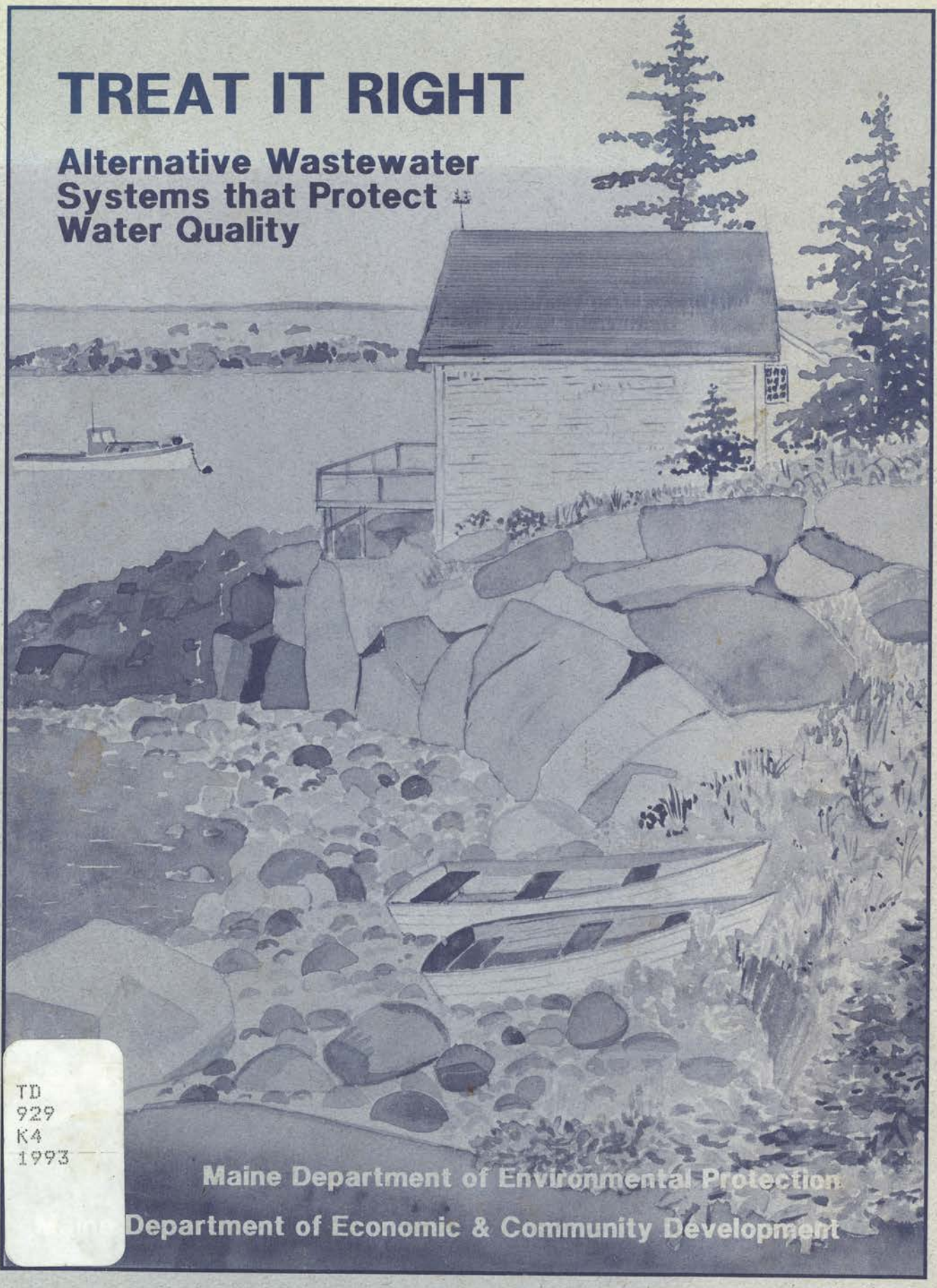
TREAT IT RIGHT

Alternative Wastewater Systems that Protect Water Quality



Maine Department of Environmental Protection

Maine Department of Economic & Community Development

Glossary of Terms

Aerobic - living, active or occurring in the presence of oxygen.

Aeration - the exposure to circulating air.

Anaerobic - living, active or occurring in the absence of oxygen.

Black water - wastewater from toilets that contains human waste.

Effluent - wastewater flowing out of a septic tank.

Gray water - wastewater from sinks, baths, showers, and washing machines that does not contain human waste.

Interceptor - the main sewer line that transports sewage to a treatment facility.

Lateral - sewer pipeline that connects between the house or structure and the interceptor.

Overboard Discharge - The discharge to surface waters of the State of domestic pollutants not conveyed to and treated in municipal or quasi-municipal sewerage treatment facilities.

Scum - the layer of particles floating on the wastewater surface in a septic tank.

Sludge - the accumulated solids that have settled to the bottom of a septic tank; sludge should be removed every 2 to 5 years.

Straight Pipe Discharge - The discharge of raw, untreated wastewater to surface waters.

Printed on Recycled Paper with Non-Toxic Ink.

TABLE OF CONTENTS

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Assisting Maine Tomorrow was Steve DeWick, P.E., of Kimball Chase Company, Bath, Maine, and Elizabeth R. Butler, an attorney with Pierce, Atwood, Scribner, Allen, Smith & Lancaster.

The consultants' work was supervised and guided by Tamara Risser and Francine Rudoff, Coastal Program staff within the Maine Department of Economic & Community Development, and by Al Frick of Albert Frick Associates, Inc., of Gorham, Maine. Final drafts of this handbook were reviewed by the Maine Coastal Program staff.

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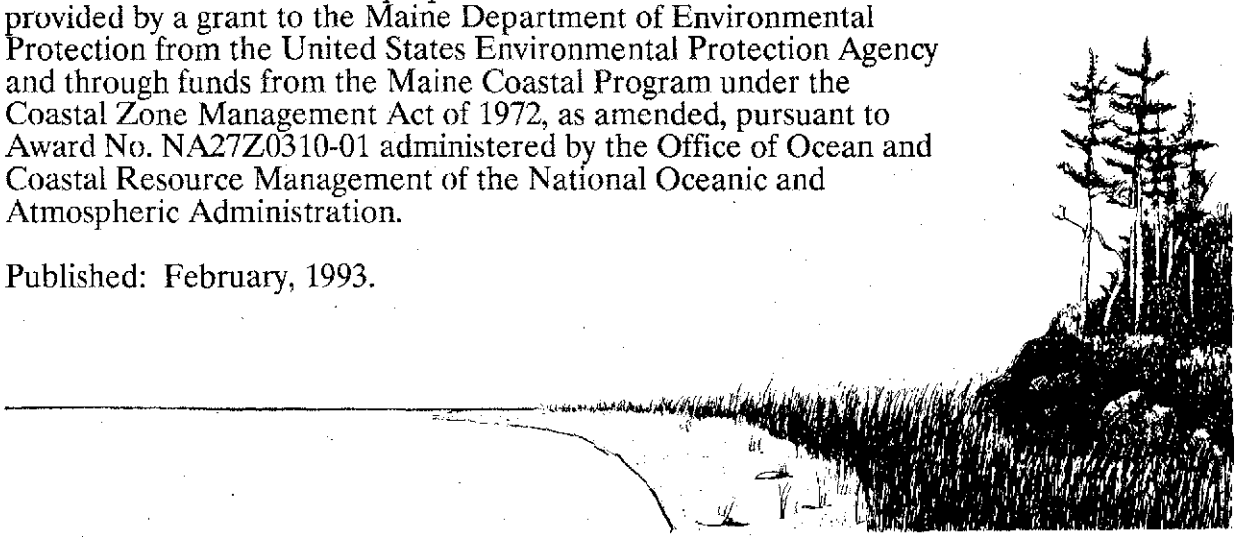


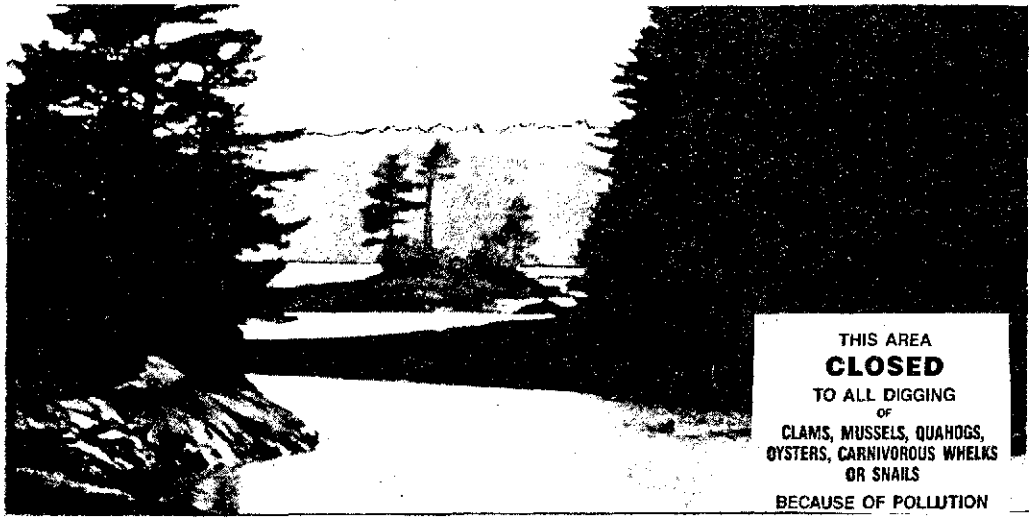
SECTION I. INTRODUCTION

Maine's Valuable and Vulnerable Waters

Maine's coastal, lake, and river waters are special; they are valuable for recreation and fishing and for aesthetic reasons. At the same time they are vulnerable. In the State's coastal areas, "overboard" discharges and malfunctioning subsurface disposal systems are responsible for the closure of shellfish beds. On inland lakes, failing septic systems cause lake pollution and can threaten public health. Finding solutions to these problems is what this handbook is all about.

An overboard discharge is the disposal of treated or untreated wastewater from private homes and businesses into a stream, river, lake or ocean. If your house or business has an overboard discharge system or malfunctioning subsurface disposal system, or if your wastewater system was installed prior to July 1974, you may be part of the water quality problem in some Maine towns. This handbook can help you become part of the solution.

Likewise, if you suspect that there are problem systems or discharges in your town, you can help lead a community effort to clean up the river, lake, or ocean near you. This handbook tells you how.



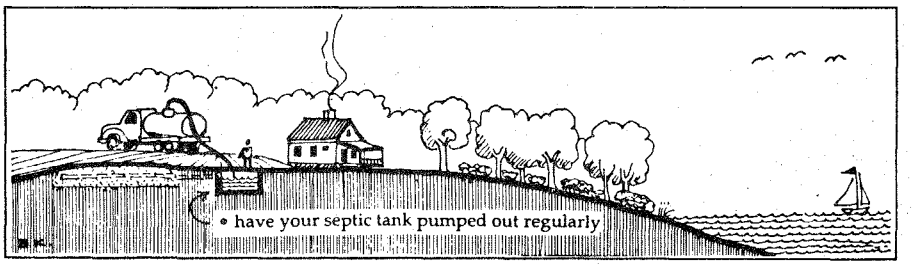
Are you Part of the Problem?

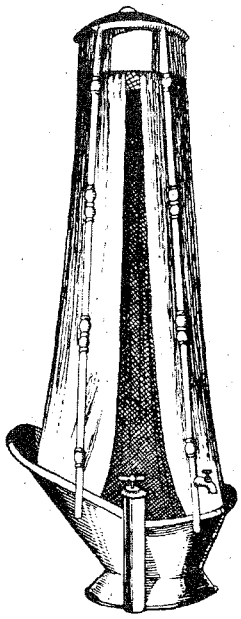
Use this Handy Checklist to Find Out.

Check if the statements below apply to you:

- ☐ My household wastewater discharges directly into the water, without being treated.
- ☐ I have a licensed overboard discharge system with sand filter.
- ☐ Shellfish flats near my house or business are closed.
- ☐ My subsurface disposal system was installed prior to July 1974.
- ☐ My subsurface disposal system was installed without a permit.
- ☐ Our septic tank, near the shore, hasn't been pumped out regularly (every 2 to 5 years).
- ☐ We live near the shore and have an old cesspool for wastewater.
- ☐ My subsurface disposal system (or my neighbor's) appears to be leaking and running into the water.
- ☐ My subsurface disposal system is located on a steep slope within 100 feet of the water.
- ☐ My subsurface disposal system was installed in very shallow soils near the shore.
- ☐ I don't know what wastewater treatment system I have.

If you've checked one or more of the above boxes, read this handbook! Pay particular attention to pages 5, 14, 15 and 16. Page 5 includes a diagram that will, in the simplest way, identify the potential solutions to your particular situation. Page 14 provides an overview of the different wastewater treatment options. Pages 15 and 16 briefly describe the steps you should take to replace an individual system or construct a group system. You may be part of the problem but you can be part of the solution, too!





The Shower Bath

Leonardo da Vinci (1452-1519) designed a bathroom for Isabella d'Aragona with a hot water system that provided pre-mixed bathwater; he calcuated that 3 parts hot to 4 parts cold water would provide the right temperature.

The Purpose of This Handbook

This handbook is designed to inform and motivate you to act. Its purpose is to identify the problem -- the pollution and degradation of Maine's marine and inland waters from wastewater systems -- and to show that there are reasonable, realistic ways to address the problem by constructing alternative wastewater systems.

Acting together (or as individuals), shoreline residents, town officials, conservation groups, lake associations, shellfish harvesters and others can make a difference. If you live or own a business on the shore, especially in an area where buildings are grouped together on steep slopes, or shallow, poorly drained soils, read this handbook. Even shoreland property owners who think their wastewater system is functioning properly may want to have it evaluated by the local Plumbing Inspector and then use this book if problems are found.

The handbook shows you that there are solutions to the contamination caused by overboard discharges and failing subsurface disposal systems; it describes which alternative wastewater treatment options are available, what is involved in constructing a replacement system, and how such a system should be maintained. The handbook describes the technical and professional expertise required to put alternative systems in place; and it also presents case studies that show how others have found successful alternatives to an overboard discharge or other wastewater system.

Create Less Waste

The next time you wash dishes, take a shower, do the laundry or flush the toilet, consider this: the average family contaminates anywhere from 120 to over 500 gallons or water per day and flushes it away. This water contains:

- *fecal matter*
- *fat and grease*
- *nitrates*
- *phosphorus*
- *pathogenic bacteria*
- *infectious viruses*
- *toxic chemicals*
- *organic compounds*

Needless to say, if you're concerned about keeping the water clean, it's in your interest to limit your use of household chemicals, detergents and cleansers. Likewise, by conserving water, you can cut down on the amount of waste water you discharge.

How to Use This Handbook

Use this handbook to educate yourself and others about better ways to dispose of your wastewater. Five sections follow this **Introduction** (Section I).

Section II provides **Background** information about the extent of the problem of overboard discharges and malfunctioning subsurface disposal systems; it explains why it is important to replace these systems and describes Maine laws that pertain to shoreland wastewater disposal.

Section III addresses **Solutions** in broad terms. Read it to learn which basic questions you need to ask yourself and what factors to consider before embarking on an effort to develop a new group or individual wastewater system. Section III also provides you with an overview of which alternative systems can solve your wastewater problem, and what funds are available to assist you.

Section IV is **Case Studies** of successful projects; the case studies illustrate how others have resolved their overboard discharge problems.

Section V describes the **Project Planning** needed to solve the problem. If you're serious about improving the quality of the water near your home, Section V is a step-by-step description of how to move from intent to action. It tells you the process to follow in managing, funding, researching and, ultimately, in installing a group or individual wastewater system that is effective.

If you are only planning an individual system just read Sections II and III. If you're looking for other options, read the entire handbook. If you're not sure what type of system you'll need, check the chart on the following page.

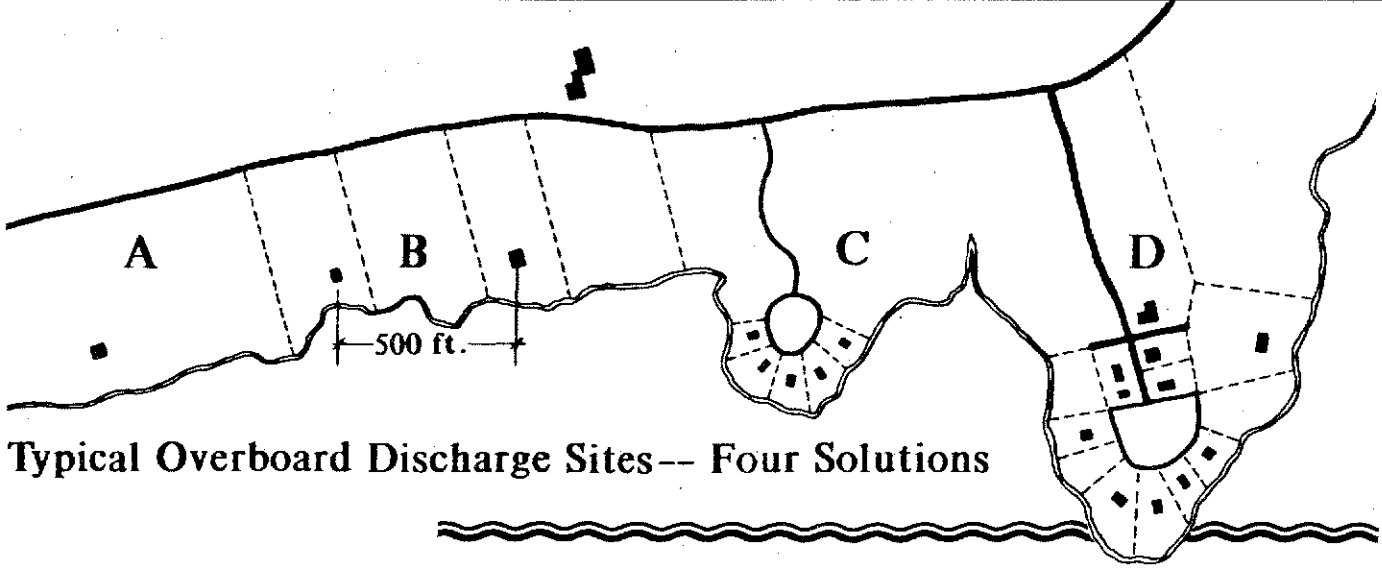
Examples of "Typical" Overboard Discharge Sites:

What's the Best Alternative Solution?

The map below shows a hypothetical stretch of Maine's coast (or lakeshore) with buildings dotted along the shore. Some houses are spaced close together, others are far apart. Given this situation, and depending on soils and slopes, different subsurface wastewater disposal systems are appropriate. The plan shows four approaches. To see which may be best for you, identify the site situation on the map most similar to yours and use the table as a guide to a recommended replacement system.

Site	Site Description	Recommended System
A	A single camp, house or business with overboard discharge or malfunctioning wastewater system; no other systems nearby.	Replace system with an individual septic subsurface disposal system located on good soils; this may require a Code variance.*
B	Two (or three) camps, houses or businesses within +/- 500 feet of each other that need replacement systems.	Replace with individual systems or consider the pros and cons of a shared septic tank and subsurface disposal field.*
C	Five units, clustered together on small lots, all with antiquated or illegal wastewater disposal systems.	Work together with a Professional Engineer or Licensed Site Evaluator to design and and build a cluster subsurface system.*
D	Year-round and seasonal houses and businesses located on a peninsula (or island) and sited relatively close together on marginal soils; most have older disposal systems or overboard discharges.	Work together, with or without town involvement to hire a professional engineer to survey and assess the situation and devise an alternative disposal method; a mix of individual and cluster systems may be appropriate, or a self-contained treatment plant with overboard discharge may be best, depending on site and soil conditions.*

* In all cases, contact your town office and/or the DEP for information and assistance.



Typical Overboard Discharge Sites-- Four Solutions

SECTION II. BACKGROUND

The Value of Shoreland

Malfunctioning subsurface disposal systems, direct outfall pipes and overboard discharges on Maine's coast and inland waters cause a host of problems. They, together with agricultural runoff and overflows from sewage treatment plants, devalue property, close clam flats and put public health at risk. In fact:

- there are over 2,500 licensed overboard discharge systems along Maine's coast, even though the Legislature has prohibited licensing of new overboard discharges and requires replacement of systems where reasonable technological alternatives exist and grant money is available;
- contamination from licensed overboard discharges, failing subsurface disposal systems and straight pipes are responsible for the closing of 25% of Maine's productive mussel and clam flats. 9,000 acres are completely closed;
- under federal law, the Department of Marine Resources must close all shellfish harvest areas near wastewater discharge pipes to protect public health;
- the annual loss of income to clamdiggers from closed flats is conservatively estimated to be between $2.5 and $5.1 million (this figure doesn't take into account losses for oyster and mussel harvesters);
- anadromous fish (those that live in both saltwater and freshwater habitat, such as striped bass and salmon) are affected by even very low levels of chlorine from wastewater systems;
- contamination from failing subsurface disposal systems on Maine lakes contributes to rising phosphorus levels, falling oxygen levels and a build-up of green algae;
- untreated or incompletely treated sewage is visible in some lakes and coastal waters;

Maine's coastal waters and lakes are of paramount importance to the fishing, recreation, and tourist industries; not to mention those who are lucky enough to live near them and enjoy their beauty every day. It is our responsibility to protect them.

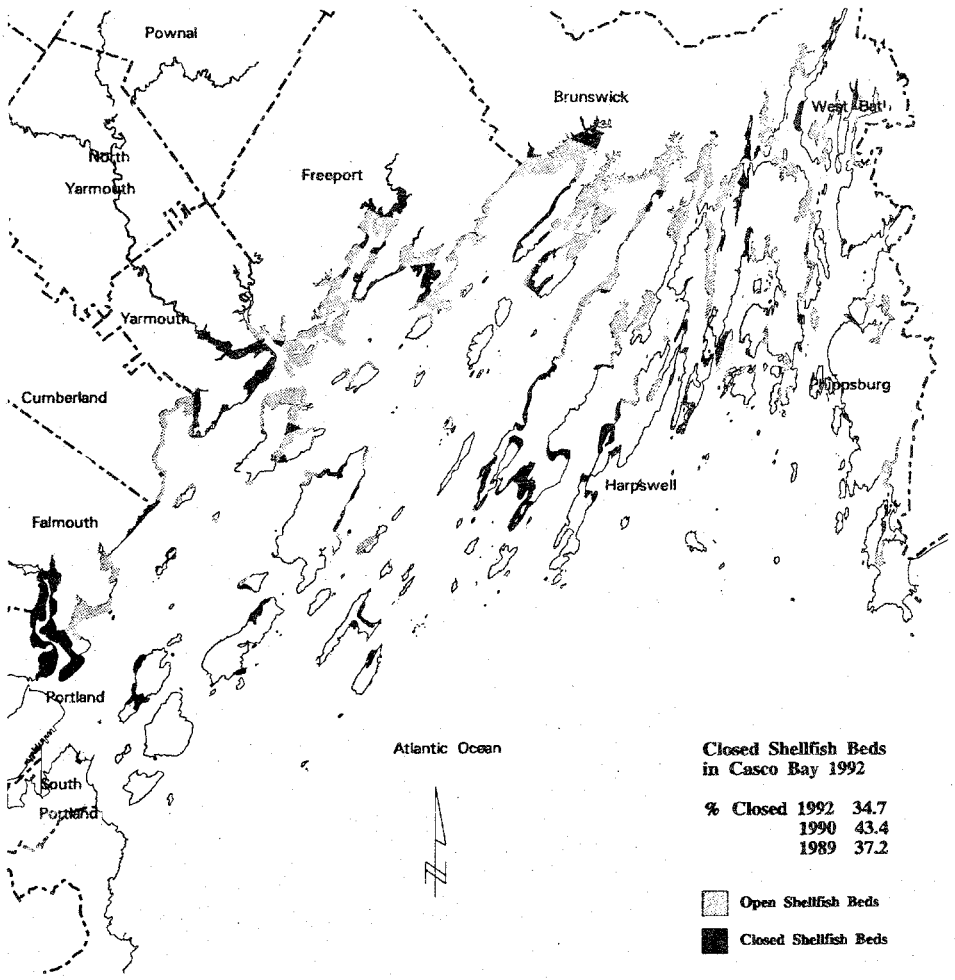
The Lambeth, 1895

The earliest of all baths comes from Crete.... Among the earliest elements of the Palace of Knossos is its water supply through terra-cotta pipes. These are of tapering form, scientifically shaped to move the water a shooting motion that prevents sediment..."

Closed Clam Flats

Flats in Maine from Kittery to Eastport have been closed because of sewage pollution. The map below is of Casco Bay. Here, between South Portland and Small Point, hundreds of acres of potentially productive clam flats have been closed because of licensed overboard discharges and bacterial contamination, caused in part by shorefront residential development with inadequate wastewater disposal systems. Hundreds more acres are only open under certain conditions.

The owners of the cottages at Mere Point, in Brunswick, have taken action to improve the situation (see the case study on page 18), but there are many other areas not only on the coast, but on rivers and lakes, where pollution from wastewater continues unabated.

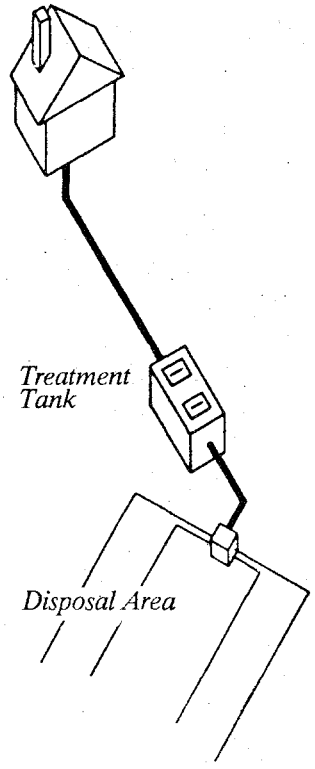


Produced for the Casco Bay Estuary Project by Thomas Burns on the Maine DEP GIS October 27, 1992

Subsurface Wastewater Disposal in Shoreland Areas

The Typical Subsurface Wastewater Disposal System

About half of all sewage in Maine is handled by individual, private, subsurface disposal systems. Typically, "gray" waste from kitchen sinks, washing machines, baths and showers, along with "black" water (human waste), is piped to a septic treatment tank where the solids settle out and decompose by bacterial action. The partially treated wastewater (effluent) in the tank then flows into the disposal area, usually through a distribution box and a series of underground pipes. The soil in the disposal area serves to filter, clean and absorb the wastewater before it infiltrates to groundwater. Typically, the septic tank provides primary treatment, while the disposal area provides secondary treatment. (These and other disposal systems are described in more detail on pages 37 and 38.)



Typical System

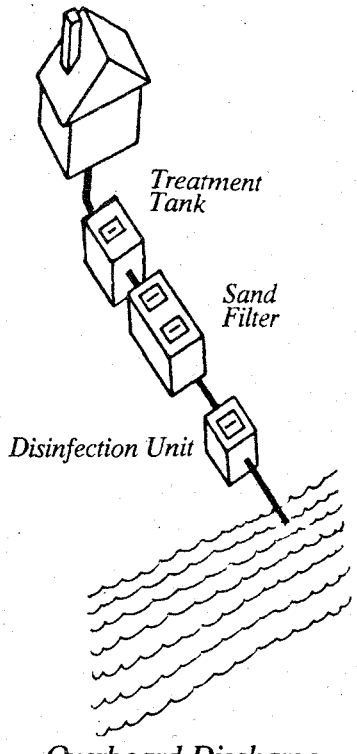
Holding Tanks

A holding tank, as the name implies, is a watertight tank which holds effluent until it is pumped out and trucked away for legal treatment and disposal.

Overboard Discharge Systems

An overboard discharge system uses a septic tank for primary treatment, then a sand filter or packaged mechanical treatment plant for secondary treatment. In both cases, a chlorination unit is used to disinfect the effluent before it is discharged into a body of water.

Existing overboard discharge systems are legal, provided the necessary permits have been obtained. Nevertheless, overboard discharge systems should be replaced with alternative systems where possible and malfunctioning subsurface disposal systems should be repaired.



Overboard Discharge

Changes in the Law

In shoreland areas where slopes are over 20%, and especially on the coast where lots are small and the soil is shallow or full of clay, the typical old subsurface septic disposal system does not work well, if at all. In many older camp and cottage situations, the subsurface disposal system is antiquated and inadequate. Before 1973, some residences and businesses in areas where subsurface disposal systems were infeasible used "straight pipes" to dispose of their wastewater.

Since 1973, the discharge of untreated waste has been prohibited by law, and year-round residents may no longer use holding tanks if they live in the shoreland zone. Most coastal residents

who have soil conditions that are unsuitable for subsurface disposal have obtained an overboard discharge license or installed a holding tank at their seasonal residence in order to comply with the law. Under current laws, overboard discharges are now being phased out throughout Maine.

Wastewater Disposal and the Law

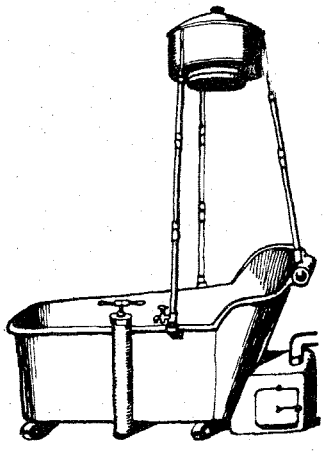
Two State agencies regulate the design and installation of wastewater disposal systems through two rules:

- Subsurface Wastewater Disposal Rules are the responsibility of the Division of Health Engineering within the Department of Human Services, working in cooperation with municipal government.
- Overboard Discharge Rules are the responsibility of the Maine Department of Environmental Protection (DEP).

These laws and the Shoreland Zoning Law are described below.

1. The State Plumbing Code

Popularly known as the "Plumbing Code," the State's Subsurface Wastewater Disposal Rules establish the design and construction standards which all subsurface disposal systems must meet. All such systems, including those for homes, businesses and groups of homes, must be designed and sited by a Licensed Site Evaluator. Large systems must be designed by a Registered Professional Engineer.



High Back Taper Bath with Heater and Shower, c. 1850

At the municipal level, the provisions of "the Code" are enforced by the Local Plumbing Inspector (LPI), who may also be the local Code Enforcement Officer. This individual is responsible for issuing a permit for a Subsurface Wastewater Disposal System (prepared by the Site Evaluator), inspecting the installation, and issuing a Certificate of Approval (COA) provided by the Department of Human Services. Under the Code, LPI's also have the authority to approve some replacement systems under certain conditions. Variances for systems that may be potential health and safety threats require additional review by the Division of Health Engineering.

2. The Overboard Discharge Law

The intent of this law is to phase out existing, non-municipal, overboard discharges into Maine waters by prohibiting the relicensing of systems that can be replaced by alternative systems, where mandated State grants are available.

Established in 1987 and amended in 1989, this law specifies the circumstances under which:

- a previously unlicensed system can be licensed;
- an existing license can be renewed;
- licenses and permits can be transferred; and
- funding for a replacement system can be obtained.

The major provisions of this law are:

- a prohibition on any and all new non-municipal overboard discharges after June 1, 1987;
- a prohibition on increases in the volume of residential overboard discharges and certain commercial and industrial overboard discharges;
- a requirement that DEP (the administering and enforcement agency) inspect all existing overboard discharge systems;
- the establishment of an Overboard Discharge Fund which helps offset the costs of replacing a system (the reimbursement rates are 90% for year-round systems, 50% for commercial systems, and 25% for seasonal systems); and
- the establishment of conditional permits; this provision allows overboard discharge systems to continue to operate until funds for an alternative and/or new technology becomes available;

3. The Shoreland Zoning Law

This comprehensive law applies to all land within 250 feet of the shore of a lake, river, wetland or the ocean. It is usually administered locally and requires municipalities to adopt local shoreland zoning ordinances that are at least as strict as the State's model ordinance. The provisions of the Shoreland Zoning Law include:

- a requirement that all new subsurface wastewater disposal systems be set back at least 100 feet from the high water mark;
- special provisions to encourage replacement systems that upgrade existing systems;
- a requirement that if a seasonal dwelling is converted to a year-round residence, the subsurface disposal system must be upgraded; and
- recognition that pre-existing systems are allowed under the law, provided they met "the Code" that existed when they were installed, and that they are functioning properly.

SECTION III. SOLUTIONS

There are many ways to combat clam flat closures and water pollution caused by overboard discharges and failing wastewater systems. But what are the best ways? How much will it cost? Who can help? How much work is involved? What alternatives are there?

This section will help you find answers to these questions. Read it, and if the information is helpful and answers your needs, refer to Section V for more information.

Raised Acanthus Pattern, 1895

Does My Wastewater System Need to be Replaced?

Five categories of wastewater systems can contribute to pollution in shoreland waters:

- straight pipe discharges (i.e. raw, untreated wastes) that come from either a septic tank with no leach bed or directly from the home;
- overboard discharge systems;
- malfunctioning or inadequately maintained subsurface disposal systems;
- older subsurface disposal systems; and
- subsurface systems on shallow or poorly drained soils or steep slopes, close to the water.

If your cottage, home or business falls into one of these categories consider replacing your system with one of the alternative systems described in this book.

What Should I do?

If your wastewater system has failed or is failing, or if it is an overboard discharge type, contact your town office and/or the Department of Environmental Protection to obtain more information about the funding programs and your eligibility for assistance (Section IV also contains advice on funding options). Also inquire about the Small Community Program and the Overboard Discharge Elimination Program (see the box on page 12, and page 27). In the latter case, the DEP makes awards based on the Department of Marine Resources' assessment of the costs, funding "match" criteria, and the benefits to adjacent shellfish areas. Find out whether you are eligible for funding assistance before you begin planning to replace your system.

Hippocrates, when offering advice to Roman bathers, suggested they bring their own special oil or ointment. The oil, he stated, may be mixed with African sand, if you're dirty, as when you've been working on your chariot.

The "Overboard Discharge Elimination" and "Small Community" Grant Programs

These programs, administered by the DEP, seek to replace all licensed and unlicensed overboard discharge systems and malfunctioning subsurface disposal systems. The programs pay, in part, for replacement subsurface disposal systems. Property owners can ask their local town officials to apply for the funds on their behalf, in which case the town is responsible for administering the programs at the local level.

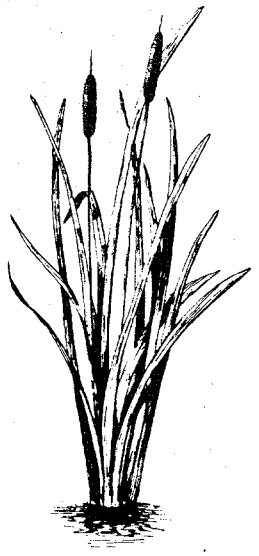
The Overboard Discharge Elimination Program

Ultimately, anyone with a licensed overboard discharge system will be eligible for this program. Currently, the DEP is focusing on helping individuals in those towns that have licensed overboard discharge systems near "redeemable" shellfish areas. Individuals can also approach DEP directly, without town involvement. There is no deadline for applications. The current list of towns with redeemable shellfish areas includes:

- Beals
- Boothbay
- Boothbay Harbor
- Bremen
- Bristol
- Brunswick
- Camden
- Edgecomb
- Friendship
- Georgetown
- Harpswell
- North Haven
- Owls Head
- Phippsburg
- St. George
- Southport
- South Thomaston
- Steuben
- Vinalhaven
- Wiscasset

The Small Community Grant Program

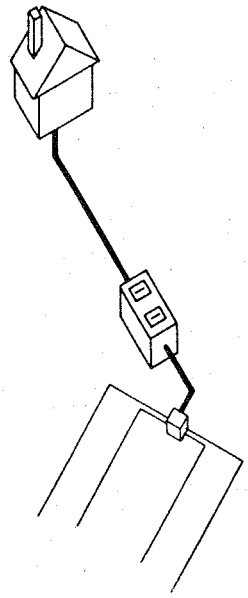
Towns with unlicensed overboard discharge systems are eligible for this program. If you have such a system, ask your town to apply for funds on your behalf. Most towns are eligible for the program, but must apply for funds by January 31st. Copies of the program regulations are available from DEP at 287-7800 (see the Appendix for a complete list of DEP contacts).



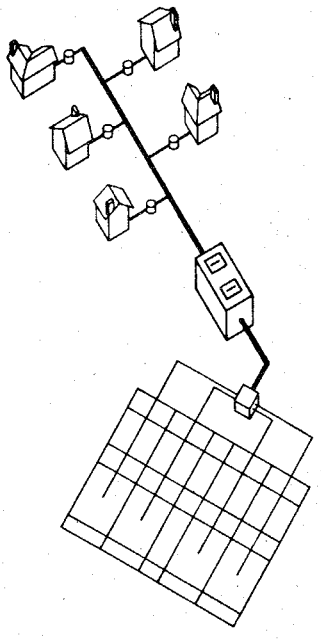
Cat-tail (Typha spp.), common plant found at the edge of fresh tidal marshes

Replacement Cost Considerations

Costs vary and depend on many factors. The type of system, its size and location, slope and soil conditions, the time of year it is constructed, the volume of wastewater it is treating, the quality and quantity of materials used, the expertise of the contractor, etc., all influence price.



Individual System



Group (or Cluster) System

An individual replacement system is generally less expensive than a shared, group, or cluster system. However, a group system that serves a number of homes can offer solutions that may have been impossible to achieve on an individual lot. Discuss costs with a Licensed Site Evaluator or Professional Engineer. (Examples of costs are provided in the Case Studies in Section IV.)

One of the best ways to establish some accurate base-line cost estimates for individual systems is to request quotes from two or more reputable contractors, based on a Licensed Site Evaluator's Subsurface Wastewater Disposal Application. Be clear about your intentions and make sure that each contractor is given the same information on which to base an estimate.

How Much Work is Involved?

Obviously, a commitment to replace an individual subsurface disposal system involves a commitment to carry through, to educate yourself, to seek advice, contact experts, investigate cost sharing, evaluate costs, hire a contractor, pay the bills, and set up a long-term maintenance program.

With "group" systems, it will take even more commitment. Whether the work is managed by a town official or an individual within a group, the planning, design, installation and maintenance of a group wastewater system requires leadership and dedication. Before you embark on a project, make sure there is a "spark plug" in the group or in the town administration - an individual who will have the staying power to see the project through. However, the first priority, after you've found a leader, is to conduct a technical planning study to determine the feasibility of a group system.

Technical Considerations

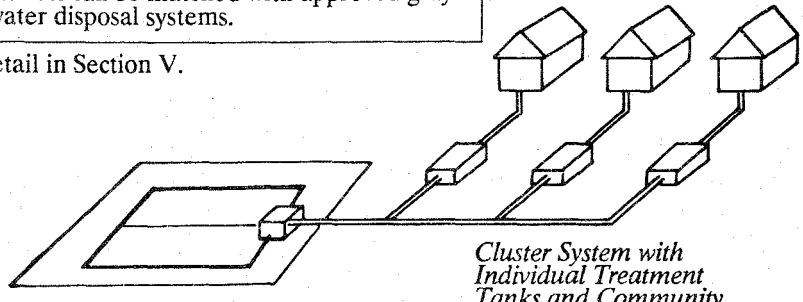
There are many alternatives to overboard discharge and other failing or outdated wastewater systems (see options on pages 14 and 34). Not only are there different subsurface disposal options available to serve one home or a group of homes, but there are experimental systems, municipal sewage districts, and holding tank systems.

A feasibility study prepared by a Professional Engineer or Licensed Site Evaluator will help you understand the options. Such a study will help you understand the physical site limitations of your site and will likely limit your options. Combine these considerations with your needs and estimates of cost and effort, and you'll have a good idea of how to proceed.

Alternative Wastewater Systems*

Option	Comment
Option 1: Water Conservation Program (with low flow fixtures)	• No matter what system you have or select, it is wise to limit your water use and to be careful about what you put in it. Any system can handle lower water volumes and the less chemicals in it, the better.
Option 2: An Individual or Group (cluster) Overboard Discharge System (with septic tank and sand filter or mechanical arobic unit, if not already installed).	• This is a compromise alternative that is not completely effective; it requires a DEP permit Although better than a straight discharge, wastewater from an upgraded system still ends up in the ocean or surface water, and will be subject to the relicensing restrictions of the law. A wastewater system that does not discharge effluent into surface waters is preferred.
Option 3: Municipal Sewer (with hook-up to Treatment Plant)	• If a municipal sewer line is nearby and can be extended at reasonable cost, this is a good option. If your home is within 200 feet of a public sewer, the Sewer District may require you to hook up to the system.
Option 4: Individual Replacement Subsurface Disposal System (with one or two septic tanks and one of various types of effluent disposal beds)	• These are standard systems that work well provided adequate soils for subsurface disposal are available or can be trucked to the site. If adequate soils are unavailable on your lot, consider obtaining an easement which allows you to dispose of your wastewater on a nearby lot with better soils, or consider Option 5.
Option 5: An Individual Holding Tank	• A holding tank should be considered as a last resort; they have to be pumped out frequently at considerable cost. They are sometimes used for seasonal residences.
Option 6: Group (or Cluster) Subsurface Disposal System (with one or more septic tanks and disposal beds or one or more holding tanks, serving two or more homes or businesses)	• A group system is often the answer when a number of homes, sited close to one another, lack enough suitable soil for individual systems. A group system requires cooperation and a long-term commitment to maintenance; it is also more complex to design and, if it serves 6 or more dwellings (i.e. if it handles more than 2,000 gallons of wastewater per day) requires the services of a Professional Engineer.
Option 7: Hybrid Systems (i.e. systems that combine individual and group systems, or systems that incorporate "alternative toilets" or recycling)	• Hybrid and experimental systems require special review by the Division of Health Engineering. Included in this category are pit and vault privies and incinerating, chemical and composting toilets. These toilets can be matched with approved gray wastewater disposal systems.

* System components are described in more detail in Section V.



Cluster System with Individual Treatment Tanks and Community Disposal Field

Replacing an Individual System?

If you are considering replacing your individual wastewater system:

Fill out the Wastewater Survey form on page 45 to gain a better understanding of your present system and your current water use.

Review the technical information on pages 34 and 39 to find out about your replacement options.

Contact your Local Plumbing Inspector (LPI) for free advice and information about necessary permits (see page 39). Your LPI can also tell you if your town government can apply on your behalf for funds from the Small Community Program.

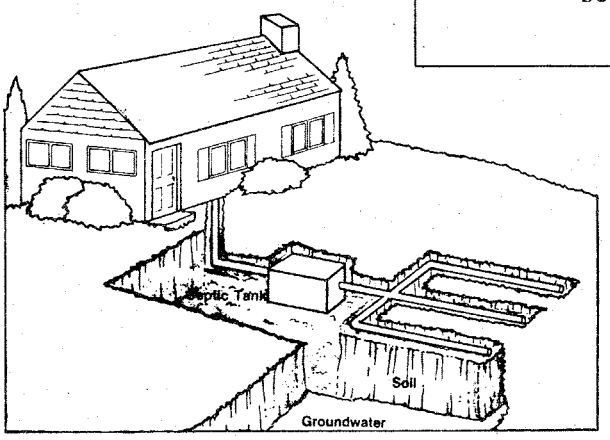
Contact the Maine Department of Environmental Protection's "Overboard Discharge Elimination Program" (telephone number: 287-7800) or your municipal office to learn about this program. The program is only open to those with licensed overboard discharge systems.

Seek the advice of a Licensed Site Evaluator or qualified Professional Engineer.

Recognize that:

(a) the current Plumbing Code may provide you with more options than you've had in the past; and

(b) if your lot is small, you may be able to place a replacement system on neighboring land by securing an easement.



Standard Septic System

Considering a Group System?

If your cottage, home or business is adjacent to others that have systems like yours, consider replacing your individual system with a "group" system that serves you and other buildings near you.

If you are considering replacing your wastewater system by joining with neighbors to create a "group" (or "cluster") system or if there's an opportunity to convince others in your town that such a system makes sense:

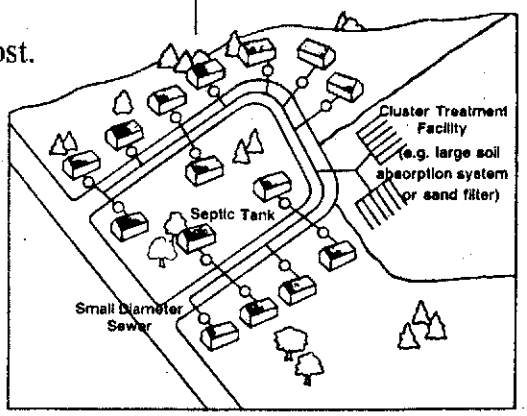
Learn everything you can about your options from this book. Urge your friends and neighbors to educate themselves about the options available to them. Give them copies of this book.

Contact the Maine Department of Environmental Protection's "Overboard Discharge Elimination Program" (telephone number: 287-7800) or your municipal office to learn about this program. The program is only open to those with licensed overboard discharge systems.

Get advice from your local plumbing inspector (LPI) and/or the advice of a Licensed Site Evaluator or Professional Engineer. Ask if your town can apply for Small Community Program funds on your behalf.

Begin to assess the potential for initiating a successful project. Is there a collective "will" in the neighborhood to resolve the problem creatively? Can you rely on support from local government? Urge your town officials to study the options and assess the feasibility of each option.

Finally, are you ready? A group solution will only work if the people involved want to tackle the problem together and they know that professional help is available. Another consideration, of course, is cost. Is financial assistance readily available?



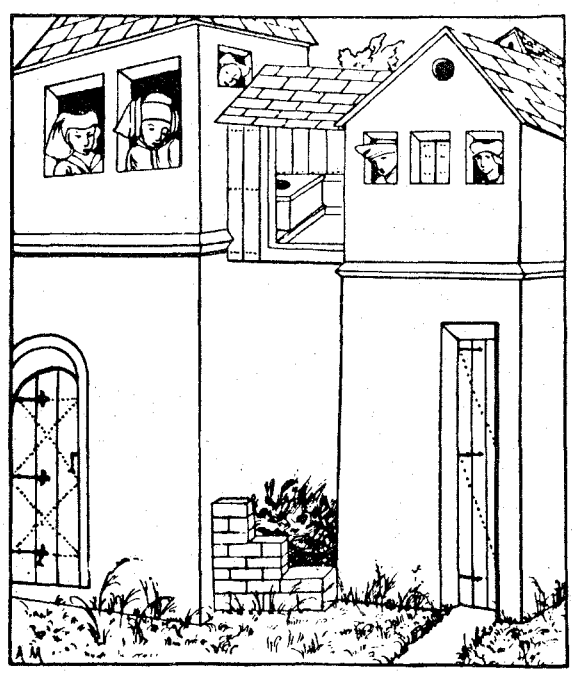
Group or "Cluster" System

SECTION IV. CASE STUDIES

CASE STUDY A: Phippsburg

Some years ago, the Clam Committee and the local Selectmen in Phippsburg recognized that by eliminating a few overboard discharges in key locations, a number of clam flats could be reopened. However, they lacked the data to back up their convictions. They contacted the Department of Marine Resources and, with the Department, directed the local Code Enforcement Officer, John Moffitt, to survey five problem areas. Moffitt identified six sources of contamination, then wrote to the responsible parties: 5 homeowners and elementary school officials. He pointed out the problem their wastewater systems were causing and told them about the grant application he had submitted to the DEP for Overboard Discharge Elimination funds. Everyone agreed to cooperate.

As a result, the State awarded the Town a $30,000 grant, and site soils evaluation reports were done. Ultimately, the school wastewater system was replaced with a subsurface septic system and 4 of the 5 homeowners were able to replace their overboard systems with subsurface disposal systems, 3 of which required special variances. The grant funds paid for the school system, 90% of the cost of the year-round home system costs, and 25% of the seasonal home system costs. Best of all, most of the adjacent clam flats can now be restored.



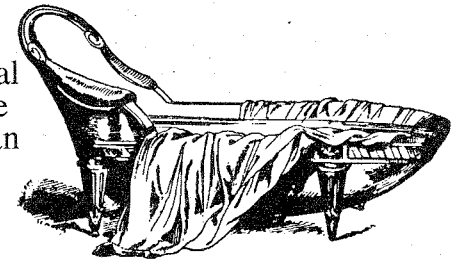
15th Century Latrine

CASE STUDY B: Mere Point, Brunswick

A "Cluster" Model for Other Coastal Communities

Fifty-three homes and cottages occupy the southern ninety-acre tip of Mere Point Neck. Over twenty are year-round houses, while the remainder are summer cottages that have been there since the late 1800s. Over the years, as water use has increased, the wastewater disposal systems serving the homes have become obsolete. With the passage of the Overboard Discharge Elimination Law in 1987, however, all the overboard discharge systems at Mere Point became subject to the relicensing restrictions of the law.

Shellfish areas around the entire Mere Point Peninsula are seasonally or permanently closed to harvesting due to both bacterial and other contamination. Nevertheless, the Department of Marine Resources has determined that these areas and others like them can be redeemed -- if viable alternative wastewater systems can be installed and other contributing sources of pollution can be eliminated.



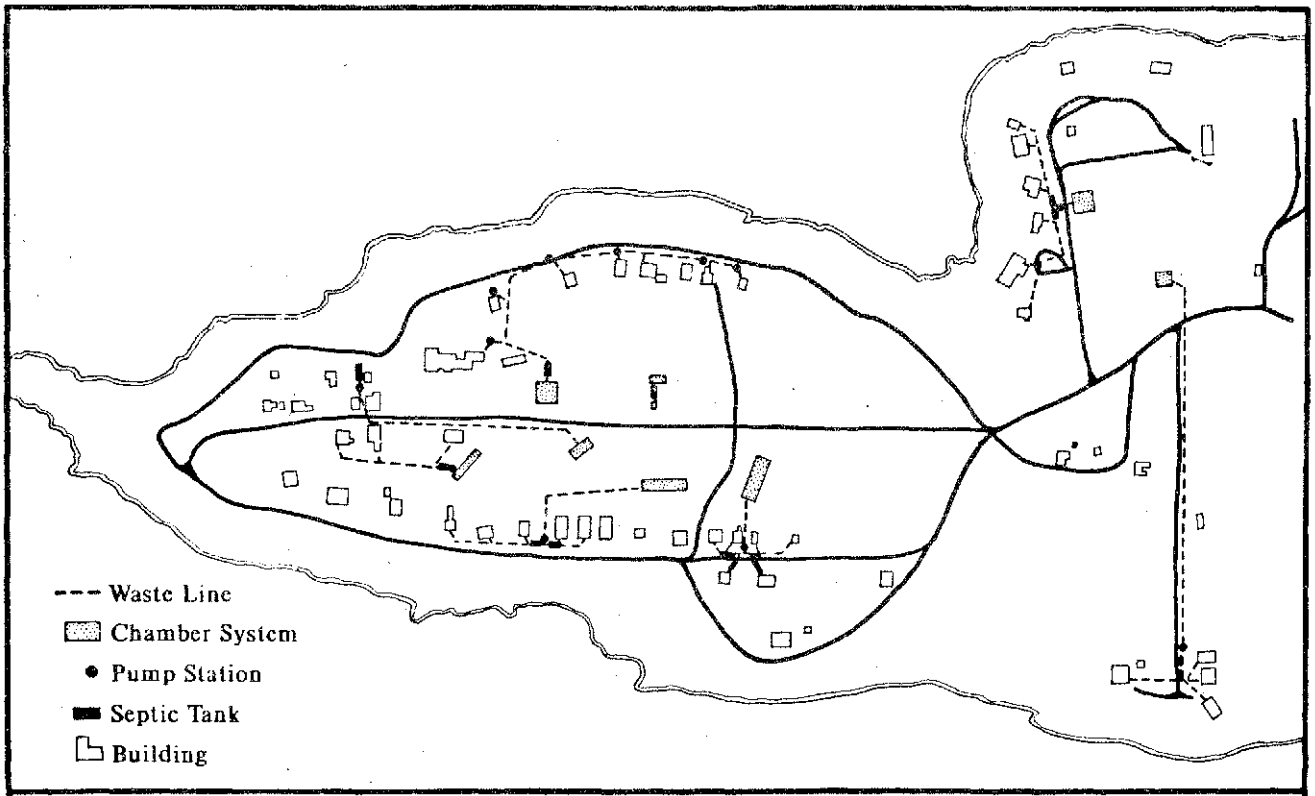
Demi-bain

In 1989, the Town of Brunswick, the Maine DEP and the Department of Economic and Community Development's Coastal Program contracted with the engineering firm of Kimball Chase of Bath, Maine, to study wastewater disposal alternatives for overboard discharge or substandard systems at Mere Point. Working with these parties and with Mere Point property owners, Kimball Chase evaluated five alternative systems and then recommended that the substandard systems and overboard discharge systems be replaced with subsurface "cluster" wastewater disposal systems, and, in some cases, individual septic systems.

Dedication and Perseverance Pay

The Mere Point project owes much to the dedication and perseverance of Brunswick's town planner, Amy Naylor and town manager, Don Gerrish. Asked to list some of the main lessons that were learned on that project, Naylor provided the following insights:

- *persevere, don't give up when the going gets tough;*
- *recognize that the project may take 3 times as much time as you originally think;*
- *make sure you get good legal advice;*
- *garner strong support from local officials;*
- *obtain easements that have legal validity - not handshakes or other undocumented agreements; and*
- *make sure you address issues of long-term maintenance and management.*



Mere Point -- Recommended Plan

Following is a summary of the steps that were taken by Kimball Chase to determine the best solution:

- ☐ **Conduct a survey to determine existing conditions.** All 53 homes were surveyed using standard questionnaires to obtain data on: the types of dwelling units (whether home or business, year-round or seasonal), the existing wastewater disposal methods, water supply, number of bedrooms and possible future expansions of the buildings. The results showed that the area had 19 subsurface septic systems, 29 overboard discharges and 5 "other" systems. All together, the houses on Mere Point use an estimated 16,650 gallons per day.

- ☐ **Map the site features.** A scale map of the area was prepared showing all roads, structures, septic tank locations, wells and property lines.

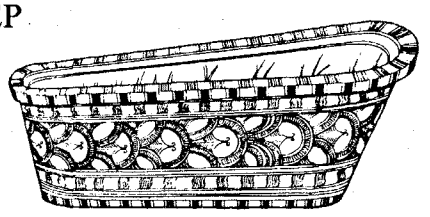
- ☐ **Undertake site investigations.** The engineers identified potential subsurface wastewater disposal sites and undertook a series of soils tests. Most test pit locations were done on the largest parcels, since housing density and well locations ruled out other sites. Twenty test pits were dug and 12 proved to have suitable soils.

☐ **Evaluate the cost of alternatives.** Five options for the disposal of wastewater were evaluated: individual septic systems; cluster (group) septic systems; individual holding tanks; central holding tanks; and a central treatment plant with overboard discharge. The evaluations considered capital and annual operating costs and produced the following results:

Options (Dwellings Served)	Capital	Annual Cost*
1. Individual Subsurface Systems (35)	$412,000	$44,400
2. Cluster Subsurface Systems (35)	$1,071,300	$115,000
3. Individual Holding Tanks (35)	$221,900	$160,000
4. Central Holding Tank (35)	$1,049,600	$246,900
5. Central Treatment Plant (53)	$1,371,300	$175,000

* Annual costs include operation and maintenance, and interest payments.

☐ **Investigate possible institutional, financial and legal issues.** Before reaching a decision, Kimball Chase evaluated the pros and cons of different management and financing options. That study showed four ownership options and eight possible funding sources, the most attractive of which was an EPA/DEP construction grant program. The necessary sewer easements across neighboring land were identified, and the availability and cost of land acquisition were determined.



Egyptian Bath

☐ **Recommend a "best" course of action, based on cost, system effectiveness, and management and financing factors.** Ultimately, Kimball Chase recommended a variation of options 1 and 2 to the Town and to the Mere Point property owners. The Company recommended siting seven cluster septic systems (each serving from three to six dwellings) and one new individual subsurface disposal system. This solution dropped the estimated capital costs considerably (from over $1 million to $640,800) and also dropped the estimated annual operating cost down to $10,740 or about $325/year per user.

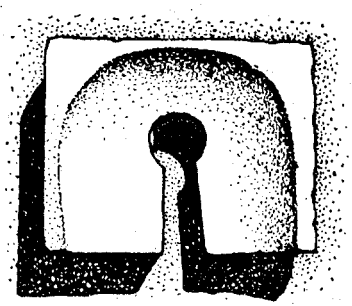
At present, the Mere Point residents and the Town of Brunswick are working on the details of their plan and the Town has obtained an EPA/DEP municipal wastewater construction grant. (Note: these grants are no longer available but there are other funding programs.) The chances of a successful outcome look promising. Indeed, the Mere Point example shows that dedicated individuals, working with their town, can make a difference.

CASE STUDY C: Lincolnville Beach

Most of the wastewater systems for individual homes or groups of homes in the Lincolnville Beach area are subsurface systems. However, several business owners in the Lincolnville Beach area had unlicensed overboard discharge systems. They took it upon themselves to correct the situation by forming a private, non-profit, quasi-municipal corporation to build and manage a sanitary treatment facility.

Once the Lincolnville Beach Sanitary Association was formed, the whole project took eighteen months to build and was funded through the Small Community Program. Established in 1990, this private district serves 10 businesses. Wastewater is pumped to a small 10,000 gallons/day treatment plant where it is treated, cleaned and disposed of as an overboard discharge.

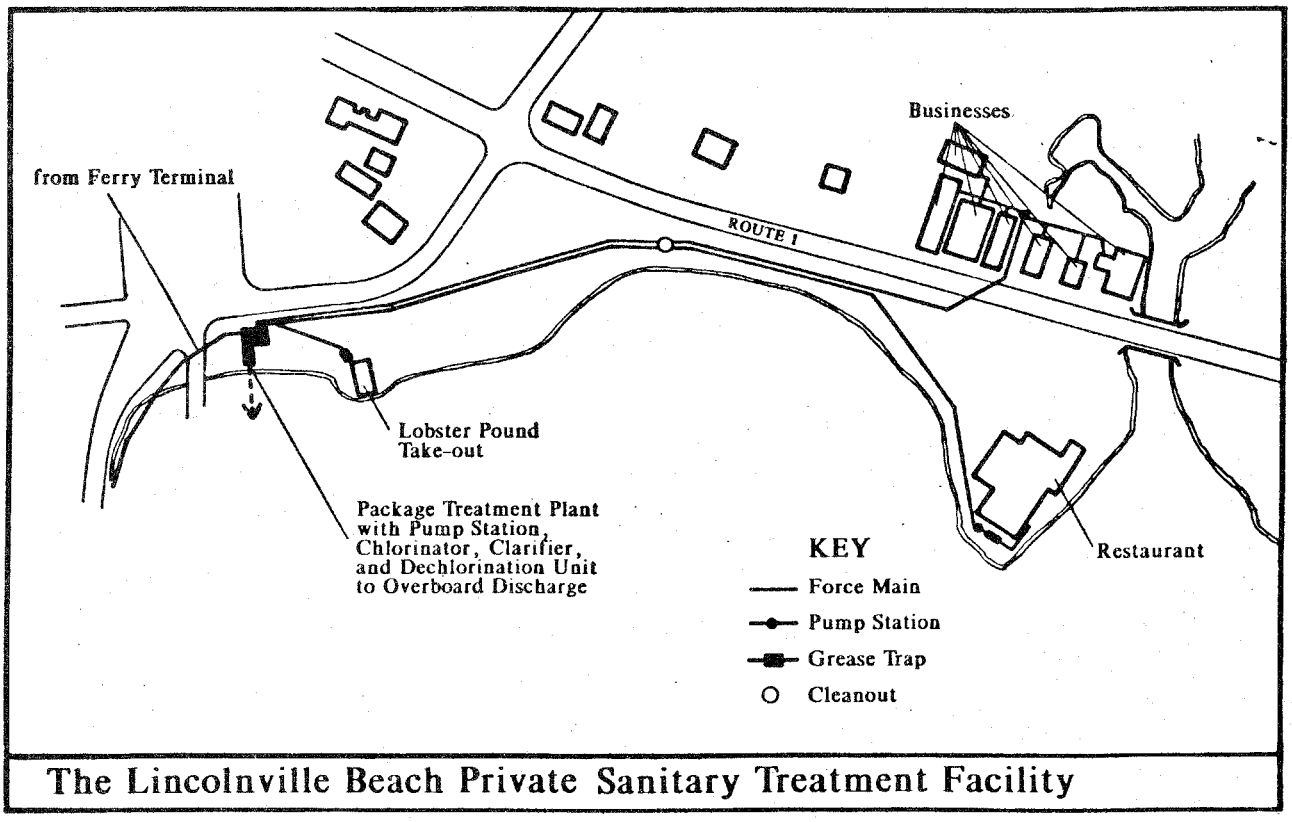
Part of the success of the Lincolnville facility plan can be traced to the "watertight" legal agreement drawn up for the system users. It ensures enforceability of the management and maintenance agreement by clearly spelling out responsibilities and penalties for noncompliance. The corporation bylaws and easement provisions were prepared by a legal consultant at a cost of about $10,000. The bylaws:



Limestone Seat, Tel-el-Amarna

- describe the facility and all collection and treatment components;
- list all the licenses, permits and approvals that have been granted;
- spell out the financial contribution required of each business (based on its water use);
- state that each participant has granted an easement for wastewater facilities to cross the property;
- spell out all repair, operation and maintenance responsibilities;
- explain how future ownership transfers can be made;
- establish payment schedules for construction and operation; and
- explain how penalties can be levied.

The plan below shows how the businesses are linked to the package treatment plant near the Lincolnville ferry terminal.



The Lincolnville Beach Private Sanitary Treatment Facility

SECTION V. PROJECT PLANNING: STEPS TO TAKE

How to Get a Cluster System Built

Pedestal Lion Closet

The preceding case studies and background information show that malfunctioning and obsolete wastewater systems adversely affect water quality and that there are many ways to address these problems.

This chapter describes in more detail the steps involved in planning for a new wastewater system and getting it built. The focus is on cluster-type systems (similar to those described in the Mere Point case study; see page 18), because cluster projects are more complex and require more organization and funding, but also because they have the greatest potential benefit.

As you review this material, remember that this is not a step-by- step "how to" manual. Rather, the intent is to help you to focus on the major issues and to ask the right questions of the officials and consultants with whom you will work. No single method will serve everyone's needs. When organizing a project, the issues raised and the information gathered must be integrated and pulled together into an overall strategy that is appropriate to the specific situation.

The following discussion is divided into seven sections; they deal with:

A. Project management
B. Finding financing
C. Consultant selection
D. Data collection
E. Alternative systems
F. Legal permission and regulatory permits
G. Implementation

A. Project Management

Doctor Sanctorius, who practiced in Padua, Italy in 1636, invented the Bag Bath which had a collar tightened around the bather's neck. The bather sits in bed, embagged and water is poured in through a funnel at the shoulder.

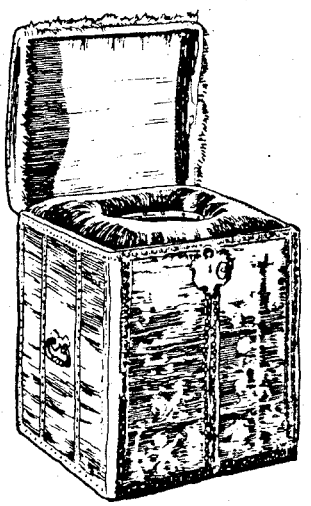
Management involves setting up a process to decide who will do what. Who will initiate the group (cluster) project? Who will design, construct, operate, maintain and monitor the project? What is required in terms of applying for funds, setting up user agreements, including rules and fee schedule, and ensuring that everything is legal? When must various tasks be completed? This section provides some broad answers to these questions.

Plan for the Long Term

On-site septic disposal systems and cluster systems serving two or more units can be managed in a number of ways:

- by a private group, such as an association of homeowners who make a commitment to own and manage the system (this is the simplest approach);
- by the municipality; (under this scenario, the municipality would assume responsibility, after approval by the local government, for operation and maintenance of the system which is owned by the users or by the municipality);
- by a private firm, hired by the town or homeowners who own the system;
- by a quasi-municipal corporation (the corporation is established as an independent non-profit organization answerable to its directors; it must be registered at the Secretary of State's Office, is tax exempt, and is eligible to receive State or Federal funds);
- by a sanitary district or municipality (the district would have to be authorized by the DEP; this is considered a "last resort" approach to management because districts are usually small, with limited access to financial capital).

There are many variations of these approaches. Make sure you discuss them carefully with your neighbors and others who might be on the system, with your engineering and legal consultants (see pages 29 and 30), and with town officials. Remember that you may be paying a user fee and that you want an efficient and reliable management solution.



Royal Close Stool at Hampton Court, C. 1700

Stay Flexible in the Short Term

The best long-term management plan for your situation may not be apparent at first, so stay flexible until you know the dimensions of the problem and you have a consultant's recommendation for one or more alternative systems. Once you know what needs to be built, how much it will cost, and what level of upkeep will be required, it will be a lot easier to decide on a long-term management plan.

Of course, just finding funds and hiring a consultant requires some management and organizational skills. It is up to you to find a home or business owner, town official, or a group of individuals who can:

- ☐ schedule meetings to discuss the project;
- ☐ form a project committee;
- ☐ conduct preliminary research;
- ☐ seek out funding to get the project rolling;
- ☐ advertise for, and help select, a consultant;
- ☐ help direct the consultant's work; and
- ☐ move the project from plan to reality.

Moving Ahead

Once you and/or your town are confident that funds are available for planning an alternative system, it is time to hire a professional consultant (see page 29). Form a selection committee made up of at least 3 individuals -- preferably people who have some technical and/or legal knowledge. Naturally, if the town is involved, a town official should serve on this committee.

Preventative Maintenance

It is said that we should pay a doctor to keep us healthy -- and receive free medical treatment when we're ill. The towns of New Gloucester and Yarmouth believe in this concept of preventative maintenance. They've instituted a community-wide septic tank pump-out program for which residents pay a small fee. As a result, malfunctions are kept to a minimum and less pollution occurs.

Cooperation: Two Examples

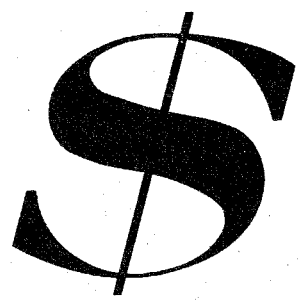
In the Mere Point situation (see Case Study B), Brunswick officials and affected residents planned the project jointly, working cooperatively throughout the conceptual, preliminary and final design stages. The Town submitted the grant application and contracted with the consultants. The Town will own the system and contract for maintenance and operation with the Brunswick Sewer District or some other subcontractor.

In the Lincolnville situation (see Case Study C), the project was initiated by the Department of Environmental Protection. Local businesses then hired a consultant and ended up owning and operating their own treatment facility.

If you and your neighbors qualify for Overboard Discharge Elimination Program funds or Small Community Program funds from the DEP, some of this initial management can be done by the town. In this case, it's the town's responsibility to hire a consultant to design the system. It's then your responsibility to cooperate with the town and assist the consultants in their work; better still, offer to serve on an advisory committee.

B. Finding Financing

The following funds are for design and construction only. There are no funding programs for planning an alternative to an overboard discharge system.



The cost of individual replacement waste-water systems can be borne by an individual or subsidized with funds from DEP's Overboard Discharge Elimination Program, the Small Community Program (see page 12), the Maine State Housing Authority or, perhaps, Farmers' Home Administration funds. Larger systems serving from two to thirty or more homes involve higher upfront expenses for consultants and substantial construction costs (although the costs per house or business may be comparable to those for individual systems). The situation can be complicated by the fact that both public and private funds are involved, funding program rules may vary, and because eligibility criteria are not always consistent.

The main funding sources for individual and cluster systems are reviewed below; the engineering firm you hire should also be able to advise you about sources of funds, as can the DEP and your local banker. Keep in mind that some of these funds can be "packaged" and combined with private money to provide upfront financing.

☐ The Overboard Discharge Elimination Program provides grants to towns and individuals to replace licensed overboard discharges that cannot be relicensed. To date, $2.5 million has been made available; the grants cover up to 90% of the construction cost for year-round residences, 50% for commercial structures, and 25% for seasonal ones. There are no income eligibility limits.

Contact: Maine DEP 287-7800

☐ Maine's Small Community Grant Program (Section 411) receives about $1 million annually for grants for pollution abatement. Only towns are eligible for funds; the grants cover up to 90% of the construction cost for year-round residents, 50% for commercial facilities, and 25% for seasonal residents. Further, there are limits to the eligibility of persons with adjusted incomes of $30,000 or more and for projects that serve only a single family dwelling or commercial establishment.

Contact: Maine DEP 287-7800

☐ State Revolving Funds (SRF) and Maine's (Section 411) Grant Program. The SRF makes loans available for design and construction for projects on the State Project Priority List; typically, this program funds larger projects. The loans are made available at 2% below the current market rate for up to 20 years. The grant program makes funds available for wastewater treatment facilities and interceptor sewers. (Lateral sewers and land or easement acquisition costs are not eligible.) The maximum reimbursement is 80%. Talk to the DEP to find out how to get onto the Priority List.

Contact: Maine DEP 287-7800

☐ The Farmers Home Administration Guaranteed Community Program makes wastewater disposal loans and grants for group systems available to communities with a population of 10,000 or less (individuals cannot apply). Some areas in towns with a population of 10,000 to 20,000 may be eligible. The grants are available to towns with a median household income of $13,400 or less. Check with your county FmHA office or call the Maine office at the number below.

Contact: FmHA in Orono 990-9120

☐ The Farmers Home Administration Home Improvement Loans and Grants. FmHA makes loans and grants available to rural homeowners depending on their need and income. Very low income families and homeowners over 62 years old are eligible for full grants to remove health hazards (a malfunctioning wastewater system is considered a hazard). Low interest loans for up to $5,000 are also available to very low income families.

If you live in the country or in a town of under 10,000 people and can't secure credit from a commercial lender, contact the local county FmHA office or call the Maine office at the number below.

Contact: FmHA in Orono 990-9120

☐ Other Federal Funds for wastewater disposal facilities are available through the Economic Development Administration (EDA) and through Housing & Urban Development's CDBG (Community Development Block Grant) program. Funds from these sources, however, must be linked to the need to attract industry and jobs (EDA) and to the improvement of local economic conditions (CDBG).

Contacts: EDA 622-8271 (Augusta office)
CDBG program 624-6800 (Maine Department of Economic and Community Development)

☐ Other Maine State Funds and assistance are available from the Maine State Housing Authority (MSHA) and from the Finance Authority of Maine (FAME). The MSHA will make Home Improvement Loans available at low interest rates to qualified homeowners with incomes of $33,000/year or less; these are only available for individual system replacements, not cluster systems. MSHA also has a revolving loan fund to help pay for overboard discharge systems and conventional septic systems that are malfunctioning. FAME does not have loans or grants available, but they will provide 100% guarantees on bank loans for businesses that are mandated by the State to repair or replace a failing wastewater system.

Contact: MSHA 626-4600
FAME 623-3263

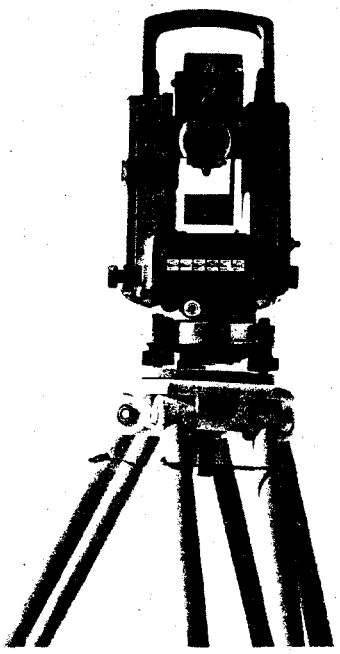
☐ Other Options: Your town could decide to issue general obligation bonds or revenue bonds to help finance a worthwhile project. However, issuing bonds is not a simple matter; you should seek help from a financial advisor.

☐ Bank Loans: You can finance all or part of your project with a loan from your local bank. Shop around and compare interest rates and loan terms to make sure you get the best deal.

☐ User Fees and Connection Fees should also be viewed as sources of funds to help finance improvements. In fact, user fees are the life blood of a multiple-user system and should, at least, cover all operational and maintenance costs.

C. Consultant Selection

Technical assistance is essential and invaluable. On small jobs involving one or two individual systems, a Licensed Site Evaluator can assist you. However on larger jobs, a knowledgeable, experienced, professional engineering firm should be hired to evaluate your situation and design a wastewater treatment solution. Generally, selecting the right firm will involve:



- identifying candidate firms,
- requesting proposals,
- interviewing candidate firms,
- checking references, and
- selecting a firm and signing a contract for services.

In some circumstances, other special consultants may also need to be hired separately or as subcontractors to the engineering firm. For example, a Licensed Site Evaluator or soil scientist may be needed. A lawyer may be required to assist in obtaining necessary easements and drafting a user agreement concerning maintenance of the system.

Identifying Engineering Firms

Once you have some assurance of funding, start by drawing up a list of several firms that claim expertise in wastewater system design. To find firms, refer to the Yellow Pages, consult with the DEP (phone: 287-7800) and talk to knowledgeable individuals in the community. Alternatively, place a legal advertisement in a large, local circulation newspaper calling for letters of interest from qualified firms.

Issue a Request for Proposals (RFP)

The best way to notify firms of your interest in their services is to prepare a formal, written Request for Proposals (RFP) that can be mailed out. The RFP should include:

- a brief description of the problem, the kind of services you require and the approximate amount of money you are prepared to devote to the engineering study;
- a request that the firm provide information about their qualifications, experience, personnel, and approach to problem-solving;
- a list of criteria that will be used in judging proposals;
- the name of a contact person and an address to which the proposal should be submitted;
- a deadline by which time all proposals must be received.

Interviewing Prospective Firms

Following is a list of questions to ask prospective consultants. Only interview the top firms, based on their response to the RFP. The interviewers should ask each firm the same questions and agree among themselves on a scoring system so as to assure everyone of a fair interview.

- What experience does the firm have in dealing with similar disposal problems?
- What types of systems has the firm actually designed and installed? How are they working now? What were the engineering and construction costs?
- What experience does the firm have in working with State agencies and private institutions, funding and loan programs?
- Is the firm willing to work with people in the community and to explore both traditional and innovative approaches?
- Who on the staff will be responsible for scheduling and completing the work?
- What are the firm's standard billing rates and estimated fees for this work?

Finally, base your tentative selection primarily on experience and qualifications, not on price. A well-designed system will cost less in the long run than a poorly-designed system that eventually fails or requires a lot of maintenance.

Check References

Talk to communities and funding agencies with whom the firms have worked recently. Ask about their experience, problems they encountered, their level of satisfaction, etc.

Contract for Services

After checking references, discuss the pros and cons of the best candidates and make a selection using your best judgment. Next, have the selected firm submit a contract that includes a description of the scope of services and an agreed upon price. You may want to, and for large contracts you should, have this contract reviewed by an attorney. Then have the legally authorized officials sign and you are ready to begin work!

D. Data Collection

No serious assessment of alternative wastewater disposal methods can be undertaken until the current systems are understood and the future needs of the users are documented. The design of any new replacement system (or systems) must be based on the amount of waste needing treatment, the site conditions, and legal constraints.

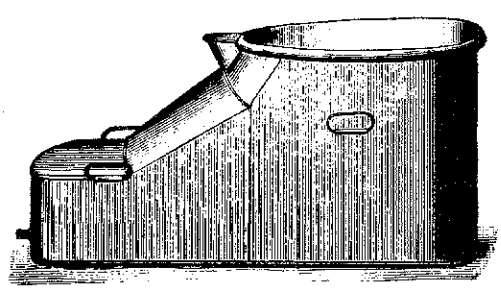
This information can be inventoried by the home or business owners themselves, by one or more consultants, by the town, or by any combination of the above. The important point, however, is that this data should be reliable and complete.

In an ideal situation, given adequate funds, it is best to have your engineering consultant collect and analyze the data. But if you wish to save time and/or money, use people within your group to survey the current situation and poll users on their future needs. Site soil characteristics can only be determined by a Licensed Site Evaluator and you may need legal counsel if complex legal questions arise. Check around. You may be able to obtain free expert advice within your group or from the municipal office.

Whatever approach you select, you will need to:

1. **Assess and analyze current waste systems and determine each owner's future water needs.**

   Each property owner can provide this information and the best way to gather the data is with a survey. A mail survey may suffice, but because a 100% response rate is essential, a door-to-door survey is preferable. A sample survey form (questionnaire) is shown on page 45. Once completed, these forms will provide information on the type of building served (summer or year-round residence, business, etc.), the existing method of wastewater disposal, the existing type of water supply, the number of people served, possible future expansions or conversions, etc. This data should be tabulated and an Existing Conditions Report drawn up.



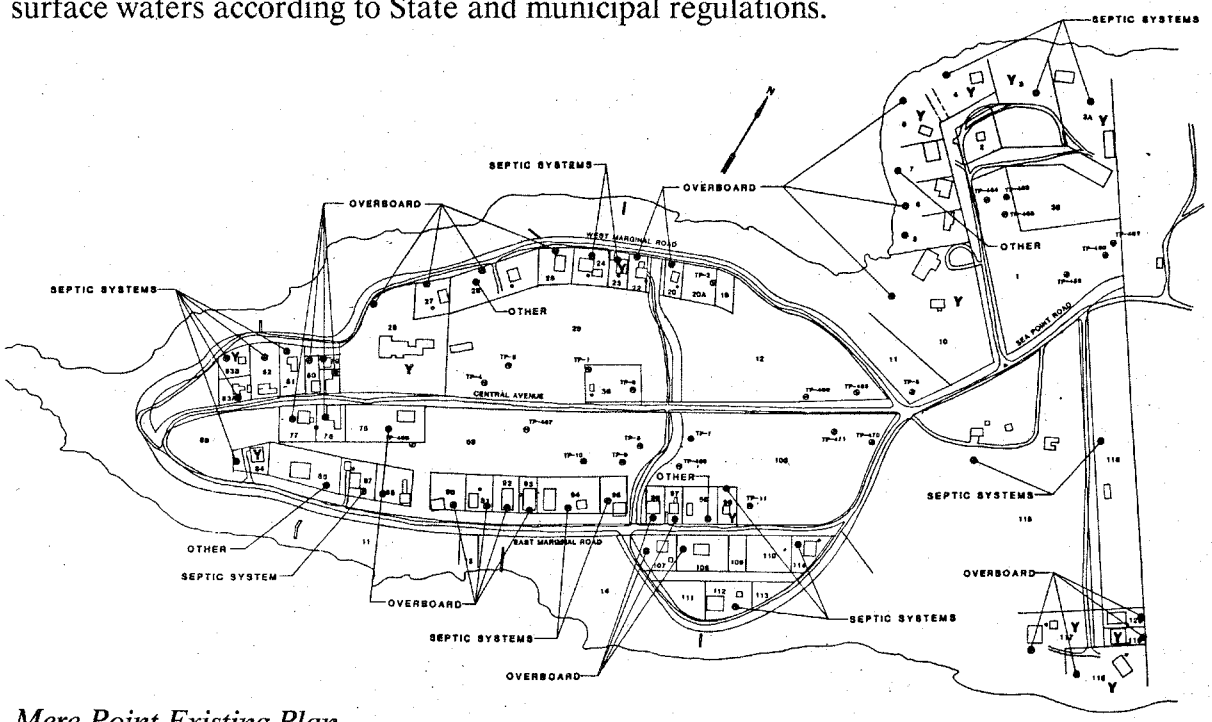
The Slipper Bath

2. Determine the physical characteristics of the wastewater disposal site.

Before initiating this work, the extent of the site must be determined. Since the principal goal of this task is to find a location for a subsurface disposal system, the search should encompass as large an area as possible, while recognizing that pipe runs must be as short as is feasible and that the cooperation of adjacent landowners may be critical to the success of the project. If the area has very shallow soils, wetlands, or ledge, map these areas as well; these are places to avoid locating subsurface pipelines.

After the extent of the site has been determined, a scale map should be drawn showing: the shoreline, prime physical features (such as streams and wetlands), structures, the location of all known wells, existing wastewater disposal systems, roads (public and private), and property lines (from a tax map). This mapping must be accurate; it should be done by a surveyor, engineer or qualified draftsperson and may be based on aerial photography. A scale of 1" = 100' or 200' is preferable.

Next, record the results of the soils evaluation on the map and in tabular form. A Licensed Site Evaluator should conduct the survey, locate test pit holes, and log the information gathered for future reference. Every area that has potential for wastewater discharge should be mapped, but keep in mind that any subsurface disposal systems must be set back from all wells and surface waters according to State and municipal regulations.



Mere Point Existing Plan

Blue Magnolia Design, 1895

3. Determine legal constraints.

The best laid plans can go awry if legal and regulatory problems have not been foreseen. In planning for a group or cluster system where there are shared responsibilities and where common facilities cross private land, careful planning and a thorough understanding of ownership patterns, property rights, land use regulations, and special deed restrictions or easements over the site are essential.

Even in situations where only a few properties are involved and the owners know each other and indicate a willingness to work together, special legal advice is still wise. Your consultant, town officials or a group member may know of a lawyer and surveyor who can conduct the necessary research and assist in drafting an agreement for system users concerning their obligations and financial responsibilities.

Finally, make sure that your engineer, or site evaluator has pertinent information about the town's shoreland zoning regulations and standards, and understands exactly what subsurface wastewater permits or licenses will be needed, both locally and from the State.

E. Alternative Systems

Before you can make an informed decision about replacing your current wastewater disposal system with a cluster or individual system, you need to know what options are available. Then, with the assistance of your consulting engineer and with a good understanding of your area (based on the collected data), you can select a solution that's uniquely designed and engineered to meet your needs. It's safest to rely on proven technology, but at the same time, don't be afraid to investigate promising new alternatives.

The systems described here are suitable for individual houses (or businesses) or groups or "clusters" of structures. Sometimes the cluster system is just a larger version of an individual system.

Keep in mind that you can mix and match system components; different treatment techniques can be used with different disposal techniques. You could elect to have in-house alternative toilets in combination with a shared gray-wastewater disposal system, for instance. Talk to your engineer about the costs and benefits of alternative systems.

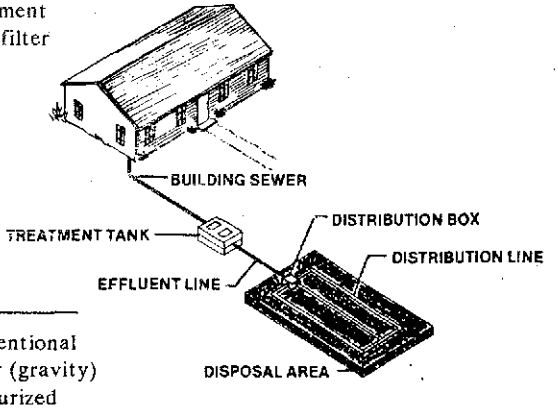
System Components

Table 1 shows the array of alternative systems and system components available to deal with wastewater disposal. Within any one column, any treatment option can be used with most any conveyance and disposal option. The illustrations on the following pages explain these options in more detail.

TABLE 1

MATRIX OF WASTEWATER SYSTEM COMPONENTS

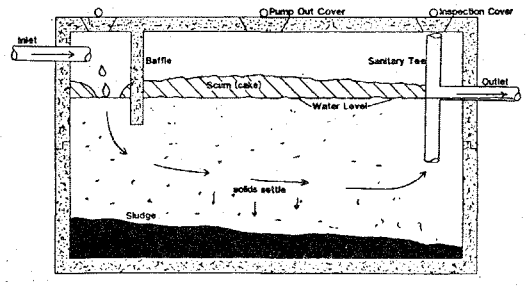
Wastewater System Component	Individual On-site System	Group or Cluster System	Municipal Sewer System
A. Primary Treatment Options	1. Septic tank 2. Septic tank or mechanical aeration with sand filter 3. Mechanical aeration with sand filters 4. Composting, chemical or incinerating toilet with septic tank for gray water	1. Cluster septic tank 2. Cluster septic or package plant with sand filter 3. Package treatment plant 4. Composting, chemical or incinerating toilet with septic tank for gray water	1. Conventional community plant with primary and secondary treatment sand filter
B. Conveyance Options	1. House sewer pipe (with gravity flow to treatment component) 2. Effluent or grinder pumps and pressurized force main 3. Transport by tank truck	1. Small diameter sewer (waste moves by gravity) 2. Grinder pumps and pressurized force main 3. Transport by tank truck	1. Conventional sewer (gravity) 2. Pressurized force main
C. Disposal Options	1. Leach field system (beds, trenches, chambers, etc.) 2. Overboard discharge* 3. Holding tank*	1. Cluster leach field (beds, trenches, chambers, etc.) 2. Overboard discharge* 3. Holding tank* 4. Land application 5. Artificial wetland/greenhouse*	1. Leach field system (beds, trenches, chambers, etc.) 2. Surface water discharge (overboard discharge) 3. Land application



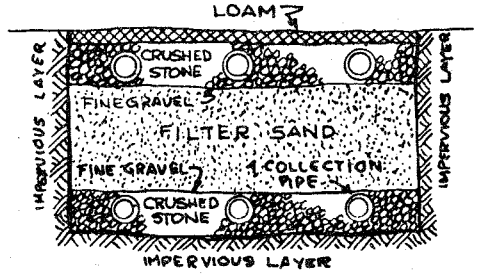
* Requires special permit; not recommended if other options are available.

Treatment Components

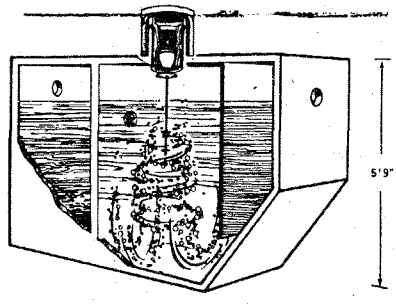
- Septic tanks: A septic treatment tank provides primary treatment of wastewater. Solids in the effluent settle out in the tank and the raw sewage is subject to physical, chemical, and biological action. Septic tanks must be pumped out about every 2-5 years. The tank should be sized according to the volume of wastewater it receives. One large tank can serve a cluster of residences.



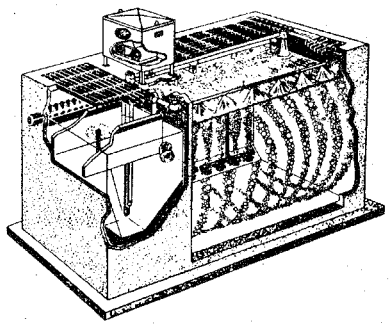
- Sand Filter Systems: Sand filter systems can clean wastewater after it has received primary treatment at an individual or cluster system. Water flows from distribution pipes through a layer of sand (the filtering agent) into underdrains from whence it can (a) be chlorinated and discharged overboard, or (b) be disposed of in a leach field. Periodic maintenance of the chlorination system is needed. The sand needs to be replaced every 5-50 years as well.

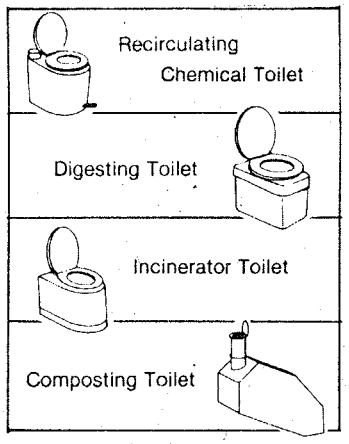


- Mechanical Aeration: Primary wastewater treatment can be enhanced by pumping fresh air into a separate tank beyond the septic tank. Aerobic treatment tanks are relatively more expensive, require regular maintenance and need an energy source.



- Package Treatment Plant: An engineered, mechanical treatment plant is a mini-version of a municipal treatment facility; self-contained, it can effectively serve a single building or a cluster of structures. The cost is high compared to septic tank treatment, but these plants work well when operated professionally and maintained responsibly.





- Composting, Incinerating and Chemical Toilets: Primary treatment can be avoided if individual households use special toilets for human waste and separate gray water disposal systems (or a single, community, gray water disposal field). Composting toilets function in much the same way as a garden compost heap -- by decomposition. Incinerating toilets rely on electricity or gas to burn up solid matter and evaporate liquids, while chemical toilets use special liquids to deodorize and clean the effluent. Chemical toilets need frequent maintenance and must be emptied frequently or connected to a holding tank.

Conveyance Components

- Sewer Pipes: Wastewater moves from its source inside the building to the treatment in watertight pipes. If the water can flow by gravity, it is best; if the wastewater must be moved uphill, pumps and pressurized pipes are essential. Gravity sewer systems are far less expensive than pressurized ones.

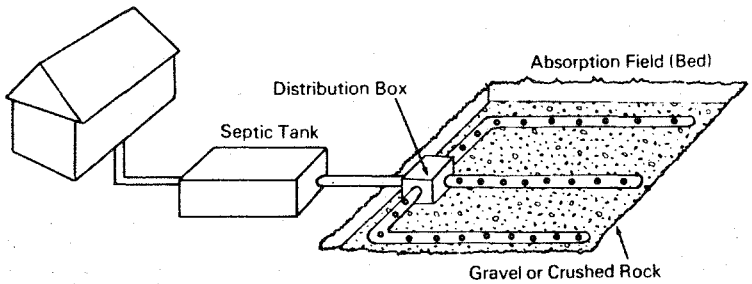
- Effluent Grinder Pumps: These pumps help liquify waste.

- Truck Transport: Waste from holding tanks is transported by truck.

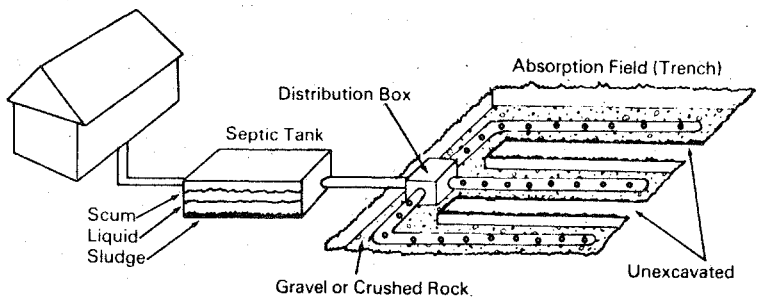
Disposal Components

Leach Field Systems: Once wastewater has been adequately treated, it must be disposed of effectively. Usually some type of underground disposal system that distributes the treated effluent over a large area is used. The size will depend on the amount of effluent generated and the type of receiving soil. The type of system depends on site conditions. The following are all examples of leach field systems.

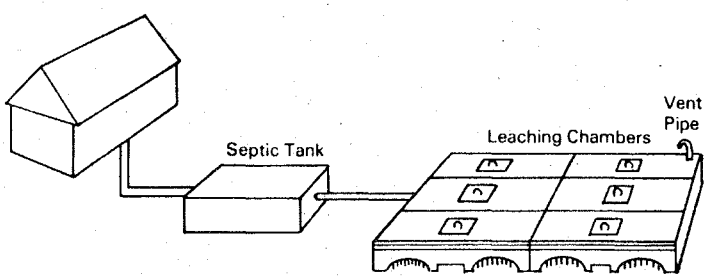
- Bed systems are often used in Maine; such systems consist of a distribution box, perforated distribution pipes and a bed of crushed rock. The bacteria and oxygen in the soil below slowly purify the effluent.



- Trench systems are similar to bed systems but they are longer and narrower. They are more effective on sloping sites since the crushed rock-filled trenches can be staggered down the hill.



- Chamber systems consist of a series or cluster of open-bottomed concrete or plastic chambers that create an underground cavern. The effluent floods into the chambers and then slowly leaches into the soil.



- Peat Systems use peat to filter and treat effluent. A peat filter can be installed between the septic tank and a conventional disposal bed, or the bed itself can be filled with peat rather than crushed rock. These systems are used where an environmentally sensitive site warrants additional effluent treatment. Peat systems are generally more expensive.

- Raised Leach Field (Mound) Systems are a type of design used where effluent cannot be adequately treated due to the existing conditions such as a high water table, soils that are too shallow, or soils that have a restrictive layer close to the surface (such as clay or hardpan). In these cases, fill material is trucked to the site to create the leach field (either a bed, trench, chamber, or peat system). A pump is often needed to move waste from the septic or aerobic tank to the raised bed. The pump and the fill make this a more expensive option than an in-ground system, but it may be the only viable design given the site conditions.

Consult an engineer about other leach field systems that might serve one or more dwellings.

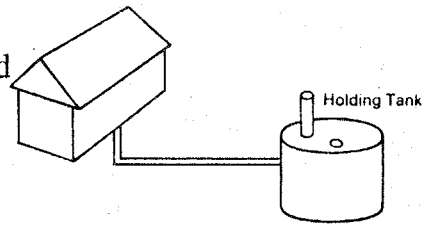
Nontraditional Disposal Methods

Other disposal methods include:

- Land Application: This is not a common practice and is more suited to warm climates. Land application involves storing the effluent and then spraying it over a large planted area. This method may be viable for seasonal use or for facilities that can provide large storage lagoons for the winter months' effluent.

- Artificial Wetland/Greenhouse: Some success has been achieved in disposing of effluent in artificially constructed wetlands within a greenhouse. Small volumes of wastewater from a cluster of buildings can be treated in this way.

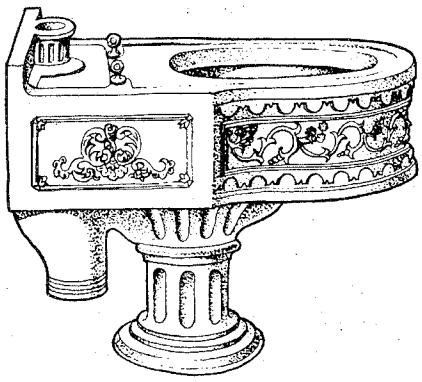
- Holding Tanks: Holding tanks store effluent until it can be pumped out by a licensed operator and disposed of at a licensed treatment plant. When there is no opportunity for subsurface disposal or an overboard discharge treatment system, a holding tank may be the only option. Regular and frequent pumping is essential and the costs are high.



- Surface Water Discharge (Overboard Discharge): Although the Overboard Discharge Law prohibits any new non-municipal overboard discharges, it may be advisable to combine several existing OBD's into one system. A single sand filter (or mechanical treatment plant) and chlorination unit are easier to monitor and maintain than multiple systems, resulting in cleaner discharge. So combining several OBD's into one can, by itself, restore shellfish beds enough to allow them to be reopened.

F. Legal Permission and Regulatory Permits

First and foremost, if you have an unlicensed overboard discharge system, obtain a license from the DEP's Water Bureau immediately! Or, if you have an old subsurface wastewater system, take steps to upgrade or replace it. Contact your local plumbing inspector (LPI) for advice.



Epic Syphonic Closet, 1897

The installation of new or replacement subsurface systems on your own property involves obtaining certain regulatory permits. If the system is a simple one, you will need a Shoreland Zoning permit from the local planning board or Code Enforcement Officer and a subsurface wastewater disposal system permit from the LPI. The application for the system must be completed by a Licensed Site Evaluator before it is submitted to the LPI for approval. On the other hand, if an alternative or experimental system is proposed, State approval from the Division of Health Engineering is required.

The Division must also review and approve so-called "engineered" systems; these include subsurface systems that treat more than 2,000 gallons of wastewater per day. Package treatment systems that discharge into the ocean require DEP Bureau of Water Quality approval.

You can obtain advice on exactly what permits are required from a Licensed Site Evaluator or from an Engineer who specializes in site evaluations and wastewater disposal systems. Alternatively, contact the Division of Health Engineering. (See page 46.)

Of course, any planned wastewater disposal system that will cross, or be located on, land other than your own, requires that owner's permission. You will require an easement from all affected owners, including the municipality if town land is involved. Because of the precise legal nature of easements, you should work with a lawyer in negotiating an easement and in agreeing on fair compensation for the easement.

G. Project Implementation

After the Project Planning is Complete

Imagine, for a moment, that you've succeeded. You (and your neighbors) recognized the need to investigate alternatives for your less-than-perfect overboard discharge systems. You worked with the town, sought out assistance and formed a committee to tackle the problem. You found a source of funds, hired an able consultant and, together, collected data and analyzed alternative systems -- using this handbook as a guide.

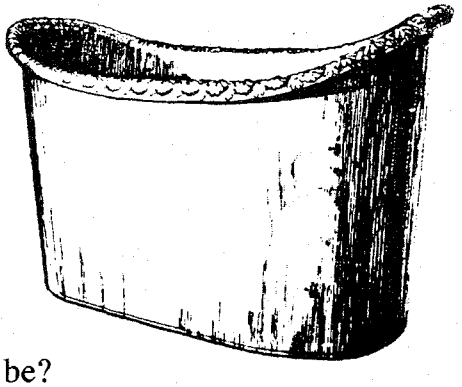
Now, with final engineering recommendations and cost estimates (see p.42) before you, what do you do? What are the next steps? How do you get the project built?

Is The Project Viable?

Obviously your goal is to move from plans to reality -- to get the project built. With a project design in hand, this is the time to demonstrate to yourself and others that you can garner the financial and management capability needed to build and operate a facility. This is the time to confirm that the project is viable and there is a commitment -- both in terms of time, perseverance and money -- to get the job done.

The following is a checklist of questions. If you have clear, definitive answers to each, it's time to move forward. If not, spend the time needed to get answers.

- ☐ Who is in charge? Who will spearhead the project and coordinate it?
- ☐ What is the role and responsibility of local government?
- ☐ Is this a public, private or quasi-public/private project?
- ☐ Is there a local advisory group to monitor and comment on progress?
- ☐ What will the ultimate funding sources and funding formula be?
- ☐ Are all the individuals affected by the project, committed to it?
- ☐ Can all the necessary easements be obtained from private property owners?
- ☐ Is the project affordable?
- ☐ Can all regulatory and legal hurdles be cleared?
- ☐ Can we obtain all the needed permits?



Tin Bath, 18th Century

Presumably most of these questions will have been aired and resolved in the engineering consultant's report. But now is the time to double-check, to communicate the study recommendations to those affected, and to confirm that all the participants are "on board" and have a clear understanding of the project, the process, the costs and the outcome.

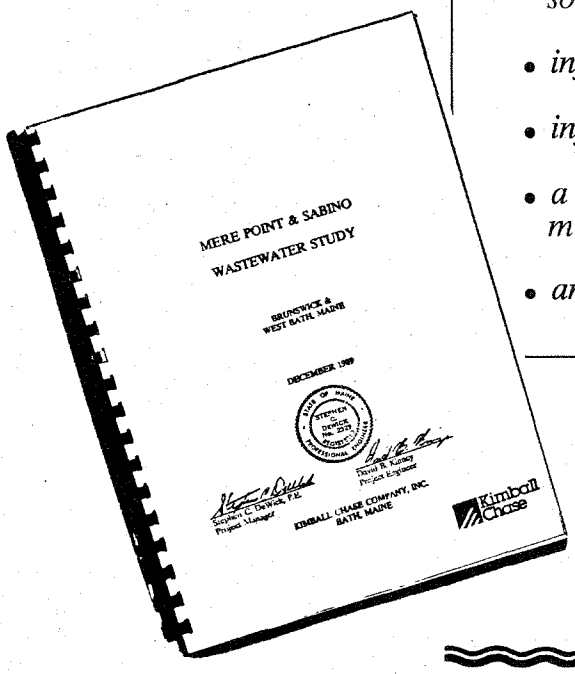
The Consulting Engineer's Report

Your consulting engineers' final report and recommendations should contain all the important information gathered during the study. It should also discuss the pros and cons of alternative systems, report on local opinion, present management and financial options, describe the recommended plan, and outline an implementation strategy.

Remember that the consultant is working for you. The final report should reflect your group's ideas and the recommendations should be the outcome of meetings and discussions between you and the engineers.

An engineer's report should, at a minimum, contain:

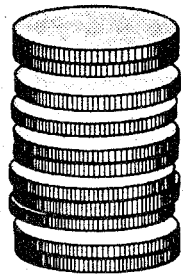
- *a summary of conclusions and recommendations;*
- *background information about the scope of the project;*
- *a discussion on water quality and supply;*
- *an analysis of existing wastewater systems and conditions;*
- *a report (and map) on the site and soil conditions;*
- *a discussion of alternative systems and solutions;*
- *information on funding and management options;*
- *information on required State and local permits;*
- *a set of recommendations, including costs and a map of the proposed plan;*
- *an implementation plan outline (with schedule).*



Ownership

In most cases, given Maine's funding sources and program rules, the town will be required to take charge and own a group or cluster project. Day-to-day operations and management can be contracted out or taken on by the public works department.

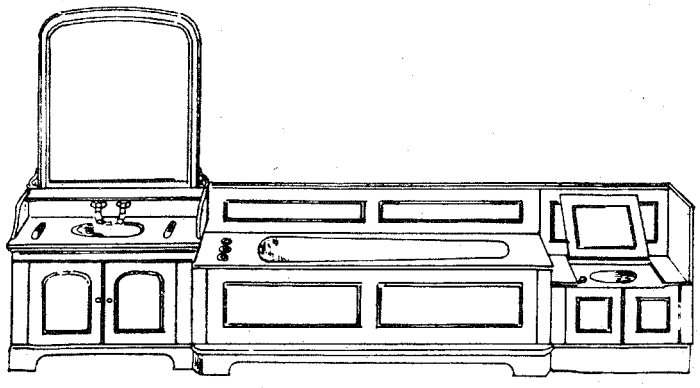
On the other hand, a privately owned facility may be preferable. If this is the case, a non-profit corporation should be formed, officers appointed, and formal procedures adopted so that all the duties and obligations of the common owners are clearly spelled out. This documentation should be written by a lawyer so as to ensure that a watertight set of operational rules are in place (see page 32). No matter what the form of ownership, before you are ready to proceed from planning to implementation, make sure that you have:



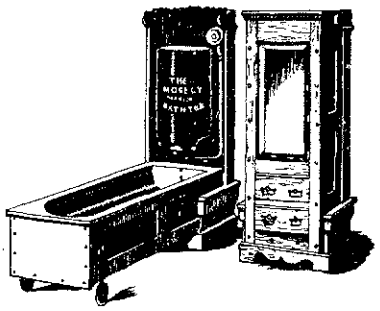
- received financial commitments from participating agencies;
- assurance that all those on the proposed system are committed to it and are prepared to sign utility easement agreements; and
- a commitment from the owner(s) of the site (for the cluster treatment and disposal facilities) to make it available.

Funding

Before approaching funding sources, make sure that your project cost estimates are up-to-date and complete. Calculate both construction costs and annual operation, maintenance and replacement costs. Once you've obtained these estimates, figure out how the facilities will be financed and, lastly, estimate user fees. The form on the following page will help you to itemize these costs.



Bathroom Suite with Copper Bath, c. 1857



Folding Tub with Gasoline Heater, U.S.A., 1895

A. Facility Cost

1. Estimated Construction Costs for:
   - Engineering Fees _____
   - Land Acquisition _____
   - Sewer lines _____
   - Septic Tank(s) _____
   - Disposal System _____
   - Grading and Landscaping _____
   - Other Construction Costs _____

   TOTAL $ _____

2. Estimated Annual Operation, Maintenance and Replacement:
   - Labor (Operator) _____
   - Materials (Chemicals) _____
   - Outside Services _____
   - Equipment _____
   - Miscellaneous _____
   - Insurance _____
   - Maintenance Fund (5%) _____

   TOTAL $ _____

B. Facility Financing

1. Amount to be Financed:
   - Total Construction Cost (from A1) _____
   - Minus State funding _____
   - Minus other grants _____
   - Minus cash on hand _____

   TOTAL $ _____

2. Financing (if applicable):

Method	Amount	Interest	Term(yrs)	Annual Debt
Bonds	_____	____ %	_____	_____
Loans	_____	____ %	_____	_____
Other	_____	____ %	_____	_____
TOTAL				$ _____

3. Total Annual Costs:
   - Debt (from B2) $ _____
   - Plus Annual O.M.& R.* (from A2) + $ _____
   - TOTAL ANNUAL COST $ _____

   * Operation, Maintenance, Replacement.

C. Annual cost per Household

- Total Annual Cost (from B3) $ _____
- Divided by Households served $ _____
- Average Annual cost per household* $ _____

* Note: This may not be the rate you establish. For example, some households may have other unique components or extra costs which should be added to this average cost.
- Also consider a set-aside (sinking fund) for future repair, maintenance, etc.

The Final Steps

Once you are confident that you have ownership, management and funding taken care of, the next steps are to:

- Apply for a construction grant(s) and/or loan
- Authorize final engineering and design (once the grant/loan is assured)
- Call for contractor bids
- Select a contractor, and
- Start construction!

MODEL QUESTIONNAIRE
WASTEWATER SURVEY

Owner Information
Property Owner's Name: _____
Local Address: _____
City/Town: _____ State: _____ Zip: _____
Mailing Address: _____
City/Town: _____ State: _____ Zip: _____
Tax Map Number: _____ Lot Number: _____
Telephone Number: _____(home)_____(office)

Land Use Information (please circle the answer that applies)
Type of Structure:
(1) Year Round Dwelling (2) Seasonal Dwelling
(3) Business (4) Other

If the structure is a dwelling, how many bedrooms?
1 2 3 4 5

If the structure is not a dwelling, how many bathrooms/restrooms does it contain? _____
Do you have plans to expand or convert your building? Yes No
If yes, please explain your plans: _____
_____

Wastewater Information
What type of disposal system do you have? (Please check the answer that applies)

——— Straight pipe
——— Holding tank
——— Package Treatment Plant with overboard discharge
——— Septic tank, sand filter and overboard discharge
——— Incinerating toilet
——— Pit privy
——— Septic tank and leach field
——— Unknown
——— Other (please describe: _____

In what year, approximately, was the system installed? 19___
Is your system shared with anybody else? ____Yes ___No
If yes, please list the names of the owners who share the system:
_____
_____

What type of water supply do you have?

——— Dug well ——— Drilled well ——— Lake water

Remarks
Is there any other information on your wastewater disposal system you wish to bring to our attention? (e.g. Is it licensed? Has it malfunctioned recently?)

_____

Thank you!

For More Information

The primary contact for more information about **overboard discharges, funding programs**, and **assistance** is the Bureau of Water Quality Control in the Department of Environmental Protection (DEP). Contact the Bureau at 287-3901 (overboard systems) or 287-7800 (Small Community Program).

Bureau of Water Quality Control
Department of Environmental Protection
State House Station 17
Augusta, Maine 04333

For more **general information** on **overboard discharges, planning,** and **coastal issues**, contact the Coastal Program within the Department of Economic & Community Development at 624-6800.

Office of Community Development,
Coastal Program
Department of Economic & Community Development
State House Station 130
Augusta, Maine 04333

Specific questions about **subsurface wastewater disposal systems, alternative systems** and **engineered systems** should be addressed to the Division of Health Engineering in the Department of Human Services at 287-5672

Division of Health Engineering
Department of Human Services
State House Station 10
Augusta, Maine 04333-0010

If you need information on which **clam flats** are open or closed, contact the marine patrol offices of the Department of Marine Resources. There are three offices: South Portland, 799-3380; Rockland, 596-2262; and Ellsworth, 667-3373. The Department number in Augusta is 624-6550.

Department of Marine Resources
State House Station 21
Augusta, Maine 04333