



Affordable Homes, Strong Communities

Septic Solutions

A Way Forward for Westchester

**Prepared by
Allied Community Enterprises
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About ACE

Allied Community Enterprises (ACE) is a not-for-profit corporation that works to increase the supply of diversified affordable housing opportunities for low and middle-income households in Westchester and nearby counties. By identifying obstacles to affordable housing and community development ACE finds targeted solutions to overcome those obstacles.

ACE serves Westchester and Putnam counties in New York State, where the private marketplace does not adequately provide affordable housing. The lack of affordable housing in this region critically impacts the ability of many people to connect with jobs, schooling and healthy living conditions. ACE fulfills its mission by allying with communities to develop projects that fit the scale and character of each neighborhood, village and town, reinforcing the quality of the community for all residents. ACE-sponsored housing proposals seek to support community investment in daycare, senior services, and physical infrastructure to support stable, affordable housing.

Among its current projects, ACE is working to streamline the municipal and regulatory approval processes that often stymie smart growth in the creation of sustainable communities. ACE strongly endorses the philosophy of smart growth as defined by Empire State Futures: “Smart growth is sustainable land use and community/economic development.” ACE’s work is also in line with Patterns for Progress’ (a Hudson Valley policy group) September 2013 report that endorses a streamlined approval process and investment in infrastructure.

ACE Septic Solutions Project

In this report, ACE recommends adoption of Decentralized Wastewater Treatment Systems (DWTS) as a solution to creating affordable housing and quality community development in areas of the County that do not have sewers, particularly inside the New York City Watershed. Many conventional septic systems are old and undersized, and the septic system regulations are based on older treatment technologies. Current inadequate infrastructure and restrictive septic regulations are obstacles to the development of affordable housing in Westchester County.

Newer, proven on-site septic system technologies that have been used for years in other parts of the country, including New York State, have rarely been used in Westchester. DWTS can allow for the creation of more units in a development by utilizing less land. DWTS also provide solutions for properties with old or failing conventional septic systems. The proposed DWTS meet the same regulatory treatment standards as central sewer treatment plants (CTP). To preserve its environment, including water resources, Westchester County must look towards these proven DWTS technology solutions to treat its wastewater.

Introduction

It is no exaggeration to say that one of humanity's greatest achievements has been developing hygienic and effective human waste removal systems. These wastewater treatment systems significantly enhance the ability to develop safe and sustainable homes as well as communities. Conversely, failing, outdated and undersized conventional septic systems can be blights to communities. Far too many local communities in northern Westchester have fallen into this latter category. In order to address affordable housing concerns and help local businesses, Westchester must utilize newer proven DWTS technologies. It is for this reason that ACE undertook its *Septic Solutions Project*. This report provides contextual background to Westchester's wastewater treatment strategies as well as recommendations for the use of DWTS that support the concept of "Smart Growth".

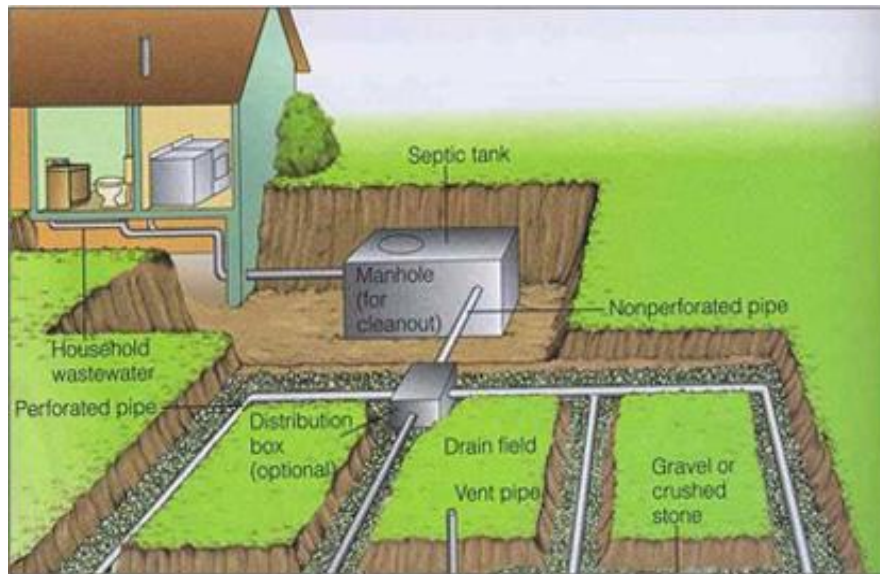
Wastewater Treatment Systems: An Overview

Individual Conventional Septic Systems:

Septic Systems are also known as onsite wastewater treatment systems (OWTS). Septic Systems are the most prevalent wastewater treatment systems in rural and suburban areas. A typical household septic system consists of a house sewer pipe, septic tank, distribution box and absorption field(s) or a seepage pit. As seen in Figure 1, the amount of space required for a conventional septic system absorption fields is

extensive. The reason for the large space requirement is because most of the treatment for conventional septic systems occurs in the ground soil.

Figure 1. Residential Conventional Septic System



The septic tank holds the household wastes with heavier solids settling to the bottom of the tank. The lighter solids rise to the top of the tank. The liquid discharge (effluent) from the septic tank requires further treatment. A distribution box directs the liquid effluent flow to either an absorption field or a seepage pit. Both of these dispersal areas must be sized appropriately. The seepage pit (while using less land) is usually not used in conjunction with sites using well water. The reason is seepage pits are much less efficient at treating wastewater than the larger absorption fields. Any component of a conventional septic system can fail if proper maintenance and preventative care is not followed. Major component failure can even lead to contamination of groundwater.

“Big Pipe” Central Sewer Treatment Plants (CTP):

In larger metropolitan areas, the elimination of wastewater was best done with the creation of central sewers to which households and businesses were hooked up leading to a surface water discharge after treatment. When the surface waters started showing visible evidence of sewage pollution, CTP were created. For example, New York City (NYC) has a maze of sewers leading to numerous CTP. Many of these sewer collection systems have been in place for well over a hundred years (which is not uncommon in large cities).

Under the "Big Pipe" solution, large diameter pipes take everything including solid human waste to a large CTP prior to dispersal to surface waters. The most common surface water used for dispersal are rivers but sometimes dispersal is to a lake. Engineering firms typically suggest the CTP solution as it is most familiar to them. The

CTP usually leads to a much larger budget resulting in higher fees for the engineering companies. These larger CTP work well for most densely populated communities. CTP are often too expensive and inappropriate for smaller suburban or rural communities like those in northern Westchester County.

Peach Lake CTP Case Example

Peach Lake is a New York community of 440 homes in the Towns of North Salem in Westchester County and Southeast in Putnam County. Peach Lake has a new CTP which serves as a useful CTP case example.

The Peach Lake CTP was designed to accommodate up to 500,000 gallons per day of wastewater. Current estimates are that the system processes between 125,000 and 150,000 gallons per day. The Peach Lake system has a high price tag of \$33.00 million to date. This represents a cost of \$72,000 per household served. The initial estimated cost for Peach Lake was \$22.00 million. Large cost over-runs like this are not uncommon with CTP projects. Peach Lake was funded in part by the East-of-Hudson Development Corp, established by the NYC- DEP to pay for remediation projects aimed at improving water quality within the NYC watersheds.

Even with the partial funding provided by the NYC-DEP, the Peach Lake CTP has created a heavy financial burden on homeowners in the community. Each household is obligated to pay an average annual sewer tax of approximately \$1,200.

The Peach Lake CTP installation took over two years and created significant disruptions, with streets and individual properties dug up. Each house also had to upgrade their electric systems for the installation of grinder pumps which are used to move all wastewater including solids to the CTP. During the first winter (2012), there was insufficient wastewater usage and flow within the system. This caused the collection pipes to freeze. This can be a common problem with CTP when they are over-designed. Excess capacity results in much higher CTP costs to the community they are designed to serve.

Decentralized Wastewater Treatment Systems (DWTS):

An alternative to the individual conventional septic system and to the ‘Big Pipe’ CTP is the DWTS. The concept of decentralized systems makes sense both in cost and simplicity.

The United States Environmental Protection Agency (US-EPA) has encouraged the use of DWTS since 1997. The EPA has been encouraging the use of DWTS even more so in the past five years due to cost savings, environmental benefits and the flexibility these systems provide smaller communities. In August 2012, the EPA produced four new publications on DWTS: *Introduction to DWTS: A Sensible Approach*; *DWTS Can Be Cost Effective and Economical*; *DWTS Can Be Green and Sustainable*; and *DWTS Can Protect the Environment, Public Health and Water Quality*. A link to these informative publications is on the Westchester County Septic Sub-Committee website listed in this report's Resources section and at www.epa.gov/owm/septic.

DWTS components typically include: wastewater collection via septic tanks for solids; smaller diameter pipes to transport the liquid effluent to the treatment units; high performance secondary treatment units; and sub-surface dispersal of the treated effluent. DWTS can also provide for surface water dispersal and for treated wastewater re-use.

DWTS are located at or near the source of the wastewater. Treated wastewater is usually dispersed subsurface, but as noted above can also be dispersed to surface waters. Treatment performance from DWTS can be comparable to large CTP. Both DWTS and CTP can treat wastewater to the highest possible regulatory standards including the removal of excess nutrients like nitrogen and phosphorus.

DWTS benefits include: much lower costs versus a CTP; flexible growth with modular expansion capabilities on an “as needed” basis; less disruption to public roads and infrastructure during installation; high levels of treatment performance and environmental benefits from re-charging groundwater aquifers and from re-using treated wastewater.

DWTS Enhanced Treatment Unit (ETU):

A DWTS Enhanced Treatment Unit (ETU) is the component of the system that provides secondary treatment levels which means treating the effluent to greater than 90% clean. Some ETU can treat to greater than 95% clean. The ETU can be for a single household or multiple ETU's can be used in a clustered system for multiple households and small communities. ETU allow for modular expansion. ETU are most commonly used to replace older failing conventional septic systems.

Putnam County ETU Case Example

In the Putnam County Septic Repair Program, the average per residence cost for the 160 ETU installed between the years 2005-2011 was \$23,500. The NYC-DEP paid for most of these systems as they were failed conventional septic systems and cesspools located within 250' of the drinking water reservoirs for NYC. Based on the most current pricing today, the average ETU installed cost for a 3-4 bedroom house (all costs included) would be \$21,500.

Skaneateles Lake ETU Case Example

In New York State, the US-EPA and the City of Syracuse partnered on the National Community Decentralized Wastewater Demonstration Project in Skaneateles Lake. The Skaneateles Lake Pilot Project sought to determine if DWTS ETU could help prevent aging and under-sized septic systems from further polluting the lake. The area was chosen because of the small lots, poor soils for biological treatment, dry wells within 100 feet of the lake and the shallow depth to groundwater or bedrock. All of these site characteristics are typical of difficult properties and found on many problem septic system properties.

The Skaneateles Lake Pilot Program chose pre-engineered, commercially available ETU that would have a small footprint, in-tank treatment and a proven history of performance. There were 19 ETU demonstration site installations all located on Skaneateles lakefront properties. These ETU successfully replaced failing conventional installed septic systems. The selected ETU had an annual operations & maintenance cost of \$300/year and a target system cost of \$20,000 including installation. The ETU were installed between 2003-2010. A link to the 2010 detailed report on the Skaneateles Lake Project can be found at www.onsite-engineering.us.

Small Community Cluster System (SCCS):

SCCS usually consist of septic tanks at each property (residential or commercial) to capture as much of the solids in wastewater as possible. A STEP (Septic Tank Effluent Pump) inside the septic tank sends the remaining untreated liquid effluent via small diameter piping to the secondary treatment units which are usually multiple ETU, Re-circulating Sand or Gravel Filters or even a Constructed Treated Wetland. The treated effluent is usually sent to a subsurface dispersal field. SCCS can also be discharged to surface waters. SCCS can provide for the opportunity to have treated wastewater re-use where permitted.

Hillsdale SCCS Case Example

The Town of Hillsdale, NY located in Columbia County is a good case study for a DWTS SCCS. The Hillsdale DWTS is a 35,000-gallon per day facility serving 72 parcels within the Hamlet of Hillsdale. Wastewater collection is provided by a STEP (Septic Tank Effluent Pump). The liquid effluent flow is conveyed via small diameter piping ranging in diameter from 1.5 to 3 inches to a central location. The central location has a large settling tank which provides time dosing to the seven commercial size ETU. These ETU provide secondary levels of treatment. Final dispersal is sub-surface to adsorption fields. The average cost per residence in Hillsdale was \$16,500 resulting in an annual cost to the homeowner of \$792 per year. Hillsdale received partial funding from a USDA-RUS grant program.

Figure 2. Hillsdale, NY DWTS SCCS



Notes: The treatment units are on the left and pump tank on the right while an operations/maintenance small shed with control panel is in the background.

Blacksburg, VA SCCS Case Example

In 2012 the US-EPA published a report on Decentralized Wastewater Management Case Studies, and identified 14 case study communities, including towns and counties. The most similar to Westchester's situation of the 14 communities is Blacksburg, Virginia.

Problem: Blacksburg, Virginia, like many growing communities, faced with the challenge of meeting development needs with a decentralized system or extending the existing centralized sewer system. The town considered factors such as cost, construction related traffic disruptions, floodplain and creek impacts due to centralized sewer main construction, collection system infiltration/inflow and leakage, treatment effectiveness, and other factors.

Solution: The town established a workgroup to evaluate wastewater treatment system alternatives. After careful review, Blacksburg chose to conduct a pilot project to test the feasibility of a decentralized, clustered system.

Results: Selection of the STEP/STEG system has saved the community more than \$1.00 million in construction, with operation and maintenance costs similar to that of conventional centralized systems. The town's public works department conducts annual inspections of each STEP/STEG system and pumps the 200 septic tanks as needed. The program estimates that pumping should occur every seven years and estimates an average cost of \$150 per tank.

Waste Treatment Systems Cost Comparison

Table 1. Average Cost Comparison Per Residential Connection

CTP	ETU	SCCS
\$72,000	\$21,500	\$15,000

Note: Estimates are based on 3-4 bedroom residences.

Source: Decentralized Advisors.

DWTS in Westchester

Westchester County's wastewater treatment strategies have long been influenced by the fact that the County stores much of New York City's drinking water in reservoirs located through-out the County. In addition to land purchase, New York City has regulatory authority over development in the NYC Watershed area that comprises most of northern Westchester.

In Westchester, larger commercial and municipal wastewater treatment systems are permitted by the New York State Department of Environmental Conservation (DEC) while the Westchester County Department of Health regulates all residential and many of the smaller commercial size septic systems. All areas within the New York City Watershed's are also subject to the NYC-DEP regulations.

There are large central sewer collection pipes leading to CTP throughout southern Westchester where there is higher population density. In northern Westchester there are some "closed system" sewer districts. These closed systems are limited to a specific, pre-determined number of households that were established when the system was specified. Examples of closed systems include Heritage Hills, a senior housing development in the Town of Somers, and the Bedford Hills Correctional Facility in the Town of Bedford.

Construction of new systems and treatment facilities that can accommodate multi-family housing has been prohibitively costly for developers in Westchester. Even repair and upgrade of existing residential and commercial septic systems has been difficult due to the lack of familiarity with newer proven DWTS technologies.

To address the above problems, the Westchester County Board of Legislators formed a Septic System Sub-committee. The Septic Sub-committee is a regional stakeholder group of East-of-Hudson municipalities, city, county and state agencies, and engineering experts. These stakeholders have been working together to learn more about DWTS and to better understand how DWTS can be utilized in Westchester and the East-of-Hudson Watershed.

Commercial Needs:

The lack of viable septic system solutions affects the economic vitality of northern Westchester's hamlets and downtown areas. For example, Katonah's business district has an active commercial district, with some residential uses, but has numerous under-sized and failing conventional septic systems. Many of these business owners must have their systems pumped on a regular basis with some requiring weekly pump-outs. Frequent pump-outs are prohibitively expensive for business owners.

Businesses that use a lot of water such as restaurants and hair salons are continually monitored by the Westchester County Board of Health for evidence of failing septic systems such as odor and visible untreated effluent above ground. Restaurants in Katonah have had to limit their business by allowing only a limited number of seats because of a history of septic failures. Failing septic systems cause problems with the property owners' bottom line and can be damaging to the groundwater and environment. Westchester business owners would benefit greatly by having the option to upgrade their old conventional septic systems to new proven DWTS technologies.

Economic Benefits of DWTS:

Several major factors influenced ACE's decision to endorse DWTS for new construction and for repair & upgrade of existing septic systems.

First, the modular expansion capability of a DWWTS allows for projects to be phased-in, preserving the character of a community. Second, the lower cost of installing DWTS due to the smaller size of the pipes and the use of septic tanks to capture solids at their source. Moving solids is one of the most expensive processes with wastewater treatment and should be avoided. Third, site disruption is far less with DWTS versus a conventional CTP and lowers the installation cost. Fourth, on-going operating and maintenance costs are lower, making the DWTS the most affordable and well-suited for affordable housing.

Figure 3. Decentralized ETUs: Orenco AdvanTex with Sand Filter



Figure 4. Decentralized ETUs: Premiere Tech ETU Textile Peat Filter



Note: Photos from Skaneateles project showing how the DWTS ETU can fit into small spaces and next to the lake's drinking water source.

Funding is Available

As previously noted, NYC-DEP East of Hudson (EOH) funds were used for the Peach Lake CTP. There remain unallocated funds from the NYC-DEP EOH that are currently available for the Towns of Bedford and Somers. Should these two communities not utilize the EOH funds to treat their wastewater, there is the potential to reallocate EOH funds to other Westchester communities. Other funding resources include Westchester County Housing Implementation Funds (HIF), which can be used for infrastructure when the project supports affordable housing.

In New York State, the Environmental Facilities Corporation (NYS-EFC) is the state agency responsible for managing and dispersing the US-EPA Clean Water Act funding for New York. NYS-EFC has acknowledged they will fund community systems for both traditional CTP and for DWT SCCS as long as the community supports their request with an engineering report justifying their preference.

Another funding source is the USDA-RUS program which provides funding for small community wastewater treatment systems including DWTS SCCS. The Hillsdale, NY DWTS SCCS was partially funded by USDA-RUS.

Moving Forward

The Westchester County Septic Subcommittee (WC-SSC) has been working with the NYS-DEC, the NYC-DEP, and the Westchester Board of Health to provide education and information about DWTS. ACE has been an active participant in the WC-SSC.

Additionally, both ACE and the WC-SSC have become more fully aware of what uses for DWTS the US-EPA has been encouraging. The US-EPA has recently defined a new 'Water Paradigm' with an emphasis on using DWTS even in parts of urban areas to offload existing CTP growth requirements with a strong focus on treated wastewater and storm water reuse. See the four US-EPA publications dated August 2012 referenced earlier in this report under DWTS and on the WC-SSC website. These publications show how DWTS are *green* and sustainable by improving water quality and availability, using energy and land wisely, and responding to growth needs while preserving green space. These DWTS benefits also support the goals of New York's 'Smart Growth Development' principles that seek to balance economic, environmental and equity objectives.

In September 2012, the NYC-DEP agreed to pilot a DWTS SCCS in the NYC East of Hudson (Croton) Watershed. The allowed DWTS SCCS pilot will only be used to replace existing failing septic systems capacity; not for the creation of new additional capacity. Westchester County's Department of Health has also acknowledged their willingness to support a pilot DWTS SCCS. A community has not yet been selected for the SCCS pilot. ACE has several possible locations in mind.

NYC-DEP already allows individual ETUs as replacement systems for older individual conventional septic systems although their regulations for ETUs are difficult to meet in their current form.

ACE is available to work with communities interested in learning how to use the significant benefits of DWTS to develop affordable housing. ACE approaches developing affordable housing in communities using a blend of activities to ensure a sustainable community with a vibrant mix of residential, commercial, retail and civic uses.

Resources

Decentralized Advisors. Available at www.decentralizedadvisors.com

** Bob Eichinger of Decentralized Advisors provided additional resource links for DWWTS including access to the US EPA funded Skaneateles Lake, NY National Community Decentralized Demonstration Project at http://www.onsite-engineering.us/small_community_onsite_success.html*

U.S. Environmental Protection Agency. *SepticSmart*. Available at <http://water.epa.gov/infrastructure/septic/septicmart.cfm>

Westchester County Septic Subcommittee. Available at <http://westchesterlegislators.com/sub-committee-on-septic.html>

**This resource also links to the January 27, 2011 Wastewater Technologies Presentation which lists over 10 small community case studies in the nation. It also includes links to other presentations on DWWTS technologies including the system installed at Hillsdale, NY.*

Acknowledgements

ACE is grateful for the technical advice from Decentralized Advisers Bob Eichinger and Ed Barnett. Eichinger and Barnett were very helpful in navigating what systems could be piloted, sorting out the sometimes-contradictory information for ACE, the subcommittee and various municipalities. Additionally, Eichinger and Barnett have provided educational presentations to the ACE staff and board, ACE funders, Blue Mountain Housing Development Corporation, and the supervisors of Bedford, North Salem and Pound Ridge. www.onsite-engineering.us. Thanks also to Althea Arnold and Cornelia Bowen and Bob Eichinger for editing this report.



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**For additional information about how ACE
can help your home, your block or your community
contact: info@alliedcommunity.org**