# Cluster Wastewater Systems

A cluster wastewater system is one which serves more than one property, with sizes ranging from a few homes up to several hundred homes and/or businesses. Conceptual illustrations of clustered wastewater collection and treatment systems are shown on the following pages. An appropriate method of treatment is provided prior to final effluent distribution/disposition using a suitable subsurface or surface effluent dispersal method. The method of treatment and final dispersal of effluent are based on local conditions and treatment needs, and applicable regulatory requirements.

Homes and businesses served by cluster systems may be at varying distances from each other. Primary treatment of wastewater for cluster systems served by small diameter effluent collection systems (gravity or pumped) is provided at the home or business with a properly designed and sized septic tank. Effluent filters or screens are used at the outlets of the septic tank or pump tank to prevent larger solids (greater than 1/8") from entering the shared portions of the system. Shut-off, or isolation valves are installed at each property served, and other appropriate valving is used to isolate and service portions of the system as needed.

The use of cluster systems for wastewater service can offer a number of economic and environmental benefits. Those include:

Site disruption, including erosion and sedimentation impacts, can be substantially reduced on each property if only a septic tank and possibly a pump tank is needed, rather than an entire treatment and disposal system constructed for each individual site.

One treatment and final dispersal system serving multiple properties can offer savings through economies of scale to those served. This is due to reduced initial capital costs per property, as well as lower long term operation and maintenance costs (costs associated with routine maintenance and servicing of one larger system tend to be significantly lower than that of multiple smaller systems).

Systems providing higher levels of treatment tend to require more maintenance over time, and may have a greater need for on-going care and attention. For environmental conditions for which higher treatment is needed, it may not be reasonable to expect that each home or property will provide adequate care to the system to keep it in good operating condition. Therefore, environmental risks increase with the number of treatment systems serving a given number of properties.

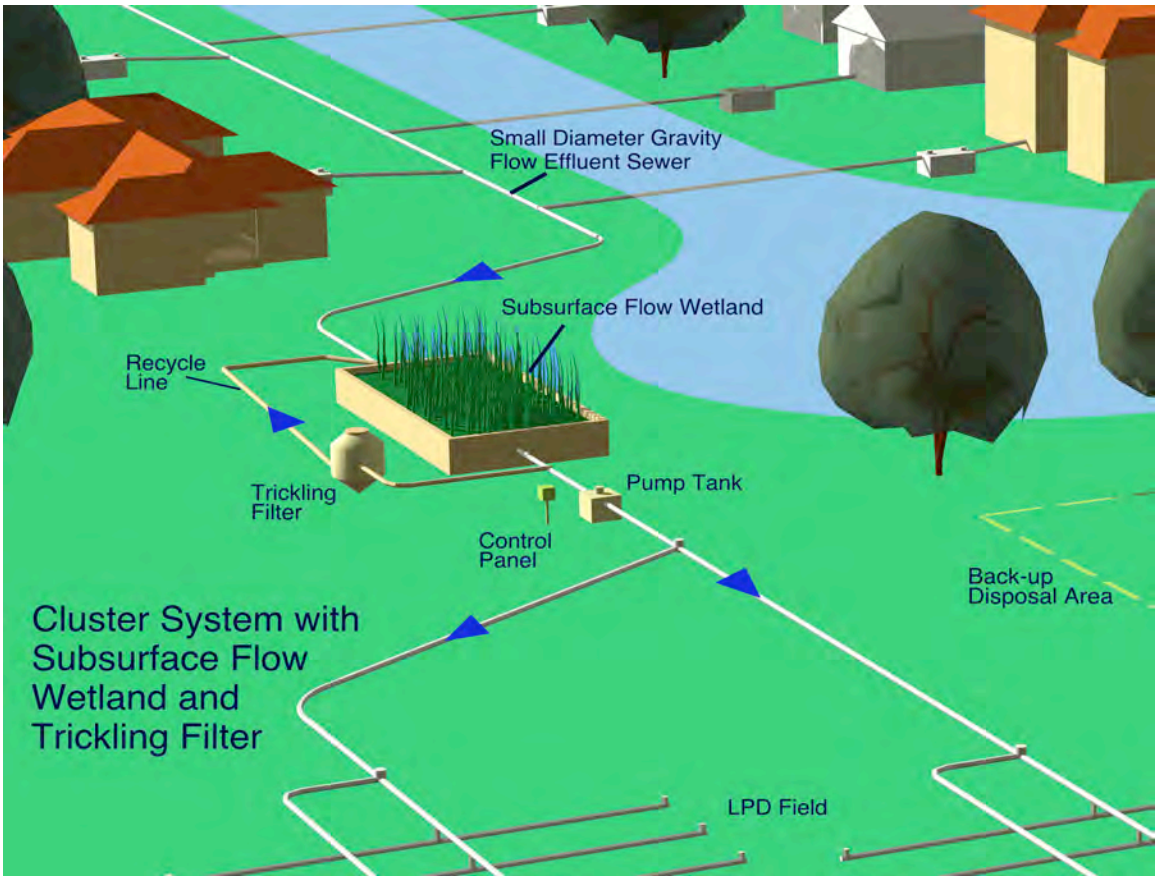
Individual property owners may not wish to be directly involved with the maintenance and care of their wastewater system. Cluster systems can be operated and maintained by a designated entity with properly trained and licensed personnel.

Individual lots can safely be smaller if a full individual onsite treatment system isn't needed for each. Homes and businesses can be located on lots with steeper slopes and rockier conditions, while reserving a more suitable area in the development/subdivision for the wastewater treatment and dispersal system.

Conceptual illustrations of cluster systems, and general information on their management (from a cited publication) are included on the following pages.

Community Environmental Services, Inc.
Email: sueparten@aol.com
Phone: (800) 654-3342
FAX: (512) 444-2313

CONCEPTUAL LAYOUT OF A
CLUSTERED SUBSURFACE FLOW WETLAND/TRICKLING FILTER
TREATMENT SYSTEM (with Recycle of Effluent for Total N Reduction)




The above illustration shows a conceptual layout of homes served by a cluster system for which advanced treatment is provided prior to final subsurface dispersal of effluent (in a low pressure dosing, or LPD, field). Septic tank primary treatment is provided at each residence or facility served (commercial or residential). A small diameter effluent collection system conveys the primary treated effluent to a common final treatment and dispersal area.

Although the above collection system layout is on relatively flat terrain, this type of system configuration may be used in very hilly areas with steep slopes. Designs for specific areas need to be engineered properly to accommodate local requirements and site conditions. A wetland-trickling filter treatment system is shown here as the means of treatment. However, a variety of treatment methods may be used to serve a cluster system. The appropriate method of treatment must be determined based on a variety of factors, including level of treatment needed, initial capital and operation/maintenance costs, climate and seasonal use, and applicable regulatory requirements. The illustration on the following page shows a cluster system with treatment using Orenco Systems, Inc. (OSI) AdvanTex textile filter treatment units. An appropriate method of effluent disposition is used after treatment, and depends on local conditions.

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CONCEPTUAL ILLUSTRATION OF A CLUSTER SYSTEM
SERVED BY AN EFFLUENT COLLECTION SYSTEM
AND AN ADVANTEX PACKED BED FILTER TREATMENT SYSTEM


Illustration Courtesy of Orenco Systems, Inc.
Sutherlin, Oregon.

Note that this type of treatment system can be installed in a modular fashion, by adding treatment units as additional residential or commercial units in the development need to be served. This can help to reduce up-front costs to developers for the wastewater system serving the cluster system. Flows can easily be monitored and reported to the permitting authority, and a determination made when additional treatment capacity is needed.

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# Cluster Systems Management

The following chapter is from:

Lombardo, P. 2004. *Cluster Wastewater Systems Planning Handbook*. Project No. WU-HT-01-45. Prepared for the National Decentralized Water Resources Capacity Development Project, Washington University, St. Louis, MO, by Lombardo Associates, Inc., Newton, MA.

# 4 CLUSTER WASTEWATER SYSTEM MANAGEMENT APPROACHES

The term management is used to represent many activities in this handbook. A detailed definition of cluster wastewater system management as used in this handbook is provided in the *Ownership and Management Options* section in Chapter 2.

The cluster wastewater system management requirements can be minimal, such as for a small Type I cluster system, or complex, as with a wastewater RME for Type II cluster systems serving many customers with a large collection system.

Cluster wastewater system management functions include:

- Ownership Options
- Administration
- Operations Management

## Ownership Options

Ownership describes the entity that has legal responsibility, liability, and authority regarding all aspects of a cluster wastewater system. Ownership is sometimes referred to as the institutional structure of a cluster wastewater system, and generally falls into three categories: public, private for-profit, and private non-profit.

The ownership options in a state are usually defined by existing enabling legislation that defines the responsibilities, authorities, composition, and functioning of the ownership entity. A community, especially in home-rule states, can petition the state legislature to establish a wastewater management district with unique features. Naturally, these desired features must be constitutional and endorsed by a vote of the community.

Traditionally, centralized wastewater systems have been owned and managed publicly, while onsite and cluster systems have been owned and managed privately with public oversight. Today, these are not the only options, and cluster systems have successfully been implemented using other innovative ownership structures. Table 4-1 describes the range of possible ownership structures.

**Table 4-1**
**Matrix of Cluster Ownership Options**

| Ownership Institution | Infrastructure | Centralized | Cluster | Onsite |
|---|---|---|---|---|
| Public | • Health department<br>• Department of Public Works<br>• Independent public entity | Traditional | **Innovative** | **Innovative** |
| Combination Public/Private | • Combinations | **Innovative** | **Innovative** | **Innovative** |
| Private | • Private individuals<br>• Special purpose entities<br>• For-profit corporation<br>• Non-profit corporation | **Innovative** | **Innovative** | Traditional |

The ownership of a wastewater system may constrain the available financial and institutional management system options available. For example, privately owned systems have traditionally been unable to obtain public funding in the form of grants. Recent legislation and programs in some states enable septic system loan programs to be used for private systems. Presumably, they could be used for Type I cluster systems. Planners should review the current program requirements in their state to explore the availability of this funding source.

The administration and monitoring, maintenance, and repair (MMR) options are discussed in the following sections. An owner can either perform some or all of these activities internally or have them performed by others (outsourced).

## Administration

Administrative functions include:

- Ownership Management
- Program Management for Capital Improvements
- Use Regulation
- Regulatory Compliance Reporting
- Customer Service, Billing, and Collections
- User-Charge System
- Financial

### *Ownership Management*

The ownership management function can consist simply of oversight of the activities of others to whom all activities have been outsourced, the performance of all activities by the owner's manager directly or within an RME, or a wide variety of combinations. At a minimum, ownership management maintains records on the cluster system and submits required compliance performance reports (as the owner's agent) to regulatory agencies, and educates system users.

Type II systems require an RME in the form of an existing or specific-purpose entity with powers to make and enforce rules that provide oversight regulators assurance of sustainable compliance.

Idaho provides for non-profit corporations to own and manage Type I cluster systems (Idaho DEQ 2000).

Ownership administration management costs include:

- General administration
- Professional services for engineering, legal, and accounting
- Insurance
- Office space and other overhead
- Customer service, billing, and collection, as described further in this section

### *Program Management for Capital Improvements*

During cluster system creation and during major expenditures, there is a significant need for management of the proposed system's capital facilities implementation. This activity is usually outsourced to an experienced engineering or program management-type firm.

### *Use Regulation*

All cluster wastewater systems are regulated regarding authorized use. Use regulations are typically included in the state and/or local code for Type I cluster systems. Adoption of special regulations on prohibited use and practices may be necessary. For example, certain disinfecting chemicals and floor cleaning products are toxic to wastewater treatment systems and cause them to malfunction. Prohibiting the discharge of certain chemicals to the cluster system is necessary, because the lower flow of cluster systems does not provide the dilution that would mitigate the toxic effects of certain waste discharges. Pretreatment requirements on high-strength wastewater generators may also be necessary to protect the wastewater collection and treatment systems.

### Regulatory Compliance Reporting

As cluster systems increase in size and proximity to environmentally sensitive areas, their regulatory reporting requirements generally increase. Owners must provide for gathering and transmission of the required regulatory compliance reporting information.

### Customer Service, Billing, and Collections

Cluster systems are mini-sewer systems, so customer service is a required activity. Customer service issues range from responding to odor complaints to change of use, including service termination and the addition of new service connections.

Billing and collections are vital functions of any RME. Many utility organizations and private and public entities provide outsourcing services for this activity. A key issue is the ability of the cluster RME to take enforcement action for non-payment of fees.

Typical enforcement options include:

- Property liens
- Water shut-off
- Civil actions (small claims court)

Owners must ensure that all stakeholders understand the legal mechanisms and proper notification procedures as well as the impact of non-payments of fees on the financial viability of the cluster system. Owners can contract with private organizations that guarantee user-charge payments. These organizations provide the revenue cash flow and will place liens (or use other legal instruments) on the property of non-paying users.

### User-Charges System

According to a 1995 survey (Beecher *et al*. 1995), Public Utilities Commissions (PUCs) regulate investor-owned wastewater utilities in 28 states, municipal systems in six states, sewer districts in five states, and non-profits in four states. Typically these are the larger wastewater systems.

Private ownership option user rates are:

- Regulated by a PUC-type agency
- Overseen by an US EPA-type department (usually for adequacy)
- Unregulated

Each state defines whether the private ownership's user rates are regulated and the terms of those regulations. The user-charges of publicly owned cluster wastewater systems are not usually regulated.

The primary cost categories for user-charges associated with cluster wastewater systems are:

- Capital Costs
- Administration
- Operation and Maintenance Costs
- Repair Funds
- Replacement-Depreciation Funds

## Capital Costs

Capital costs are the total installed costs of the wastewater system(s), including engineering (design and construction management), land, financing and capital improvement program, administration, and construction costs. Capital costs for cluster systems have been generated in one or more of the following ways:

- Federal or state grants and loans
- User-charges, in which a portion or all of the capital costs are amortized over a fixed term (such as 20 years)
- Connection charges, in which users pay a fee when the cluster system is constructed or when they connect
- Property taxes in which all property owners in an entire community, regardless of whether the property owners are served by the cluster system or a special tax district, finance some or all of the wastewater system
- Unique taxing mechanisms, in which revenues are restricted for payment of capital and/or O&M costs
- Private entity building the cluster system, as in a new parcel development
- Private entity in a design, build, own, and operate situation

A key determinant of which financing options will be available is the ownership of the system, as many public funding sources are restricted from being used for private property.

## Administration

Administration costs were described previously in the *Administration* section.

### Operation and Maintenance Costs

O&M costs include the annual cost of operating and maintaining the system arising from:

- Electricity use
- Labor
- Chemicals
- Equipment servicing
- Residuals removal and ultimate disposal
- Routine repair/parts replacement
- Equipment and major component replacement

### Repair Fund

A repair fund should be established for equipment with a useful life of less than 10 years. This fund is used to pay for small equipment repair/replacement when it fails or on a scheduled basis (to avoid damaging impacts). Establishing an annual repair fund contribution ensures that funds are available when needed. A repair fund also levels impacts on the user-charge rates.

### Replacement-Depreciation Fund

A major challenge with cluster systems and wastewater systems in general is the funding of future replacements of major capital equipment. This funding is sometimes referred to as a depreciation fund.

User-charge systems need to be established to cover:

- Amortization of capital costs, if any
- Annual actual O&M costs
- Repairs, when needed
- Replacement, when needed

Typically, funding of future major equipment replacement has been a challenge for RMEs. Inclusion of replacement-depreciation fund contributions in user-charge systems is strongly recommended so that funds are available when major repairs are required. An affordability challenge exists when the user-charge includes some capital amortization. When this occurs, replacement-depreciation fund contributions can be programmed to occur in later years, say after year 10, and fully funded when the initial capital is fully paid (for example, after year 20).

Some states require that privately owned cluster systems maintain the replacement-depreciation fund (sometimes referred to as the reserve fund) with the regulatory authority having access to those funds, should the private entity not replace the system when necessary to maintain permit compliance. In addition to actual fund contributions, numerous financial instruments (such as bonds or letters of credit) provide equivalent financial assurances.

GASB 34 (Government Accounting Standards Board 2000) requires replacement-depreciation funding of municipal systems. Replacement-depreciation funding and asset management are

intertwined issues. US EPA (2002b) provides a *Fact Sheet on Asset Management for Sewer Collection Systems* at: www.epa.gov/npdes/pubs/assetmanagement.pdf.

The NDWRCDP is completing a study entitled *Decentralized Wastewater System Reliability Analysis* (Project Number WU-HT-03-57) that should provide some guidance on this issue.

### *Financial*

The financial issues associated with cluster systems are:

- Budgeting, accounts payable, and accounts receivable, as with any business operations
- Capital resources procurement

The owner will need to establish a budget for any cluster system (in particular for user-charge determination), and revenues and expenses will need to match the budget parameters. Cash-flow difficulties arise when the timing of expenses outpaces revenue receipts. In part for this reason, capitalizing the first year or two of operating expenses may be wise.

The procurement of capital resources for cluster systems is a significant issue and the options are discussed in the following section.

#### Government Financing Options

Grants and loans for wastewater projects are available under several state and federal programs. Major programs that are generally available on a national basis include:

- Federal Sources
  - US EPA Nonpoint Source Section 319 Grant Program
  - USDA Rural Utilities Service
  - HUD Community Development Block Grants
  - Department of Commerce Economic Development Administration
  - US EPA Hardship Grants Program for Rural Communities
- Tribal Sources
  - US EPA Colonias Set-Aside Program
  - US EPA Clean Water Indian Set-Aside Grant Program
  - US EPA American Indian Environmental Office Tribal Grants
  - HUD (Resources for Native Americans)
  - Indian Health Service Sanitation Facilitation Construction Program
  - US Department of Health and Human Services Administration for Native Americans Environmental Regulatory Enhancement

- State Sources
  - State Revolving Funds
  - Other specific state programs include:
    - Massachusetts Community Septic Management Program
    - Pennsylvania  Community Septic Management Program (PENNVEST)
    - Texas Supplemental Environmental Project
    - Washington Centennial Clean Water Fund

The major federal programs, along with the state revolving funds, are briefly described as follows:

**Clean Water Act Section 319 Non-Point Source Management Program**—This program provides grants through state governments. The goal of the program is to support projects nationwide that work to restore water adversely affected by non-point source pollution and to protect waters endangered by such pollution. Most states allow the use of Section 319 funds for decentralized wastewater system projects. The program has provided money to small communities and state agencies to construct decentralized wastewater systems in areas where these systems are more cost effective than centralized systems. Funds have also been used for the repair of existing decentralized wastewater systems and for decentralized system technology demonstration projects. Projects must meet a minimum set of project planning, implementation, monitoring, and evaluation requirements designed to lead to successful documentation of project effectiveness with respect to water quality protection or improvement.

**USDA Rural Utility Service (RUS)**—Communities may be able to fund projects through RUS, formerly Farmers Home Administration (FmHA). RUS offers low interest loans at 4.5 percent or higher depending on the criteria set by RUS for award. The RUS grant/loan program is a grant in conjunction with a low-interest loan. The population and the median income are two important factors used to determine pre-qualifiers for the RUS grant and low interest loan.

The final eligibility for RUS funding depends upon the available funding in the program, the number of projects submitted, and the rankings for each project. The grant/loan combination for any particular community may be limited to a maximum of $2.5 million dollars for any fiscal year. The projects can be phased to spread the cost over a number of years to maximize funding. To receive funding a community must show that it:

- Cannot obtain funding from commercial lenders at reasonable rates
- Has the capacity to borrow and repay loans and pledge security
- Can operate and maintain the affected facilities

The maximum grant funding level is 75 percent of a project's total cost.

Nationwide, RUS (and FmHA) has provided $16 billion in loans and grants since 1940, including $3.7 billion between 1992 and 1998.

For more information contact:

*USDA RUS*
*Water & Environmental Programs*
*1400 independence Avenue SW*
*Washington, DC 20250*
*(202) 720-9583*
*www.usda.gov/rus/water*

**HUD Community Development Block Grant (CDBG) Program**—HUD provides block grants to participating states, which allocate funds to local governments that perform development activities, principally for people with low to moderate incomes. HUD requires that 70 percent of grant funds be used to benefit low- and moderate-income people. Detailed eligibility requirements vary by state. Funded activities include wastewater, drinking water, and economic development projects. As of 1999, 48 states and Puerto Rico participate in the HUD CDBG program. Hawaii and New York do not administer the CDBG program. CDBGs are available directly from HUD for communities in these states.

For more information contact:

*US Department of Housing & Urban Development*
*Office of Block Grant Assistance*
*State and Small Cities Division*
*451 7th Street SW*
*Washington, DC 20410*
*(202) 708-1322*
*www.hud.gov/cpd/cdbg.html*

**Department of Commerce Economic Development Administration (EDA) Funding**—EDA grants are intended to help distressed communities attract new industry, encourage business expansion, diversify local economies, and generate long-term jobs. Water and wastewater facilities designed primarily to serve industry and commerce are among the many projects that can be funded under this program.

For more information contact:

*US Department of Commerce*
*Economic Development Administration*
*Public Works Division*
*Herbert C. Hoover Building, Room H7326*
*Washington, DC 20230*
*(202) 482-5265*
*www.doc.gov/eda/html/pwprog.htm*

**US EPA Hardship Grants Program for Rural Communities**—This program applies to communities that meet the following criteria:

- Fewer than 3,000 residents
- No access to centralized wastewater treatment or collection systems or need improvements to onsite wastewater treatment or collection systems
- Proposed project will improve public health or reduce environmental risk
- Per capita income of less than 80 percent of the national average
- Unemployment rate exceeding the national average by 1 percent or more

For communities that meet these criteria, grants can be issued for the planning, design, and construction of publicly owned treatment works or alternative wastewater services, such as onsite treatment systems (including septic systems). States may also use hardship assistance to provide training, technical assistance, and educational programs on the operation and maintenance of wastewater treatment systems.

For more information contact:

*US Environmental Protection Agency*
*Clean Water State Revolving Fund Branch*
*(Mail Code 4204)*
*401 M Street, SW*
*Washington, D.C. 20460*
*(202) 260-2268*
*www.epa.gov/OWM*

**US EPA Colonias Program**—Native American communities located in Texas, New Mexico, or within 62 miles of the Mexican border may be eligible for funding assistance under the Colonias Program. Program criteria are set at the state level, and include:

- Economic/income criteria
- Communities must be unincorporated
- Communities must pre-date the Colonias program
- Communities must lack basic services such as water and sanitation

Through October 2001, approximately $27 million has been budgeted for water and wastewater projects on tribal lands, and some 25 projects have been identified for funding.

For more information contact:

*Colonias Program*
*Office of Waste Management*
*401 M Street SW*
*Washington, DC 20460*
*(202) 260-5841*
*www.epa.gov/owm/smallc.htm*

**State Revolving Fund (SRF) Loans**—Capital for state SRF programs is provided 20 percent by the state and 80 percent by US EPA. States have broad discretion to establish program priorities and project eligibility criteria. There are two SRF programs for which communities may be eligible:

- Drinking Water State Revolving Fund Program (DWSRF), created as part of the 1996 Clean Water Act. As of 2000, approximately $2.3 billion has been awarded to states under this program.
- Clean Water State Revolving Fund (CWSRF), created in 1988, all 50 states and Puerto Rico currently participate in the program. As of 2000, CWSRF programs nation-wide have total assets of approximately $30 billion.

These loan programs are mainly designated for communities with water quality problems.

## Local Financing Options

Local financing options for cluster systems include community-wide charges and those based on the service area:

- Community-Wide
  - Taxes (property or through local assessment districts)
  - Sales tax
- Service-Area-Wide
  - User-charges
  - Connection fees

### *Community-Wide*

Local community-wide financing options include all financing options that are derived from the community at large through public means. Under these structures, everyone in the community supports the wastewater system financially even though the system may not provide service to all of the property owners. The primary community-wide financing structure is the property tax. Property taxes have historically been used to pay for infrastructure work such as wastewater systems. This is normally done by increasing the property tax rate (the mil rate) for the entire community. Alternative structures are also possible, such as establishing special tax rate districts. The tax burden is based on the relative value of each property and is independent of the wastewater capacity or generation from a property. The property tax is normally used to finance all or a portion of a wastewater system.

An innovative means of community-wide financing is the use of a specialty tax. The town of Provincetown, MA, for example, which hosts many tourists, dedicates a portion of its room tax to its wastewater fund.

### *Service-Area-Wide*

Local service-area financing options include revenues that are derived only from the property owners served by the wastewater system. These financing options can be implemented through public or private entities. They can take the following forms:

- **User-charges** are periodic (monthly, quarterly, or semiannual) fees paid by all property owners in the wastewater system. User charges can be structured as a fixed fee per connection, a fee based on actual wastewater flows (flat rate or a usage based multi-step rate structure with a minimum monthly fee), or a fee based on allocated capacity (regardless of actual usage). User-charges can be implemented to raise revenues for capital, O&M, or both.
- **Connection fees** are typically a one-time payment or assessment made at the time the wastewater system is built or when the property connects to the system. The fee is the proportionate share of the capital costs. Connection fees are assessed based on the principal that the property is being improved by the wastewater system. Connection fees can be assessed based on lot size, street frontage, water demand/wastewater generation capacity, or as a fixed amount per equivalent dwelling unit (EDU), with non-residential properties assessed based upon similar capacity criteria.

A combination of property taxes, user fees, and connection fees is frequently used to finance projects. The relative distribution of revenue from property tax, connection fee, and user fee varies widely by community.

Communities can also fund wastewater projects through municipal (or county or other locality) bonds. Municipal bond interest rates will depend on the community's bond rating. An innovative financing technique is through the use of tax increment financing, described as follows.

**Tax increment financing** captures the projected increase in property tax revenue created by developing an area and uses that projected increase to obtain a bond to pay for the wastewater projects. Tax increment financing is possible because the wastewater project is expected to increase the aggregate assessed value of property in the project area. A guarantor of the tax increment bonds is usually needed to mitigate the financing risk.

Upon creation of a project (or district), the local assessor establishes the base-assessed value of the properties in that area. During subsequent years, the assessor certifies the current assessed value of the property in the project area or district. The tax increment is the difference between the amount of regular levy property taxes on the current assessed value and the amount of regular levy property taxes on the base-assessed value. Regular levy property taxes on the base-assessed value of the property continue to be allocated to the appropriate local taxing bodies, while the tax increment is deposited in a tax increment financing fund used to pay the project bonds.

There are two ways to fund projects using tax increment financing:

- **Pay-as-you-go**—In some cases, the municipality may be able to use the tax increment to pay for projects as they are constructed. Small wastewater improvement projects might be suitable for the pay-as-you-go method.

- **Issuing Tax Increment Financing Bonds or Notes**—In other cases, such as with larger wastewater projects, there may be substantial up-front capital costs. Thus, the county or municipality can issue tax increment financing bonds or notes to help finance the project. These obligations will provide money to pay for a portion or all of the project's capital costs. They can then be paid back by the tax increment over a period of up to 30 years.

### Affordability Guidelines

The US EPA (1995) has developed guidelines to assess the affordability of wastewater fees. Simple assessment guidelines are the annual cost as a percentage of median household income with the following benchmarks for comparison:

- Little Impact Less than 1 percent
- Mid-Range Impact 1 to 2 percent
- Large Impact Greater than 2 percent

For situations of large impacts, secondary indicators should be examined and include:

- Bond rating
- Overall net debt as a percentage of full market value of taxable property
- Unemployment
- Median household income—as a percentage of state median income
- Property tax revenues as a percentage of full market value of taxable property
- Property tax collection rate

Grants are available for connection and assessment fees for low-income families and the elderly. Developing fee deferral programs for the elderly and low-income households in which the fees accumulate and are paid when the property is sold may also be advantageous. Obviously, cash-flow financing will need to be provided to the ownership agency.

## Operations Management—Monitoring, Maintenance, and Repair

The maintenance, monitoring, and repair (MMR) activities required for cluster wastewater systems are heavily influenced by system capacity, with Type II systems having more requirements than Type I systems. Maintenance and repair activities are dictated by the equipment, while monitoring requirements are dictated by permits.

Table 4-2 presents typical MMR responsibilities for the range of cluster wastewater system sizes. Table 4-3 shows the State of Florida Required Monitoring Schedule for a wastewater treatment plant discharging to surface waters with an NPDES permit.

**Table 4-2**
**Typical MMR Responsibilities for the Range of Cluster Systems**

| MMR Activity | Onsite Systems | Small Systems *<2,000 gpd* | Medium Systems *2,000–10,000 gpd* | Large Systems *10,000–50,000 gpd* | Very Large Systems *50,000+ gpd* | Centralized Systems |
|---|---|---|---|---|---|---|
| **Maintenance** | Periodic residuals removal | | Treatment, collection system maintenance | Treatment, collection, dispersal system maintenance activities | On-going treatment, collection, dispersal system maintenance activities | |
| **Monitoring** | Periodic Inspections | Periodic Inspections<br>Remote monitoring systems may be appropriate | Regular inspections<br>Regular sampling<br>On-call personnel<br>Remote monitoring systems | Regular inspections<br>Regular sampling<br>On-call personnel<br>SCADA system | Regular inspections<br>Regular sampling<br>Full time personnel<br>SCADA system | |
| **Repair** | Component repair as needed | | Component repair as needed<br>On-call personnel | Preventative repair and replacement program<br>On-call personnel | Preventative repair and replacement program<br>Full time personnel<br>Redundant systems | |
| **Administration** | Varies by degree of oversight (Education, Permit Applications, Inspections, etc.)<br>System use regulation | | Discharge permit<br>Compliance reporting<br>System use regulation | Discharge permit<br>Compliance reporting<br>Minimal customer service<br>System use regulation | Discharge permit<br>Compliance reporting<br>Full customer service<br>System use regulation | |

**Table 4-3**
**Sample Schedule for Minimum Sampling and Testing Domestic Wastewater Treatment Plant Discharging to Surface Water with NPDES Permit, State of Florida**

| Parameters | Permitted Capacity | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2,000 gpd up to, but not including 5,000 gpd | 5,000 gpd up to, but not including 50,000 gpd | 50,000 gpd up to, but not including 500,000 gpd | 0.5 mgd up to, but not including 1 mgd | 1 mgd up to, but not including, 5 mgd | 5 mgd up to, but not including, 15 mgd | 15 mgd and above |
| **Flow, pH[1] Chlorine Residual[2]** | Daily (5/wk) | Daily (5/wk) | Daily (5/wk) | Daily (5/wk) | Continuous | Continuous | Continuous |
| **Dissolved Oxygen** | Daily (5/wk) | Daily (5/wk) | Daily (5/wk) | Daily (5/wk) | Daily (7/wk) | Daily (7/wk) | Daily (7/wk) |
| **Suspended Solids[4] $CBOD_5$, Nutrients** | Monthly | Monthly | Every two weeks[3] | Weekly | Weekly | Daily (5/wk) | Daily (7/wk) |
| **Chlorine Residual[5]** | Monthly | Monthly | Every two weeks[3] | Weekly | Daily (7/wk) | Daily (7/wk) | Daily (7/wk) |
| **Fecal Coliform[4]** | Monthly | Monthly | Every two weeks[3] | Weekly | Weekly | Daily (5/wk) | Daily (7/wk) |

[1] Hourly measurements during the period of required operator attendance may be substituted for continuous measurement.

[2] Total chlorine residual measured for disinfection effectiveness (after chlorine contact). Hourly measurements during the period for required operator attendance may be substituted for continuous measurement except for systems permitted under Part III of Chapter 62-610, F.A.C. Continuous measurement shall be provided for all systems permitted under Part III of Chapter 62-610, F.A.C.

[3] Reuse and land application facilities (which include rapid-rate, slow-rate, absorption fields, and other systems pursuant to Chapter 62-610, F.A.C.) less than 100,000 gpd, may sample monthly. (This reduction does not apply to injection wells pursuant to Chapter 62-28, F.A.C., and reuse systems requiring high-level disinfection.)

[4] For reuse systems requiring high-level disinfection, samples shall be obtained and reported daily, 7 days per week for systems of 0.5 mgd and greater, 4 days per week for systems 50,000 gpd but less than 0.5 mgd, and 3 days per week for systems less than 50,000 gpd; or daily during the period required for operator attendance, whichever is less. At permit renewal, reduction to 4 days per week for systems of 0.5 mgd and greater or to 3 days per week for systems of at least 50,000 gpd but less than 0.5 mgd may be requested if no violations for these parameters have occurred in the last 12 months. For systems requiring high-level disinfection, the reduction allowed by note 3 does not apply.

[5] Total chlorine residual measured for dechlorination effectiveness.