



Onsite Wastewater Treatment Systems: Five Levels of Protection

Christopher C. Obropta, Ph.D., Extension Specialist in Water Resources & David Berry, Student in Bioresource Engineering

The Importance of OWTS Management

Onsite Wastewater Treatment Systems (OWTS) have been identified by the U.S. Environmental Protection Agency (USEPA) as a long-term solution to wastewater treatment. Twenty-five percent of U.S. homes and 33% of new construction utilize OWTS (USEPA, 2002). These systems may be the best option in many areas because of relatively low construction and maintenance costs and effective treatment of domestic wastewater. Because impaired and failing systems are costly to repair and replace and can endanger public health and water quality, proper maintenance of OWTS is essential. Furthermore, management of OWTS can help ensure proper maintenance and early detection of malfunctioning systems before problems become larger and more expensive to repair. Thus, the USEPA has developed a voluntary OWTS management program consisting of five models based upon varying levels of management.

The Incentives of OWTS Management

- Protection of public health and local water resources;
- Increase in property values;
- Avoidance of expensive repairs;
- Groundwater aquifer replenishment;
- No costly infrastructure to install unlike public sewerage;
- Long-term savings through proper maintenance (longer system life means less replacement costs).

Management Considerations

The management model that a community chooses to use should be based upon the potential for system failure, environmental sensitivity, and potential public health risks in the area (see Figure 1). The density of development, soil type, water table depth, limiting horizons (clay lens or bedrock), important ecological areas, and receiving water use are among the many factors affecting environmental sensitivity. Advanced technology and rigorous management may be suitable for areas at a high risk for system failure, whereas, homeowner awareness and education programs combined with regular pumping and inspections may be the best option for non-sensitive areas.

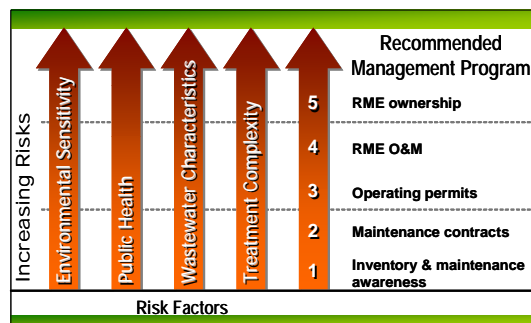


Figure 1. Risk Levels Determine Management Program (USEPA, 2003).

The Five Management Levels

LEVEL 1 – Homeowner Awareness:

The homeowner awareness model is appropriate for areas where conventional systems function properly, and there are no critical environmental issues of concern. The



purpose of this model is to educate the homeowner on the proper operation and maintenance of their systems. In doing so, a regulatory agency (typically, the township engineer or local health department) issues permits for system construction and keeps a comprehensive database of OWTS. The agency is advised by the USEPA to send reminders to homeowners when a pump-out or inspection is due. The reminder, combined with community “refresher” classes in maintenance and care, will ensure an educated and aware homeowner.

This model has the advantage of compiling comprehensive information about onsite systems within a region, which may be useful in monitoring and future planning. The possible disadvantage of the model is that maintenance and system operation fall in the hands of the homeowner, who is responsible for proper care of their system.

LEVEL 2 – Maintenance Contracts:

The maintenance contract level is an additional step above Level 1, the Homeowner Awareness Model. In this program, homeowners must have OWTS maintenance contracts with licensed septic technicians. This model is appropriate for areas that require additional treatment and more advanced technologies, which may require more maintenance and understanding. Typically, pretreatment (removing excess solids) is used in conjunction with conventional systems. These advanced technologies require maintenance levels agreed upon by the owner and operator.

Advantages of this model include the ability to implement technology, to treat wastewater to a higher level, and to ensure that regular inspections will occur by a licensed service provider. The limitation of this system is that the regulatory agency depends on the homeowner or the service provider to alert them if there has been a breach of contract. In this model, there is no mechanism that ensures that the contracts are being upheld.

LEVEL 3 – Operating Permits:

The operating permit model guarantees regular inspections by a licensed service provider through mandatory compliance of municipal regulations. Limited-term operating permits are issued to the owner upon satisfying the terms of the permit agreement. When the permit expires, the homeowner must demonstrate that the system is still in accordance with permit specifications. This model ensures long-term commitment from the homeowner and

fewer impaired systems. The degree of management afforded by operating permits promotes greater property values and fewer repair costs in the long run. This model is appropriate for areas where high levels of treatment are crucial, in particular, areas that are concerned with excessive nutrient inputs into local water bodies. This model is also appropriate for places where systems may have been installed in marginally appropriate areas such as areas with a high water table or areas having soils with low permeability.

Level 3 gives regulatory agencies a mechanism for regulating consistent and proper operation of OWTS. Because implementation of this program level is fully dependent on the support of the community, proper steps must be taken to raise awareness among residents. Currently, some municipalities have approved ordinances that only require new systems to enter the program. Unfortunately, allowing existing systems to operate unregulated may reduce the effectiveness of the program, particularly if the unregulated systems are much older and possibly failing (see Figure 2).

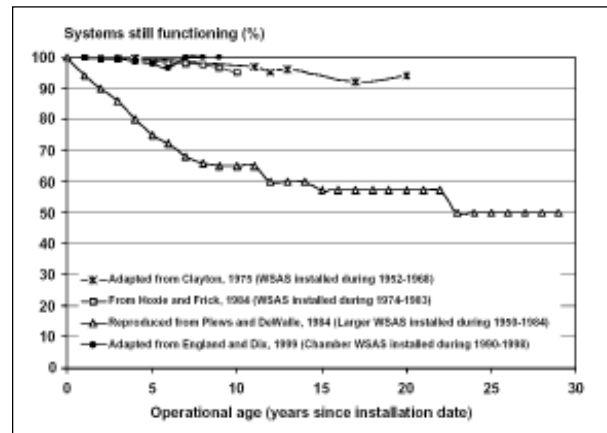


Figure 2. System Functionality with Respect to Age (USEPA, 2003).

LEVEL 4 – Responsible Management Entity (RME) Operation and Maintenance:

This model grants operating permits to RME organizations. The RME is then responsible for timely and concise operation and maintenance of OWTS. While operation and maintenance is a responsibility of the RME, the homeowner owns the OWTS and is responsible for any repair or replacement costs. This is appropriate for areas of moderately high environmental sensitivity or with large concentrations of OWTS. Particularly, this management level is applicable for developments that utilize clustered OWTS technology.

In this program, the RME, not the homeowner, is responsible for the permit and the maintenance of the system. Thus, responsibility lies in the hands of knowledgeable professionals. However, potential for conflict between the RME and the homeowner exists when there is a disagreement over repair or system replacement. Accordingly, the RME must also have a legal easement to the OWTS to access the system.

LEVEL 5 – RME Ownership:

In this model, the RME owns the OWTS and is responsible for all aspects of operation, maintenance, repair, and replacement of failing systems. This is the decentralized analog to public sewerage. Level 5 has the greatest amount of management and allows for technologically advanced systems that treat wastewater to a very high level. This management level is ideal for very sensitive areas and clustered systems that require a high level of monitoring and maintenance. It also provides a form of insurance to the homeowner for repairing or replacing malfunctioning systems. In New Jersey, these costs can be excessive, and the homeowner typically delays repairing or replacing a failing system, resulting in unpleasant smells, human health concerns, and environmental impacts until the system is repaired. A potential impediment is the unwillingness of homeowners to pay an annual fee to a RME. Some homeowners will relate this fee as an additional tax for a service that they have been financially responsible for on their own. Homeowners may object to the establishment of an RME if the annual RME fee is significantly greater than the cost homeowners incurred with their system before the creation of the RME.

Existing New Jersey Management Programs

In New Jersey, all municipalities are required by regulation to implement management programs similar to a Level 1 program. For example, the Standards for Individual Subsurface Sewage Disposal Systems (N.J.A.C. 7:9A) requires all system construction and repairs to be designed by a Professional Engineer (P.E.) and to be approved by the appropriate health department. In addition, N.J.A.C. 7:9A-3.14 requires health departments to notify homeowners on a triennial basis of proper operation and maintenance practices. Furthermore, when people buy homes with septic systems, it is standard practice for them to hire the services of a qualified septic inspector.

Of 566 New Jersey municipalities, eight have implemented more comprehensive OWTS management programs based on the USEPA’s voluntary guidelines (see Table 1). The management programs have been spurred, in many instances, by a need to protect shared resources such as recreational and potable waterbodies. To fully establish a Level 5 management strategy, years of planning may be necessary. Figure 3 depicts an approximate timeline for program establishment.

These eight New Jersey municipalities have instituted management programs to the EPA’s Level 3. OWTS owners are required to apply for and maintain a license for operation, which is typically a three year agreement. At the end of this time, the owner is required to apply for a new license and prove that the terms of the license have been fulfilled. This usually means that the tank has been

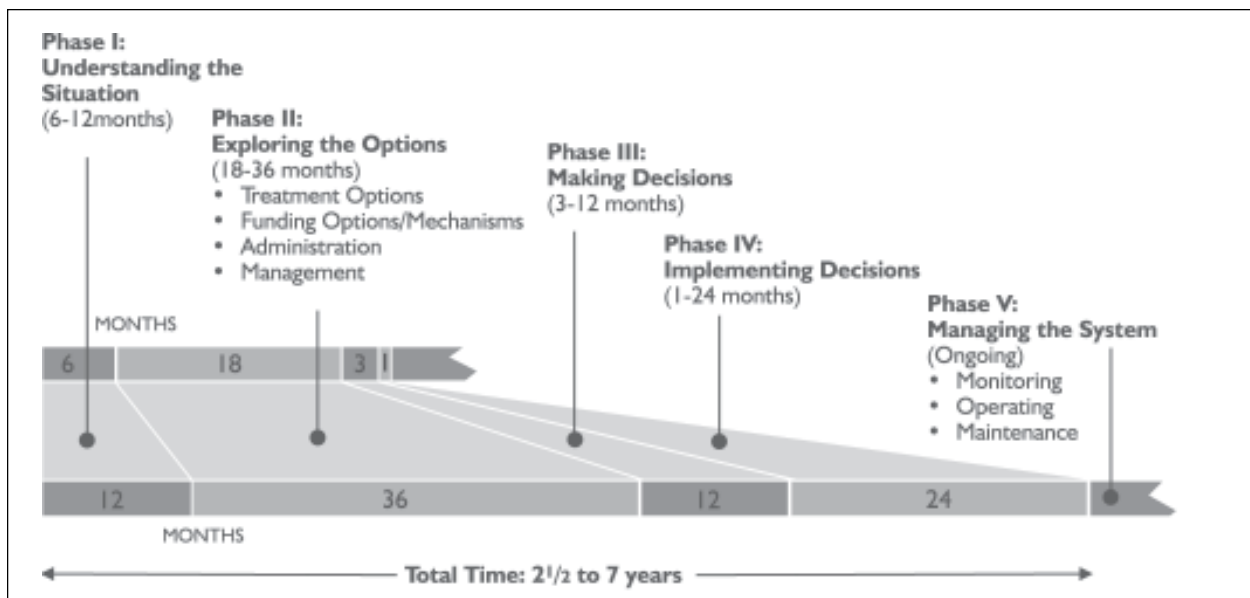


Figure 3. Typical Timetable for a Wastewater Treatment Project (Olson et al., 2002).

inspected and pumped in the last three years and that any necessary repairs have been made. These measures can reduce the number of failing systems, aid the municipality in tracking the frequency and location of system failures, and ensure that non-working systems will be repaired.

Table 1. New Jersey Municipalities with OWTS Management Programs.

County	Municipality	Level	“Grand-fathering”
Morris	Chatham Township	3	No
Morris	Montville Township	3	Yes
Morris	Mount Olive Township	3	Yes
Somerset	Montgomery Township	3	Yes
Sussex	Byram Township	3	No
Sussex	Frankford Township	3	Yes
Sussex	Borough of Hopatcong	3	No
Sussex	*Sparta Township	3	No

*Lake Mohawk Watershed only.

Fifty percent of the municipalities requiring operating permits for septic systems included a “grandfather clause” allowing homeowners with existing systems the option of not entering the program. This means that a failing system may continue to fail until such time as there is new construction. This can limit the effectiveness of the program, and should be considered during program design.

All OWTS that have flow greater than 2,000 gallons per day are required to obtain permits to operate from the NJDEP. These NJDEP permits require frequent maintenance inspections and monitoring to ensure ongoing compliance with ground water and surface water quality

standards. This level of management corresponds to USEPA Level 3, 4, or 5.

Funding Sources

- Clean Water State Revolving Fund (USEPA). www.epa.gov/owm/cwfinance/cwsrf.
- Environmental Finance Program (USEPA). www.epa.gov/efinpage/.
- Nonpoint Source Pollution Program (USEPA). www.epa.gov/owow/nps/319hfunds.html.
- U.S. Department of Agriculture, Rural Development. www.rurdev.usda.gov.
- U.S. Department of Housing and Urban Development, Office of Community Planning and Development. www.hud.gov/cpd/cdbg.html.
- The National Decentralized Water Resources Capacity Development Project. www.ndwrcdp.org/funding.cfm.

For More Information

- Rutgers Cooperative Research & Extension. www.rcrc.rutgers.edu.
- *A Guide to Public Management of Private Septic Systems*. www.cardi.cornell.edu/clgp/septics_index.cfm.
- *U.S. Environmental Protection Agency, Septic Systems, Guidelines, and General Guidance*. <http://cfpub.epa.gov/owm/septic/guidelines.cfm#7479>.

References

- Olson K., Chard B.I., Hickman, D., Malchow, D. 2002. *Small Community Wastewater Solutions: A Guide to Making Treatment, Management and Financing Decisions*.
- U.S. Environmental Protection Agency (USEPA). 2002. *Onsite Wastewater Treatment Systems Manual*. EPA/625/R-00/008. Office of Research and Development. Cincinnati, OH.
- U.S. Environmental Protection Agency (USEPA). 2003. *Draft: Handbook for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*. EPA 832-D-03-001. Office of Research and Development. Cincinnati, OH.

© 2005 by Rutgers Cooperative Research & Extension, (NJAES), Rutgers, The State University of New Jersey.

Desktop publishing by Rutgers' Cook College Resource Center

Published: April 2005

**RUTGERS COOPERATIVE RESEARCH & EXTENSION
N.J. AGRICULTURAL EXPERIMENT STATION
RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY
NEW BRUNSWICK**

Distributed in cooperation with U.S. Department of Agriculture in furtherance of the Acts of Congress on May 8 and June 30, 1914. Rutgers Cooperative Research & Extension works in agriculture, family and community health sciences, and 4-H youth development. Dr. Karyn Malinowski, Director of Extension. Rutgers Cooperative Research & Extension provides information and educational services to all people without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Rutgers Cooperative Research & Extension is an Equal Opportunity Program Provider and Employer.