United States
Environmental Protection
Agency

Office of Water
Program Operations
Washington DC 20460

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EPA

Is Your Proposed Wastewater Project Too Costly?

Options for Small Communities

Wastewater Facilities For Small Communities A Tall Order

Providing wastewater treatment facilities to small communities is by no means a small task. According to a 1982 survey, small communities with populations less than 10,000 need more than $13 billion to comply with the Clean Water Act. Of this, $9 billion is for new sewers and $4 billion is for treatment plants. Clearly, clean water for the nation is essential, but expensive.

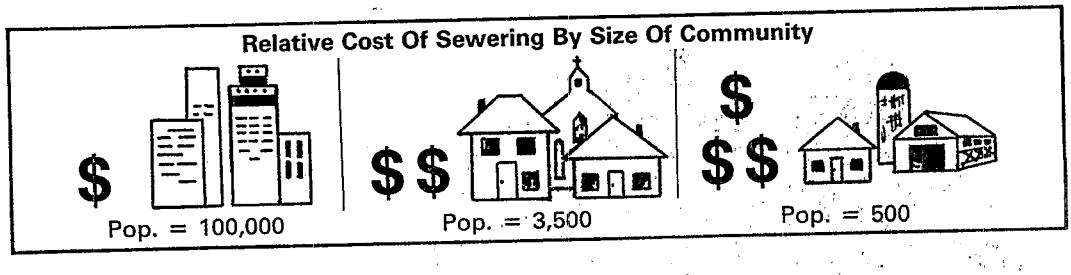
Some small community residents may have trouble understanding why large increases in their sewer bills are necessary, especially if their rates have been low in the past. Your existing facilities were likely built years ago when everything was less expensive. Perhaps the loan or bonds used to finance them have been paid off or are being paid through other means, such as property taxes. The only cost you may be paying now is for operation and maintenance. More importantly, old wastewater plants probably do not provide the high level of treatment needed to clean up the waters. Better treatment facilities to meet our clean water goals simply cost more to build and run. Therefore, your increased sewer bill may be a reasonable price for the benefits to your community — cleaner water, better fishing and swimming, and a healthier environment.

Most small communities find it difficult to afford conventional sewers and wastewater treatment plants. Since 1972, the U.S. Environmental Protection Agency (EPA) has paid 75% of the construction costs for most wastewater facilities. Beginning in October 1984, however, the EPA share will be reduced to 55%, and less EPA funding will be available for constructing collector sewers. States and local communities must assume a larger share of the cost of clean water.

What will this mean to small towns that need new or improved wastewater treatment facilities? Is it possible to reduce the financial burden without reducing the quality of treatment?

The Small Community Dilemma

Higher Costs Because of their size and layout, small communities face a heavier cost burden in building wastewater systems. Their size does not allow them to enjoy the economies of building large facilities. In other words, sewers and treatment plants cost more per house in a small town. Adding to this problem is the fact that a rural population is spread out, which means longer sewers are needed to serve each house. It costs twice as much per house to sewer a town of 3,500 than a city of 100,000 and three times as much for a town of 500.



Harder to Raise Capital. In addition to higher costs, smaller communities have more difficulty financing their facilities. Some common financial problems include:

- Lower Income - In general, annual incomes of rural households are about $3,000 less than urban households.
- Dependence on Residential Tax Base - Since there may be only a few commercial or industrial revenue sources in a small community, the homeowner often shoulders a greater share of the tax burden.
- Difficult Financing - Smaller communities often have difficulty qualifying for the bond market. Those that do usually have a low bond rating. Further, a small community is likely to pay a higher interest rate because of the smaller amount of the bond.

Management Problems. Most small towns have the resources and expertise to manage only simple wastewater systems. They seldom can get the skilled personnel needed for the project management, construction supervision, billing, accounting, budgeting, operations and maintenance necessary for a sophisticated treatment plant.

As you can see, selecting a wastewater treatment option, finding the best financial plan, and maintaining the necessary expertise to manage the system are extremely difficult jobs for a small community.

Choose Appropriate Technologies

How do you solve this dilemma? First, it's vital to keep costs down. The most important way to reduce wastewater facility costs is to choose the appropriate technology for your small community situation — a system that is simple and inexpensive to operate. In many cases this can mean simply modifying or upgrading the facilities you have now, especially onsite systems. If the cost of new sewers is a problem, your community should strongly consider different types of small diameter sewers, maintaining and upgrading septic systems, or using alternative onsite systems where septic systems are unsuitable. Cluster systems, which take septic tank flow to a suitable neighborhood treatment site, can also be used where onsite systems won't work properly. Appropriate systems for centralized treatment include ponds, lagoons, overland flow, trickling filters and oxidation ditches. These appropriate small community technologies are described more fully in the last section of this pamphlet.

Has Your Community Selected A Project With Reasonable Costs?

EPA has developed a screening system to help ensure selection of an appropriate wastewater treatment option. The system is based on an analysis of thousands of projects in EPA's biennial survey of needs in the construction grants program. The purpose of this system is to help your community identify problems at an early stage when they can be more easily resolved.

The EPA screening system consists of six financial indicators and has two parts (see below). Part A measures the reasonableness of your project's costs and sizing based on national experience. The cost indicators reflect what your community would pay to build the facilities without funding. Part B is a measure of the net cost of the project to the existing households. These costs assume a 25% local share of the project capital cost. Since costs vary in different parts of the country, your State's screening program may use different criteria.

Part A-Project Capital Costs And Sizing

Indicator	Suggested Criteria
Capital Cost of Sewers	$ 4000 per household
Capital Cost of Treatment	$ 3 per gallon per day of capacity
Total Project Capital Cost	$ 6000 per household
Allowance for Future Flow	50% of initial flow

Part B-Cost to the Residential Customer

Indicator	Suggested Criteria
Annual Operations and Maintenance Cost	$ 100 per household
Annual Household Cost	1.5% of median household income

The values of these indicators for your project are compared to the criteria based on national data or to your State's criteria. Both parts of the screening system are important; both the total cost of the project and its net cost to each household must be within acceptable limits. If your project exceeds the criteria for any of the indicators in Part A or Part B, your State will work with you to take a closer look at your project so that any problems can be analyzed and resolved. Contact your State officials for more information.

What To Do If Sewers Or Treatment Facilities Are Too Expensive

Reduce Project Scope. If the project you are planning is too costly, it may be possible to reduce its size. Take a hard look at the population projections and flow estimates. Be realistic about estimates of future growth and wastewater treatment needs and reevaluate the extent of sewering you propose. Can some pipes be eliminated by using onsite or cluster systems in outlying areas? A water conservation program may reduce wastewater flow and the size of the proposed treatment plant. It also may allow continued use of onsite systems. Another idea for communities expecting high growth is to construct the facilities in stages to spread out your town's investment over a longer time period.

Simplify Design. Often there are ways to simplify the design of facilities to cut costs and make operation easier. Make sure the layout of the plant is as efficient as possible and eliminate all non-essential features such as brick veneer walls on buildings and paved roads with curbs and gutters. Perhaps laboratory or other facilities, and even plant operators, could be shared with a neighboring town.

Improve Financing. Sometimes the cost to finance a project can be reduced. Be certain that all potential funding sources for the project have been considered. Some Federal and State agencies have low interest loans. To reduce interest rates, some States have bond banks or will guarantee local bonds. In some cases, extending the bond life can reduce annual costs. Your State water quality officials or Regional EPA staff may know of some innovative financing methods that could save you money.

Have You Chosen An Appropriate Technology?

A standard wastewater treatment facility may not be the best solution for your small community situation. A combination of approaches may be needed to solve different wastewater problems within the community. One or more of the technologies described below may be the most appropriate for your community. All are proven technologies currently being used successfully across the country.

Onsite Systems

Some communities have avoided sewers altogether by using systems that treat the wastewater at each homesite. Properly installed and maintained onsite systems will operate satisfactorily for twenty years or more in areas where site conditions are suitable. A management district can be set up to oversee operations.

Septic Systems. The most common onsite system is the septic tank, soil absorption system. This simple method settles out solids in a buried tank, which is cleaned every 3 to 5 years. Liquid flows from the tank to a drainage bed or trench and filters into the soil through perforated pipes.

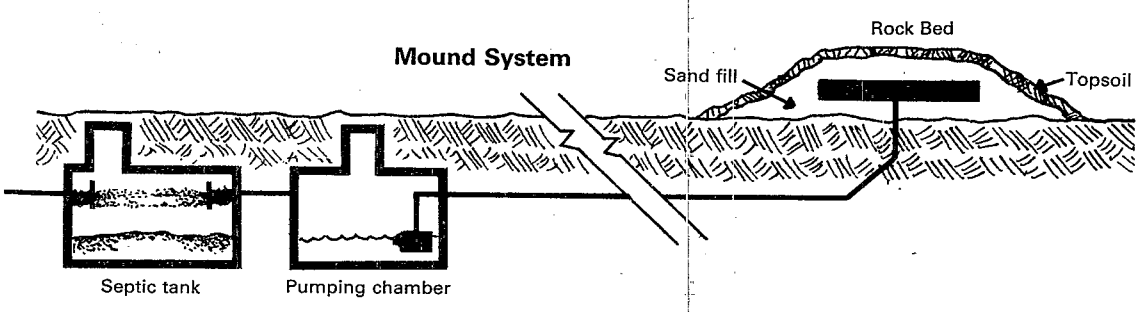
Alternative Onsite Systems. Several different types of onsite systems have been developed to operate in situations not suitable for conventional septic systems such as steep slopes, rocky or tight soils and high groundwater.

Aerobic System. This variation uses an aerobic tank instead of a septic tank to mix air with the wastewater for additional treatment before disposal.

Dosing. Some systems use a leaching bed or trench but pump the wastewater in measured doses to allow a more even flow over the entire distribution area.

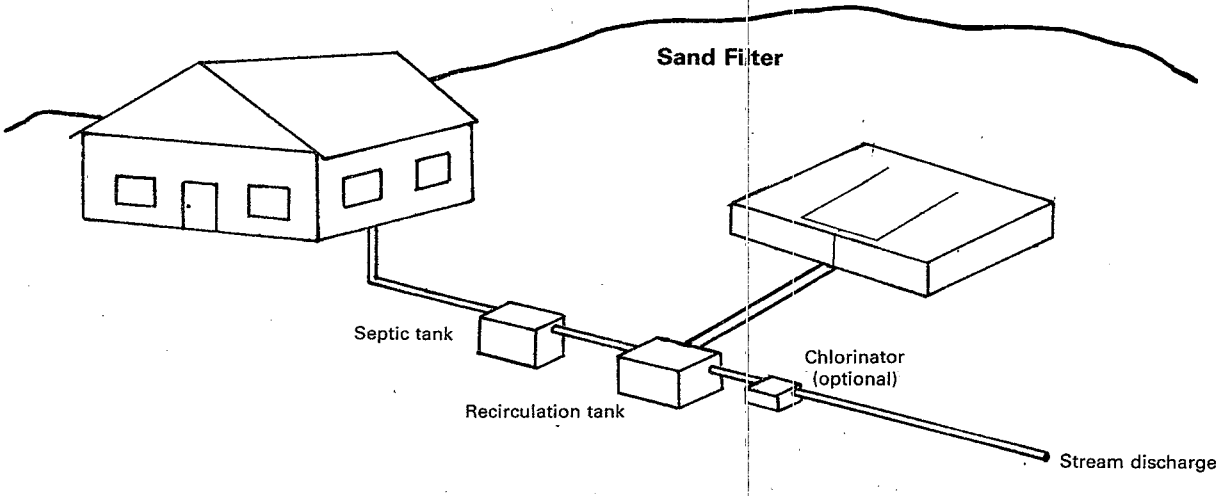
Alternating Beds. If space is available, two alternating absorption fields can be used so one can have time to recover its ability to absorb wastes.

Mounds. Where soils are rocky or tight or the water table is high, a mound can be created with fill material. The wastewater from a septic or aerobic tank is allowed to seep through the soil in the mound, which provides the treatment.



E-T Beds. An evapo-transpiration (E-T) bed is similar to a mound but relies more on the evaporation of the wastewater through the bed and plant cover.

Sand Filters. Still another system which uses a septic or aerobic tank is a sand filter. A two to three foot bed of sand installed in the ground filters the wastewater from the tank. The filtered wastewater can be disposed through the soil or discharged to a stream. Some States require disinfection before stream discharge.

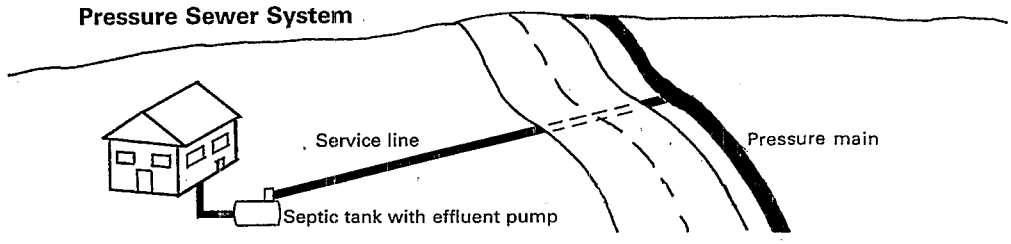


Alternative Sewers

Since conventional sewers are usually by far the major capital cost item of a wastewater system, alternative sewers should be carefully considered. Alternative sewers are smaller in size and are installed at shallow depths. Since they have no manholes and fewer joints, much less rain and ground water gets into alternative sewers so treatment plants can be smaller. One or more of the following alternative sewers are generally better suited for small communities than conventional sewers.

Small Diameter Gravity Sewers. Small diameter gravity sewers carry septic tank effluent. The pipes, which are usually plastic, can be small (4 inches in diameter) and placed at less slope than a conventional sewer. Operation and maintenance requirements are low.

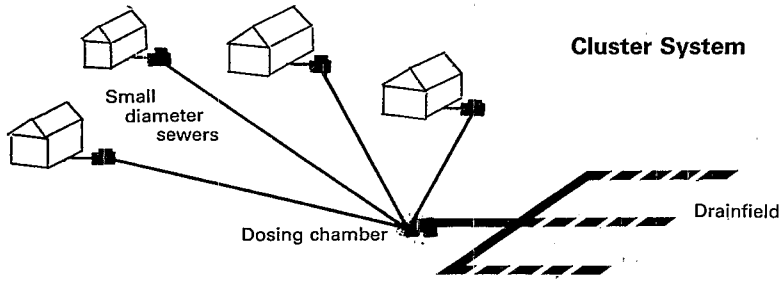
Pressure Sewers. Pressure sewer systems use a small pump at each house to move wastewater under pressure through small diameter plastic pipes to a treatment facility or a larger interceptor sewer. The pumps are of two types. Grinder pumps are housed in basement or underground tanks and grind the raw sewage while pumping it. The other type is the septic tank effluent pumping system, called STEP. STEP systems have less expensive pumps and have fewer problems with grease buildup than grinder pump systems.



Vacuum Sewers. In a vacuum sewer system, wastewater from each home is drawn through small collector pipes to a central collection station by vacuum. The vacuum collection station houses a pump which delivers the wastewater to the treatment facility or an interceptor sewer. Wastewater entry into the system is controlled by vacuum valves at each home or at groups of homes. Because of their limited ability to lift wastewater, vacuum sewers are best suited to flat areas where gravity sewers would be too expensive.

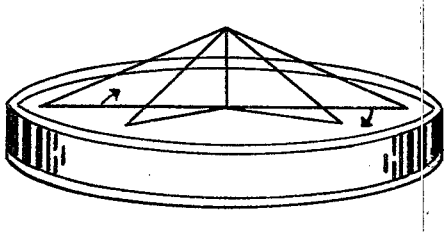
Cluster Systems

Where conditions are not suitable for onsite systems, cluster systems can be used. The most common form uses alternative sewers to transport either septic tank effluent from several houses to a common drainfield, or raw wastewater from several houses to a common septic tank followed by disposal. Treatment can also be provided by a pond, sand filter, mound or land application. Typically each cluster system serves a group of two or more homes but less than an entire community.



Low Cost Centralized Treatment

Some simple and reliable centralized treatment systems that are well suited to small community situations are ponds, lagoons, trickling filters, oxidation ditches and overland flow land treatment. All are well established methods for providing standard levels of treatment or better. In general, they cost less to build and run than the common method of treatment called activated sludge. They also use less energy and are easier to operate and maintain.



Trickling Filter

If your community is starting to plan a wastewater project, make sure the engineer you choose has experience with these small community technologies. If your ongoing project does not consider these technologies, a reevaluation of alternatives may be in order.

Putting in a wastewater system that effectively and reliably does the job, yet doesn't financially strap the community, is a challenge. This challenge can be met by making careful choices to keep down the cost of construction, operation, maintenance and financing.

MORE INFORMATION FROM

- **EPA National Small Wastewater Flows Clearinghouse**
  West Virginia University; Morgantown, WV 26506; 800-624-8301
- **Center for Environmental Research Information**
  26 W. St. Clair; Cincinnati, OH 45268; 513-684-7391
- **EPA publications** (call 202-382-7373)
  —Small Wastewater Systems–Alternative Systems for Small Communities and Rural Areas, FRD-10
  —Emerging Technology series of foldouts
  —Less Costly Wastewater Treatment Your Town
  —Financial Capability Summary Foldout—A Simplified Approach
- **Your EPA Regional Office**

1. Boston
(CT, ME, MA, NH, RI, VT); JFK Federal Bldg.; Boston, MA 02203; 617-223-7210

2. New York
(NJ, NY, PR, VI); 26 Federal Plaza; New York, NY 10007; 212-264-2525

3. Philadelphia
*(DE, MD., PA, VA, WV, DC);*6th & Walnut Sts.; Philadelphia, PA 19108; 215-597-9814.

4. Atlanta
(AL, GA, FL, MS, NC, SC, TN, KY); 345 Courtland St., N.E.; Atlanta, GA 30308; 404-881-4727

5. Chicago
(MI, WI, MN, IL, IN, OH); 230 S. Dearborn St.; Chicago, IL 60604; 312-353-2000

6. Dallas
(TX, OK, AR, LA, NM);
1201 Elm St.; Dallas, TX 75270; 214-767-2600

7. Kansas City
(KS, NE, IA, MO); 324 E. 11th St.; Kansas City, MO 64108; 816-374-5493

8. Denver
(CO, MT, WY, UT, ND, SD); 1860 Lincoln St.; Denver, CO 80203; 303-837-3895.

9. San Francisco
(CA, AZ, NV, HI, GU, American Samoa, Trust Territories of the Pacific); 215 Fremont St.; San Francisco, CA 94105; 415-974-8088

10. Seattle
(WA, OR, ID, AK); 1200-6th Ave.; Seattle, WA 98101; 206-442-5810.

EPA does not endorse, approve, or disapprove any system described here. Not all systems shown are approved by all jurisdictions. To get EPA funds, a project must meet Federal, State, and local standards.

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