

#### TEXAS ASSOCIATION OF REALTORS®

#### SELLER'S DISCLOSURE NOTICE

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Section 5.008, Property Code requires a seller of residential property of not more than one dwelling unit to deliver a Seller's Disclosure Notice to a buyer on or before the effective date of a contract. This form complies with and contains additional disclosures which exceed the minimum disclosures required by the Code.

CONCERNING THE PR	OPE	ERT'	Y A	Γ			Е					eld Ln 7833-0606			
DATE SIGNED BY SEL	LEF	R AN	ID I	SN	TC	A SI	JBSTITUTE FOR A	NY I	NSF	PEC	TIC	ON OF THE PROPERTY AS INS OR WARRANTIES THE ELLER'S AGENTS, OR ANY	BU	YEF	7
	ccup		the	Pro	pert (app	y. If roxi	unoccupied (by Sellemate date) or nev	er), h ver o	ow ccup	long pied	sir the	nce Seller has occupied the P Property	rope	erty	?
Section 1. The Proper This notice does n												Unknown (U).) which items will & will not convey			
Item	Y	N	U	]	Ite	m		Υ	N	U	]	Item	Υ	N	U
Cable TV Wiring	~			1	Lic	uid	Propane Gas:	V		,	1	Pump: sump grinder		V	
Carbon Monoxide Det.		<b>V</b>			-LF	Co	mmunity (Captive)	,	V		1	Rain Gutters	V		
Ceiling Fans	V			1	-LF	on on	Property	V			1	Range/Stove( 1 in shap)	V	1	-
Cooktop	V			1	Но	t Tu	b		1		1	Roof/Attic Vents	V		
Dishwasher	1		2		Int	erco	m System		V		1	Sauna		V	
Disposal		V			Mi	crow	/ave	V			1	Smoke Detector	V	•	
Emergency Escape Ladder(s)		/			Οι	tdoo	or Grill		V			Smoke Detector - Hearing Impaired		V	
Exhaust Fans	V				Pa	tio/E	Decking	V			1	Spa		V	
Fences	V				Plu	ımbi	ng System	V		3501	1	Trash Compactor		V	
Fire Detection Equip.	/				Po	ol			V		1	TV Antenna		~	
French Drain		V			Po	ol E	quipment		V		] ,	₩asher/Dryer Hookup	V		
Gas Fixtures		7			Ро	ol M	laint. Accessories		V	,		Window Screens	V		/
Natural Gas Lines		V			Ро	ol H	eater		V			Public Sewer System		/	
												of House and shop			
Item				Υ	N	U	/					al Information			
Central A/C				V			electric gas	nun	nber	of u	ınit	s: <u>2</u>			
Evaporative Coolers					V	/	number of units:								
Wall/Window AC Units					V		number of units:								
Attic Fan(s)					<b>V</b>		if yes, describe:								
Central Heat				V			velectric gas								
Other Heat				/			if yes, describe:	pro	_			ll heater in 5 hop			
Oven				V			number of ovens: _		7		ect				
Fireplace & Chimney				V			wood <u>√</u> gas log		mo		0	ther:			
Carport machinegeh	ed			~	1		attached _vnot			- N		****			
Garage (3 car)				V				atta	chec	t					
Garage Door Openers				V			number of units:	2			r	number of remotes: 3			
Satellite Dish & Controls	i				V	/	ownedlease		_						
Security System					V		owned lease	-							
Solar Panels				,	V		ownedlease		_					5 A	op
Water Heater				V,			velectric gas		her:			number of units; 2 i	1 h	or	sl
Water Softener				V		_	owned lease	d fro	m: _						
Other Leased Items(s)					V		if yes, describe:								

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Phone: 979.836.0011

Page 1 of 5

7735 Steinfeld Ln

Fax: 979.353.4334

(TAR-1406) 02-01-18

Coldwell Bankers Properties Unlmt, 2402 South Day St. Brenham TX 77833

Initialed by: Buyer:

#### Concerning the Property at

#### 7735 Steinfeld Ln Brenham, TX 77833-0606

Underground Lawn Sprinkler  Septic / On-Site Sewer Facility  Water supply provided by:citywellMUDco-opunknownother:	xima or r	te) roof , or
Water supply provided by:city _ well MUDco-opunknownother: (If y water available) Was the Property built before 1978?yesv nounknown	or refects	, or
Roof Type:	you	, or
Covering)?yesnounknown  Are you (Seller) aware of any of the items listed in this Section 1 that are not in working condition, that have deare need of repair?yesno If yes, describe (attach additional sheets if necessary):	you	, or
are need of repair?yesno If yes, describe (attach additional sheets if necessary):	you	_
aware and No (N) if you are not aware.)       Item     Y     N     Item     Y     N     Item     Sidewalks       Basement     Image: Second or color of the property of the p		are
aware and No (N) if you are not aware.)       Item     Y     N     Item     Y     N     Item     Sidewalks       Basement     Image: Second or color of the properties of the		are
Basement	Y	
Basement V Floors V Sidewalks  Ceilings V Foundation / Slab(s) V Walls / Fences  Doors Interior Walls V Lighting Fixtures V Other Structural Components		N
Ceilings	+-	1
Doors     Interior Walls     Windows       Driveways     Lighting Fixtures     Other Structural Components	+	V
Driveways	1	1
	+	V
Electrical Systems V Plumbing Systems V	+	
Exterior Walls Roof		$\vdash$
Section 3. Are you (Seller) aware of any of the following conditions: (Mark Yes (Y) if you are aware and you are not aware.)		
Condition Y N Condition	Y	N
Aluminum Wiring Previous Foundation Repairs	+	-
Asbestos Components  Previous Roof Repairs  Previous Roof Repairs	+	V
Diseased Trees:oak wilt Previous Other Structural Repairs	+	1
Endangered Species/Habitat on Property  Fault Lines  Radon Gas  Settling	+	1
Fault Lines Settling Hazardous or Toxic Waste Soil Movement	+	1
Improper Drainage  Subsurface Structure or Pits	+	1
Intermittent or Weather Springs  Underground Storage Tanks	1	
Landfill Unplatted Easements	V	V
Lead-Based Paint or Lead-Based Pt. Hazards  Unrecorded Easements	+-	V
	+	V
Find Encroachments onto the Property     √   Urea-formaldehyde Insulation	$\top$	V
Encroachments onto the Property  Urea-formaldehyde Insulation  Water Penetration	+-	
Improvements encroaching on others' property  Water Penetration	- 1	
Improvements encroaching on others' property  Located in 100-year Floodplain  Water Penetration  Wetlands on Property		
Improvements encroaching on others' property  Water Penetration		V
Improvements encroaching on others' property  Located in 100-year Floodplain (If yes, attach TAR-1414)  Located in Floodway (If yes, attach TAR-1414)  Wood Rot  Property Flood Inc. Coverage	ted	1
Improvements encroaching on others' property  Located in 100-year Floodplain (If yes, attach TAR-1414)  Located in Floodway (If yes, attach TAR-1414)  Wood Rot  Active infectation of termitos or other wood	ted	V
Improvements encroaching on others' property Located in 100-year Floodplain (If yes, attach TAR-1414) Located in Floodway (If yes, attach TAR-1414)  Present Flood Ins. Coverage  Water Penetration Wetlands on Property  Wood Rot Active infestation of termites or other wood	ted	I I
Improvements encroaching on others' property  Located in 100-year Floodplain (If yes, attach TAR-1414)  Located in Floodway (If yes, attach TAR-1414)  Present Flood Ins. Coverage (If yes, attach TAR-1414)  Previous Flooding into the Structures  Water Penetration Wetlands on Property  Wood Rot  Active infestation of termites or other wood destroying insects (WDI)  Previous treatment for termites or WDI	ted	V V

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7735 Steinfeld Ln

#### 7735 Steinfeld Ln Brenham, TX 77833-0606

Concerning	g the Property at		Brenham, TX 77833-0606	
Historic Pro	operty Designation	$\overline{}$	Termite or WDI damage needing repair	V
	se of Premises for Manufacture		Single Blockable Main Drain in Pool/Hot Tub/Spa*	V
If the answ	er to any of the items in Section 3 is yes,	5		
,				
	*A single blockable main drain ma	y cause a	suction entrapment hazard for an individual.	
Section 4. which has necessary)	not been previously disclosed in th	is notice	or system in or on the Property that is in need of receivesno If yes, explain (attach additional sheet as around sky light	pair, ets if
Section 5. not aware.	)		g (Mark Yes (Y) if you are aware. Mark No (N) if you	
	unresolved permits, or not in compliance			*******
	Name of association:		or assessments. If yes, complete the following:	
	Manager's name: Fees or assessments are: \$		Phone: and are: mandatory volu	ntary
4	Any unpaid fees or assessment for	the Prop	erty?yes (\$)no on, provide information about the other associations belo	
_ */	with others. If yes, complete the following	ng:	is courts, walkways, or other) co-owned in undivided int	erest
	Any notices of violations of deed restrict Property.	ctions or	governmental ordinances affecting the condition or use c	of the
	Any lawsuits or other legal proceedings to: divorce, foreclosure, heirship, bankr		or indirectly affecting the Property. (Includes, but is not lind taxes.)	nited
_ 🗸	Any death on the Property except for t to the condition of the Property.	hose dea	ths caused by: natural causes, suicide, or accident unre	lated
	Any condition on the Property which ma	aterially a	ffects the health or safety of an individual.	
<b>-</b> ₩	hazards such as asbestos, radon, lead-	-based pa er docum	entation identifying the extent of the remediation (for exar	
	Any rainwater harvesting system locate water supply as an auxiliary water sour		Property that is larger than 500 gallons and that uses a p	oublic
/	The Property is located in a propane ga	s system	service area owned by a propane distribution system retail	ler.
	Any portion of the Property that is locat	ed in a gr	oundwater conservation district or a subsidence district.	
(TAR-1406)	02-01-18 Initialed by: Buyer: _	,	and Seller: QMB, BCB Page	3 of 5

Concerning the Pro	perty at		7735 Steinfeld Brenham, TX 7783		
•			(attach additional she	ets if necessary):	
	_ has <u>√</u> has not at				<b>.</b>
regularly provide i	the last 4 years, have nspections and who as \( \frac{1}{2} \) no If yes, attach	are either license	ed as inspectors or	inspection reports fro otherwise permitted by	m persons who / law to perform
Inspection Date	Туре	Name of Inspec	otor		No. of Pages
WHITE AND					
Note: A l	ouyer should not rely o Property. A buyer sho			n of the current condition chosen by the buver.	of the
Section 8. Check	any tax exemption(s	•	-		
		_ Senior Citizen	,	Disabled	
Wildlife Man	agement _	Senior Citizen Agricultural		Disabled Veteran Unknown	
				the Property with	
insurance claim of	a settlement or awa	rd in a legal proc	eeding) and not use	age to the Property ( d the proceeds to mak	e the repairs for
requirements of C	he Property have w hapter 766 of the He heets if necessary):	orking smoke de alth and Safety C	tectors installed in ode?* unknown	accordance with the no yes. If no or u	smoke detector inknown, explain.
installed in ac including perfe	cordance with the requir ormance, location, and p	ements of the building ower source require	ng code in effect in the ments. If you do not k	llings to have working smo area in which the dwelling now the building code required cial for more information.	g is located,
family who wi impairment fro the seller to in	Il reside in the dwelling i m a licensed physician; a	is hearing-impaired; and (3) within 10 day r the hearing-impaire	(2) the buyer gives the s after the effective date ed and specifies the loc	i) the buyer or a member of seller written evidence of e, the buyer makes a written ations for installation. The loke detectors to install.	the hearing n request for
	nstructed or influenced	l Seller to provide i	naccurate informatio	eller's belief and that no n or to omit any material	information.
Jelly C. Br	yant 9	7-24-201	8 Anna 4 Signature of Seller	n. Bryant	9-24-1
Signature of Seller	/	Date			Date
Printed Name:	استفاصا ــا	ve Dinare	Printed Name: and Seller:		Page 4 of 5
(TAR-1406) 02-01-18	initialed b	y. buyer	and Seller:		raye 4 or 5

#### 7735 Steinfeld Ln Brenham, TX 77833-0606

Concerning	the	Propert	v at
			,

#### ADDITIONAL NOTICES TO BUYER:

- (1) The Texas Department of Public Safety maintains a database that the public may search, at no cost, to determine if registered sex offenders are located in certain zip code areas. To search the database, visit <a href="www.txdps.state.tx.us">www.txdps.state.tx.us</a>. For information concerning past criminal activity in certain areas or neighborhoods, contact the local police department.
- (2) If the Property is located in a coastal area that is seaward of the Gulf Intracoastal Waterway or within 1,000 feet of the mean high tide bordering the Gulf of Mexico, the Property may be subject to the Open Beaches Act or the Dune Protection Act (Chapter 61 or 63, Natural Resources Code, respectively) and a beachfront construction certificate or dune protection permit may be required for repairs or improvements. Contact the local government with ordinance authority over construction adjacent to public beaches for more information.
- (3) If the Property is located in a seacoast territory of this state designated as a catastrophe area by the Commissioner of the Texas Department of Insurance, the Property may be subject to additional requirements to obtain or continue windstorm and hail insurance. A certificate of compliance may be required for repairs or improvements to the Property. For more information, please review *Information Regarding Windstorm and Hail Insurance for Certain Properties* (TAR 2518) and contact the Texas Department of Insurance or the Texas Windstorm Insurance Association.
- (4) This Property may be located near a military installation and may be affected by high noise or air installation compatible use zones or other operations. Information relating to high noise and compatible use zones is available in the most recent Air Installation Compatible Use Zone Study or Joint Land Use Study prepared for a military installation and may be accessed on the Internet website of the military installation and of the county and any municipality in which the military installation is located.
- (5) If you are basing your offers on square footage, measurements, or boundaries, you should have those items independently measured to verify any reported information.

(6)	The following providers currently provide service to the Property:	
	Electric: Bluebonnet Celedric	phone #:
	Sewer: > private	phone #:
	Water:	phone #:
	Cable: Direct TV - not isonnected	phone #:
	Trash: town "Country - not using non	phone #:
	Natural Gas:	phone #:
	Phone Company: ATT connections are there	phone #:
	Propane: Brenham LP Gas	phone #:
	Internet: none connected	phone #:

(7) This Seller's Disclosure Notice was completed by Seller as of the date signed. The brokers have relied on this notice as true and correct and have no reason to believe it to be false or inaccurate. YOU ARE ENCOURAGED TO HAVE AN INSPECTOR OF YOUR CHOICE INSPECT THE PROPERTY.

The undersigned Buyer acknowledges receipt of the foregoing notice.

Signature of Buyer	Date	Signature of Buyer	Date
Printed Name:		Printed Name:	

(TAR-1406) 02-01-18



#### TEXAS ASSOCIATION OF REALTORS®

#### **INFORMATION ABOUT ON-SITE SEWER FACILITY**

USE OF THIS FORM BY PERSONS WHO ARE NOT MEMBERS OF THE TEXAS ASSOCIATION OF REALTORS® IS NOT AUTHORIZED.

®Texas Association of REALTORS®, Inc., 2004

CC	7735 Steinfeld Ln  NCERNING THE PROPERTY AT Brenham, TX 77833-0606		
	DESCRIPTION OF ON-SITE SEWER FACILITY ON PROPERTY:		
	(1) Type of Treatment System: Septic Tank Aerobic Treatment	∏Ur	nknown
	(2) Type of Distribution System: Field lines	Ur	nknown
	(3) Approximate Location of Drain Field or Distribution System:  150 ft. east Side of house.	Ur	nknown
	(4) Installer: Dirt Dobber Const. Co. (Justin Flisowski)		nknown
	(5) Approximate Age: 15 4VS.	∐Ur	nknown
В.	MAINTENANCE INFORMATION:		
	(1) Is Seller aware of any maintenance contract in effect for the on-site sewer facility?  If yes, name of maintenance contractor:  Phone:  contract expiration date:		No   
	Maintenance contracts must be in effect to operate aerobic treatment and certain non-sewer facilities.)	standard" (	on-site
	(2) Approximate date any tanks were last pumped? <u>July, 2018</u>		
	(3) Is Seller aware of any defect or malfunction in the on-site sewer facility?  If yes, explain:	Yes	<b>X</b> No
	(4) Does Seller have manufacturer or warranty information available for review?	□Yes	No
C.	PLANNING MATERIALS, PERMITS, AND CONTRACTS:		_
_•	(1) The following items concerning the on-site sewer facility are attached:  planning materials permit for original installation final inspection when OS maintenance contract manufacturer information warranty information	SF was ir	nstalled
	(2) "Planning materials" are the supporting materials that describe the on-site sewer submitted to the permitting authority in order to obtain a permit to install the on-site sever		
	(3) It may be necessary for a buyer to have the permit to operate an on-sit transferred to the buyer.	e sewer	facility
(TA	AR-1407) 1-7-04 Initialed for Identification by Buyer, and Seller BCBATA B	Pa	ige 1 of 2

D. INFORMATION FROM GOVERNMENTAL AGENCIES: Pamphlets describing on-site sewer facilities are available from the Texas Agricultural Extension Service. Information in the following table was obtained from Texas Commission on Environmental Quality (TCEQ) on 10/24/2002. The table estimates daily wastewater usage rates. Actual water usage data or other methods for calculating may be used if accurate and acceptable to TCEQ.

<u>Facility</u>	Usage (gal/day) without water- saving devices	Usage (gal/day) with water- saving devices
Single family dwelling (1-2 bedrooms; less than 1,500 sf)	225	180
Single family dwelling (3 bedrooms; less than 2,500 sf)	300	240
Single family dwelling (4 bedrooms; less than 3,500 sf)	375	300
Single family dwelling (5 bedrooms; less than 4,500 sf)	450	360
Single family dwelling (6 bedrooms; less than 5,500 sf)	525	420
Mobile home, condo, or townhouse (1-2 bedroom)	225	180
Mobile home, condo, or townhouse (each add'l bedroom)	75	60

This document is not a substitute for any inspections or warranties. This document was completed to the best of Seller's knowledge and belief on the date signed. Seller and real estate agents are not experts about on-site sewer facilities. Buyer is encouraged to have the on-site sewer facility inspected by an inspector of Buyer's choice.

Billy C, Bufant Signature of Seller	9-24-2018 Date	Annia M. Signature of Seller	Bryant	9 - 24 - 18 Date
Billy C Bryant		Anna M Bryant		
Receipt acknowledged by:				
Signature of Buyer	Date	Signature of Buyer		Date



#### **Information About Brokerage Services**

Texas law requires all real estate licensees to give the following information about brokerage services to prospective buyers, tenants, sellers and landlords.

#### **TYPES OF REAL ESTATE LICENSE HOLDERS:**

- A BROKER is responsible for all brokerage activities, including acts performed by sales agents sponsored by the broker.
- A SALES AGENT must be sponsored by a broker and works with clients on behalf of the broker.

#### A BROKER'S MINIMUM DUTIES REQUIRED BY LAW (A client is the person or party that the broker represents):

- Put the interests of the client above all others, including the broker's own interests;
- Inform the client of any material information about the property or transaction received by the broker;
- Answer the client's questions and present any offer to or counter-offer from the client; and
- Treat all parties to a real estate transaction honestly and fairly.

#### A LICENSE HOLDER CAN REPRESENT A PARTY IN A REAL ESTATE TRANSACTION:

AS AGENT FOR OWNER (SELLER/LANDLORD): The broker becomes the property owner's agent through an agreement with the owner, usually in a written listing to sell or property management agreement. An owner's agent must perform the broker's minimum duties above and must inform the owner of any material information about the property or transaction known by the agent, including information disclosed to the agent or subagent by the buyer or buyer's agent.

AS AGENT FOR BUYER/TENANT: The broker becomes the buyer/tenant's agent by agreeing to represent the buyer, usually through a written representation agreement. A buyer's agent must perform the broker's minimum duties above and must inform the buyer of any material information about the property or transaction known by the agent, including information disclosed to the agent by the seller or seller's agent.

AS AGENT FOR BOTH - INTERMEDIARY: To act as an intermediary between the parties the broker must first obtain the written agreement of each party to the transaction. The written agreement must state who will pay the broker and, in conspicuous bold or underlined print, set forth the broker's obligations as an intermediary. A broker who acts as an intermediary:

- Must treat all parties to the transaction impartially and fairly;
- May, with the parties' written consent, appoint a different license holder associated with the broker to each party (owner and buyer) to communicate with, provide opinions and advice to, and carry out the instructions of each party to the transaction.
- Must not, unless specifically authorized in writing to do so by the party, disclose:
  - o that the owner will accept a price less than the written asking price;
  - o that the buyer/tenant will pay a price greater than the price submitted in a written offer; and
  - o any confidential information or any other information that a party specifically instructs the broker in writing not to disclose, unless required to do so by law.

AS SUBAGENT: A license holder acts as a subagent when aiding a buyer in a transaction without an agreement to represent the buyer. A subagent can assist the buyer but does not represent the buyer and must place the interests of the owner first.

#### TO AVOID DISPUTES, ALL AGREEMENTS BETWEEN YOU AND A BROKER SHOULD BE IN WRITING AND CLEARLY ESTABLISH:

- The broker's duties and responsibilities to you, and your obligations under the representation agreement.
- Who will pay the broker for services provided to you, when payment will be made and how the payment will be calculated.

**LICENSE HOLDER CONTACT INFORMATION:** This notice is being provided for information purposes. It does not create an obligation for you to use the broker's services. Please acknowledge receipt of this notice below and retain a copy for your records.

South Day Inc dba Coldwell Banker Prop Unimt	417611	lindi.camaron@coldwellbanker.com	(979)836-0011
Licensed Broker /Broker Firm Name or	License No.	Email	Phone
Primary Assumed Business Name			
Lindi Braddock	233744	lindi.camaron@coldwellbanker.com	(979)277-4763
Designated Broker of Firm	License No.	Email	Phone
same			
Licensed Supervisor of Sales Agent/	License No.	Email	Phone
Associate			
Lindi Braddock	233744	lindi.camaron@coldwellbanker.com	(979)277-4763
Sales Agent/Associate's Name	License No.	Email 9-24-18	Phone
Buyer/Tenan	t/Seller/Landlord I	nitials Date	

Regulated by the Texas Real Estate Commission

TAR-2501 Coldwell Bankers Properties Unlmt, 2402 South Day St. Brenham TX 77833

Information available at www.trec.texas.gov

IABS 1-0 Date 7735 Steinfeld Ln 217-629

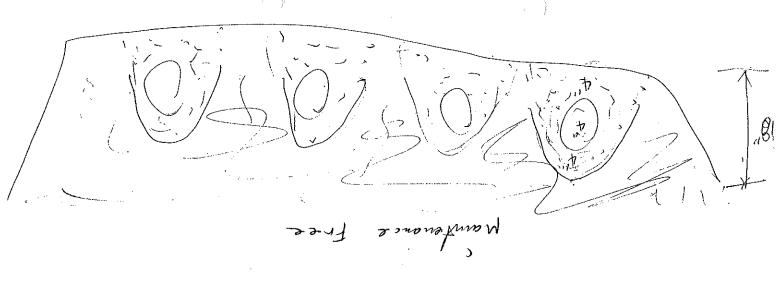
#### WASHINGTON COUNTY ENVIRONMENTAL DERPARTMENT

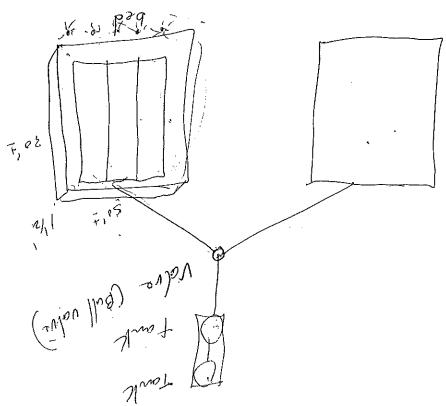
100 E. Main Street, Brenham, Texas, 77833, (979) 277-6290 Fax # (979) 277-6291

#### EVALUATION FORM--ON-SITE SEWERAGE FACILITY FOR OVER 10 ACRES

	Property Owners Name: Billy C. Anna M.	<i>Dry an</i> Xpplication	1 No				
	Permanent Mailing Address: 7588 Stein	Seld Ln. City: Br	enham Zip: <u>77833</u>				
	Home Telephone #: (979) 836-6442	Work Telephone #	:(_)Same				
	7588 7735 County Road Address (911):Steinseld Ln.(	City: <u>Brenham</u>	Zip: <u>77833-0</u> 60				
	Property Description: Lot:Size:	Block:	Sec:				
_	Or Deed Description with Vol. # <u>0903</u> Pa	ige#: 465					
_	Other than Subdivision: Acreage: 28.7 S	Survey: Abne	V Kuy Kentall A				
	Water Source:Private Well	P	ublic Water Supplier				
	House Mobile Home N	o. of Bedrooms	4				
	TYPE OF DEVELOPMENT—	COMMERCIAL (	ONLY)				
Commercial/Institutional (including multi-family residences) Type							
No. of Employees/Occupants/Units (circle one): Days occupied per week							
	Estimated Maximum Daily Water Consumption	(gpd) (water bill):					
٠	Any Organized Sewage Collection within 300 fe	eet:YES	NO				
	Site Evaluator: Registratio	on NoPho	ne No:				
	Designer:License N	oPhor	ne No:				
	Installer:Registration Owner hereby authorizes the WASHINGTON C	NoPhor	ne No: NMENTAL				
	INSPECTOR, TNRCC, and Texas Department of singly or jointly, to enter upon the described profevaluation tests, inspecting the private sewage factorsistent with the water quality programs of W Texas Department of Health.	perty for the purpos acility or performing	se of making soil/site g other activities				
	Signature of Owner	Date	over-10 eval				

Note X below





The On-Site Wastewater Treatment Systems series of publications is a result of collaborative efforts of various agencies, organizations and funding sources. We would like to acknowledge the following collaborators:

Texas State Soil and Water Conservation Board
Texas On-Site Wastewater Treatment Research Council
Texas Natural Resource Conservation Commission
USDA Water Quality Demonstration Projects
Consortium of Institutes for Decentralized Wastewater Treatment

USEPA 319(h) Program
Texas Agricultural Extension Service
Texas Agricultural Experiment Station
Texas On-Site Wastewater Association
USDA Natural Resources Conservation Service

Produced by Agricultural Communications, The Texas A&M University System

All publications in the On-site Wastewater Treatment Systems series can be downloaded free from the World Wide Web at: http://agpublications.tamu.edu/pubs/ewaste

Educational programs of the Texas Agricultural Extension Service are open to all people without regard to race, color, sex, disability, religion, age or national origin.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Chester P. Fehils, Deputy Director, The Texas Agricultural Exension Service, The Texas A&M University System.

30,000 copies, New ENG

#### On-site wastewater treatment systems

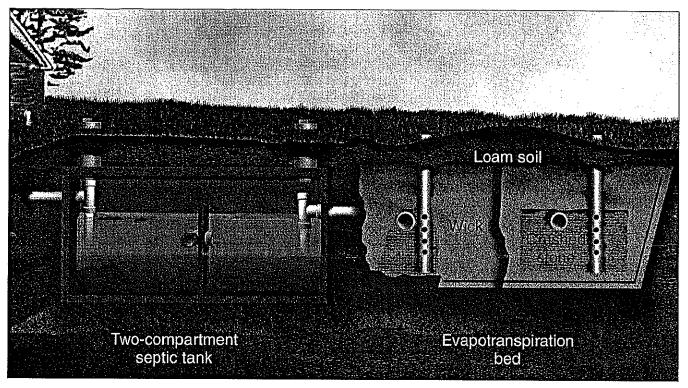


Figure 1: An evapotranspiration bed system.

### **Evapotranspiration bed**

#### **Bruce Lesikar**

Extension Agricultural Engineering Specialist The Texas A&M University System

n evapotranspiration (ET) bed treats wastewater by using evapotranspiration — the loss of water from the soil by evaporation and by transpiration from plants growing there.

ET beds are used where the soil cannot treat wastewater before it percolates to groundwater, such as in rocky soils, or where the soil prevents wastewater from percolating from the application field, such as in heavy clay soils.

ET systems are designed according to local evapotranspiration and rainfall rates, which vary across Texas. The local authorized agent, generally the local health department or regional office of the Texas Natural Resource Conservation Commission,

can tell you what the rates are in your area. ET bed systems can be smaller in drier regions of the state compared to the same size household in wetter locations. These systems do not work in very wet areas where more rain falls than is evaporated or transpired.

There are two types of ET beds: lined and unlined. In lined systems, the ET bed is lined with a natural clay, synthetic or concrete liner. A liner is required if the surrounding soil is very permeable, such as in sandy gravel or karst limestone.

Unlined systems can be used in highly impermeable soils such as heavy clays. In unlined systems, wastewater is disposed of by a combination of evaporation, transpiration and absorption, which is often called an evapotranspiration/absorption (ETA) system.

# Grass cover is important for transpiration of wastewater

#### **Treatment**

In ET bed systems, solid materials are removed from the wastewater by a septic tank. Then the wastewater is distributed throughout the ET bed system. There, final treatment and disposal occur when the water evaporates and plants use nutrients in the effluent and release moisture through transpiration.

As the water evaporates, salts, minerals and solids from the effluent accumulate in the bed. During very wet periods when evapotranspiration is low, ET beds store water until drier periods when it evaporates and transpires.

#### Design

An ET bed contains storage trenches, loam backfill around the trenches and sandy loam soil over the top of the loam backfill for grass growth. Generally, the required bed surface area is divided between two beds, which allows for switching between the beds to avoid overloading.

A liner and sand cushion are placed in the ground, and the storage system is set on the bed bottom. Generally, the storage system consists of a bed of rocks or gravel of a uniform size ranging from <sup>3</sup>/<sub>4</sub>-inch to 2 inches in diameter, filling the bed to a depth of 12 inches or less, depending on the bed's overall depth. Distribution pipes are placed no more than 12 feet apart and no less than 3 feet from the bed walls. The top of the distribution pipe must be flush with the top of the rock media.

Other types of media such as tire chips, or storage systems such as leaching chambers, may be used for the storage trenches.

A water-permeable soil barrier (a geotextile filter fabric) is placed over

the rock. A loam soil is added to fill the bed to within two inches of the top. Selecting the proper soil is extremely important in building an ET system. (State regulations classify the soil as a class II, loamy soil.) The soil draws the water toward the surface faster than coarse sand.

Wicks incorporated into the rock media draw water continuously from the rocks into the soil and toward the surface area, where it evaporates or is taken up by plants. A wick is a column of soil that extends through the rock media to the bottom of the bed. The total wick area should be 10 to 15 percent of the bed surface and should be uniformly spaced throughout the bed.

After the loamy soil is in place, the final two inches are filled with sandy loam and mounded in the center with a slope of 2 to 4 percent toward the outside of the bed. The last step is to plant vegetation specially selected to transpire the most water, such as bermudagrass or St. Augustine grass. Placing grass sod over the bed may be the best approach to establishing grass there. Using seed may let the mounded soil wash away during heavy rainfall before the grass is established. Larger plants with shallow root systems, such as evergreen bushes, may also be used to help take up water.

If you use grasses with dormant periods, be sure to provide adequate vegetation on the beds during these periods. A common solution is overseeding with winter grasses to provide year-round transpiration.

#### How to keep it working

A valve connecting the two beds allows you to alternate the wastewater inflow between each bed. When one bed becomes saturated, turn the valve to send effluent into the other underloaded bed. An inspection port added

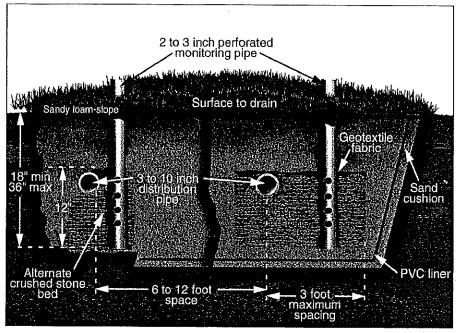


Figure 2: Evapotranspiration beds should be built as shallow as possible, from 18 inches to a maximum of 36 inches deep.

to each bed will help you determine each bed's water levels during use. Covering the port prevents insects, small animals and unauthorized people from getting to the bottom of the bed.

Here's how to maintain your ET bed properly:

- Mow the grass cover regularly. Grass cover is important for transpiration of wastewater. Overseed with a cool-season grass to provide transpiration in winter. If you do not maintain the grass cover, the system will probably fail.
- Divert rainfall runoff around the system. The system is designed to handle normal rainfall entering from the top of the system, but excessive rainfall will overload it. Rainfall runoff from buildings and paved areas can add too much water to the ET bed. This water must be diverted around the

- system. Maintain the sloped cover on the system to help rain run off the bed.
- Check the vegetation growing on the system as the system matures. You may need to use salt-tolerant grasses, such as bermuda-grass, because salt accumulates in the system. Water leaves salts in the soil when it evaporates. Harvesting the salt-tolerant grasses may reduce the salts in the system if the plants can accumulate the salt in their leaves. The potential for high salt concentrations depends on how much salt is in the water supply.
- Develop good water conservation habits at home. Excessive water use overloads the system and causes failure.

To keep the beds aerobic and prevent clogging, build them as shallow as possible, from 18 inches to a maximum of 36 inches deep.

## Divert rainfall runoff around the system