Alternative Wastewater Treatment for Individual Lots

Part Two of a Series About Onsite Wastewater Treatment Alternatives

A Series About Onsite Wastewater Treatment Alternatives

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Introduction

The factors involved in selecting a wastewater treatment system are numerous. As a property owner, you may be faced with space limitations or other site constraints on the property. There may be specific treatment requirements, and costs associated with the installation, maintenance and operation of the system must be considered. The availability of support from companies supplying treatment components may be another factor. **Choosing to install an alternative system often permits fuller enjoyment of the property while achieving higher levels of treatment than conventional systems offer.**

This manual is the second in a series about alternative wastewater treatment systems. While the manual *Choosing a Wastewater Treatment System* provides detailed information about conventional systems, modifications to those systems, and alternative systems, **the chapters that follow highlight real-world cases where alternative systems have overcome unique site constraints to meet specific treatment objectives.** These case studies explore a variety of factors involved in selecting a system and reveal how alternative systems can permit a greater use of property area while maintaining distinctive architectural or natural features. In each case, the alternative system was constructed as a repair to a failing or substandard conventional system. Advanced treatment technology was selected to protect sensitive coastal waters and groundwater supplies, because a conventional system repair was simply not feasible or would have required extensive and costly site disturbance.

In this historical seaside village, the character and growth of Main Street - as well as local shellfishing - were preserved using alternative wastewater technology. Small town and village centers in rural areas often rely on conventional wastewater treatment technology that doesn't meet current state standards and can't be made to do so in the available spaces. Advanced wastewater technology can support the reuse of town center buildings, while maintaining the simplicity of individual systems.

Important Notes About This Manual

The case studies discussed within this manual focus upon the individual site constraints that influence the choice of wastewater treatment system. However, choosing the most appropriate treatment system is equally influenced by watershed-level factors such as watershed susceptibility to nitrogen or bacterial inputs. This is especially important for lots located in coastal areas, near freshwater, or within an aquifer. System designers should be aware of local regulations and also may be able to recommend treatment systems that are most appropriate for the local area.

In addition to the benefits that accrue to property owners, the surrounding neighborhood's character may be enhanced when alternative systems are used on individual lots. Alternative systems can support compact development to minimize sprawl and promote pedestrian-friendly, distinctive neighborhoods. They also enable communities to retain their architectural or natural features, while protecting public and environmental health.

Conventional wastewater treatment system siting and design standards tend to reinforce the need for large lots and extensive property disturbance. The house on the left uses a raised "mounded" or "fill" drainfield, contained by sidewalls. This uses almost all of the available lot. An alternative treatment system would have enabled the property owner to avoid such extensive disturbance to the yard.

Case #1: A Stony-Soil, Coastal Site

This one-third acre site located in a nitrogen- and pathogen-sensitive coastal watershed is almost completely surrounded by a wetland. The site has wet, glacial till soils with numerous stones and large boulders. As a result of the high water table, groundwater is at the surface of the lot for several months during the wet season. The home and the surrounding neighborhood are serviced by a town water supply.

The existing system for this site consisted of an approximately 500-gallon cesspool, which was pumped four times a year. An auxiliary drainfield line was also present. A shallow pool of water covered the cesspool during the wet season which would flow through a neighboring lot and then into the adjacent coastal wetland.

The Constraints

- A nitrogen- and bacteria-sensitive coastal site
- Stones and large boulders
- A high water table

The Existing System

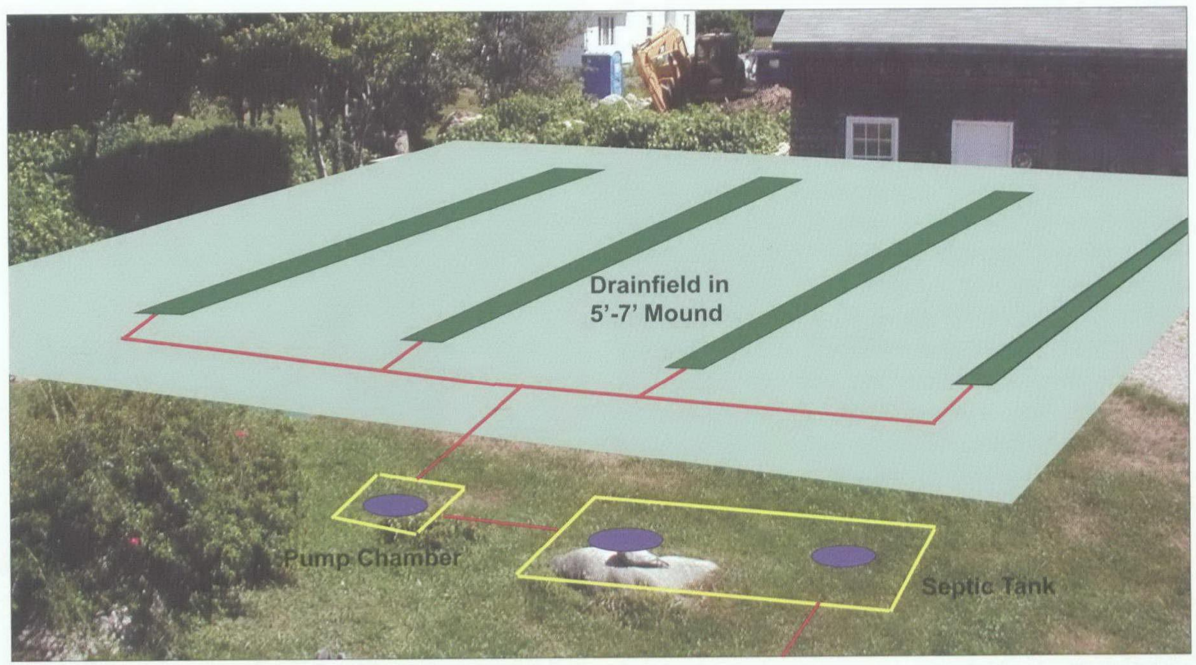
- A 500-gallon cesspool

The Solution

- A recirculating media filter
- A bottomless sand filter drainfield

Replacing the cesspool with a conventional septic system would have drastically altered the site. Most of the yard area would have been required for the system; boulders would have been excavated and trees removed. Four feet of gravel would have been brought in to raise the drainfield above the water table, and a pump would have been installed to move septic tank effluent to the raised drainfield. In the absence of a level 25-foot area surrounding the drainfield, retaining walls would have been constructed to contain the fill material. Because of the degree of excavation and amount of fill material required, the cost of this conventional system would have far exceeded the cost of the alternative system. In addition, the landscape alterations required by the conventional system would have altered stormwater movement and aggravated the already wet site conditions.

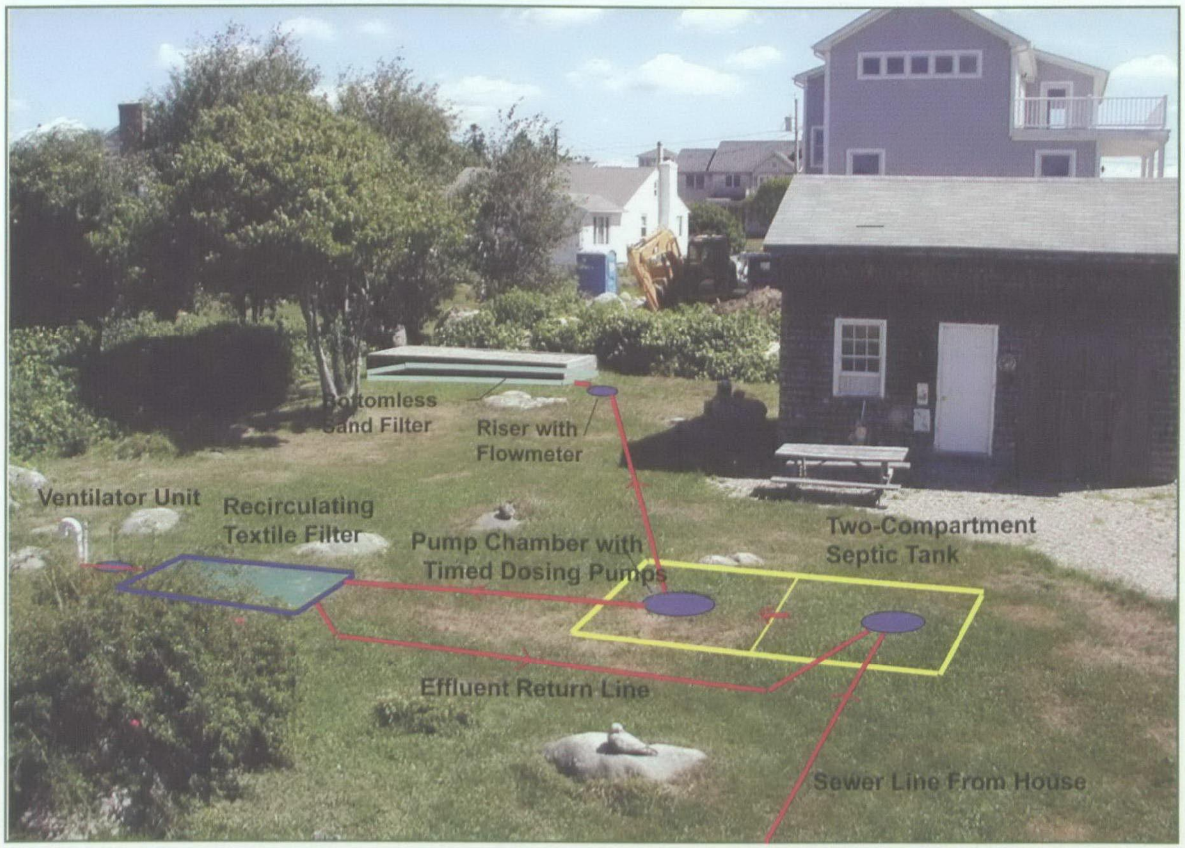
Surfacing cesspool before repair -- near house.

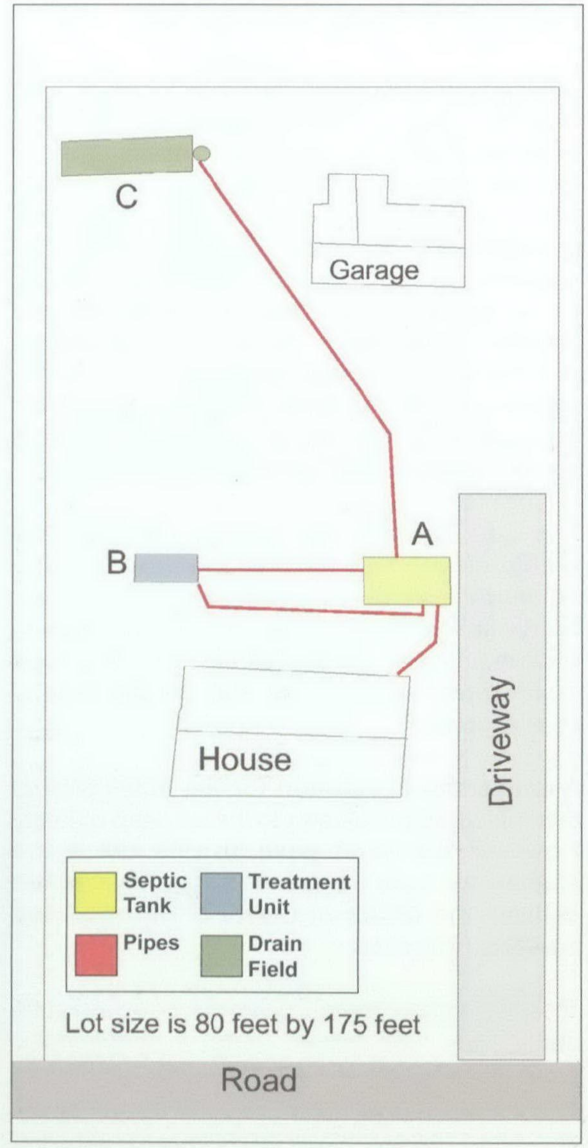


The typical conventional septic system fix would completely alter the lot, and most of the yard would be required.

A recirculating media filter was selected as the treatment unit that could effectively overcome the constraints presented by the site. A bottomless sand filter was added to provide additional treatment. With this system, the wastewater flows from the house into a septic tank with two pumps controlled by separate timers. One pump recirculates the effluent to a media filter, and the other disperses this blended effluent to the raised bottomless sand filter, located on the highest point in the yard.

The media filter was selected for its small footprint and nitrogen-reducing performance. In fact, this alternative system provides a minimum of 50% nitrogen removal to help protect nearby coastal waters. The bottomless sand filter was the only drainfield option available for this high water table site. It provides bacterial reduction and avoids large amounts of fill material. The alternative system significantly minimizes site disturbance and surface topography changes that would have altered stormwater movement. It blends into the landscape, among boulders and trees, while providing a much higher level of treatment than a conventional system could offer. Thus, the use of an alternative treatment system on this real-world site maintained distinctive natural and architectural features of the property while protecting public and environmental health.





Flow from the house enters septic tank (A), recirculates to the media filter (B) and is then pumped to the bottomless sand filter for final treatment and dispersal (C). The alternative system fits into the landscape, amid boulders and trees while providing a much higher level of treatment than a conventional system.

Case #2: A Small Summer Lot

Homes in this low-lying, sandy soil coastal plain are primarily seasonally-occupied, and they often experience intense summer use. The home on this site, like most of the older homes in this working class summer resort neighborhood, dates back to the period between the 1950s and 1970s. The house is situated on a small, 50-foot by 100-foot lot. In fact, lots of five thousand square feet are common for the area. The site is approximately 300 feet from a coastal pond. Well and septic system setbacks are rarely met, and wells on both the case study site and a neighboring lot were approximately 50 feet from the failed cesspool.

The goal for this site was to maintain the architectural and natural elements of the neighborhood by avoiding large, obtrusive, raised fill systems. An additional goal was to remove nitrogen and bacteria in order to protect groundwater supplies as well as the nearby coastal pond.

A conventional solution for the small size of this lot would have been to install deep galleys. However, the water table on this site is too shallow for such a system, and galleys do not achieve the necessary level of nitrogen and bacteria reduction.

To save limited space, a modular recirculating media filter was placed under a cantilevered room of the house, leaving the remaining 15-foot by 50-foot usable backyard space for the septic tank and shallow, narrow drainfield. Wastewater from the home enters the septic tank, where it then recirculates to the media filter that fits in the crawl space under the cantilevered room of the house. The wastewater is dosed to the shallow, narrow drainfield where additional treatment occurs.

The Constraints

- A small lot
- Low-lying, sandy soil in a nitrogen- and bacteria-sensitive coastal area
- Intense summer use
- Nearby private wells

The Existing System

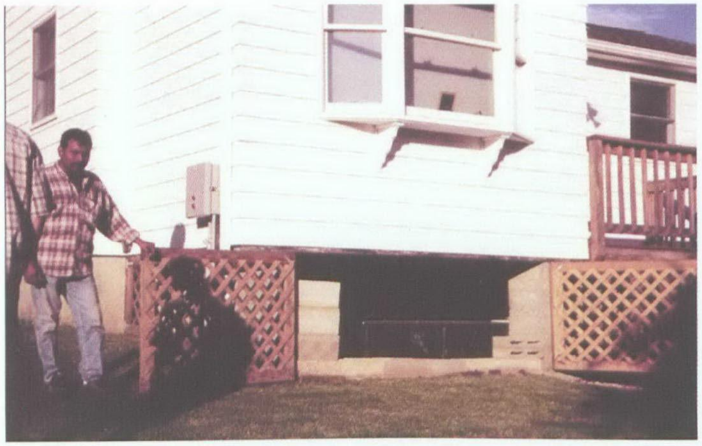
- A failed cesspool

The Solution

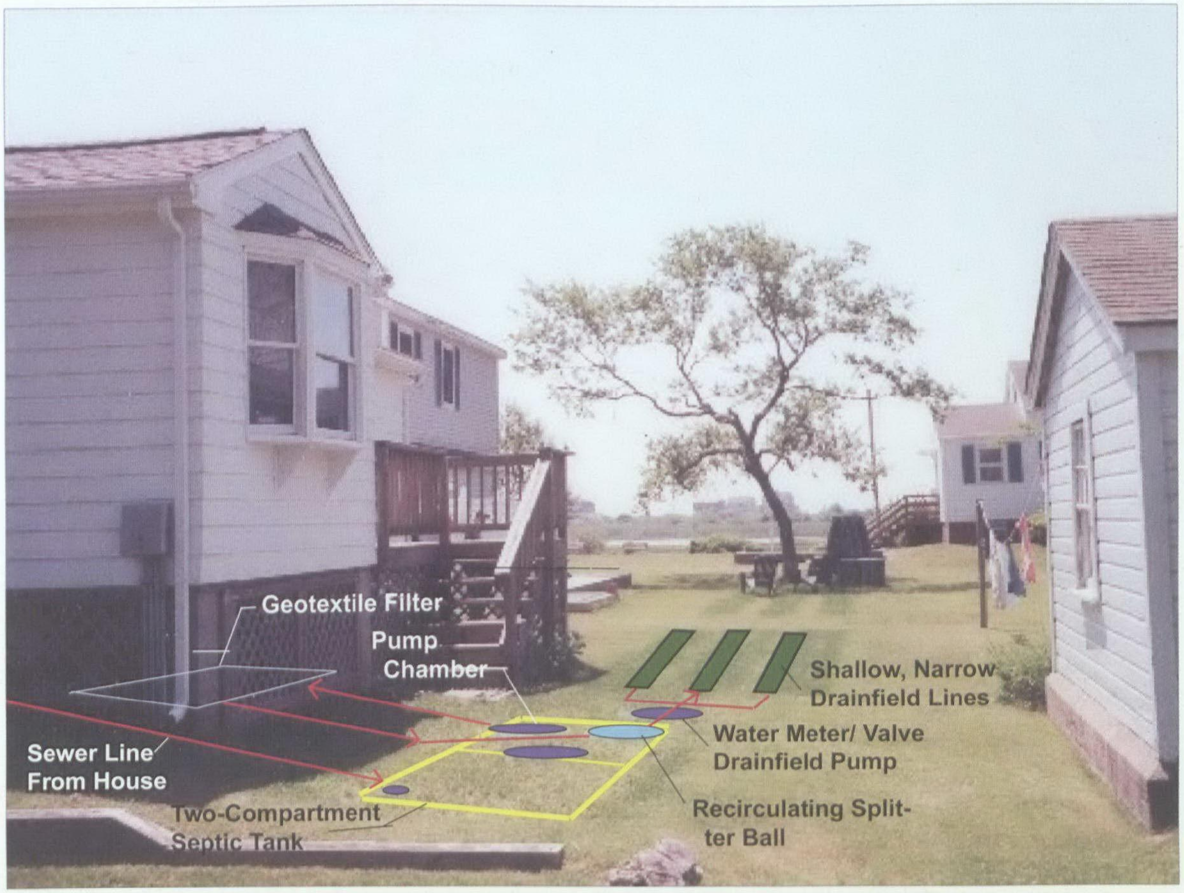
- A modular recirculating media filter
- A shallow, narrow drainfield

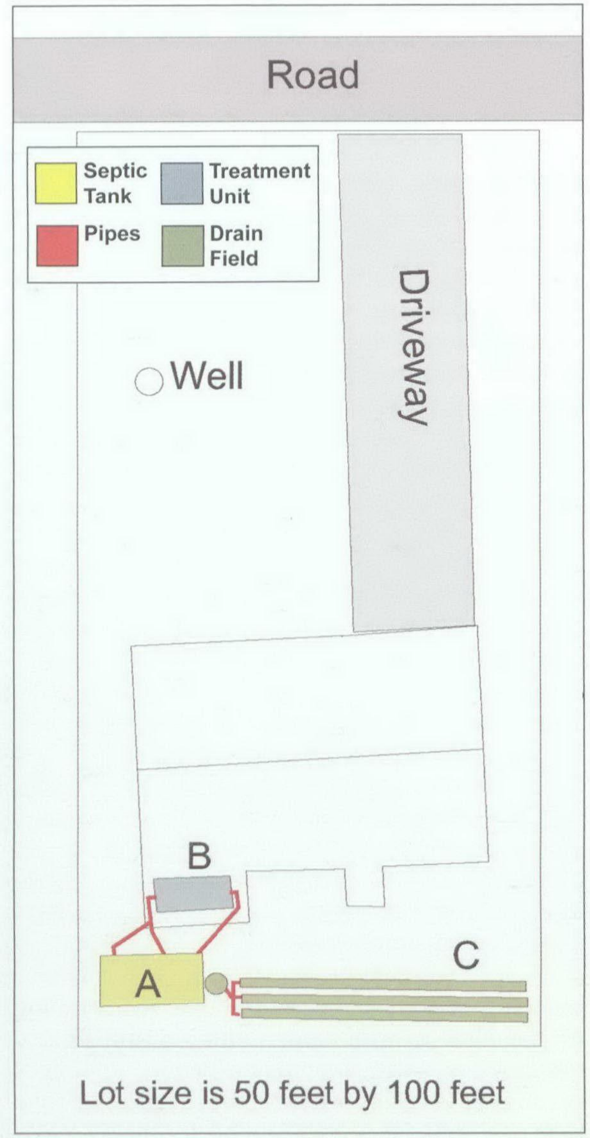
The house sits on a narrow 5000 square foot lot, with little room for a conventional septic system.

An aerial view of the flat coastal plain, where many dense summer colonies were established in the days before septic systems were commonplace.



Two houses are shown in the left of the photo below. The drainfield can be seen in the center, with the coastal pond in the background approximately 300 feet away. A separate shallow, narrow drainfield for the neighboring lot can be seen in the background of the photo below. The recirculating media filter is shown, left and below, located in the crawl space under the cantilevered bay window.





The system layout above shows the septic tank (A), media filter (B) and drainfield (C). Wastewater from the home enters the septic tank, where it then recirculates to the media filter in the crawl space, then is dosed to the shallow narrow drainfield where additional treatment occurs.

Case #3: A Sustainable Landscape for Lawn-Lovers

This one-third-acre lot is located in a flat coastal plain with sandy soils and an eight-foot-deep water table. Homes in this area are typically 1950s vintage, with about half occupied year-round. The existing system consisted of a cesspool that had hydraulically failed and was surfacing. **The homeowner's primary objective was to maintain a vigorously growing turf on the landscaped site. Another important objective for this site was to remove nitrogen**, so although a conventional system easily could have been accommodated on the lot, it would not have provided the desired treatment level. A standard trench drainfield or shallow leaching chambers may also have been used as a conventional option, although the homeowner would have missed the opportunity to reuse the moisture and nutrients for his lawn that are circulated by the alternative system that was chosen.

The system selected was a septic tank followed by a pump tank that doses a drip-irrigated field. The drip irrigation tubing was installed six inches below ground surface to maximize nutrient and moisture use by the turf. Although the yard was large enough to accommodate almost any technology, the drip irrigation fit well on the site because there was sufficient space to accommodate the required amount of drip tubing. **Recycling wastewater in the irrigation system has the additional benefit of conserving well water that the homeowner would have used to water the lawn.**

In this system, wastewater from the home enters the septic tank where solids settle. Effluent flows to the dosing tank and is pumped through disc filters that remove fine organic particles that might clog the drip irrigation lines. A sand-lined, shallow narrow drainfield was also installed as a backup to the drip field.

The Constraints

- A nitrogen-sensitive coastal site
- A landscaped lot with well established and valued lawn

The Existing System

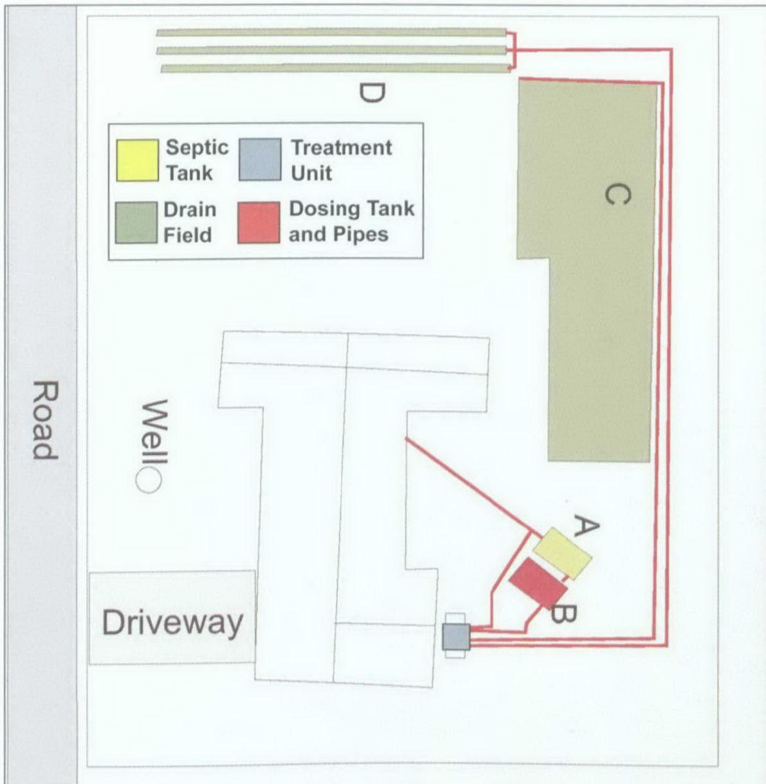
- A failed cesspool

The Solution

- A septic tank and a disc filter
- A dosed, drip-irrigated field
- Reuse of treated wastewater to maintain lawn

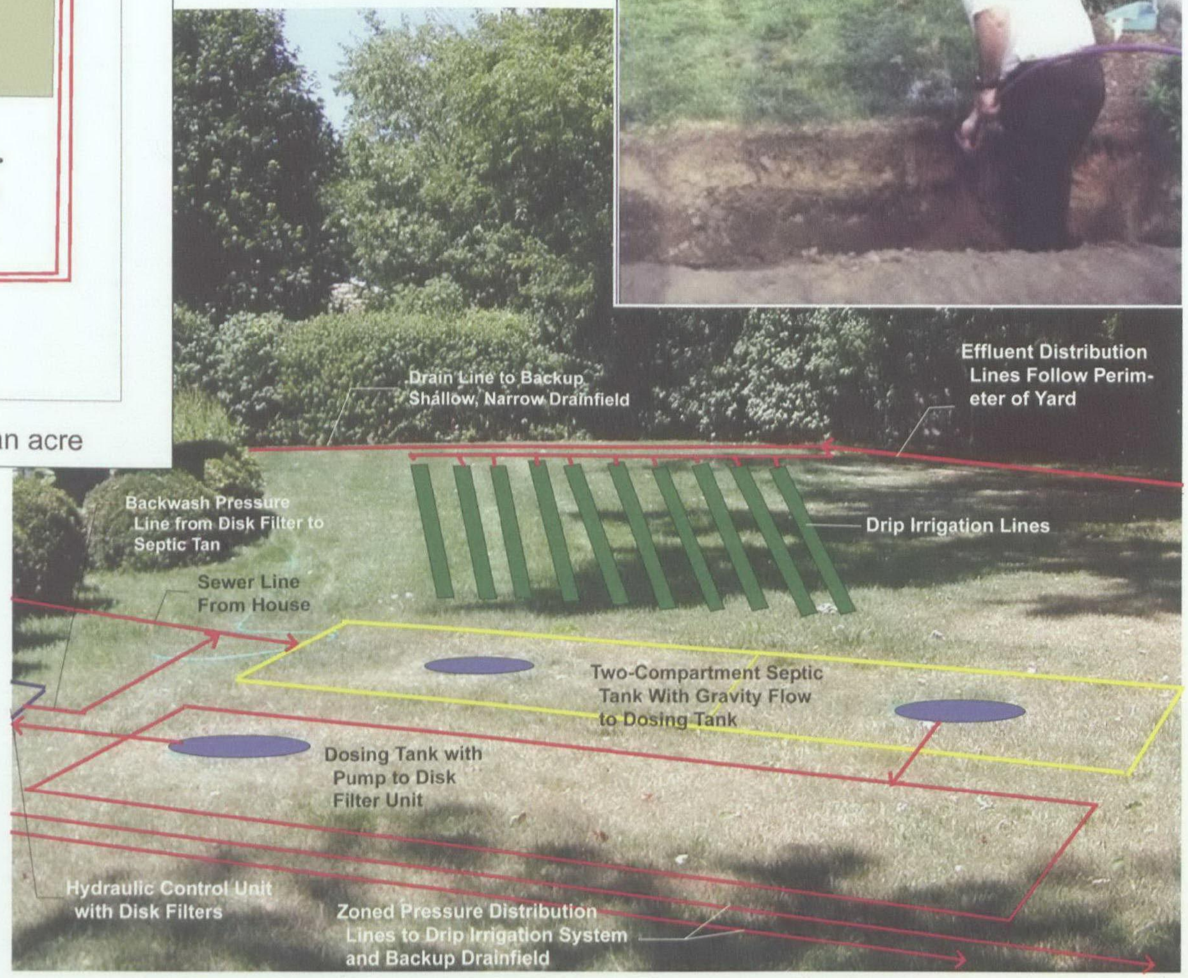
A Fertilizer Caution

The application of fertilizers to promote lawn growth can offset the nutrient reduction achieved by an alternative wastewater treatment system. To promote a healthy lawn using sustainable practices, experts suggest that you use no more than one pound of slow-release fertilizer per one thousand square feet and that you return clippings to the lawn.



Lot size is approximately one-third of an acre

Drip irrigation lines can be installed with relatively light equipment (right). There is minimal damage to existing lawn areas, and tree roots that would be cut by conventional deep trenches do not have to be disturbed.



The layout of the drip irrigation system is shown above. Wastewater from the home enters the septic tank (A) where solids settle. Effluent flows to the dosing tank (B) and is pumped through disc filters that remove fine organic particles that might clog the drip irrigation lines (C). A sand-lined, shallow, narrow drainfield (D) was also installed as a backup to the drip field but has not been used.

The drip irrigation lines drawn in green on the photo, right, were installed with a vibratory plough that caused little disturbance to the lawn. In addition, the contractor was able to minimize further damage by removing and then replacing topsoil in the areas of installation.

Case #4: A Site With Unique Wetlands

This sandy soil lot is half of an acre and is located close to a small, yet environmentally-important, vernal pool. Vernal pools are a type of wetland that occur primarily during the wet spring season, and they provide a unique habitat for threatened species of amphibians. These vernal pools are located throughout several sites in this portion of the community. The topography of the site is slightly rolling, and it has a high water table at about three feet. This home, along with others in the neighborhood, relies on well water. The existing system on the site was a failed, bed-type drainfield.

The primary treatment objective in this process of selecting a wastewater system was to maximize bacteria and phosphorus removal, enhancing the protection of the drinking water well and the unique wetland feature.

A single-pass sand filter was selected for this site because it is a reliable pathogen removal technology, used for more than 100 years to treat water and wastewater. The single-pass sand filter is more effective in removing bacteria than a recirculating filter, which excels in nitrogen reduction. In addition, single-pass sand filters are larger than recirculating media filters, and space was available on this site. The shallow, narrow drainfield provides additional nitrogen and bacteria removal to protect groundwater and phosphorus treatment to protect the vernal pool from nutrient enrichment.

This system required little site alteration, which prevented disruption of the wetland buffer and allowed existing landscaping to remain. A conventional septic system would have required clearing, regrading, and filling to adjust for slopes and to raise the drainfield at least two feet to achieve the required separation to groundwater.

In this alternative system, wastewater from the home enters the septic tank. This effluent is then dosed to the single-pass sand filter. Final treated effluent is then dispersed to a shallow, narrow drainfield.

Vernal pools, which by definition exist only in the spring, support a unique variety of plants and animals that have adapted to these special conditions. These include a number of endangered amphibians that are easily displaced by any disturbance to nearby areas.

The Constraints

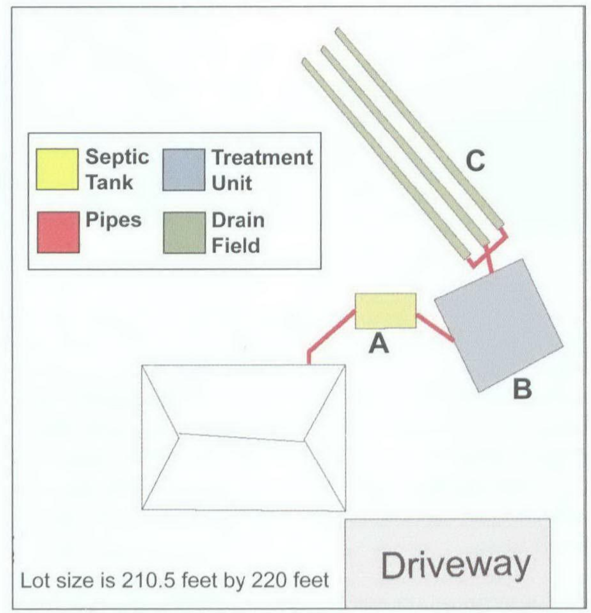
- A nearby, environmentally-important vernal pool
- A bacteria- and phosphorus-sensitive area
- Some existing landscaped area

The Existing System

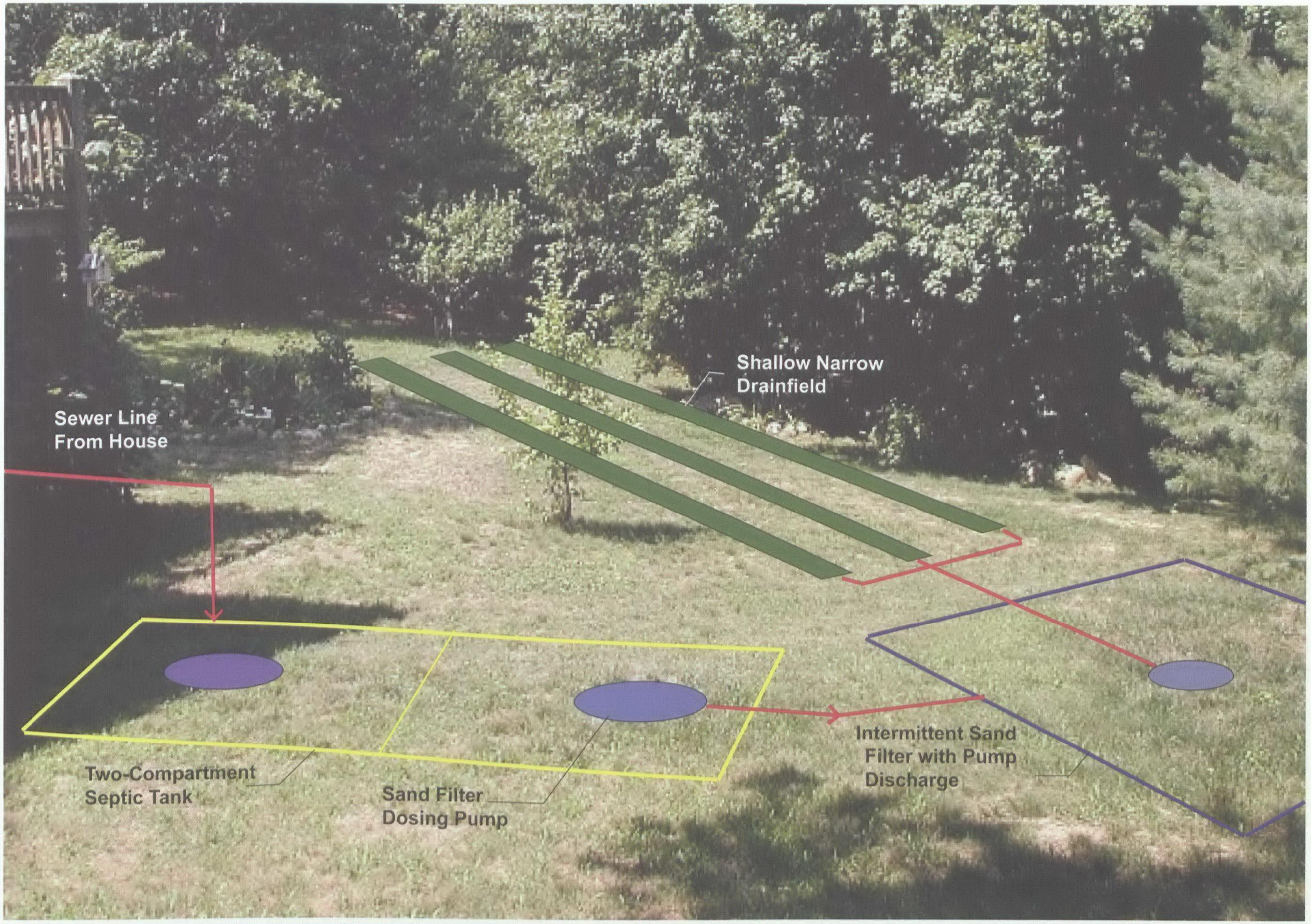
- A failed bed-type drainfield

The Solution

- A single-pass sand filter
- A shallow, narrow drainfield



The layout for a single-pass sand filter system on the lot with nearby well and wetlands is shown above. Wastewater from the home enters the septic tank (A), and this effluent is then dosed to the single-pass sand filter (B). Final treated effluent is then dispersed to a shallow narrow drainfield (C).



This photo provides a more detailed view of the lot. Wastewater flows by gravity from the home to a two-compartment septic tank. (The shadow of the house is visible on the left of the photo.) A pump located in the second half of the tank dispenses effluent to the sand filter, which is located just below the ground surface. The treated effluent is then pressure-dosed to the shallow drainfield. These units were installed without disturbing the existing landscaping and wooded wetland edges.

Case #5: A Small, Sandy-Soil Site

With a total area of 6,000 square feet, this site has extremely limited usable space to fit a house, septic system, well, and parking area. In addition, the site is located directly on the shore of a nitrogen-sensitive coastal pond that has been closed to shellfishing due to high bacteria levels, and nutrient enrichment at the shoreline of the property has caused an overabundant growth of nuisance algae. A dug well drawing from a shallow freshwater lens provides water to the 1950s vintage home. The existing failed system consisted of a series of two 55-gallon steel drums, an approximately 300-gallon steel septic tank, and a 600-gallon cesspool.

The primary objective for this site was to choose a wastewater treatment system that would retain existing landscaping and natural features within this coastal neighborhood, including views of the property from the water, while protecting the coastal pond and nearby well from nitrogen and bacteria. An equally important consideration was the small size of the lot.

Until a few years ago, the conventional option for such small lots with deep, sandy soils would have been a septic tank followed by deep concrete leaching chambers. This type of system has an extremely small footprint but provides little treatment. Instead, a septic tank, recirculating media filter, and shallow, narrow drainfield were chosen as an alternative system for this site. Wastewater from the house enters the septic tank where effluent is then pumped to the recirculating media filter. The treated effluent is then dosed to a two-zone shallow, narrow drainfield, half of which is located under the clothes line in between the home and the fence at the lot line.

The Constraints

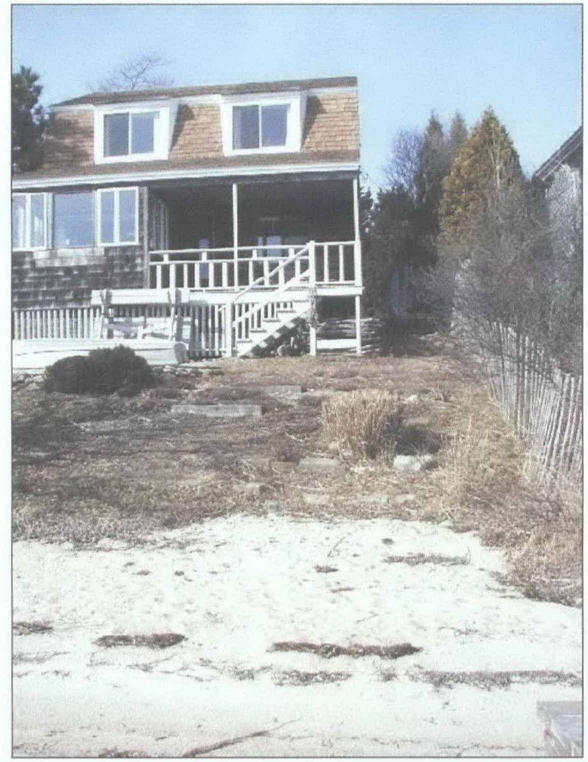
- Sandy soils
- An adjacent, nitrogen-sensitive coastal pond
- Existing high bacteria levels
- Extremely limited usable space

The Existing System

- Two 55-gallon steel drums
- 300-gallon steel septic tank
- 600-gallon cesspool

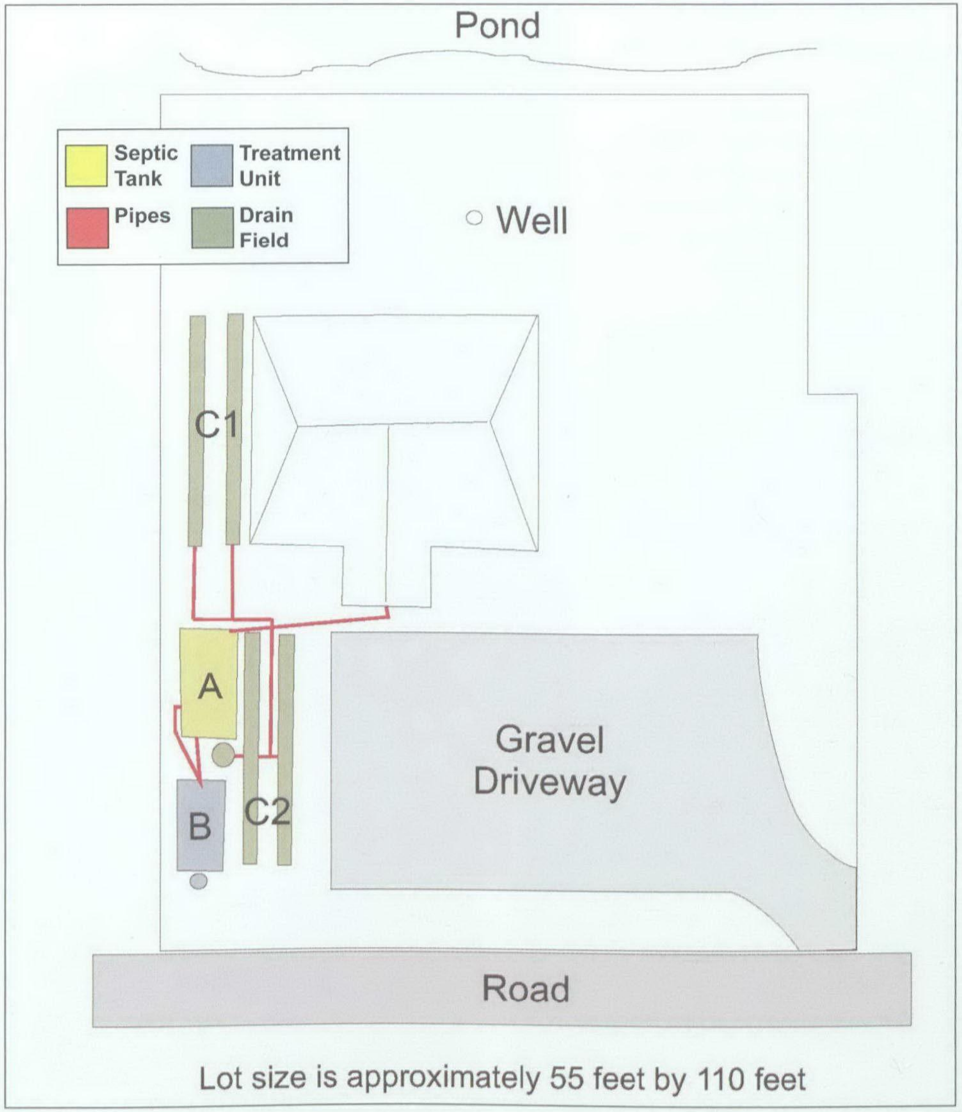
The Solution

- A recirculating media filter
- A shallow, narrow drainfield



The house occupies a narrow lot with a sandy beach directly on a coastal pond. A small space between the house and the fenced property line on the right, which now accommodates a clothesline, is the only available space for a drainfield.

Overabundant growth of nuisance algae caused by nutrient enrichment at the shoreline of this property is shown at right.



The layout for a recirculating media filter system for a lot with limited space is shown above. Wastewater from the house enters the septic tank (A) where effluent is then pumped to the recirculating media filter (B). The treated effluent is dosed to a two-zone shallow narrow drainfield (C1 and C2).

Two views of the recirculating media filter system are shown at right. Half of the drainfield is located under the clothes line, in between the home and the fence at the lot line.

Case #6: A Sloping, Landscaped Site

This one-half-acre lot has rocky, glacial-till soils, well-established landscaping, and many obstacles that render the site with little usable space in which to fit a conventional septic system repair. Although the site has a fairly deep water table and municipal water service, the adjacent coastal pond, located approximately one block from the site, is sensitive to nitrogen and bacterial inputs. This site's slope directs stormwater runoff directly to the coastal pond.

Due to the slope of this lot, a conventional system would have required extensive clearing with large amounts of machine time and gravel fill to enable level areas for drainfield lines. Equally importantly, a conventional system would have provided little nitrogen removal.

The alternative system selected had to fit into an area under an existing raised deck to save space and to preserve the existing landscaping. A series of alternative treatment units were chosen as the most effective method of wastewater treatment. These include a septic tank with a pump that doses a single-pass media filter, an ultraviolet light disinfection unit, and a shallow, narrow drainfield.

Wastewater from the house enters the septic tank where effluent is dosed to the single-pass media filters located under the deck. Treated wastewater then flows through the ultraviolet light disinfection unit and is dosed to the shallow, narrow drainfield adjacent to an existing fern garden.

The media filters come in pre-packaged modular units that provide flexibility in siting, simplify installation, and enable limited site disturbance to the lot during construction. The ultraviolet light disinfection unit provides an additional level of bacterial removal to help reduce the pollution risk from this system.

Using an alternative system on this sloping, landscaped site eliminated extensive filling and regrading of the lot, maintained the natural elements of the landscape, and achieved high levels of nitrogen and bacterial removal.

The Constraints

- Well-established landscaping
- Sloping lot
- Rocky soils
- An adjacent, nitrogen- and bacteria-sensitive coastal pond

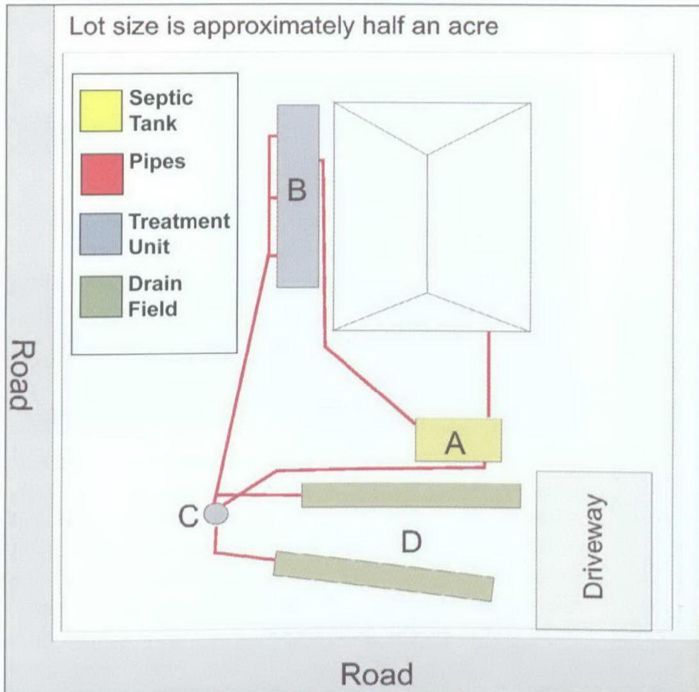
The Existing System

- A conventional septic tank
- A bed-type drainfield with some hydraulic failure

The Solution

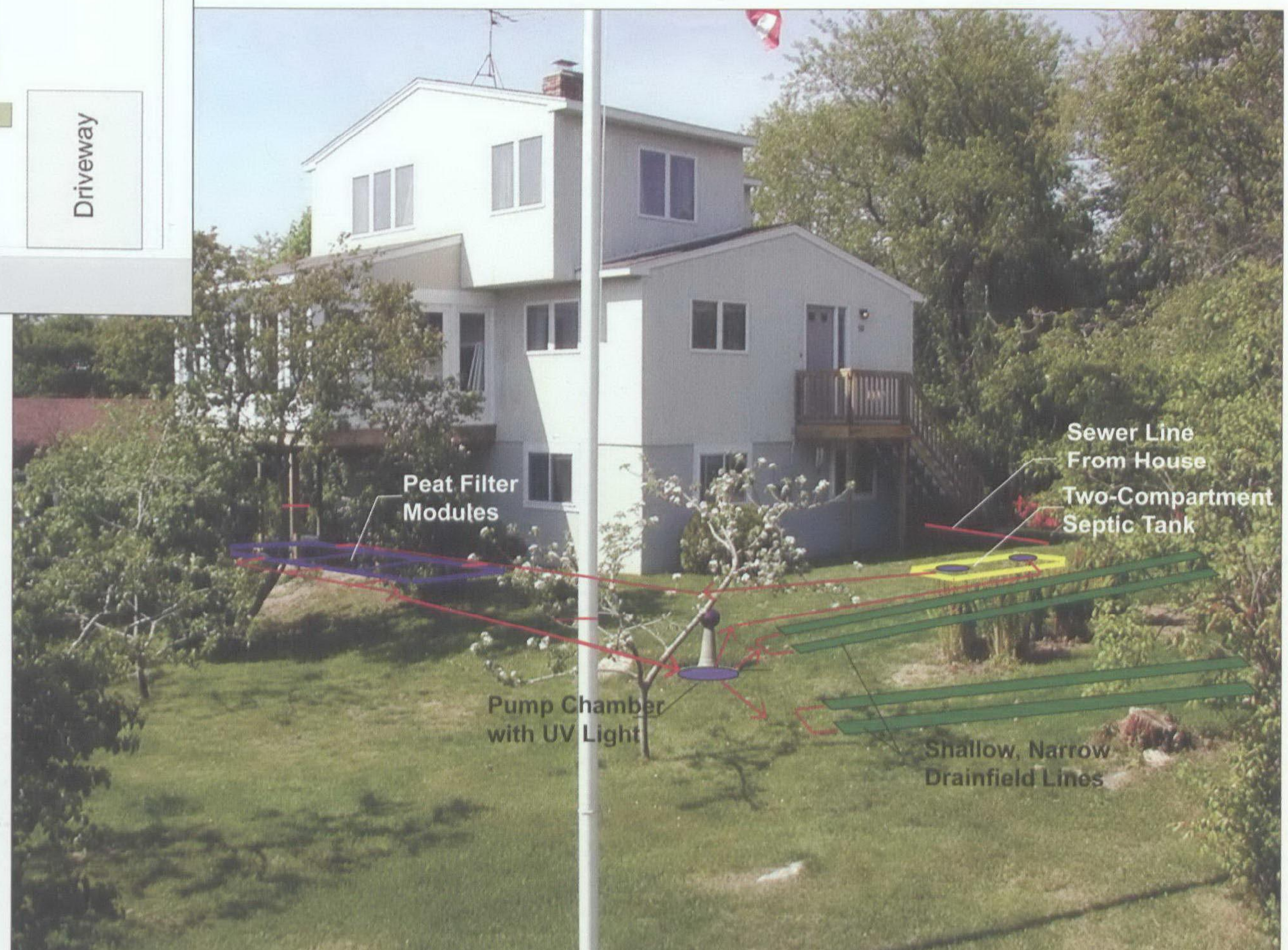
- A septic tank with a pump
- A single-pass, modular, media filter
- An ultraviolet light disinfection unit
- A shallow, narrow drainfield

The sloping lot increases the potential impact of a conventional system.



The system is designed for a sloping site where bacterial removal is important. The layout is shown at left. Wastewater from the house enters the septic tank (A) where effluent is dosed to the single-pass media filters (B) located under the deck. Treated wastewater flows through an ultraviolet light disinfection unit (C) and then is dosed to the shallow narrow drainfield (D).

The modular media filters were located under the raised deck (photo, bottom left) to save space and fit into the existing landscape.



Case #7: A Tiny Waterfront Lot

Homes on postage stamp sized lots had little impact on water quality when first built decades ago. But now, with years of infill development and the shift to year-round use, the summer cottage neighborhood has hastened the loss of recreational and commercial use of a water resource.

The next example is one such lot, located on a peninsula, surrounded by a poorly flushed coastal pond that is permanently closed to shellfishing due to bacterial levels. The pond is also showing signs of nitrogen enrichment. This roughly 4,000 square-foot lot has very limited space, and a conventional system would neither fit on the site nor would it protect the pond. Even the most advanced treatment systems would not fit in the available space on this lot.

In order to meet the space and treatment demands of this site, a system incorporating fixed activated sludge technology was installed. This is a space saver system because the treatment unit itself actually rests within the septic tank, eliminating the need for separate space to fit the treatment unit. A recirculating media filter also would have been appropriate for this site, but it would have used slightly more space. This technology, followed by an ultraviolet light disinfection unit, minimizes inputs of nitrogen and bacteria from this particular lot, protects the receiving water body, and has as small a footprint as possible. This example illustrates the use of alternative technology to maintain the quaint charm of a neighborhood, while allowing the landowner to renovate and revitalize his home.

The Constraints

- Extremely limited usable space
- A nitrogen- and bacteria-sensitive coastal area

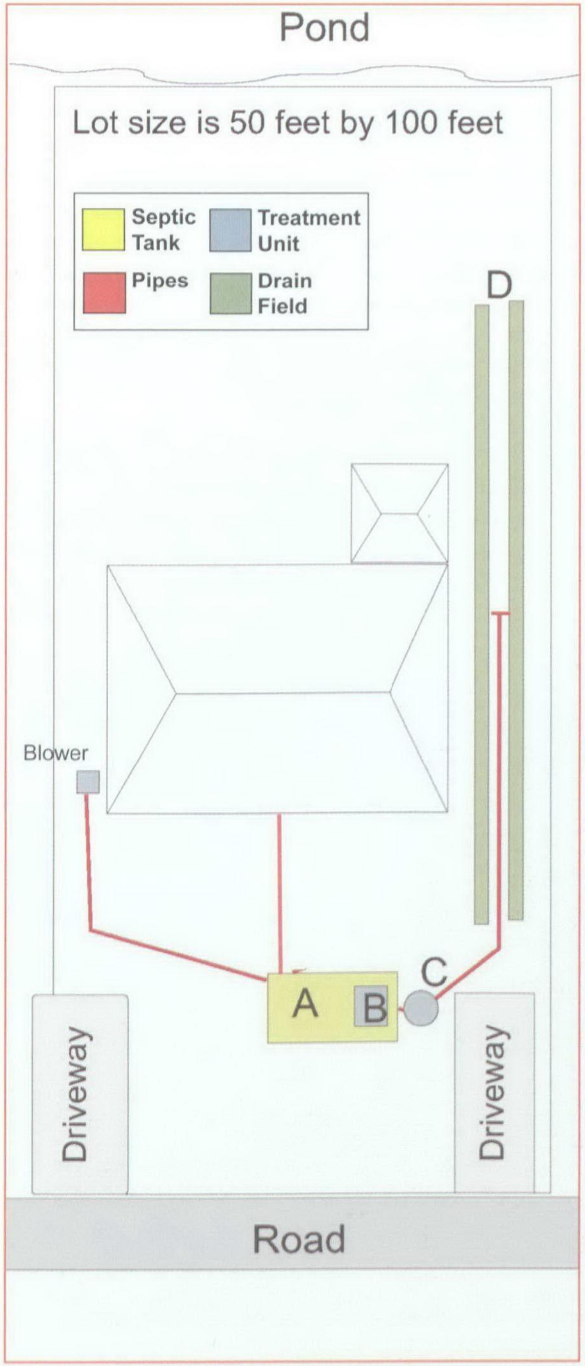
The Existing System

- 325-gallon steel septic tank
- A bed-type drainfield in contact with the water table during the wet season

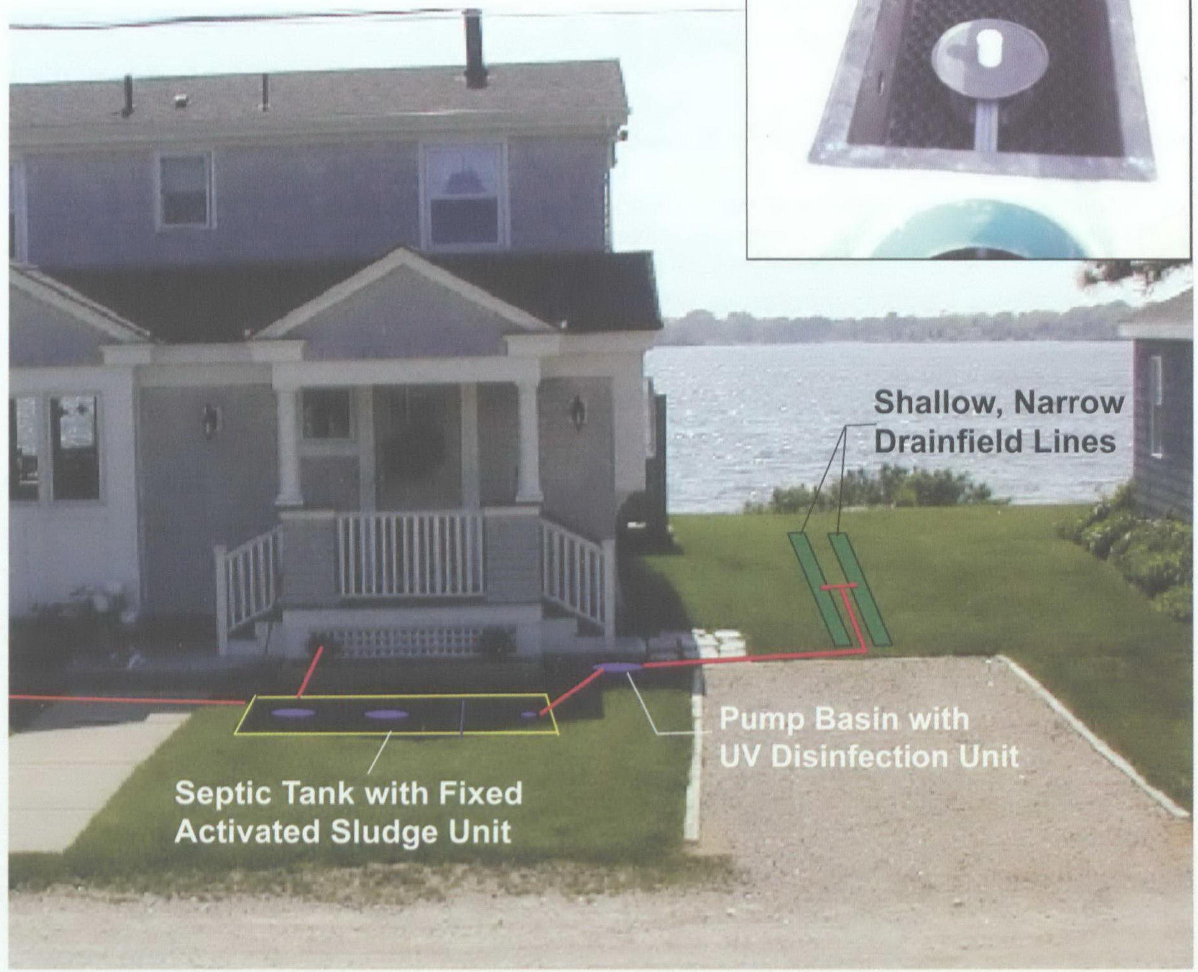
The Solution

- Fixed activated sludge technology
- An ultraviolet light disinfection unit
- A shallow, narrow drainfield

A small footprint system was required for this lot with very limited space. The existing house was originally a seasonal home with a building footprint less than 600 sq. ft (above). With remodeling, the footprint was slightly enlarged (below). The number of bedrooms remained the same, keeping potential occupancy at the same level and preventing an increase in nutrient loading.



As shown in the diagram (left), wastewater from the house enters the septic tank (A) and flows through the fixed activated sludge system (B). Treated wastewater flows through an ultraviolet light disinfection unit (C) and then is dosed to the shallow narrow drainfield (D). The fixed activated sludge unit sits inside the septic tank, producing a small system footprint (right).



This chapter attempts to help the reader understand the fundamental principles of system placement, setback, landscaping, and aesthetic issues that often determine how the property owner and neighbors feel about the system. Although it is the designer's responsibility to make sure the system meets all of these parameters, it is certainly advantageous for a homeowner to have basic knowledge about how a system should look, how it can fit the home landscape, or how it can blend into a subdivision without looking obtrusive. The following case studies illustrate how attention to the aesthetic impacts of a system can produce a finished product that blends more naturally into the surrounding environment.

Alternatives to Above-Ground Treatment

On this small flat coastal plain lot (photo, below) located in the watershed of a nitrogen-sensitive coastal pond, a recirculating media filter was installed to achieve a state-imposed discharge standard of at least 50 percent total nitrogen reduction. Although this technology was a good choice for this area from a treatment and space allocation perspective, the designer insisted upon using a conventional (gravity-fed) drainfield. The media filter serves the house on the left, where only a corner is barely visible; the fence behind the tank and filter mark the adjoining property boundary with the house in the background.

A single family home with a raised, recirculating media filter and conventional gravity flow drainfield.

The recirculating media filter, which is raised well above the original ground surface and landscaped with native shrubs, uses up more space than actually needed. It effectively limits the owner's use of that portion of their property and creates an aesthetic concern.

Incorporating the following simple changes would have allowed the homeowner greater use of the yard space.

- **Tank risers should be trimmed flush with the ground surface so a lawn mower could move directly over them.**
- **A second pump could have been used to dose a shallow, narrow drainfield rather than using a conventional gravity-fed drainfield.**

This would have required one more pump, but the advantages would be:

1) the media filter would be flush with the ground surface, blending into the existing landscape more easily;
2) a shallow narrow drainfield could have been installed easily with minimal disturbance of the yard; and
3) the shallow narrow drainfield would also provide additional wastewater treatment. Recent studies show additional nitrogen and total phosphorus removal rates in shallow drainfields range, respectively, from 33 to 55 percent annually and from 55 to 100 percent annually (Holden, 2004).

Paying Attention to the Details

It is important to consider how the system will blend with surrounding properties. In the photo (below) the site in the foreground shows a treatment system with a shallow, narrow drainfield. This is apparent by the strips of greener grass. When the neighbor to the rear decided to replace his system with a similar advanced treatment system, the installer took care to line up the drainfields for a neater look. This is a minor point, but a nice touch from an installer who put a little extra thought and effort into system aesthetics.

A conscientious installer, paying careful attention to detail, lined up the drainfield lines on these two separate lots to produce a more orderly and aesthetically pleasing look.

Placing System Components With Care

Two adjoining lots in a coastal pond neighborhood upgraded failed septic systems using advanced treatment systems. Recirculating media filters, followed by bottomless sand filter drainfields, were used to achieve several objectives. These systems needed to achieve nitrogen and bacterial removal, needed to fit on a small lot, and needed to accommodate high water table conditions. The orange line shown in the photo marks the property boundary; the treatment unit is outlined in yellow, and the bottomless sand filter is on the right of the pine tree (below, left).

Unfortunately for the homeowner, the system components became the focal point of the landscape when placed in a highly visible, open area. An alternative placement scenario could have been to site the treatment unit along the property boundary, as shown in the foreground. The bottomless sand filter could have been designed as a long narrow rectangle and sited along the hedge line to the right of the current location, as shown with the dashed blue line. In addition to opening up more usable space, a long rectangular bottomless sand filter configuration actually functions more effectively, and it is easier to install and maintain.

In the adjoining lot shown below, right, similar redesign would have allowed greater use of the property and avoided the need for costly landscaping to camouflage treatment units. The property boundary, as shown by the orange line, extends beyond the left side of the photo, with space at the corner of the property, left of the telephone pole, for the treatment unit. The bottomless sand filter, located in front of the shed at the rear of the property, currently blocks the shed door, preventing it from opening fully. The bottomless sand filter could have been designed in a long rectangular shape and sited along the hedge following the property boundary on the left.

Two properties where redesign of system components would allow greater use and aesthetic enjoyment.

The case studies in the previous chapters offer basic tips to help systems blend into the home landscape. When systems are sited with care and with attention to detail, system owners and neighbors can appreciate the flexibility of the technology and focus upon the aesthetic quality of the property rather than the treatment system. The following is offered as a checklist for fitting alternative systems into the landscape:

Site Aesthetics

- ☐ Work with the existing topography, buildings, and vegetation to blend components into the landscape.
- ☐ Will any treatment units be above ground? Special care is needed to fit these into the landscape unobtrusively.
- ☐ Place components along existing edges such as vegetation borders, shrub rows, driveways, or stone walls.
- ☐ Whenever possible, avoid putting units in the middle of lawns or other open spaces.
- ☐ Use natural materials such as wooden timbers and rocks to encase the sides of treatment units.
- ☐ Small modular treatment units can be tucked into crawl spaces and under decks, provided access is maintained.

Property Enjoyment

- ☐ Where possible, locate treatment units and drainfields away from high-use areas.
- ☐ Electrical panel boxes can be noisy, as switches controlling pumps go on and off. These should be located on the outside of utility walls or high-use areas such as garages, entryways, or kitchens where refrigerators, air conditioners, or other utilities already create some noise.
- ☐ When locating shallow, narrow drainfields in playing fields, cover inspection ports with turf for safety but tag them beforehand with metal markers to easily identify with a metal detector when maintenance is due.
- ☐ Activated charcoal pads can be inserted at the top of drainfield inspection ports if odors are a problem.

System Functioning

- ☐ Keep in mind the convenience and safety of maintenance providers. Locate panel box for easy access.
- ☐ Use grade changes to avoid an additional pump. For example, when using a recirculating system, locate the bottom of the treatment unit up gradient of the inlet of the recirculating tank, thereby allowing gravity flow back to the tank.

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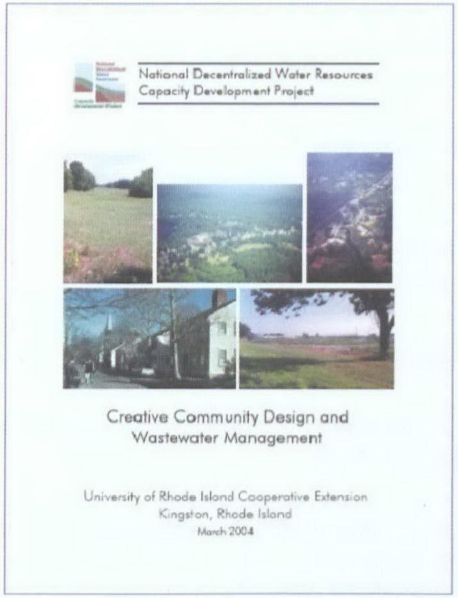
Photo credits – unless otherwise noted all system diagrams are from the University of Rhode Island Cooperative Extension Water Quality Program.

Further information about alternative wastewater treatment can be found at:

http://www.uri.edu/ce/wq

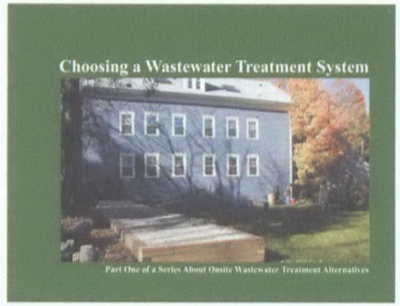
http://www.onsiteconsortium.org

http://www.nesc.wvu.edu/nsfc/nsfc_index.htm

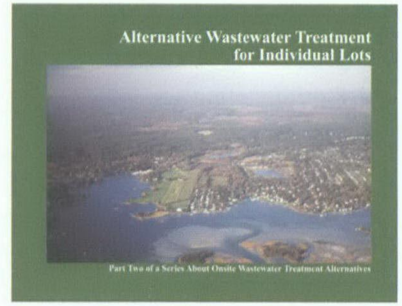


This series is condensed from "Creative Community Design and Wastewater Management", prepared by URI Cooperative Extension for the National Decentralized Water Resources Capacity Development Project (NDWRCDP). The full report is available at the NDWRCDP website at http://www.ndwrcdp.org/publications.cfm

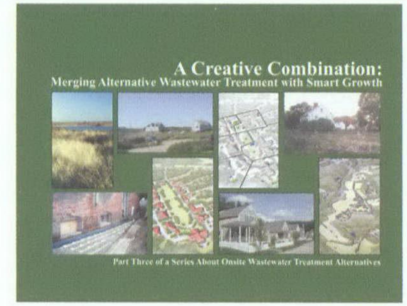
For additional information, please consult the other manuals in this series:



Overview of conventional alternative onsite wastewater technologies available to homowners and communities



Case studies illustrating use of alternative systems as repairs to address unique site constraints and meet specific treatment objectives



A community guide to use of onsite wastewater treatment systems and creative development design to achieve more compact "smart growth" land use

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Applying knowledge to improve water quality

SAFEWATER

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