Texas On-Site Insights
Information about On-Site Wastewater Treatment Systems in Texas
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Texas A&M Researchers Receive Grant to Study Performance of Constructed Wetlands for Wastewater Treatment

An interdisciplinary team of Texas A&M University researchers and extension specialists has been awarded a grant to investigate the potential use of constructed wetlands for on-site wastewater treatment.

The grant was awarded through the urban Section 319 program, that the Texas Natural Resource Conservation Commission administers for the EPA. Research will begin in September 1995 and run through August 1998. Lead investigators include Bruce Lesikar, Guy Fipps, and Ann Kenimer of the Agricultural Engineering Department, Richard Weaver of the Soil and Crop Sciences Department, James Davis of the Wildlife and Fisheries Sciences Department, and Suresh Pillai of the Texas A&M University Agricultural Research Center at El Paso.

Bruce Lesikar (standing) helps install this septic tank in D'Hannis. The septic tank will work with a constructed wetlands to treat household water.

The overall goal of the study is to evaluate the use of "modified" constructed wetlands in many climatic regions of Texas. For example, the systems that will be tested have a smaller length to width ratio (2-3: 1) than designs that are now commonly used. The researchers modified the typical design to decrease the hydraulic loading, which may reduce the risk of clogging the bed media and could help minimize the possibility of "short-circuiting" the beds. Another important design change is the system that will be evaluated has shallower bed depths (1') and depths to water (0.75'). The researchers believe this will provide proportionally more surface area and will allow wastewater to contact more of the plant roots, thus increasing treatment. The system is designed primarily to reduce biochemical oxygen demand (BOD) and to remove ammonia. In most

systems, wastewater is routed from constructed wetlands to subsurface drip irrigation systems for disposal.

In the project, four demonstration sites will be established (most likely two in Brazos County and two in the greater Houston area). Four recently constructed wetlands at Stephenville, D'Hannis, and Weslaco will also be studied.

The on-site wastewater systems will be monitored for nitrogen and ammonia removal, using labeled nitrogen. The effectiveness of the system for removing such bacteria as fecal streptococci, fecal coliforms, coliphages, Clostridium, and Salmonella will also be evaluated. Management practices for preventing clogging of the drip irrigation system will be investigated by comparing continuous and intermittent chlorine injections. The need for acid injection to control clogging by dissolved minerals and root intrusion will also be examined.

The project includes technology transfer. The researchers will develop fact sheets on how to design, install, operate and maintain these systems. An educational video will be developed that describes the use of subsurface flow constructed wetlands for domestic wastewater treatment. Educational meetings will be conducted. For details, call Lesikar at (409) 845-7543 or Fipps at (409) 845-3977.

'Environmentally Friendly' Landscape

Council Funds Project to Study Performance of Composting Toilets and Greywater Wetland Treatment Systems

The effectiveness of the use of composting toilets to treat blackwater as part of an environmentally friendly landscape will be evaluated in a new research project sponsored by the Texas On-Site Wastewater Treatment Research Council. The greywater portion of the household wastewater will be treated by a subsurface flow wetland treatment system. Part of the effluent will be recycled back for use in a low-flow composting toilet, while the rest will be used for on-site landscape irrigation.

Sherwood Reed, a national expert on wetlands wastewater treatment systems with Environmental Engineering Consultants of Norwich, VT, and Susan Parten of Community Environmental Services, Inc. (CES) from Austin will design the wetland greywater treatment system. The landscaped final disposal system is being developed by Pliny Fisk III of the Center for Maximum Potential Building Systems, and Parten and Janet Dunkelberg of CES.

The project involves developing a landscaped natural treatment system (LNTS) at a site in East Austin. The project will assess the viability of a prototype residential-scale landscape that provides environmentally sound wastewater treatment and protects human health. Goals of the study are to address common concerns about the use and performance of alternative wastewater treatment systems, to document the performance of this type of system, and to educate the public about the environmental and economic benefits of these systems.

Pliny Fisk (at left), Susan Parten (middle) and Janet Dunkelberg stand in front of a demonstration home where innovative on-site systems will be used to treat grey and black water.

The study focuses on the use of composting toilets to provide primary treatment and to supply treated greywater to irrigate the LNTS. Blackwater will be supplied by toilets and garbage disposals. Blackwater and greywater will be treated separately. A compost chamber will treat organic solids and blackwater, while a settling tank and a microbial rock reed filter will treat the greywater. The system is designed so that excess liquids flow from the compost chamber into the settling tank. Excess treated greywater not used for the low-flow composting toilet will supply water to a low pressure dosing system. The dosing will provide subsurface irrigation for the landscape.

The study will incorporate the combined use of flush toilets and composting toilets to see if they are acceptable to potential users; will design a low maintenance system that provides homeowners with access to finished composted material; and will allow users to operate a low flow composting toilet with treated greywater. Key water quality and composting parameters will be tested at the City of Austin's Center for Environmental Research at Hornsby Bend.

Statewide cooperators include the Texas State Energy Conservation Office and the Texas Department of Health. Regional partners include the Texas Capital Area Builders Association, the Austin/ Travis County Health Dept., the Lower Colorado River Authority, Southern Union Gas, and the City of Austin's Environmental and Conservation Services Dept., Electric Utility Department, Green Builder Program, and Water and Wastewater Utility. For details, call Fisk at (512) 928-4786 or Parten at (512) 443-2733.

Texas On-Site Insights *Now Available Via Internet, Modem*

Information about on-site wastewater issues, including *Texas On-Site Insights*, is now on the "information superhighway" and can be accessed through a personal computer. Ric Jensen, Steve Fuller, and Jonathan Jones of the Texas Water Resources Institute have developed a world wide web (WWW) page called "Texas WaterNet." It allows users to access information on many of its research and technology transfer programs, including *Texas On-Site Insights.*

To access the full text and graphics on the WWW site, you need to have a WWW browser like Mosaic, Netscape or Lynx. The URL for Texas WaterNet is <http://twri.tamu/>. To view the text and graphics, you should have an internet connection or a high speed modem. Even with a slower modem, you will still be able to view the text. One section of the WWW page now contains the text, graphics, and photographs from the two most recent issues of *Texas On-Site Insights*. Future plans for this section of the WWW site include posting all the back issues, general information about the Texas On-site Wastewater Treatment Research Council, breaking information on publications and conferences, and links to sites with other related information.

For computer related questions about how to access the site, contact Fuller or Jones at (409) 845-8572. For more information about this project, contact Jensen at (409) 845-8571. Jensen's e-mail address is RJensen@tamu.edu.

ASAE Publishes Proceedings from 1994 International Conference

The American Society for Agricultural Engineering (ASAE) has published the proceedings from the 7th International Symposium on Individual and Small Community Sewage Systems, that was held in December 1994 in Atlanta, GA. The proceedings contains papers dealing with design and performance of constructed wetlands, impacts of on-site systems, field evaluation of alternative technologies, design and evaluation of sand filters, and small community options. For details, call ASAE at (616) 294-0300. The e-mail is hq@asae.org.

Texas On-Site Council Annual Meeting Set for Feb. 26-28 in Austin

The Texas On-Site Wastewater Treatment Council will host its annual meeting Feb. 26-28 in Austin. The meeting, centered on the theme "We're Creating Solutions," will be at the Wyndham Austin Hotel.

Activities begin on Sunday, Feb. 26, with exhibitor registration and move-in and a welcome reception that runs from 5 to 7:30 PM.

On Monday morning beginning at 9 AM, the General Assembly will feature presentations by Sherwood Reed of EEC, Inc., of Norwich, Vermont, Kevin Sherman of the Florida Department of Health and Rehabilitative Services, Steven Steinbeck of the North Carolina Department of Environment, Health, and Natural Resources, Bob Rubin of the University of North Carolina, Bill Harris of Texas A&M University, and Warren Samuelson of the Texas Natural Resource Conservation Commission. Monday's concurrent sessions, which begin at 1 PM, focus on such issues as management of on-site programs, managing and maintaining on-site systems, site evaluation and system selection, and pump selection, installation, and maintenance.

On Tuesday morning, there will be concurrent sessions focusing on pretreatment, industry issues, disposal alternatives, and results of Council-funded research projects. The pretreatment session will feature presentations by Bruce Lesikar of Texas A&M University, Dudley Burton of Baylor University, David Venhuizen, and Andy Kruzic of

the University of Texas at Arlington. Tuesday afternoon sessions will focus on disposal alternatives, updates of regulations and legislation, and regulatory assistance for small businesses. A round-table discussion is scheduled for Tuesday afternoon that will focus on prioritizing research needs for the Council.

For more information about the meeting, call the On-Site Program Office of the TNRCC at (512) 239-6326. For more information on sponsorship and registration for the meeting, contact Barbara DuBose (210) 540-4196 or Denise Rhodes at (512) 482-0321. Registration at the door is $125. A limited number of free registrations are available to county on-site agencies. To reserve a room at the Wyndham, call (800) 433-2241.

EPA Clearinghouse Publishes New Journal For On-Site Systems

A new free journal dealing with on-site and small community wastewater treatment issues is being published by the EPA Small Flows Clearinghouse at West Virginia University.

The journal is titled *Small Flows.* The first issue was published in the Fall of 1994. Articles in the first issue dealt with such issues as the use of pressure sewers and a community septic system in New York, scum control in septic tanks, and how improvements in wastewater treatment are improving water quality in a Rhode Island bay.

To receive a sample copy or to subscribe to Small Flows, call the Clearinghouse at (800) 624-8301.

Construction of Henderson Constructed Wetlands Nearly Complete; Wastewater Treatment to Begin Soon

By Ric Jensen
Editor, Texas On-Site Insights

Construction is nearly complete and wastewater treatment and monitoring will begin soon at a constructed wetland funded in part by the Texas On-Site Wastewater Treatment Research Council.

The constructed wetland is being developed at the Rusk County Youth Exposition Center by a team led by Ken Awtrey of Pineywoods Resource Conservation and Development (RC&D), which is headquartered

John Herndon (far left), Stephan Gelwicks (middle) and Ken Autrey (far right) check on the progress of cattails that were planted in a constructed wetlands.

in Nacogdoches. The Council provided funding for the project to provide increased information on the ability and performance of constructed wetlands to treat on-site wastewater.

Lead individuals and agencies involved in the design and construction of the facility include John Herndon of Shaumberg and Polk Engineers, Inc., of Tyler, Stephan Gelwicks of the U.S.D.A./ Natural Resource Conservation Service (NRCS) in Henderson, and private consultant Dan Schellenberg of Kennard.

CONSTRUCTION ACTIVITIES

Stephan Gelwicks (far left), Ken Awtrey(middle), and John Herndon (far right) discuss how wastewaters will flow from the septic tank and sump into holding ponds

Throughout the construction phase of the project, many individuals and agencies provided more than 120 hours of volunteer labor and donated such equipment as bulldozers, backhoes, front-end loaders, and trucks. Some of the most active groups include various Rusk County agencies, the local office of the USDA/NRCS, and the Texas Forest Service.

Work to install a 10,000-gallon septic tank began in December of 1993. In the Spring of 1994, work began to construct two 43' x 118' holding ponds and the two 37' x 112' wetlands cells. A large amount of clay had to be transported to the site to line the ponds and prevent seepage. Work is still ongoing to slow erosion from the banks of the wetlands ponds. Shortly thereafter, the distribution system that transfers water from the septic tank to the ponds was built. In the Fall of 1994, the wetlands cells were planted with cattails and bulrushes that grow in the wild nearby. Hopefully, the system will begin receiving wastewater this Spring. Wastewater has not yet flowed through the system, because the project managers want the wetlands plants to become established first.

Awtrey said this constructed wetland was needed because the Exposition Center can generate as much as 5,000 gallons of wastewater each weekend. It's used heavily on the weekends by as many as 4,500 visitors who come to the Center for fairs, rodeos, and high school graduations. Before the wetland was installed, wastewater was held in a smaller septic tank and was collected by a hauler as needed.

HOW THE SYSTEM FUNCTIONS

The system works like this. First, wastewater is routed from the Exposition Center to a large septic tank. When wastewater reaches the top of the septic tank, it flows into a sump. When the sump fills, it trips pumps that send the wastewater into a holding pond. From the holding pond, wastewater will flow by gravity to two constructed wetlands cells and a second holding pond. Operators are able to control the volume of wastewater in the ponds, which will always be less than 2 feet deep. In the Summer, when rainfall is low, the holding pond will provide a source of water for the wetlands cells. The system is designed so that the cells can be operated individually, in parallel or in series.

Awtrey said there are a number of advantages to the system. It is winter hardy and is designed to provide adequate wastewater treatment in low temperatures. Treatment in winter months will be provided by BOD-reducing and denitrifying bacteria that will attach themselves to the plant roots. The plant's designers expect the constructed wetland will consistently produce effluent with relatively low levels of nitrogen and phosphorus.

Stephan Gelwicks of USDA/Natural Resources Conservation Service gathers cattails that will be planted in the constructed wetland. The project utilizes naturally growing wetlands plants that grow in the wild.

"This type of system could be a viable option for communities that are considering a mechanical plant and for individual homeowners, especially where soils are mainly clay and percolate poorly," Awtrey said. "It's a low cost-system because it's passive, uses little electricity, and the water mainly flows by gravity."

FUTURE ACTIVITIES

One of the goals of this project is to demonstrate first-hand that this type of on-site wastewater system is a functional, economic alternative for many communities in East Texas, Awtrey said. The site is designed for easy access so that many will want to come and see it in operation. Even though it hasn't yet begun operation, Awtrey said RC&Ds and local on-site agencies in Gilmer, Kilgore, and Gregg County have already shown an interest in learning more about the system and possibly using it in their areas.

Another anticipated product from this project is the development of a site-specific manual that Schellenberg is working on. It will be used to make sure the system runs properly

and will be made available to others who may need guidance on how to operate their own systems.

NOTE: For more information, call Awtrey at (409) 568-0414.

Benefits of Making a Computerized, Searchable, Bibliographics Database Available On-Line

By Susan Parten
Community Environmental Services, Inc., Austin, TX

In 1991, the Texas On-Site Wastewater Treatment Research Council funded the development of a large searchable bibliographic computerized database that contains information about on-site and small community treatment systems. The database was developed by Susan Parten and Howard Liljestrand of the University of Texas at Austin Civil Engineering Department, with assistance from the UT General Libraries staff. The original intent was to make the database available on-line , so it could be used by the public to perform literature searches by modem or internet.

The database was then updated several times after its development. It now contains approximately 10,500 citations, most of which are accompanied by abstracts. The main subject categories in the database are: 1) Waste generation and conveyance, 2) Waste treatment and disposal; 3) Economic aspects of on-site and small community systems; 4) Regulatory aspects of on-site treatment systems; 5) Community and individual system planning and management; 6) Animal waste treatment; 7) Industrial waste treatment; 8) Patents, and 9) Newspaper articles.

How can an on-line, regularly updated database benefit researchers and professionals working with on-site wastewater issues in Texas?

If an on-line, updated database were NOT available, individuals would have to do the following: 1) locate a library where on-line searches can be performed by a trained librarian or technician, 2) identify public and private online bibliographic databases, 3) select those databases that have the specific information you need, 4) assess the cost of performing searches from different sources, 5) conduct searches as costs allow, and 6) review each citation and abstract to see if it is relevant to your needs. However, if the database funded by the Council is regularly updated and made available on-line, this literature search process would be made much more simple and less expensive.

Updating the database and making it available on-line is important. It can provide valuable information for the Council and its staff, researchers, professionals engineers, sanitarians, and regulators working to address on-site wastewater issues.

NOTE: A questionnaire about the database will be circulated at the Texas On-Site Conference so that individuals can express interest in making the database available on-line. Parten can be contacted at CES at (512) 443-2733.

EPA Publishes Handbook on Septage Treatment, Disposal

The U.S. Environmental Protection Agency (EPA) has recently published a new handbook titled *Septage Treatment and Disposal* (EPA/ 625/R-94/002).

The handbook contains information on septage management options, methods to characterize septage, the design of receiving stations, land disposal, co-treatment of septage and sludge, independent treatment of septage, and operation and management considerations. Fact sheets and a state-by-state summary of septage regulations are also included.

The report can be obtained free by contacting the EPA Center for Environmental Research Information, Cincinnati, OH 45268. The phone number is (513) 569-7562.

New Book Explains Basics About On-Site Wastewater Systems

A new book, *Onsite Wastewater Treatment Systems,* has been published to help homeowners, practitioners, and policy makers learn more about septic systems. The book was co-authored by Bennette Burks, who heads Wisconsin's septic systems division, and Mary Margaret Minnis, who is an adjunct associate professor of Chemistry at Pace University.

The book is easy to read and can be used as an introductory text for engineering students, a guide for regulators and policy makers, and a reference book for homeowners who are thinking of buying a home with a septic system. The book also contains step-by-step instructions that readers can use to perform necessary calculations. The book contains sections dealing with the history of on-site wastewater systems, wastewater chemistry and biology, soil and site evaluations, hydraulics, wastewater treatment theory, alternative systems, design and installation, operations and maintenance, and advanced wastewater treatment methods.

To order, call Hogarth House, Ltd. at (800) 879-4214.

Developing an Innovative On-Site Wastewater Treatment System for a Hidalgo County Colonia

By Ric Jensen
Editor, Texas On-Site Insights

INTRODUCTION

According to estimates by the Texas Water Development Board (TWDB), Hidalgo County has the largest number of colonias in Texas and perhaps the U.S. For example, Hidalgo County's 765 colonias represent 60% of all such sites in Texas and 40% of all those nationally.

More than 50 of these Hidalgo County colonias lack drinking water, while roughly 85% do not have access to adequate on-site wastewater or sewer service. Conversely, roughly 44% of colonia residents in the County rely on cesspools, or pit privies. Meanwhile, another 50% are serviced by septic tanks and drainfields, many of which are inadequately sized and do not meet State standards.

Women in this south Texas colonia haul drinking water to their homes. Colonias are poor subdivisions that do not have adequate drinking water or wastewater treatment

Recently, assessments have been performed about the need for improved wastewater service in Hidalgo County colonias. In 1987, a broad Reconnaissance Study of colonia needs was conducted. In 1990, a Hidalgo County study focused specifically on how improved wastewater services could be provided to colonias.

Shortly after the 1990 study was completed, Hidalgo County applied for Economically Distressed Area Program (EDAP) funds from TWDB to improve water and wastewater service in 13 colonias, including El Paraiso. Hidalgo County officials have taken an "aggressive approach" to bring in TWDB funding to improve wastewater treatment. Through the Hidalgo County Water Development Board, the County pays 12.5% in required local matching funds.

A CASE STUDY: THE EL PARAISO PROJECT

El Paraiso is one of many colonias in Hidalgo County, TX, along the Texas-Mexico border. The El Paraiso colonia houses 780 residents who live in 211 homes. Most of these households do not have adequate wastewater treatment.

In 1991, Hidalgo County submitted a Phase I study to TWDB to fund an "innovative" wastewater treatment system. Senate Bill 2, passed by the Texas Legislature in 1988, required TWDB to consider "cost effective methods of wastewater treatment" including reed rock filters and root zone treatment.

Hidalgo County proposed that an innovative system be constructed that would provide primary wastewater treatment through 1,000 gallon interceptor tanks, a pump chamber, and a spin disc filter with automatic backwash capabilities. Treated effluent would be pumped through a series of 4" PVC pipes. The pipe would be installed 3 to 4 feet below

the surface so that it could be maneuvered around obstacles like trees and fences. Ultimately, the treated effluent would flow into a large drip irrigation field, where it would be used to irrigate trees and plants in a nursery that would be owned and operated by colonia residents. The system allowed for treated wastewater to be routed back to the collection tank, if needed, to help flush the system.

Many colonias include homes that lack even the most basic infrastructure and maintenance like this one. Only a few homes in colonias have adequate drinking water or on-site wastewater treatment.

Unfortunately, Hidalgo County officials said that there were difficulties in getting the system approved by the TWDB and the Texas Natural Resource Conservation Commission (TNRCC), which issues permits for and regulates on-site wastewater issues. Many of these issues centered around the "innovative" nature of the system. For example, the TNRCC asked that 23 acres be set aside for a disposal and drain field -- almost eight times more than the area that would be needed if individual conventional drainfields were constructed for each house in the colonia. There were also concerns by the TWDB about how well the system would perform. Hidalgo County officials say that even the system functioned at only 50% effectiveness, it would provide better treatment than now exists. Another obstacle was determining if a colonia would be able to repay the loan.

CURRENT STATUS OF THE EL PARAISO PROJECT

Recently, the TWDB EDAP program awarded a $180,000 grant to help design and plan an on-site system that will serve most of the homes in three of El Paraiso's subdivisions.

When construction begins later this year, it will cost $876,000 and will be financed by the U.S. Environmental Protection Agency's Colonias Wastewater Treatment Program and the TWDB EDAP program.

After the system is in place, plans are underway to monitor overall performance, groundwater levels and quality, and maintenance needs and costs. It is expected that EPA may provide funds to help pay for the monitoring effort.

NOTE: This project is now on hold. Hidalgo County is now working with TWDB to acquire land for effluent distribution. Information was taken from: 1) the January 1995

issue of the EPA "Small Flows" newsletter, and 2) a paper by Anthony Covacevich that was published in the Proceedings from the 1992 Texas On-Site Wastewater Conference. For details, contact Covacevich at (210) 318-2619 or Michael McDevitt at the TWDB at (512) 463-8503.

LCRA Assesses Pollution Potential From Near Coastal On-Site Systems

By Burt Carter
On-Site Wastewater Program,
Lower Colorado River Authority
Austin, TX

INTRODUCTION

The Lower Colorado River Authority (LCRA) has just completed a comprehensive assessment of 16 subdivisions near the Gulf Coast to determine how well on-site wastewater systems are performing. The results suggest that there are many potential problems with some of these systems, including surfacing of wastewater effluent, potential groundwater contamination, over-development, the widespread distribution of unsuitable soils, and others. One of the most valuable products of the study is a matrix developed by LCRA that can be used to rank the likelihood that individual systems may cause potential problems.

Ed Schulze of the Matagorda County Health Department inspects on-site wastewater systems that are sited on very small lot sizes along the Gulf Coast.

The primary objective of the study was to identify, inventory, prioritize and map pollution-prone on-site wastewater systems in the LCRA service area and the Colorado-Lavaca Coastal Basin in Matagorda, Wharton, Jackson, and Calhoun Counties. The survey included assessments of two segments of the Colorado River and two stretches of Tres Palacios Creek.

In June 1993, LCRA officials met with local and county on-site wastewater officials, a regional representative from the Texas Natural Resource Conservation Commission (TNRCC) and private engineers. Originally, 24 areas of concern were identified and 16 subdivisions were identified for more detailed studies. These 16 sites were ranked based on current and projected population density, lot sizes, soil types, the proximity of ground and surface water, the age of systems, and known failures and illegal discharges.

HOW THE STUDY WAS CONDUCTED

The 16 sites that were studied included two from Calhoun County (Port Alto and Campbell Carancahua Beach), two from Jackson County (Cape Carancahua, and Lewis Subdivision), three from Wharton County (Lane City, Glen Flora, and Pecan Valley), and nine from Matagorda County (Jensen Point, Tres Palacios Oaks, Tidewater Oaks, East Blessing, El Dorado, Beach Road, River Road, Selkirk Island, and River Oaks).

The LCRA looked for obvious signs that on-site wastewater systems were malfunctioning. Here, Ed Schulze of the Matagorda County Health Department examines raw or partially treated sewage that flows onto the surface.

Each area was mapped using county subdivision plats to estimate the number and size of residential and commercial lots at each site. Each area was then surveyed in the field to gather data on the precise location, proximity to ground and surface water, the approximate age of each system, the number of houses, apartments and condominiums, and whether the systems were used year-round or on weekends.

Information from these surveys then provided input to an "evaluation matrix," which was used to rank pollution potential. In general terms, subdivisions were classified as being "pollution prone" if there were more than 2 or 3 systems per acre, if the volume of wastewater was more than 30,000 gallons per day, if soil permeability was more than 2 inches per hour, if drinking water wells were less than 75 feet away from septic tanks and drainfields, if more than 50 system failures were suspected or actually observed, or if the development was more than 50 years old.

RESULTS AND DISCUSSIONS

As could be expected, there was considerable variability in the conditions found at many of these sites. For example, some of the subdivisions were platted as long ago as the 1930s, while others were much more recent (from the 1970s). In most subdivisions, lot sizes were very small (50' x 100' or 150') and would not meet current TNRCC regulations for lots developed today. Most of the subdivisions were designed primarily for weekend or recreational use, although four (East Blessing, River Oaks, Lane City, and Glen Flora) are used mainly for permanent year-round residences. In some areas where consumers use private, individual wells to obtain groundwater for drinking water, the separation distance between the wells and the septic system and drainfield is minimal. Generally, most of the soils in the region are unsuitable for conventional on-site systems that use septic tanks and drainfields. In some subdivisions, alternatives to conventional systems that use low pressure dosing and other technologies are already being installed.

Use of the evaluation matrix showed that two subdivisions had a score over 220 that indicate a high pollution potential (River Road and Port Alto), while 12 other sites had

scores over 10, which shows a moderate pollution potential. The River Road subdivision is of particular concern because it is sited very close to the Colorado River and the river appears to be eroding some of the lots used for drainfields. Obviously, this increases the likelihood that raw or partially treated wastewater will flow directly into the river.

FOLLOW-UP TO THE STUDY

LCRA is using the information from this study to identify sites where improvements to the existing on-site systems may be needed. Options being actively considered include single-family wetlands, reed-rock filters, and cluster systems.

LCRA is now applying for funding from TNRCC and other sources to install some of these technologies with the hope that these will also serve as demonstration areas.

NOTE: For details, call Burt Carter at LCRA at (800) 776-5272.