

Management Options for Traditional and Alternative Wastewater Systems

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Management of onsite, decentralized, and clustered wastewater treatment systems can be set up in existing communities. Management can also be set up in areas of new development that use onsite, decentralized, and clustered systems of any size for residential and commercial wastewater treatment and disposal. These systems can be protective of public health, drinking water supplies, and the quality of water resources if they are properly planned, installed, operated, and maintained. When they are managed properly, these systems can also protect property values, preserve tax bases, and result in life-cycle cost savings.

Small communities across the United States are implementing programs designed to better manage their wastewater resources. Many guides and electronic resources such as management handbooks, model programs, and tracking databases are readily available to groups beginning this process.

General Wastewater Management / Definitions

Communities have many alternatives to consider for wastewater collection and treatment. Generally, the options include onsite, cluster, centralized, and decentralized alternatives.

- An **onsite system** is a system relying on natural processes and/or mechanical components that is used to collect, treat, and disperse/discharge wastewater from single dwellings or buildings.
- A **cluster system** is a wastewater collection and treatment system under some form of common ownership and management that provides treatment and dispersal/discharge of wastewater from two or more homes or buildings but less than an entire community.
- A **centralized system** is a wastewater collection and treatment system that consists of collection sewers and a centralized treatment facility.

<i>Category</i>	<i>Management program elements</i>
Program planning and administration	Public education and participation Planning Establishment of performance requirements Record keeping, inventories, and reporting Financial assistance and funding
System installation and operation oversight	Site evaluation System design Construction or installation Operation and maintenance Residuals management
Compliance assistance and assurance	Training and certification/licensing of service providers Inspections and monitoring Corrective actions and enforcement
Functional categories of management and program elements.	

Centralized systems are used to collect and treat wastewater from entire communities.

- **Decentralized systems** are onsite and/or cluster wastewater systems used to treat and disperse or discharge small volumes of wastewater, generally from dwellings and businesses that are located relatively close together. Decentralized systems in a particular management area or jurisdiction are managed by a common management entity.

Decentralized, onsite, and clustered systems “can protect public health and the environment, typically have lower capital and maintenance costs for low-density communities, are appropriate for varying site conditions, and are suitable for ecologically sensitive areas when adequately managed” (U.S. Environmental Protection Agency (USEPA) Response to Congress, 1997).

The elements comprising a comprehensive decentralized wastewater management program, regardless of its intensity, include sets of activities focused within three functional categories: program planning and administration; treatment system installation and operation oversight; and compliance assistance and assurance.

The management model a particular community or service area selects should be based on environmental sensitivity, public health risks, the complexities of the wastewater treatment technologies that might or should be implemented, and the size or density of development.

Why Manage Wastewater Treatment?

Public health and protection of our water resources require management of wastewater. In New Jersey, centralized treatment systems, as well as decentralized systems with design flows of over 2,000 gallons per day, are well managed under the Department of Environmental Protection’s Pollution Discharge Elimination System Program (NJPDDES). Often, little or no management of smaller systems is provided.

Although it is often difficult to measure and document specific cause-and-effect relationships between onsite wastewater treatment systems and the quality of water resources, it is widely accepted that improperly managed systems are contributors to major water quality problems. In the National Water Quality Inventory, 1996 Report to Congress, state agencies designated the top 10 potential contaminant sources that threaten their ground water resources. The second most frequently cited contamination source was improperly functioning septic systems.

Improperly managed wastewater systems can also ad-

versely impact the water quality of surface waters such as rivers, lakes, and coastal waters. Moreover, failing septic systems pose a direct risk to public health and adversely affect property values and quality of life in a community.

To safeguard Pinelands water resources, the water quality provisions of the Pinelands Comprehensive Management Plan (CMP) require periodic inspection and maintenance of all onsite systems. In addition, the CMP focuses on controlling the amount of nitrogen that enters the environment. The water quality standards of the CMP permit the use of onsite systems (individual subsurface sewage disposal systems) provided that the system’s design and the size of the parcel on which the system is located will ensure that the concentration of nitrogen in the ground water exiting the parcel or entering a surface water body will meet the Commission’s water quality standard of two parts per million (ppm). In order to comply with the Pinelands water quality standard, unsewered residential development on parcels smaller than 3.2 acres requires the use of advanced onsite denitrifying wastewater treatment technology.

USEPA’s Voluntary Management Program Models

The *Guidelines for the Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems* recently published by the USEPA contain five models that are structured to reflect an increasing need for more comprehensive management as the sensitivity of the environment or the degree of technological complexity increases. The five model management programs are described in more detail in the box on the next page and can be viewed at http://www.epa.gov/own/septic/pubs/septic_guidelines.pdf. An individual program may include elements of several management models. These combination programs may be appropriate where site conditions vary within the community. Different levels of management may also be established in communities where both centralized and decentralized treatment systems are present. In some cases, it may be feasible for the entity that manages the centralized wastewater treatment facility to manage the decentralized systems as well.

Operation and Maintenance (O/M) Requirements

Operation and maintenance needs of different onsite technologies vary considerably. Traditional gravity-based onsite systems usually require only a tank pump-out once every few years with an accompanying system inspection. Mechanical systems such as aerobic treat-

US Environmental Protection Agency's Voluntary Management Models

Model 1: The Homeowner Awareness Model

Ensures systems are sited, designed, and constructed in compliance with prevailing rules.
Includes inventory and documentation of all systems by regulatory authority with voluntary maintenance.
Appropriate for traditional systems in areas of low environmental sensitivity.

Model 2: The Maintenance Contract Model

Builds on Model 1 by ensuring that property owners maintain maintenance contracts with trained operators.
Includes tracking and reporting functions to ensure that requirements of maintenance contracts are fulfilled.
Appropriate for more complex wastewater treatment systems, small clusters, or restrictive site conditions.

Model 3: The Operating Permit Model

Builds on Model 2 by issuing limited-term renewable operating permits to individual system owners.
Provides continued oversight of system performance (may include scheduled inspections).
Appropriate where large-capacity onsite systems or systems treating high-strength wastewaters exist, and in areas of heightened environmental concern (lakes, estuaries, or drinking water supplies).

Model 4: The Responsible Management Entity (RME) Operation and Maintenance Model

Similar to Model 3, except that after systems are constructed, operating permits are issued to a management entity that performs operation and maintenance activities.
Appropriate where large numbers of onsite and clustered systems must meet specific water quality requirements because environmental sensitivity is high (e.g., shellfish waters or wellhead protection areas).

Model 5: The Responsible Management Entity (RME) Ownership Model

Similar to Model 4, except that the RME owns, operates, and manages the decentralized wastewater treatment systems in a manner analogous to central sewerage.
Appropriate where new or existing high-density development is proposed or exists near sensitive receiving waters.

ment systems, which use pumps and blowers to treat and discharge wastewater, may require more frequent service. Activated sludge-based units require servicing three to four times per year to assure that aeration tank solids concentrations do not increase to the point that they are "belched" out with the effluent and cause infiltrative surface clogging. Biological nutrient removal (BNR) systems require periodic inspections to

assure effective treatment. Other mechanical/electrical systems also require more frequent (usually annual) inspection to assure proper operation of electro-mechanical components. Newer modem or internet-based packages can monitor and control many of these mechanical components, thus reducing the frequency of inspection and keeping labor costs affordable.

Well-conceived O/M programs as part of a wider management program are facilitated by better design (e.g., risers that are easily accessible from the surface), real-time accessibility to system records by field personnel, and automated monitoring that can warn or even adjust operational sequences to avoid problems in advanced treatment systems.

In preparing a management program, the planning committee or management entity should include an O/M component to ensure that systems under the entity's purview continue to operate properly and meet any established performance standards. A variety of people or service providers will play a part in successful O/M efforts. For example, the homeowner or a management entity may hire licensed septage haulers to perform regular septic tank pumpouts. Trained specialists may perform regularly scheduled inspections, especially for larger systems or for systems using alternative technologies. If a system is large or complex enough, it may be necessary to hire a part- or full-time licensed wastewater system operator to watch over the system. The management entity can perform important record-keeping functions such as recording inspection results or sending out maintenance reminders.

The homeowner is very important in most O/M efforts, particularly in the lower level management programs. In all management programs the homeowner must be aware of the damage that can be caused to soil-based disposal systems resulting from leaking toilets, grease disposal, driving heavy vehicles over the onsite system, etc. Owners must also be aware of the effects of adding strong acids or bases, toxic compounds, non-biodegradable wastes, paints, solvents, and oils on the performance of these systems and on the receiving waters.

"Adequately managed decentralized wastewater treatment systems are a cost-effective and long-term option for meeting public health and water quality goals, particularly in less densely populated areas"
(USEPA, 1997)

For Further Information Contact:

New Jersey Pinelands Commission
(609) 894-7300
Web Address: <http://www.state.nj.us/pinelands>

New Jersey Department of Environmental Protection
http://www.state.nj.us/dep/dwq/owmp_main.htm

U.S. Environmental Protection Agency
<http://cfpub.epa.gov/owm/septic/index.cfm>

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With input from a number of professional and citizen
planners

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