



DOES YOUR COMMUNITY NEED A “SEWER” SYSTEM?

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Background

About one-fourth of the population of the United States lives in rural areas outside the reach of existing wastewater collection and treatment systems. These homes and businesses rely on some form of onsite septic system. Many of these existing systems were designed and installed with an expectation that their community would be served by public sewers before they would have to repair or replace their septic system, and many of these onsite systems are nearing the end of their useful life. Counties that have now implemented some kind of inspection program are often finding 20% or more of the septic systems they inspect to be malfunctioning in some way.

Many of the onsite systems in use today were installed using the simplest of designs and management methods developed over 50 years ago. Both the technology of small scale wastewater treatment and the management methods for smaller systems have improved dramatically over the last quarter of a century.

This paper provides members of such rural and suburban communities a description of the options that may be available for local decision-makers to consider when addressing their wastewater infrastructure needs. It also suggests some steps they can use to evaluate which options might be appropriate and feasible for the community to consider.

The Traditional Approach

Since the invention of the water-flush toilet, the traditional approach to meet our wastewater treatment needs has most often been either a large public collection and treatment system, or onsite septic systems serving individual homes and businesses. The publicly-owned system is usually accompanied by government control with full-time, professionally trained employees whose job it is to operate and maintain the system. The scattered onsite systems are typically installed to meet the provisions of a county or state code, but the maintenance of the system is left in the hands of the untrained homeowner. Efforts have been made to educate homeowners, but it is an enormous task considering the periodic changeover that occurs in typical home ownership, and the resources that would be necessary to do the task well. So, the onsite system has been considered by many to be a temporary option to be used until public sewer becomes available.

This traditional paradigm has resulted in the construction of literally hundreds of thousands of miles of public and private sewers and thousands of treatment facilities across the country. Many of these sewer systems and treatment facilities are now aging and in need of major repair and upgrades. Tremendous amounts of public resources are being invested in such efforts, leaving very little to address the wastewater needs of rural and as yet unsewered communities.

Further, many decision-makers are waking up to the fact that the continual expansion of our large centralized sewer collection and treatment systems is not the most cost-efficient and sustainable way to

provide our wastewater infrastructure needs of the future. Many of our large urban areas are now taking great quantities of water from our lakes and rivers, piping it great distances to our metropolitan areas, treating it to a very high quality, and then using it for both drinking and other non-potable uses just *once*. Much of this high-quality water is being used for non-potable purposes such as flushing toilets or watering landscaping. After use, this “waste” water is then piped and often pumped great distances to be treated again and typically discharged to our rivers and streams. In this traditional approach, large quantities of energy are used just to move water from place to place. In locations where water is a premium, this wasteful process is also creating surface water and groundwater shortages.

Because of this extremely inefficient process, those with a vision for the future are looking at decentralized (or “dispersed”, as some refer to the concept) wastewater treatment concepts as the *first choice* of the future. Individual onsite and small cluster (or “satellite”) treatment systems are being implemented as a permanent part of our wastewater treatment infrastructure.

Development of Technology

Wastewater treatment is a matter of assembling any number of treatment components in an appropriate “system” that, when properly managed, will treat a given wastewater to achieve a specified performance standard. This performance standard may vary from place to place depending on where the treated water goes and what it will be used for. For instance, if the water is discharged back into the ground to be further filtered and treated by the soil, finally ending up as a part of the subsurface groundwater resources, it will need to be treated to a different standard than if it were directly discharged to a river.

Over the last twenty years, manufacturers and researchers have developed and refined products and processes for smaller treatment works that, when properly managed, will produce a treated water quality that is as good as the best performing public treatment facilities. Some of these are processes that have been downsized from the larger traditional treatment processes while many are processes that depart from traditional means, but lend themselves well to the smaller flow systems. These technologies, when properly applied, allow the treatment of wastewater to occur closer to the point of origin, thus avoiding the expenses of moving the wastewater great distances for treatment to occur.

As far back as 1997, the U.S. Environmental Protection Agency reported to the U.S. Congress that: *“Properly managed decentralized wastewater systems can provide the treatment necessary to protect public health and meet water quality standards just as well as centralized systems.”* One of the key phrases in this statement is “properly managed”. Management programs are and should be developed to provide the necessary oversight to ensure that all systems are designed, installed and operated in the manner necessary to achieve the intended performance.

Decentralized Wastewater Treatment as an Infrastructure

The concept of decentralized wastewater treatment versus centralized wastewater treatment deserves some explanation. The use of these terms may imply an either/or choice but this is not necessarily the case in actual application. In fact, the wise choice is to consider all of the options that may be available to any community. In doing so, one would consider the whole range of choices that may be feasible.

As an example, a rural community with failing onsite septic systems may be near another community that has an existing public wastewater treatment system. As such, the following options may be considered as a part of the initial preliminary engineering study:

1. **Replace failing systems with improved onsite systems and institute some form of management entity to provide oversight of the individual treatment system performance.**
The management entity that is formed should not only provide for the proper maintenance of the

newly repaired systems, but should also ensure that existing systems that are currently working are properly maintained to minimize future problems. Considering this option will require a very careful community-wide inventory of the condition of existing onsite systems, lot sizes, and soil conditions.

2. **Design one or more small collection and treatments systems serving clusters of homes and/or businesses.** This type of an approach may be necessary or desirable when site conditions prevent the construction of individual onsite systems. If one or more off-lot sites can be identified that are suitable for a small treatment system to serve a group of homes, this choice may be preferred.
3. **Design a smaller localized central treatment system or systems.** This option is very similar to both the clustering option and the larger connection to an existing public system, but differs in the number of customers served.
4. **Connect to an existing public system nearby.** Our existing central public systems will always have a place in our wastewater infrastructure, and this may be the best and most economical solution in some cases.

A careful review of the above options demonstrates that there is a whole range of options for many communities. Beyond that, for any given community, some combination of the above may be the best choice. Whatever the choice, a management program must be put in place so that the solutions work and the community’s investment is protected.

When considering the best and most cost-effective solution for any community, the local decision-makers should consider both the initial construction costs and the long-term operation and maintenance costs. Many of the smaller and simpler technologies require less operator attention, therefore reducing labor costs, and may consume less energy.

Retaining a Consultant

If a person needs dental work done, he or she goes to a dentist - a specialist in teeth and gums. If someone is having heart surgery, the normal person to do the work is a heart surgeon. Likewise, if you want a professional to do a comprehensive job of evaluating this entire array of options for your community’s wastewater infrastructure needs, you should look for a company that has experience in the application of the various options and choices available. Officials of various agencies call this the “Qualifications Based” selection process. In other words, communities should look for the most qualified consultants, rather than the one who might offer the lowest price, or even the one who has the largest staff.

On the issue of price, there are always multiple ways to solve problems. Even though the design investment is a significant one, this portion of the project cost is a small percentage of the total cost to build the system or systems. Design choices made during the planning and design phases have a more significant impact on project costs than the design fee itself. So, care in choosing a knowledgeable and experienced consultant in this field is an important factor.

Traditionally, many engineering companies provided their services as a percentage of the project’s total cost. Such engineering contracts are actually a disincentive for these engineers to try to save the community money by considering less costly alternatives. In fact, in some instances, using alternative choices is not the easiest path. To acquire the necessary permits from regulators, non-traditional treatment approaches often require more investigation, meetings, and more effort than more traditional

approaches might require.

The type of decentralized wastewater treatment means and methods discussed here are rarely taught in colleges and universities. It is unusual to find an engineering company - even a large company - that has professionals on staff who are trained in the application of the various wastewater treatment technologies available today. This is unfortunate, but it does mean that the size of the engineering firm has no direct relationship to their qualifications in this area of expertise.

Communities that desire to have the entire range of wastewater treatment options evaluated should use a qualifications-based selection process when selecting a wastewater treatment professional. Communities need to look deep into the background and experience of the companies they may be considering to see if they have the experience to meet the community's needs. Communities should place significantly more weight upon experience than on price or size.

Contact Information

This document has been prepared by and being made available by the National Onsite Wastewater Recycling Association (NOWRA). For additional information on this subject or to find an experienced professional in your area, go to www.nowra.org. Click on the **SEPTIC LOCATOR** button you will find there, type in your zip code, and you will find a list of the NOWRA members in your area.

If you have questions and/or need more information please contact:

National Onsite Wastewater Recycling Association (NOWRA)

P.O. Box 9279

Tacoma, WA 98490-0279

Phone - 800.966.2942

info@nowra.org

www.NOWRA.org

