

Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Bobby Janecka, *Commissioner*
Erin E. Chancellor, *Interim Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

The Honorable Judge Kyle Kutscher
Guadalupe County Judge
101 East Court Street
Seguin, Texas 78155

RE: Greenway Ag, LLC and Steven Lee Kubena and Alyssa Leanne Johnson
(CN606072981 and CN605761170 and CN606101335)
Beneficial Land Use Site Registration No. 711042 (RN111595534)

Dear Judge Kutscher:

Enclosed is a notice of receipt on an application and declaration of administrative completeness for the referenced beneficial use site registration located in Hopkins County.

In accordance with Chapter 312.13 of the Texas Commission on Environmental Quality Rules, the notice states that a copy of the application has been provided to the county judge and is available for review. This notice is mailed to all landowners named on the application map or supplemental map, or the sheet attached to the map(s).

If you should have any questions, please contact Ms. Abesha Michael, Applications Review and Processing Team, at 512-239-4912.

Sincerely,

A handwritten signature in cursive script that reads "Laurie Gharis".

Laurie Gharis, Chief Clerk
Texas Commission on Environmental Quality

LG: ahm

Enclosures

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



NOTICE OF RECEIPT OF AN APPLICATION AND DECLARATION OF ADMINISTRATIVE COMPLETENESS

The Honorable Kyle Kutscher
Guadalupe County Judge
101 East Court Street
Seguin, Texas 78155

RE: Greenway Ag, LLC and Steven Lee Kubena
CN606072981, CN605761170
Beneficial Land Use Site Registration No. 711042 (RN111595534)

Dear Judge Kutscher:

Enclosed is a notice of receipt on an application and declaration of administrative completeness for the referenced beneficial use site registration located in Guadalupe County.

In accordance with Chapter 312.13 of the Texas Commission on Environmental Quality Rules, the notice states that a copy of the application has been provided to the county judge and is available for review. This notice is mailed to all landowners named on the application map or supplemental map, or the sheet attached to the map(s).

If you should have any questions, please contact Ms. Abesha Michael, Applications Review and Processing Team, at 512-239-4912.

Sincerely,

A handwritten signature in cursive script that reads "Laurie Gharis".

Laurie Gharis, Chief Clerk
Texas Commission on Environmental Quality

BB: ahm

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



NOTICE OF RECEIPT OF AN APPLICATION AND DECLARATION OF ADMINISTRATIVE COMPLETENESS

An application for a proposed beneficial use site registration number 711042 for:

Applicant: Greenway Ag, LLC and Steven Lee Kubena and Alyssa Leanne Johnson
 240 Senedra Crossing 240 Senedra Crossing 240 Senedra Crossing
 La Vernia, Texas 78121 La Vernia, Texas 78121 La Vernia, Texas 78121

was received by the Texas Commission on Environmental Quality (TCEQ) on October 25, 2022 and declared to be administratively complete on January 30, 2023.

Type of Operation: Beneficial land application of domestic septage products only.

Location of Site: The site is located at 650 Kubena Road, Seguin, in Guadalupe County, Texas 78155. This link to an electronic map of the site or facility's general location is provided as a public courtesy and not part of the application or notice. For exact location, refer to application.

<https://gisweb.tceq.texas.gov/LocationMapper/?marker=-98.031944,29.432777&level=18>

Remarks: The applicant is seeking authorization to land apply domestic septage at agronomic rates on approximately 266 acres.

The TCEQ has mailed a copy of the application for registration with this notice to the Guadalupe County Judge for viewing by interested parties. For further information concerning this application, you may contact the authorized person to act for the applicant, Mr. Steven Kubena, Greenway Ag, LLC, at 210-296-4778. Interested parties have 30 days from the date this notice is issued to review the application and provide written comments to Laurie Gharis, Chief Clerk (MC-105), P.O. Box 13087, Austin, Texas 78711-3087, regarding this proposed land application site. At the end of this notice period, all written comments will be forwarded to the Biosolids Team for review and consideration.

The application will now be subject to technical evaluation by the staff of the TCEQ. Persons should be advised that the application is subject to change based on evaluations of the proposed treatment levels, treatment processes and site specific conditions as they relate to the protection of the environment and public health.

After the technical evaluation of this application is complete, the Executive Director will issue a decision to approve or deny this registration. The applicant or a person affected by this decision may file a Motion to Overturn with the Chief Clerk's Office pursuant to 30 TAC §312.13(e) and §50.139.

The identification number of this application is Registration Number 711042. Individual members of the public who wish to inquire about the information contained in this notice, or who wish to inquire about other agency permit applications or the permitting processes, should call the TCEQ Public Education Program toll free at (800) 687-4040. Si desea información en Español, puede llamar al 1-800-687-4040.

Issued: February 14, 2023

Kubena Farms (Greenway Ag, LLC)
Landowner List

Map #	Landowner	Map #	Landowner
1	Kleinschmidt (David & Penny Sue & Darren & Angela Eileen) 4111 FM 467 Seguin, TX 78155	12	John Anderson 2210 Curry Rd Seguin, TX 78155
2	John Schwertlech 1208 O'Daniel School Rd Seguin, TX 78155	13	Anderson (John & Austin & Tyler) 2210 Curry Rd Seguin, TX 78155
3	Daniel & Janelle Behrens 1208 O'Daniel School Rd Seguin, TX 78155	14	Austin Anderson 2219 Curry Rd Seguin, TX 78155
4	Nancy Lynn Carroll 327 Ashland Dr San Antonio, TX 78218	15	Chrles James et al 1035 Gibbs St San Antonio, TX 78202
5	Lambeck Living Trust DTD 8-31-2010 Carl & Margie Lambeck - Trustees PO Box 364 Stockdale, TX 78160	16	Delvage McIntyre 1042 O'Daniel Rd Seguin, TX 78155
6	ARGAR46 LLC 3321 Casa Blanca Corpus Christi, TX 78411	17	Betty Young 1010 O'Daniel Rd Seguin, TX 78155
7	Arnulfo & Jacqueline Garcia 703 O'Daniel School Rd Seguin, TX 78155	18	Steven & Donna Kubena 911 O'Daniel Rd Seguin, TX 78155
8	Martin & Teresa Lund 515 O'Daniel School Rd Seguin, TX 78155	19	Jeffrey & Eleanore Smits 831 O'Daniel Rd Seguin, Tx 78155
9	Martin & Teresa Lund 515 O'Daniel School Rd Seguin, TX 78155	20	Carol Werner 507 O'Daniel Rd Seguin, TX 78155
10	Ernest Foreman Jr. 391 O'Daniel School Rd Seguin, TX 78155	21	George Green 217 E River St Seguin, TX 78155
11	Lebo (Mary Frances & Justin & Crystal) & Danielle Alaniz 4516 W Fork Dr Schertz, Tx 78154		

Peters Environmental Consulting

October 25, 2022

Texas Commission on Environmental Quality
Applications Review and Processing Team, MC 148
Building F Room 2101
12100 Park 35 Circle
Austin, TX 78753

RE: TCEQ Application to Register a Site for Beneficial Land Application of Domestic Septage for Greenway Ag, LLC.

Water Quality Division,

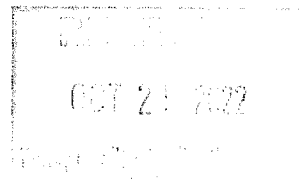
On behalf of Greenway Ag, LLC (Applicant), Peters Environmental Consulting (PEC), is submitting the enclosed application to register a site for beneficial land application of domestic septage, administered by the Texas Commission on Environmental Quality (TCEQ).

The enclosed application includes one original and three copies of the application checklist, administrative report, technical report, core data form and supplemental information.

If you have any questions or require additional information, please contact me at 505-974-0225 or by email at pecoftexas@gmail.com.

Sincerely,


Shawn Peters
Peters Environmental Consulting



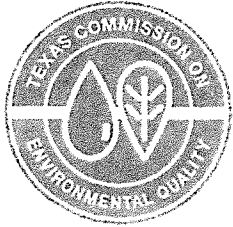
Enclosures

cc: Mr. Paul Reynolds, P.G., P K Double C Environmental Consulting
via email: paul@pkcc.com

*Handle Delivered
10-25-02
Paul Reynolds*

Zc
Terr

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



APPLICATION TO REGISTER A SITE FOR THE BENEFICIAL USE OF DOMESTIC SEPTAGE CHECKLIST

Complete and submit this checklist with your application.

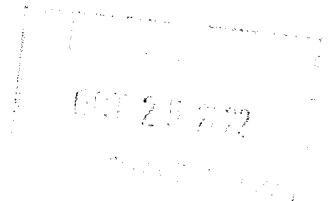
Applicant's Name: Steven Kubena

Permit Number (if assigned):

Indicate if each of the following items is included in your application.

Table with 3 columns: Item, Y, N. Rows include Administrative Report, Technical Report, Landowner Map and List, General Highway Map, USGS Topographic Map, USDA NRCS Soils Map, FEMA Map, Required Signature Pages, Appendix A, Appendix B, Appendix C, and Soil Test Results.

Required for New and Major Amendments



For TCEQ Use Only
Segment Number
Expiration Date
Registration Number 711042
County GUADALUPE
Region 13

Attachment 1 Individual Information

Complete this attachment if the applicant or co-applicant is an individual. Make additional copies of this attachment if both are individuals.

Prefix (Mr., Ms., Miss): Mr.

Full Legal Name, including middle name:

Driver's License or State Identification Number:

State that Issued the License or Identification Number:

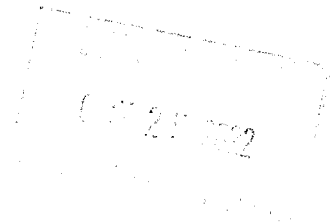
Date of Birth:

Mailing Address:

City, State, and Zip Code:

Phone Number:

Fax Number:



For TCEQ Use Only

Customer Number GREENWAY AG, LLC

Regulated Entity Number _____

Permit Number 711042



TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided.)		
<input checked="" type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/> Other	
2. Customer Reference Number (if issued)	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number (if issued)
CN 606072981		RN 111595534

SECTION II: Customer Information

4. General Customer Information		5. Effective Date for Customer Information Updates (mm/dd/yyyy)	
<input checked="" type="checkbox"/> New Customer		<input type="checkbox"/> Update to Customer Information	
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)		<input type="checkbox"/> Change in Regulated Entity Ownership	
The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).			
6. Customer Legal Name (If an individual, print last name first: eg: Doe, John)		If new Customer, enter previous Customer below:	
Greenway Ag, LLC			
7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number (if applicable)
804650197	32085459173	88-3602593	
11. Type of Customer:	<input checked="" type="checkbox"/> Corporation	<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Other	<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Other:	
12. Number of Employees		13. Independently Owned and Operated?	
<input checked="" type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
14. Customer Role (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following			
<input type="checkbox"/> Owner		<input type="checkbox"/> Operator	
<input type="checkbox"/> Occupational Licensee		<input type="checkbox"/> Responsible Party	
<input checked="" type="checkbox"/> Owner & Operator		<input type="checkbox"/> Voluntary Cleanup Applicant	
<input type="checkbox"/> Other:			
15. Mailing Address:	Steven Kubena		
	240 Sendra Crossing		
	City	La Vernia	State TX ZIP 78121 ZIP + 4
16. Country Mailing Information (if outside USA)		17. E-Mail Address (if applicable)	
		surefloseptic@gmail.com	
18. Telephone Number	19. Extension or Code	20. Fax Number (if applicable)	
(210) 296-4778		() -	

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application)	
<input checked="" type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input type="checkbox"/> Update to Regulated Entity Information	
The Regulated Entity Name submitted here may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).	
22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.)	
Kubena Farms	

23. Street Address of the Regulated Entity: <i>(No PO Boxes)</i>	650 Kubena Rd						
	City	Seguin	State	TX	ZIP	78155	ZIP + 4
24. County	Guadalupe						

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:							
---------------------------------------	--	--	--	--	--	--	--

26. Nearest City	State			Nearest ZIP Code		
New Berlin	TX			78155		

27. Latitude (N) In Decimal:	29.432670	28. Longitude (W) In Decimal:	-98.031943		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)	31. Primary NAICS Code (5 or 6 digits)	32. Secondary NAICS Code (5 or 6 digits)
4953		562212	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*
 Septage application for beneficial land use

34. Mailing Address:	Steven Kubena						
	240 Sendra Crossing						
	City	La Vernia	State	TX	ZIP	78121	ZIP + 4

35. E-Mail Address:	surefloseptic@gmail.com						
---------------------	-------------------------	--	--	--	--	--	--

36. Telephone Number	37. Extension or Code	38. Fax Number <i>(if applicable)</i>
(210) 296-4778		() -

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Emissions Inventory Air	<input type="checkbox"/> Industrial Hazardous Waste
<input type="checkbox"/> Municipal Solid Waste	<input type="checkbox"/> New Source Review Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS
<input type="checkbox"/> Sludge	<input type="checkbox"/> Storm Water	<input type="checkbox"/> Title V Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Waste Water	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:

SECTION IV: Preparer Information

40. Name:	Shawn Peters	41. Title:	
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(505) 974-0225		() -	pecoftexas@gmail.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Greenway Ag, LLC	Job Title:	
Name <i>(In Print)</i> :	Steven Kubena Jr.	Phone:	(210)2964778
Signature:	<i>Steven Kubena Jr.</i>	Date:	9-26-22

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



APPLICATION TO REGISTER A SITE FOR THE BENEFICIAL USE OF DOMESTIC SEPTAGE ADMINISTRATIVE REPORT

If you have questions about completing this form please contact the Applications Review and Processing Team at 512-239-4671.

SECTION 1. TYPE OF APPLICATION

- New (original, site not registered)
- New (previously registered but allowed to expire or canceled)
- Major Amendment (including renewals with changes to substantive provisions of the registration)
- Minor Amendment (including non-substantive provisions of the registration, expiration date remains the same)
- Renewal
- Renewal with Minor Amendment

For amendments or modifications, describe the proposed changes:

For existing registrations:

What is the registration number?

SECTION 2. APPLICANT INFORMATION

What is the legal name of the applicant? The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.

Greenway Ag, LLC

If the applicant is an existing TCEQ customer, provide the Customer Number (CN) issued to this entity? CN

SECTION 3. CO-APPLICANT INFORMATION

Complete this section only if another person or entity is required to apply as a co-permittee.

What is the legal name of the co-applicant? The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.

What is the Customer Number (CN) issued to this entity? CN

Explain the need for a co-applicant:

SECTION 4. APPLICATION CONTACT INFORMATION

This is the person TCEQ will contact if additional information is needed about this application. Provide one contact for administrative questions and one contact for technical questions.

A. Administrative Contact:

Prefix (Mr., Ms., Miss): Mr.

Application Contact First and Last Name: Shawn Peters

Organization Name: Peters Environmental Consulting

Mailing Address: PO Box 351

City, State, and Zip Code: Lockhart, TX 78644

Phone Number: 505-974-0225 Fax Number:

E-mail Address: pecoftexas@gmail.com

B. Technical Contact:

Prefix (Mr., Ms., Miss): Mr.

Application Contact First and Last Name: Paul Reynolds P.G.

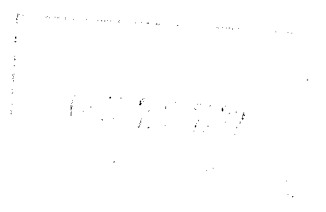
Organization Name: Pk Double C Environmental Consulting

Mailing Address: PO Box 778

City, State, and Zip Code: Clarendon, TX 79226

Phone Number: 806-205-3362 Fax Number:

E-mail Address: paul@pkcctx.com



SECTION 5. REGISTRATION CONTACT INFORMATION

Provide two names of individuals that TCEQ can contact during the term of the registration.

A. Prefix (Mr., Ms., Miss): Mr.

Permit Contact First and Last Name: Steven Kubena

Organization Name: Greenway Ag, LLC

Mailing Address: 240 Sendra Crossing

City, State, and Zip Code: La Vernia, TX 78121

Phone Number: 210-296-4778 Fax Number:

E-mail Address: surefloseptic@gmail.com

B. Prefix (Mr., Ms., Miss): Mr.

Permit Contact First and Last Name: Paul Reynolds P.G.

Organization Name: Pk Double C Environmental Consulting

Mailing Address: PO Box 778

City, State, and Zip Code: Clarendon, TX 79266

Phone Number: 806-205-3362 Fax Number:

E-mail Address: paul@pkcctx.com

SECTION 6. REPORTING AND BILLING INFORMATION

A. Please identify the individual for receiving any annual domestic septage report correspondence.

First and Last Name: Steven Kubena

Organization Name: Greenway Ag, LLC

Mailing Address: 240 Sendra Crossing

City, State, and Zip Code: La Vernia, TX 78121

Phone Number: 210-296-4778 Fax Number:

E-mail Address: surefloseptic@gmail.com

B. Please identify the individual for receiving the annual fee invoices.

First and Last Name: Steven Kubena

Organization Name: Greenway Ag, LLC
Mailing Address: 240 Sendra Crossing
City, State, and Zip Code: La Vernia, TX 78121
Phone Number: 210-296-4778 Fax Number:
E-mail Address: surefloseptic@gmail.com

SECTION 7. REGULATED ENTITY (SITE) INFORMATION

- A. Site Name: Kubena Farms
- B. If this is an existing permitted site, provide the Regulated Entity Number (RN) issued to this site? RN
- C. Owner of the beneficial land use area (Attach an additional sheet if more than one landowner).

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: Steven Kubena

Organization Name: Greenway Ag, LLC

Mailing Address: 911 O'Daniel Rd

City, State, and Zip Code: Seguin, TX 78155

Phone Number: (210) 854-8397

D. Property Acreage

Total acreage listed in legal description, including the application area and buffer zones: 347.16

E. Application Area Acreage

Total acreage where septage may be applied, excluding the buffer zones:
266

F. Application Site Jurisdiction

Complete ONE of the following statements:

The application site is within the city limits of

The application site is within the extraterritorial jurisdiction of

The application site is outside the extraterritorial jurisdiction of New Berlin, TX

G. Describe the source of the septage i.e., residences, mobile homes, etc.

Source is residences

SECTION 8. MISCELLANEOUS INFORMATION

- A. Did any person who was formally employed by the TCEQ represent your company and get paid for services regarding this application? Yes No

If yes, provide the name(s) of the former TCEQ employee(s): Paul Reynolds P.G.

- B. Is the site located on Indian Lands?

Yes No

- C. Is any permanent school fund land affected by this application?

Yes No

If yes, provide the location, foreseeable impacts, and effects this application has on the land(s).

- D. Delinquent Fees and Penalties:

Do you owe fees to the TCEQ? Yes No

Do you owe any penalties to the TCEQ? Yes No

If you answered yes to either of the above questions, provide the amount owed, the type of fee or penalty, and an identifying number.

SECTION 9. ATTACHMENTS

- A. TCEQ Core Data Form

Complete and submit a TCEQ Core Data Form (TCEQ-10400).

Attachment Number: 9-A

- B. General Highway (County) Map

Submit an original General Highway (County) Map showing all boundaries of the site area. These can be ordered from the Texas Department of Transportation Map Sales from the following web site: http://www.txdot.gov/travel/county_grid_search.htm

Attachment Number: 9-B

- C. United States Geological Survey (USGS) Topographic Map

Submit an original United States Geological Survey (USGS) Topographic Map (1:24,000 scale) showing the items listed below:

- the entire property boundary
- all residences and occupied structures within 1000 feet of the site (if the site is on the border of the USGS map, the adjoining map is also needed)
- the location of all wells, structures, and public water supply facilities on-site and within 500 feet of the application area (including those off-site)
- the boundaries of the application area within the property boundaries including the labeled buffer zones

USGS maps are available at the following website: <http://store.usgs.gov>.

Attachment Number: 9-C

D. USDA Natural Resources Conservation Service (NRCS) Soil Map

Submit a legible copy of a USDA Natural Resources Conservation Service (NRCS) Soil Map that shows the approximate application area boundaries along with a soil legend and necessary interpretative information. Identify the location of each grab sample of the composite soil sample(s) taken for analyses. Soil maps are available at the following website:

<http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=TX>.

If the specific county is not mapped, have a soil scientist identify the soils.

Attachment Number: 9-D

E. Federal Emergency Management Agency (FEMA) Map

Submit a copy of the Federal Emergency Management Agency (FEMA) Map that shows the approximate application area boundaries along with the appropriate legend. Several options are available for obtaining these: They can be obtained by requesting a Flood Insurance Study (no charge) from the FEMA Flood Map Distribution Center at 800-358-9616. The flood insurance study will contain a booklet and the FEMA maps. The maps can also be downloaded from the following web site:

<https://msc.fema.gov/portal/search>.

Attachment Number: 9-E

SECTION 10. NOTICE INFORMATION

This section is only required for New and Major Amendment applications.

A. Individual to be listed as contact in the notice

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: Steven Kubena

Organization Name: Greenway Ag, LLC

Mailing Address: 240 Sendra Crossing

City, State, and Zip Code: La Vernia, TX 78121

Phone Number: 210-296-4778 Fax Number:

E-mail Address: surefloseptic@gmail.com

B. County Judge

Provide information for the County Judge in each county where the site is located. Attach an additional page if the site is located in more than one county.

First and Last Name: Kyle Kutscher

Name of County: Guadalupe

Title: County Judge

Mailing Address: 101 East Court Street

City, State, and Zip Code: Seguin, TX 78155

Phone Number: 830-303-8867

C. Landowner map. Attach a landowner map or drawing, with scale, that includes the following, as applicable.

- The applicant's property boundaries;
- The land application unit boundaries within the applicant's property boundaries;
- The property boundaries of all contiguous property owned or under the control of the applicant and the landowners;
- The property boundaries of all landowners bordering the applicant's property.

Attachment Number: 10-C

D. Landowner list. Attach a separate list of the landowners' names and mailing addresses. The list must be cross-referenced to the landowners map.

Attachment Number: 10-D

E. Landowner list media. Indicate the format of the landowners list.

Read/Writeable CD

4 sets of labels

F. Landowner data source. Provide the source of the landowners' names and mailing addresses. Via Guadalupe CAD - Property Search - Harris Govern

<https://propaccess.trueautomation.com/mapSearch/?cid=2&p>

APPLICANT SIGNATURE PAGE

If co-applicants are necessary, each co-applicant must submit an original, separate signature page.

Registration Number: 711092

Applicant: Greenway Ag, LLC

I understand that I am responsible for operating the site described in the legal description in accordance with the Texas Commission on Environmental Quality(TCEQ) requirements in 30 TAC Chapter 312, the conditions set forth in this application, and any additional conditions as required by the TCEQ.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signatory Name: Steven Kubena Sr.

Title:

Signature (use blue ink): Steven Kubena Sr. Date: 9-24-22

SUBSCRIBED AND SWORN to before me by the said Steven Kubena Sr. on this 24 day of September, 20 22

My commission expires on the 8 day of December, 20 24

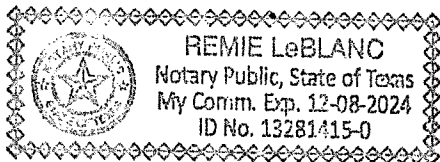
[Signature]

(Seal)

Notary Public

Wilson

County, Texas



LANDOWNER SIGNATURE PAGE 1 OF 2

Required if the landowner is not the applicant or co-applicant. Each landowner must submit an original, separate signature page.

Registration Number:

Applicant: Greenway Ag, LLC

I certify, as the owner of the land described in the attached legal description, that I have all rights and covenants to authorize the applicant for this registration to use this site for the beneficial reuse of the following type of waste: domestic septage. I understand that 30 TAC Chapter 312 requires me to make a reasonable effort to see that the applicant complies with the required operating conditions stated in the above paragraph. I also certify under penalty of law that all information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine, imprisonment for violations, and revocation of this registration.

Signatory Name: Steven Kubena

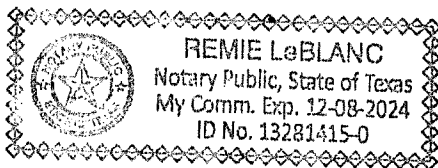
Title:

Signature (use blue ink): Steven Kubena Date: 9-24-2022

SUBSCRIBED AND SWORN to before me by the said Steven Kubena on this 24 day of September, 20 22

My commission expires on the 8 day of December, 20 24

(Seal)



[Signature]
Notary Public

Wilson
County, Texas

LANDOWNER SIGNATURE PAGE 2 of 2

Required if the landowner is not the applicant or co-applicant. Each landowner must submit an original, separate signature page.

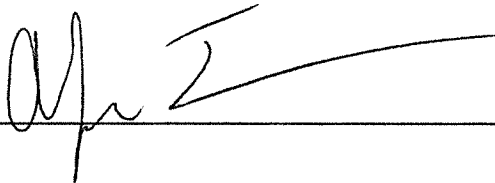
Registration Number:

Applicant: Greenway Ag, LLC

I certify, as the owner of the land described in the attached legal description, that I have all rights and covenants to authorize the applicant for this registration to use this site for the beneficial reuse of the following type of waste: domestic septage. I understand that 30 TAC Chapter 312 requires me to make a reasonable effort to see that the applicant complies with the required operating conditions stated in the above paragraph. I also certify under penalty of law that all information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine, imprisonment for violations, and revocation of this registration.

Signatory Name: Alyssa Johnson

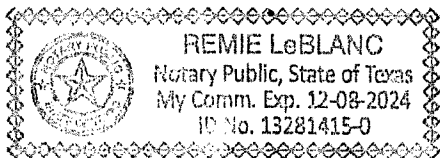
Title:


Signature (use blue ink):  Date: 09/24/2022

SUBSCRIBED AND SWORN to before me by the said Alyssa Johnson on this 24 day of September, 20 22

My commission expires on the 8 day of December, 20 24

(Seal)




Notary Public
Wilson
County, Texas

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



APPLICATION TO REGISTER A SITE FOR THE BENEFICIAL USE OF DOMESTIC SEPTAGE TECHNICAL REPORT

SECTION 1. EQUIPMENT USE AND APPLICATION INFORMATION

- A. Describe the equipment and methods to be used to evenly distribute the septage, and if the septage is to be incorporated into the soil, describe the equipment and methods to be used:

It is planned to inject the septage. Registrant desires to utilize knives/chisels to inject the materials below the soil surface.

- B. Describe how often septage will be applied to the site and during which times of the year:

Ultimately the septage could potentially be injected 7 days/week, 12 months/year. It is understood that there is near surface groundwater and these conditions will be accounted for and all applications will adhere to the rule where it pertains to these limitations.

SECTION 2. SITE HISTORY

- A. Has septage been previously applied to this site? Yes No
- B. Please provide a description of the planned use (as well as historic use if amendment or renewal application) of the application area, including the type of crop(s) grown, crop rotation, tillage practices and previous septage application amounts (gallons) and rates (gallons per acre).

Historically, this property was utilized as a family owned dairy. The dairy has been closed for numerous years. Most of the vegetation has historically been forages in the form of improved grasses and crops. Some acreages were irrigated. Since the dairy closed some acreages were in production for "truck crops" (vegetables, etc.). Anticipated crops will be for the purpose of forage production as hay or grazing. All harvest restrictions will be followed.

SECTION 3. PATHOGEN AND VECTOR ATTRACTION REDUCTION REQUIREMENTS

Note: The initial pathogen reduction and vector attraction reduction treatment of untreated domestic septage is not authorized under this registration. A separate TCEQ Municipal Solid Waste authorization must be obtained to treat the domestic septage if it is not treated in the registered transport vehicle.

Please check each of the following to ensure that the pathogen reduction and vector attraction options will be met prior to land application of domestic septage.

- Yes Reduction of pathogens (as stated in 30 TAC §312.82) by the addition of lime before land application.
- Yes Reduction of vector attraction (as stated in 30 TAC §312.83) by raising the pH to greater than 12 standard units for at least 30 minutes.

SECTION 4. WELL DATA

A. Attach a USGS map with the following information shown and labeled. If not applicable, provide a detailed explanation (on a separate page) indicating why.

Attachment Number: T4-A

- The boundaries of the application area
- All wells located on the application area
- All wells located within 500 feet of the application area, including off-site wells of other landowners
- All springs and seeps onsite and within 500 feet of the property boundaries
- All surface waters in the state onsite and within 500 feet of the property boundaries
- All faults and sinkholes onsite and within 500 feet of the property

B. Show well locations and numbers on the USGS map and cross reference to the numbers on the list below. Attach additional pages as necessary to include all of the wells.

Well #	Well Use (drinking, irrigation, sampling, etc)	Producing? (Yes/No)	Open, cased*, capped, or plugged?
1	Livestock	Operational, not in use	Cased
2	Livestock	Yes	Cased
3	Livestock	Yes	Cased
4	Livestock	Yes	Cased

Well #	Well Use (drinking, irrigation, sampling, etc)	Producing? (Yes/No)	Open, cased*, capped, or plugged?
5	Irrigation	Yes	Cased
6	Livestock	Operational, not in use	Cased
7	Livestock	Yes	Cased
8	Livestock	Yes	Cased

* Proper casing is a minimum of 10 feet of casing and cement. Casing, plugging and capping rules can be found at 16 TAC §76.72.

The site operator shall ensure that the following action will be taken on each well before septage application begins on the site.

Condition of Well	Action to be Taken
If producing and cased	no action necessary
If producing and not cased	case or describe other means of protection
If non-producing and cased	must plug or cap before septage application.
If non-producing and not cased	must plug before septage application.

SECTION 5. SOIL DATA

A. Use the USDA Natural Resources Conservation Service (NRCS) soil descriptions to complete the following table. Refer to Physical and Chemical Properties Table and Engineering Tables in the appropriate county soil survey.

Map Symbol	Soil Type	Maximum slope	pH	Depth to Bedrock* (Inches)	Depth to Groundwater (Feet)	Permeability (Inch/hour)	* Soil Depth (Inches)
CfB-CsC	S. Loam	3	5-7	72	N/A	2.0-6.0	72
DmC	L. Sand	5	4-6	80	Perched	6.0-20.0	80
MaB	Loam	3	5-7	66	N/A	0.6-2.0	66
PaD	Sand	8	5-7	96	Perched	6.0-20.0	96
Uw	Loam	1	5-8	80	Perched	0.2-0.6	80

* If depth to bedrock is not specified in the soil survey, use the maximum depth shown.

B. If soil depth is less than two feet, please provide the rationale for utilizing soils thinner than two feet. The rationale should include site specific investigation results.

C. Soil Data Table Completed By: Paul Reynolds, P.G.-Soil Scientist

D. Data Source(s): USDA-NRCS Soil Survey

E. Date: June 2022

F. List Soils with Restrictive Characteristics (refer to the list below):

DmC, PaD, Uhland

Restrictive Soil Characteristics:

Soils with at least an "occasional flooding" classification in the soil legend may flood between 5 and 50 times in 100 years.

Seasonal groundwater or groundwater table shall be below the treatment zone at least:

3 feet for soil with permeability of < 2 in/hr;

4 feet for soil with permeability of 2 - 6 in/hr;

For soil permeabilities of > 6 in/hr, the TCEQ will review each case individually.

APPENDIX A

SEPTAGE APPLICATION RATE

SECTION 1. CROPPING PLAN AND NUTRIENT NEEDS

Warm Season Intended Crop(s): Coastal Bermuda grass

Yield Goal or Number of Planned Harvest Events/Year: 3-4 Cut Hay Nitrogen Requirement, in lb/yr: 300 @ 100 lb/cut

Cool Season Intended Crop(s): Ryegrass

Yield Goal: 5,000 lbs/Ac Nitrogen Requirement, in lb/yr: 140 lb/Ac

Nitrogen needed by crop:

A. Total Nitrogen Requirement for specified yield goals*: 440 lb/Ac/Yr

B. Nitrogen available in soil ** Minus - 22 lbs/Ac

C. Supplemental Nitrogen needed to meet yield goals Equals = 418 lbs/Ac

Provide the data source for the value entered in Line A.

NRCS "S" Tables

*Line A = Sum of the nitrogen requirement for the specified yield goals for the warm season crop and cool season crop

**Line B = $2 * \text{NO}_3\text{-N (ppm)(in the 0-6" soil depth)} + 6 * \text{NO}_3\text{-N(ppm)(in the 6-24" soil depth)}$

SECTION 2. CALCULATE ANNUAL APPLICATION RATE

The annual application rate (AAR) is based on the nitrogen requirements of the crop, in gallons per acre per 365 day period.

$\text{AAR} = \text{N (Line C)} / 0.0026 = \underline{160,769} \text{ gal/acre/yr}$

AAR = Annual application rate in gallons per acre per 365 day period.

N = Amount of nitrogen, in pounds per acre per 365 day period, for the crop.

If the land application unit is located in a Major Sole-Source Impairment Zone, then please provide a copy of a nutrient management plan that has been prepared by a certified nutrient management specialist in accordance with the practice standards of the Natural Resources Conservation Service of the United States Department of Agriculture, and if the phosphorous level in the soil is greater than 200 parts per million, you must also submit a detailed Nutrient Utilization Plan.

Attachment Number: APX-A2

APPENDIX B

SOIL TESTING INFORMATION

Soil samples shall be taken prior to any application of commercial fertilizer. Do not use a galvanized container as this could give a false reading on zinc. Samples will need to be taken within the same 45 day time-frame each year, or by an approved sampling plan and analyzed within 30 days of sample collection. The initial soil sample for application approval may be taken whenever necessary.

Obtain one composite sample for each soil depth per 80 acres and per uniform soil type (soils with the same characteristics and texture) within the 80 acres, or per approved soil sampling plan. Composite samples shall be comprised of 10 - 15 random sample cores taken from each of the following soil depth zones: 0-6 inches and 6-24 inches.

Soil samples shall be submitted to a soil testing laboratory along with a previous crop history of the site, intended crop growth and yield goal. Soil reports shall include fertilizer recommendations for the crop yield goal. Samples shall be analyzed for the parameters below:

Parameter (7)		0- 6 "	6 -24"	Frequency
Nitrate Nitrogen (NO ₃ -N, mg/kg)	(1)	x	x	1 per year
Ammonium Nitrogen (NH ₄ -N, mg/kg)	(1)	x	x	1 per year
Total Kjeldahl Nitrogen (TKN, mg/kg)	(2)	x	x	1 per year
Phosphorus (plant available, mg/kg)	(3)	x	x	1 per year
Potassium (plant available, mg/kg)	(3)	x	x	1 per year
Sodium (plant available, mg/kg)	(3)	x	x	1 per year
Magnesium (plant available, mg/kg)	(3)	x	x	1 per year
Calcium (plant available, mg/kg)	(3)	x	x	1 per year
Electrical Conductivity	(4)	x	x	1 per year
Soil Water pH (S.U.)	(5)	x	x	1 per year
Total Arsenic (mg/kg)	(6)	x	N/A	1 per 5 years
Total Cadmium (mg/kg)	(6)	x	N/A	1 per 5 years
Total Chromium (mg/kg)	(6)	x	N/A	1 per 5 years
Total Copper (mg/kg)	(6)	x	N/A	1 per 5 years
Total Lead (mg/kg)	(6)	x	N/A	1 per 5 years
Total Mercury (mg/kg)	(6)	x	N/A	1 per 5 years
Total Molybdenum (mg/kg)	(6)	x	N/A	1 per 5 years
Total Nickel (mg/kg)	(6)	x	N/A	1 per 5 years
Total Selenium (mg/kg)	(6)	x	N/A	1 per 5 years
Total Zinc (mg/kg)	(6)	x	N/A	1 per 5 years

1: Determined in a 1 N KCl soil extract (<http://soiltesting.tamu.edu/webpages/swftlmethods1209.html>).

2. Determined by Kjeldahl digestion or an equivalent accepted procedure. Methods that rely on Mercury as a catalyst are not acceptable.

3. Mehlich III extraction (yields plant-available concentrations) with inductively coupled plasma.

4. Electrical Conductivity (EC) - determine from extract of 2:1 (volume/volume) water/soil mixture and expressed in dS/m (same as mmho/cm).

5. Soil pH must be analyzed by the electrometric method in Test Methods for Evaluating Solid Waste, EPA SW-846, 40 CFR 260.11; method 9045C - determine from extract of 2:1 (volume/volume) water/soil mixture.
6. Analysis for metals in soil must be performed according to methods outlined in Test Methods for Evaluating Solid Waste, EPA SW-846; method 3050.
7. All parameters must be analyzed on a dry weight basis, except Soil Water pH and Electrical Conductivity.

Please be advised that the maximum acceptable soil concentrations of metals are listed below. These rates are based on the maximum cumulative loading rates found in §312.43 Table 2- Cumulative Metal Loading Rate.

Metal	Soil Conc. Limit (mg/kg soil)
Total Arsenic	20.5
Total Cadmium	19.5
Total Chromium	1500
Total Copper	750
Total Lead	150
Total Mercury	8.5
Total Molybdenum	Monitor
Total Nickel	210
Total Selenium	50
Total Zinc	1,400

Attach copies of the laboratory reports for all required tests.

Attachment Number: APX-B1

Attach a map which clearly delineates where the soil samples were taken on the site. It must match the scale of the soil survey map submitted with the application. The soil analysis data submitted must be clearly cross referenced to the location of the sample(s).

Attachment Number: APX-B2

Stormwater within the staging area will be treated as a waste material. All water will be collected and pumped into the holding tanks and distributed to the field(s) along with the septage materials being distributed.

- F. Describe methods to be used to ensure no loads of septage remain at the temporary storage site for longer than 90 days, including how exceptions to this restriction will be requested (as provided by 30 TAC §312.50) when needed.

It is not anticipated that materials will be stored longer than allowed for a staging area. If the staging storage becomes a problem, the materials will be removed.

Kubena Farms

- C. Owner of the beneficial land use area (Attach an additional sheet if more than one landowner).

Prefix (Mr., Ms., Miss): Ms.

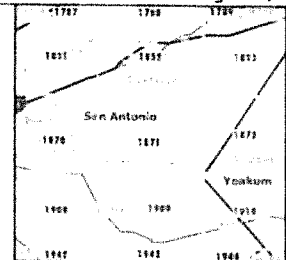
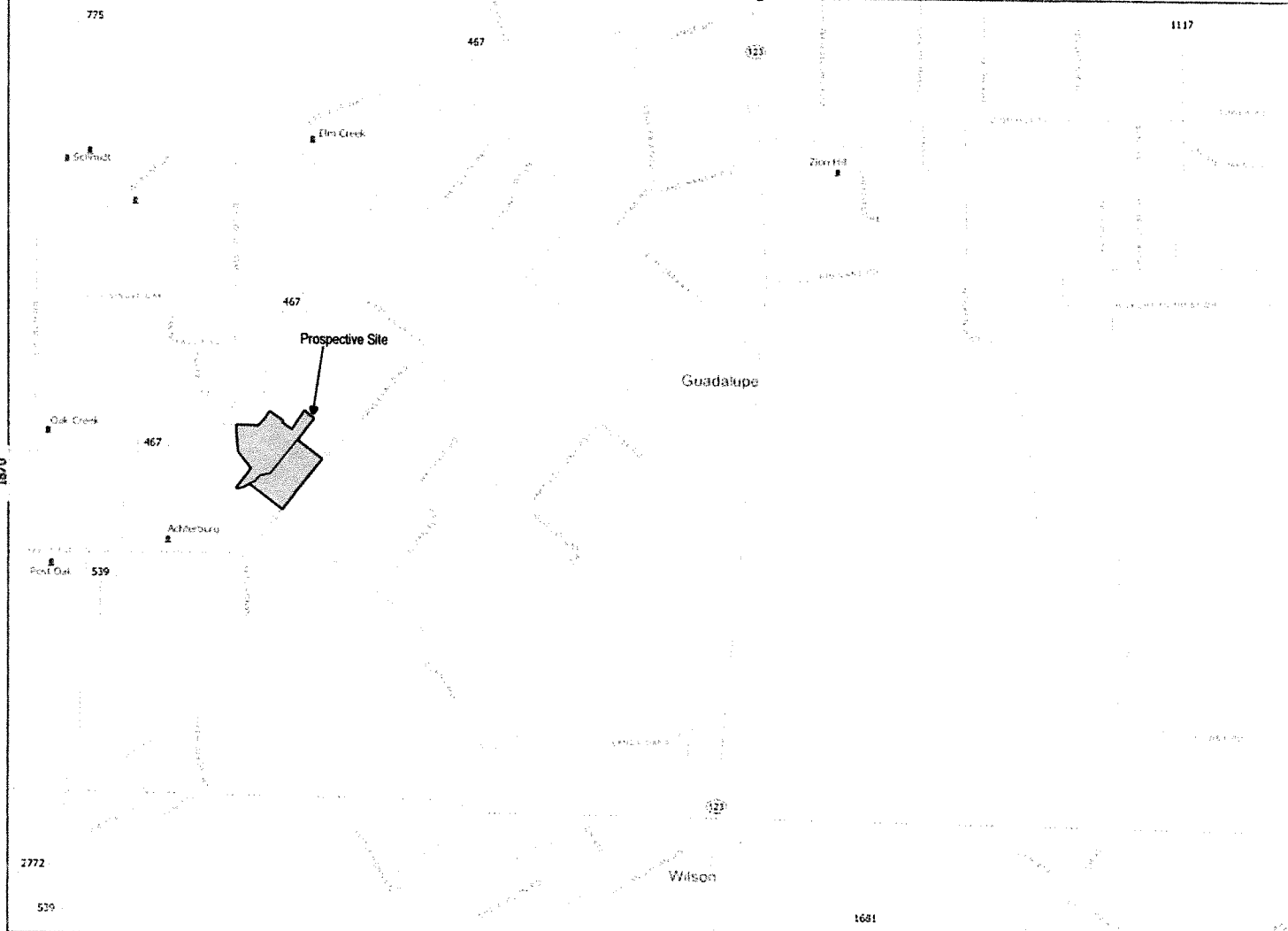
First and Last Name: Alyssa Johnson

Organization Name:

Mailing Address: 516 O'Daniel School Rd

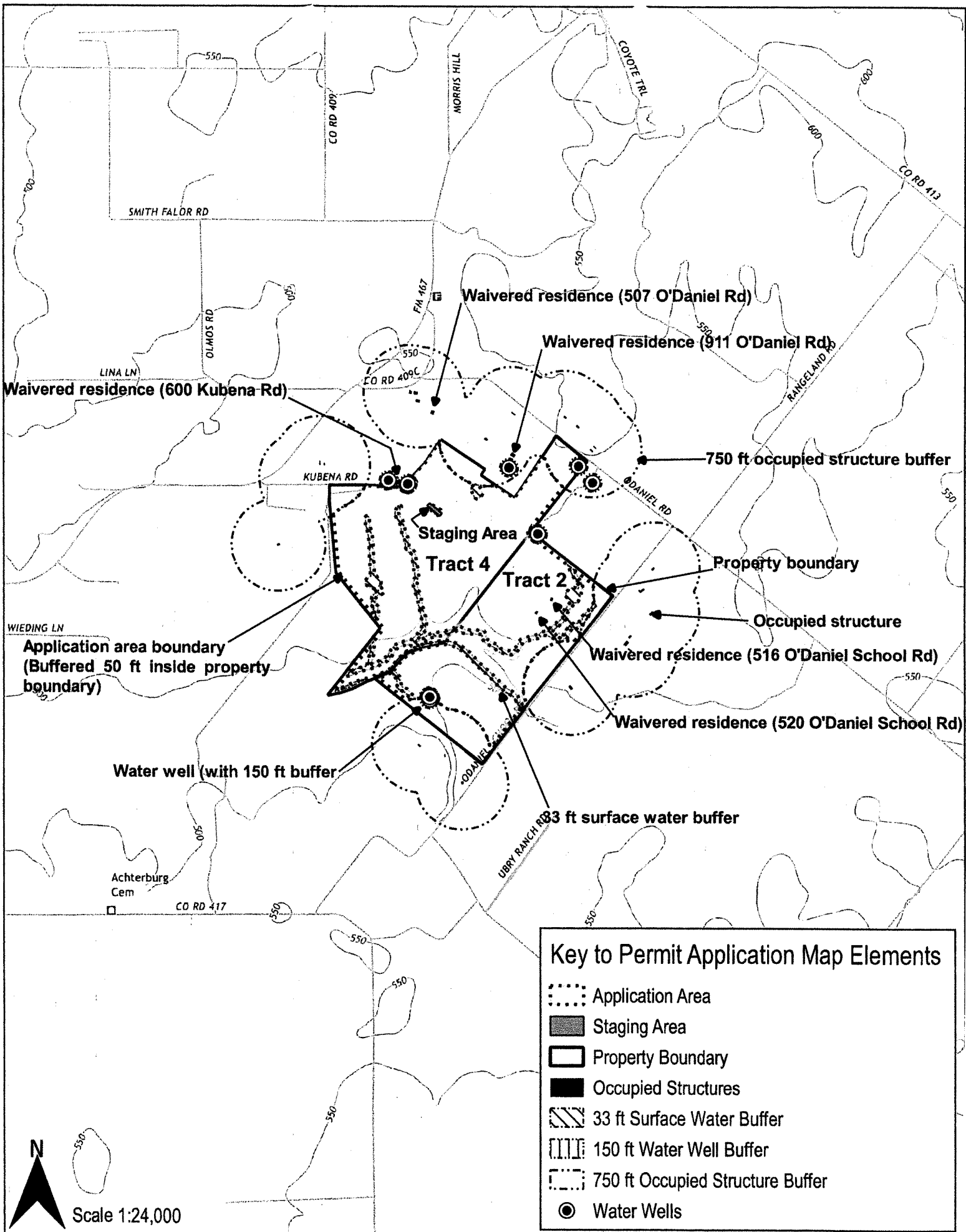
City, State, and Zip Code: Seguin, TX 78155

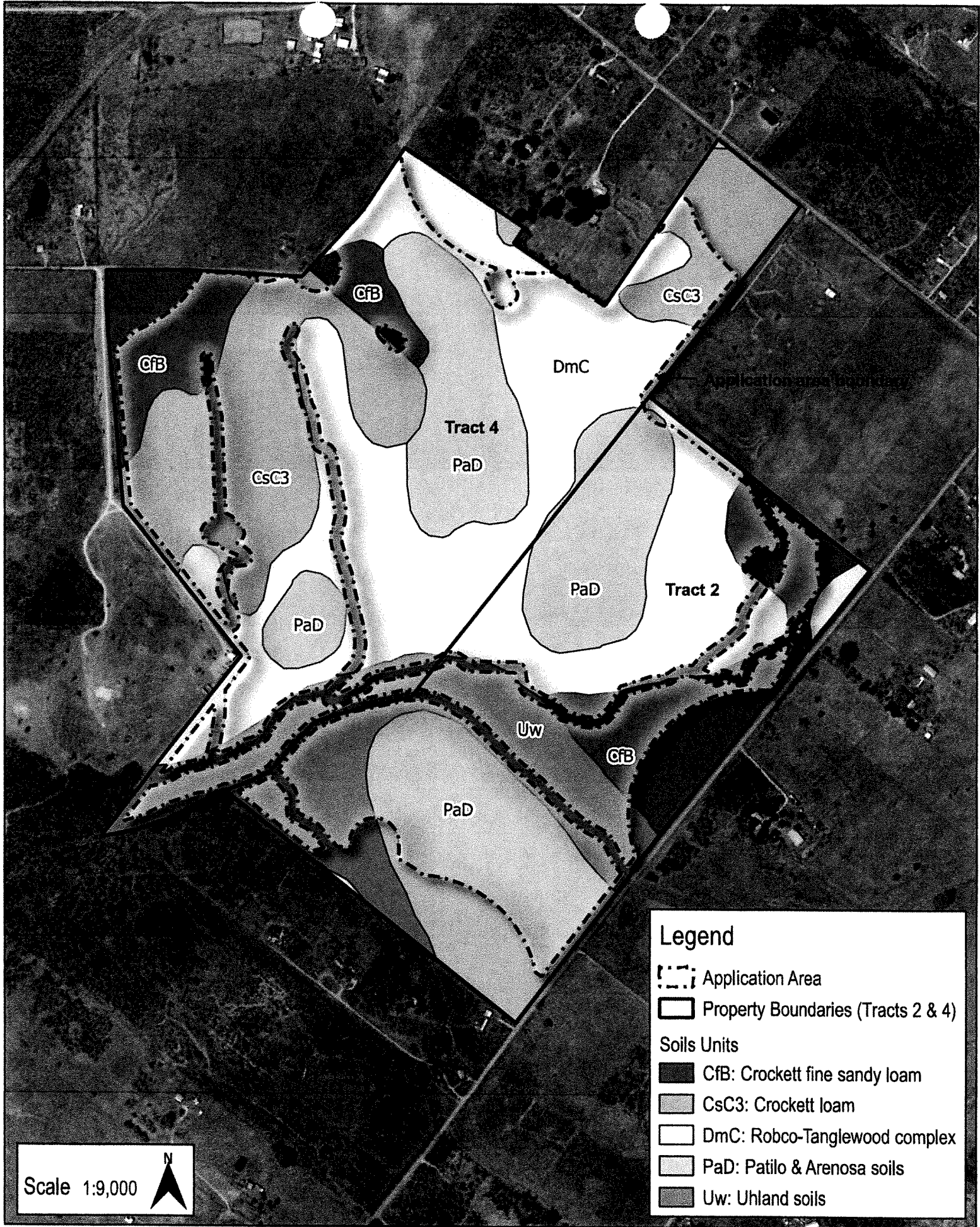
Phone Number: (830) 560-6764



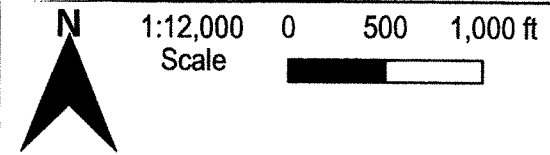
- Texas Department of Transportation
- Unincorporated Community
 - County Seat
 - Border Crossing
 - Cemetery
 - Cemetery (Inside City)
 - ⚓ Deep Draft Port
 - ⚓ Shallow Draft Port
 - Railroad
 - Dam
 - River or Stream
 - TXDOT District
 - Lakes
 - Education
 - Military
 - ▨ Airport Runway
 - Airport
 - Prison
 - Parks and Other Public Land

Scale 1:72,224
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Kubena Farms NRCS Soil Map



Application Area Legend

- Property Boundaries (2 Tracts)
- Proposed Application Area

FEMA Legend

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Elevations determined.

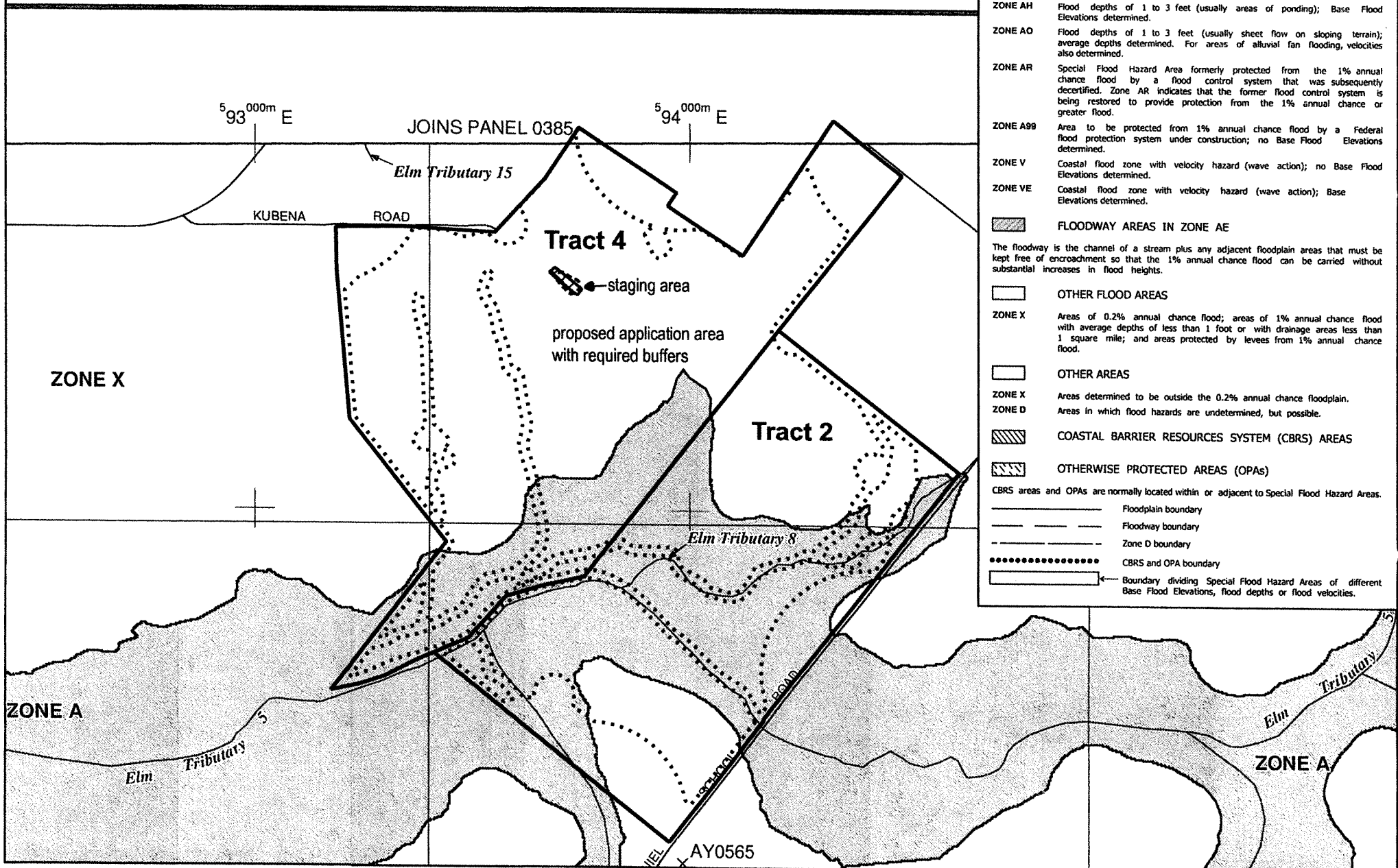
FLOODWAY AREAS IN ZONE AE

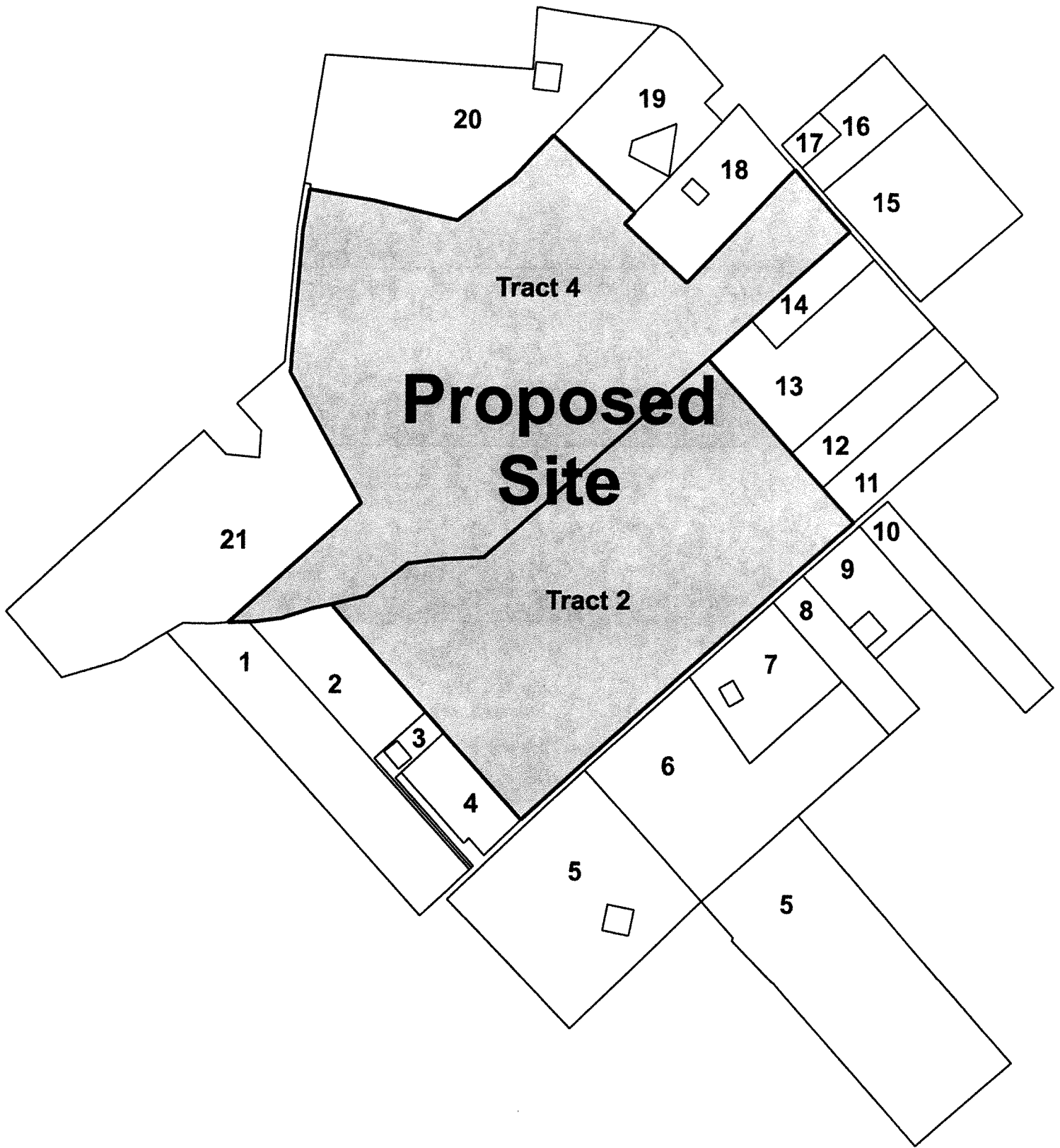
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

- OTHER FLOOD AREAS**
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
- OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

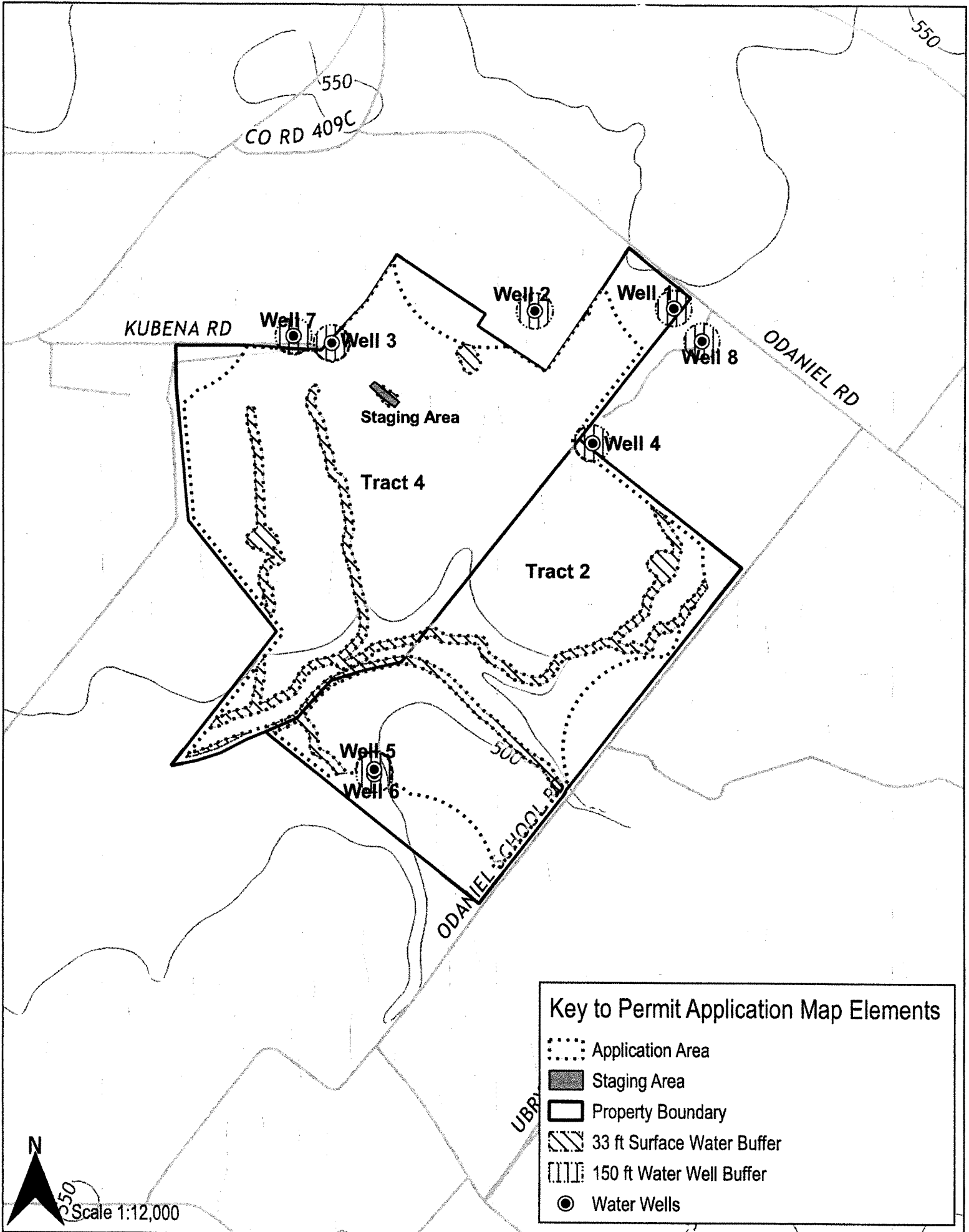
- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, Flood depths or flood velocities.











Kubena Farms (Greenway Ag, LLC)
Landowner List

Map #	Landowner	Map #	Landowner
1	Kleinschmidt (David & Penny Sue & Darren & Angela Eileen) 4111 FM 467 Seguin, TX 78155	12	John Anderson 2210 Curry Rd Seguin, TX 78155
2	John Schwertlech 1208 O'Daniel School Rd Seguin, TX 78155	13	Anderson (John & Austin & Tyler) 2210 Curry Rd Seguin, TX 78155
3	Daniel & Janelle Behrens 1208 O'Daniel School Rd Seguin, TX 78155	14	Austin Anderson 2219 Curry Rd Seguin, TX 78155
4	Nancy Lynn Carroll 327 Ashland Dr San Antonio, TX 78218	15	Chrles James et al 1035 Gibbs St San Antonio, TX 78202
5	Lambeck Living Trust DTD 8-31-2010 Carl & Margie Lambeck - Trustees PO Box 364 Stockdale, TX 78160	16	Delvage McIntyre 1042 O'Daniel Rd Seguin, TX 78155
6	ARGAR46 LLC 3321 Casa Blanca Corpus Christi, TX 78411	17	Betty Young 1010 O'Daniel Rd Seguin, TX 78155
7	Arnulfo & Jacqueline Garcia 703 O'Daniel School Rd Seguin, TX 78155	18	Steven & Donna Kubena 911 O'Daniel Rd Seguin, TX 78155
8	Martin & Teresa Lund 515 O'Daniel School Rd Seguin, TX 78155	19	Jeffrey & Eleanore Smits 831 O'Daniel Rd Seguin, Tx 78155
9	Martin & Teresa Lund 515 O'Daniel School Rd Seguin, TX 78155	20	Carol Werner 507 O'Daniel Rd Seguin, TX 78155
10	Ernest Foreman Jr. 391 O'Daniel School Rd Seguin, TX 78155	21	George Green 217 E River St Seguin, TX 78155
11	Lebo (Mary Frances & Justin & Crystal) & Danielle Alaniz 4516 W Fork Dr Schertz, Tx 78154		



Key to Permit Application Map Elements

-  Application Area
-  Staging Area
-  Property Boundary
-  33 ft Surface Water Buffer
-  150 ft Water Well Buffer
-  Water Wells

N
 Scale 1:12,000

Kubena Farms					
Application Rate by Crop and Crop Scenario					
PK double C Environmental Consulting					
Crops	Yield	Crop N Required lb/Ac N	Soil Residual lb/Ac N	Remainder N Lb/Ac	Application rate Gal/Ac
Forage Sorghum	7000	160	21	139	53,462
Wheat Forage	4000	160	21	139	53,462
Sorghum/Wheat	11000	320	21	299	115,000
Coastal	3 T	300	21	279	107,308
Rye Grass	5000	140	21	119	45,769
Coastal/Rye	11000	440	21	419	161,154

SOIL ANALYSIS REPORT

CLIENT: 41493	PKCC PAUL REYNOLDS PO BOX 778 CLARENDON, TX 79226
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www.servitech.com

1816 E. Wyatt Earp
PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	99767 - 99768
INVOICE NO:	892125
DATE RECEIVED:	05/26/2022
DATE REPORTED:	06/01/2022

SOIL ANALYSIS RESULTS FOR: KUBENA FARMS **FIELD IDENTIFICATION: 1**

METHOD USED:			1:2 Soil-Water	1:2 Soil-Water	XSL(f)	LOI(r)	Cd Reduction		Mehlich 3 ICP												
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	Nitrate-Nitrogen lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	Sulfur lb. S/A	Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
99767		0 - 6	6.7		0.13	No	1.6	10.1	18	451	270	22	40	1670	233	15					
99768		6 - 24	7.5		0.09	No	0.6	3.7	20	313	243	12	65	1590	308	19					

METHOD USED:			KCl Extr.		TKN
Lab Number	Sample ID	Sample Depth	Ammonium ppm	Nitrogen lb. /A	TKN ppm
99767		0 - 6	3	5	1206
99768		6 - 24	2	11	412

FERTILIZER RECOMMENDATIONS:			POUNDS ACTUAL NUTRIENT PER ACRE														Cation Exchange Capacity						
Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P ₂ O ₅	K ₂ O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	CEC	%H	%K	%Ca	%Mg	%Na
				6.0	6.5	7.0																	
99767																		11	0	6	76	18	1
99768																		11	0	6	71	23	1

SUBCONTRACT LABS

Pace Analytical Services - Lenexa

99767 Arsenic	mg/kg	EPA 6010
99767 Cadmium	mg/kg	EPA 6010
99767 Lead	mg/kg	EPA 6010
99767 Mercury	mg/kg	EPA 7471

Servi-Tech Laboratories did not analyse the sample for the reported subcontracted results.
The original report from the subcontract lab is available upon request.

SPECIAL COMMENTS AND SUGGESTIONS:

Analyses are representative of the samples submitted Samples are retained 30 days after report of analysis Explanations of soil analysis terms are available upon request

Reviewed and Approved By: Michele Pacheco Data Review Coordinator *Michele Pacheco*

The reported analytical results apply only to the sample as it was supplied. The report may not be reproduced, except in full, without permission of ServiTech.

Your opinion is valuable to us. Please let us know what you think about our services! Send an email to feedback@servitech.com.

Page 1 of 2
06/01/2022 3:29 pm

SOIL ANALYSIS REPORT

CLIENT: 41493	PKCC PAUL REYNOLDS PO BOX 778 CLARENDON, TX 79226
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1816 E. Wyatt Earp
PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	99767 - 99768
INVOICE NO:	892125
DATE RECEIVED:	05/26/2022
DATE REPORTED:	06/01/2022

SOIL ANALYSIS RESULTS FOR: KUBENA FARMS**FIELD IDENTIFICATION:** 1

Lab Number(s): 99767

Servitech Laboratory fertilizer recommendations were not requested.

Analyses are representative of the samples submitted

Samples are retained 30 days after report of analysis

Explanations of soil analysis terms are available upon request

Reviewed and
Approved By:Michele Pacheco
Data Review Coordinator

Page 2 of 2
06/01/2022 3:29 pm

The reported analytical results apply only to the sample as it was supplied. The report may not be reproduced, except in full, without permission of ServiTech.

Your opinion is valuable to us. Please let us know what you think about our services! Send an email to feedback@servitech.com.

SOIL ANALYSIS REPORT

CLIENT: 41493	PKCC PAUL REYNOLDS PO BOX 778 CLARENDON, TX 79226
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PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	99769 - 99770
INVOICE NO:	892125
DATE RECEIVED:	05/26/2022
DATE REPORTED:	06/01/2022

SOIL ANALYSIS RESULTS FOR: KUBENA FARMS **FIELD IDENTIFICATION: 2**

METHOD USED:			1:2 Soil-Water	1:2 Soil-Water	XSL(f)	LOI(r)	Cd Reduction		Mehlich 3 ICP											
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	Nitrate-Nitrogen lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	Sulfur lb. S/A	Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
99769		0 - 6	6.1		No	0.9	2.0	4	135	156	8	14	696	78	10					
99770		6 - 24	6.6		No	0.3	2.5	14	206	134	6	32	762	77	16					

METHOD USED:			KCl Extr.	TKN																		
Lab Number	Sample ID	Sample Depth	Ammonium ppm	Nitrogen lb. /A	TKN ppm																	
99769		0 - 6	3	5	742																	
99770		6 - 24	2	11	286																	

FERTILIZER RECOMMENDATIONS:				POUNDS ACTUAL NUTRIENT PER ACRE														Cation Exchange Capacity					
Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P ₂ O ₅	K ₂ O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
99769																		5	0	9	76	14	1
99770																		5	0	7	78	13	1

SUBCONTRACT LABS

Pace Analytical Services - Lenexa

99769 Arsenic	mg/kg	EPA 6010
99769 Cadmium	mg/kg	EPA 6010
99769 Lead	mg/kg	EPA 6010
99769 Mercury	mg/kg	EPA 7471

Servi-Tech Laboratories did not analyse the sample for the reported subcontracted results.
The original report from the subcontract lab is available upon request.

SPECIAL COMMENTS AND SUGGESTIONS:

Analyses are representative of the samples submitted Samples are retained 30 days after report of analysis Explanations of soil analysis terms are available upon request

Reviewed and Approved By: Michele Pacheco Data Review Coordinator *Michele Pacheco* Page 1 of 2

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SOIL ANALYSIS REPORT

CLIENT: 41493	PKCC PAUL REYNOLDS PO BOX 778 CLARENDON, TX 79226
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www.servitech.com

1816 E. Wyatt Earp
PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	99769 - 99770
INVOICE NO:	892125
DATE RECEIVED:	05/26/2022
DATE REPORTED:	06/01/2022

SOIL ANALYSIS RESULTS FOR: KUBENA FARMS**FIELD IDENTIFICATION:** 2

Lab Number(s): 99769

Servi-Tech Laboratory fertilizer recommendations were not requested.

Analyses are representative of the samples submitted

Samples are retained 30 days after report of analysis

Explanations of soil analysis terms are available upon request

Reviewed and

Michele Pacheco

Approved By:

Data Review Coordinator

Page 2 of 2

06/01/2022 3:29 pm

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SOIL ANALYSIS REPORT

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1816 E. Wyatt Earp
PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	99771 - 99772
INVOICE NO:	892125
DATE RECEIVED:	05/26/2022
DATE REPORTED:	06/01/2022

SOIL ANALYSIS RESULTS FOR: KUBENA FARMS **FIELD IDENTIFICATION: 3**

METHOD USED:			1:2 Soil-Water	1:2 Soil-Water	XSL(f)	LOI(f)	Cd Reduction		Mehlich 3 ICP											
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	S/A	Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
99771		0 - 6	6.4		No	1.7	1.4	3	46	226	11	20	1400	264	19					
99772		6 - 24	7.1		No	0.9	1.2	6	11	287	10	54	2170	516	89					

METHOD USED:			KCl Extr.		TKN
Lab Number	Sample ID	Sample Depth	Ammonium ppm	Nitrogen lb. /A	TKN ppm
99771		0 - 6	4	7	1075
99772		6 - 24	2	11	451

FERTILIZER RECOMMENDATIONS:			POUNDS ACTUAL NUTRIENT PER ACRE														Cation Exchange Capacity						
Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P ₂ O ₅	K ₂ O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	CEC	%H	%K	%Ca	%Mg	%Na
				6.0	6.5	7.0																	
99771																		10	0	6	71	22	1
99772																		16	0	5	67	26	2

SUBCONTRACT LABS

Pace Analytical Services - Lenexa

99771 Arsenic mg/kg EPA 6010

99771 Cadmium mg/kg EPA 6010

99771 Lead mg/kg EPA 6010

99771 Mercury mg/kg EPA 7471

Servi-Tech Laboratories did not analyse the sample for the reported subcontracted results. The original report from the subcontract lab is available upon request.

SPECIAL COMMENTS AND SUGGESTIONS:

Analyses are representative of the samples submitted Samples are retained 30 days after report of analysis Explanations of soil analysis terms are available upon request

Reviewed and Approved By: Michele Pacheco Data Review Coordinator *Michele Pacheco* Page 1 of 2

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SOIL ANALYSIS REPORT

CLIENT: 41493	PKCC PAUL REYNOLDS PO BOX 778 CLARENDON, TX 79226
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PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	99771 - 99772
INVOICE NO:	892125
DATE RECEIVED:	05/26/2022
DATE REPORTED:	06/01/2022

SOIL ANALYSIS RESULTS FOR: KUBENA FARMS**FIELD IDENTIFICATION:** 3

Lab Number(s): 99771

Servi-Tech Laboratory fertilizer recommendations were not requested.

Analyses are representative of the samples submitted

Samples are retained 30 days after report of analysis

Explanations of soil analysis terms are available upon request

Reviewed and
Approved By:Michele Pacheco
Data Review Coordinator

Page 2 of 2
06/01/2022 3:29 pm

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Servi-Tech Laboratories

*Herstel C
5/25
Quarantine*

SOIL SAMPLE INFORMATION SHEET

1102 Park West Drive • P.O. Box 169 • Hastings, NE 68902
1816 East Wyatt Earp Blvd • P.O. Box 1397 • Dodge City, KS 67801
6921 S. Bell • Amarillo, TX 79109

800-557-7509

Name PKCC

Date sampled _____

Address _____

Date sent _____

City/St/Zip _____

Fax/email results

Lab Use Only	Producer /	Field I.D.	Sample I.D.	Depth	Test	Crop	YG
22767	1. <i>Kubena Farms</i>	<i>#1</i>		<i>0 to 6</i>	<i>PKCC 4-9</i>		
22768	2.			<i>10 to 24</i>			
22769	3.	<i>#2</i>		<i>0 to 6</i>			
22770	4.			<i>6 to 24</i>			
22771	5.	<i>#3</i>		<i>0 to 6</i>			
22772	6.			<i>6 to 24</i>			
	7.			to			
	8.			to			
	9.			to			
	10.			to			
	11.			to			
	12.			to			
	13.			to			
	14.			to			
	15.			to			
	16.			to			
	17.			to			
	18.			to			
	19.			to			
	20.			to			
	21.			to			
	22.			to			
	23.			to			
	24.			to			
	25.			to			
	26.			to			
	27.			to			
	28.			to			
	29.			to			
	30.			to			

Comments

SOIL ANALYSIS REPORT

CLIENT: 41493	PKCC PAUL REYNOLDS PO BOX 778 CLARENDON, TX 79226
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**Servi-Tech
Laboratories**
www.servitechlabs.com

1816 E. Wyatt Earp
PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

INVOICE NO:	893206
DATE RECEIVED:	8/1/2022
DATE REPORTED:	08/02/2022

SOIL ANALYSIS RESULTS FOR: KUBENA **FIELD IDENTIFICATION: TRACT 2**

METHOD USED:			1:2 Soil-Water	1:2 Soil-Water	XSL(l)	LOI(r)	Cd Reduction		Mehlich 3 ICP										
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	Phosphorus ppm P	Potassium ppm K	Sulfur lb. S/A	Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
110653	CLAY	0 - 6	6.0		0.12	No	2.1	2.7	5	19	185	8	14	2110	230	8			
110654	CLAY	6 - 24	6.6		0.07	No	0.7	<1.0	5	6	122	6	32	1780	246	17			
110655	SAND	0 - 6	5.9		<0.05	No	0.6	2.9	5	51	81	9	16	306	38	5			
110656	SAND	6 - 24	6.1		<0.05	No	0.4	<1.0	5	9	129	12	65	1000	293	16			

METHOD USED:			KCl Extr.		TKN															
Lab Number	Sample ID	Sample Depth	Ammonium Nitrogen ppm	TKN ppm																
110653	CLAY	0 - 6	4	7	1321															
110654	CLAY	6 - 24	3	16	436															
110655	SAND	0 - 6	6	11	444															
110656	SAND	6 - 24	3	16	289															

FERTILIZER RECOMMENDATIONS:			POUNDS ACTUAL NUTRIENT PER ACRE														Cation Exchange Capacity						
Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P2O5	K2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	CEC	%H	%K	%Ca	%Mg	%Na
				6.0	6.5	7.0																	
110653	CLAY																13	0	4	81	15	n	
110654	CLAY																11	0	3	79	18		
110655	SAND																2	0	10	74	15	1	
110656	SAND																8	0	4	64	31	1	

SPECIAL COMMENTS AND SUGGESTIONS:
 Lab Number(s): 110653, 110655
 Servi-Tech Laboratory fertilizer recommendations were not requested.

Analyses are representative of the samples submitted Samples are retained 30 days after report of analysis Explanations of soil analysis terms are available upon request

Reviewed and Approved By: Michele Pacheco
 Data Review Coordinator

Michele Pacheco

Page 1 of 1
 10/01/2022 3:28 pm

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August 19, 2022

Sean Jenkins
ServiTech, Inc.
PO Box 1397
Dodge City, KS 67801

RE: Project: 41493
Pace Project No.: 60407676

Dear Sean Jenkins:

Enclosed are the analytical results for sample(s) received by the laboratory on August 10, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Kansas City

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Spiller

Alice Spiller
alice.spiller@pacelabs.com
(913)599-5665
PM Lab Management

Enclosures

cc: Ellie Elmore, ServiTech, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: 41493
Pace Project No.: 60407676

Pace Analytical Services Kansas

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Arkansas Drinking Water
Illinois Certification #: 2000302021-3
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055

Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-21-15
Utah Certification #: KS000212019-9
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: 41493
Pace Project No.: 60407676

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60407676001	110653-CLAY	Solid	07/15/22 16:30	08/10/22 10:15
60407676002	110655-SAND	Solid	07/15/22 15:35	08/10/22 10:15

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: 41493
 Pace Project No.: 60407676

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60407676001	110653-CLAY	EPA 6010	MA1	9	PASI-K
		EPA 7471	ALH	1	PASI-K
		ASTM D2974	DWC	1	PASI-K
60407676002	110655-SAND	EPA 6010	MA1	9	PASI-K
		EPA 7471	ALH	1	PASI-K
		ASTM D2974	DWC	1	PASI-K

PASI-K = Pace Analytical Services - Kansas City

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 41493
 Pace Project No.: 60407676

Sample: 110653-CLAY Lab ID: 60407676001 Collected: 07/15/22 16:30 Received: 08/10/22 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP Red. Interference		Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City						
Arsenic	2.4	mg/kg	0.93	1	08/18/22 09:53	08/18/22 16:46	7440-38-2	
Cadmium	ND	mg/kg	0.46	1	08/18/22 09:53	08/18/22 16:46	7440-43-9	
Chromium	7.4	mg/kg	0.46	1	08/18/22 09:53	08/18/22 16:46	7440-47-3	
Copper	5.7	mg/kg	1.9	1	08/18/22 09:53	08/18/22 16:46	7440-50-8	
Lead	8.6	mg/kg	0.93	1	08/18/22 09:53	08/18/22 16:46	7439-92-1	
Molybdenum	ND	mg/kg	1.9	1	08/18/22 09:53	08/18/22 16:46	7439-98-7	
Nickel	6.2	mg/kg	0.46	1	08/18/22 09:53	08/18/22 16:46	7440-02-0	
Selenium	ND	mg/kg	1.4	1	08/18/22 09:53	08/18/22 16:46	7782-49-2	
Zinc	28.7	mg/kg	9.3	1	08/18/22 09:53	08/18/22 16:46	7440-66-6	
7471 Mercury		Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City						
Mercury	ND	mg/kg	0.044	1	08/15/22 12:44	08/16/22 10:59	7439-97-6	H1,H2
Percent Moisture		Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City						
Percent Moisture	1.7	%	0.50	1		08/11/22 16:48		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 41493
 Pace Project No.: 60407676

Sample: 110655-SAND Lab ID: 60407676002 Collected: 07/15/22 15:35 Received: 08/10/22 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP Red. Interference		Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City						
Arsenic	0.99	mg/kg	0.67	1	08/18/22 09:53	08/18/22 16:54	7440-38-2	
Cadmium	ND	mg/kg	0.33	1	08/18/22 09:53	08/18/22 16:54	7440-43-9	
Chromium	4.4	mg/kg	0.33	1	08/18/22 09:53	08/18/22 16:54	7440-47-3	
Copper	1.8	mg/kg	1.3	1	08/18/22 09:53	08/18/22 16:54	7440-50-8	
Lead	3.4	mg/kg	0.67	1	08/18/22 09:53	08/18/22 16:54	7439-92-1	
Molybdenum	ND	mg/kg	1.3	1	08/18/22 09:53	08/18/22 16:54	7439-98-7	
Nickel	1.2	mg/kg	0.33	1	08/18/22 09:53	08/18/22 16:54	7440-02-0	
Selenium	ND	mg/kg	1.0	1	08/18/22 09:53	08/18/22 16:54	7782-49-2	
Zinc	8.6	mg/kg	6.7	1	08/18/22 09:53	08/18/22 16:54	7440-66-6	B
7471 Mercury		Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City						
Mercury	ND	mg/kg	0.040	1	08/15/22 12:44	08/16/22 11:01	7439-97-6	H1,H2
Percent Moisture		Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City						
Percent Moisture	ND	%	0.50	1		08/11/22 16:48		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 41493
 Pace Project No.: 60407676

QC Batch: 802753 Analysis Method: EPA 7471
 QC Batch Method: EPA 7471 Analysis Description: 7471 Mercury
 Laboratory: Pace Analytical Services - Kansas City
 Associated Lab Samples: 60407676001, 60407676002

METHOD BLANK: 3195474 Matrix: Solid
 Associated Lab Samples: 60407676001, 60407676002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.050	08/16/22 10:27	

LABORATORY CONTROL SAMPLE: 3195475

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.5	0.54	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3195476 3195477

Parameter	Units	60407364001 Result	MS	MSD	MS	MSD	MS	MSD	% Rec	Max RPD	Qual
			Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits		
Mercury	mg/kg	ND	0.53	0.49	0.58	0.55	107	105	75-125	7	20

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 41493
 Pace Project No.: 60407676

QC Batch: 803377 Analysis Method: EPA 6010
 QC Batch Method: EPA 3050 Analysis Description: 6010 MET
 Laboratory: Pace Analytical Services - Kansas City
 Associated Lab Samples: 60407676001, 60407676002

METHOD BLANK: 3197631 Matrix: Solid
 Associated Lab Samples: 60407676001, 60407676002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	1.0	08/18/22 16:29	
Cadmium	mg/kg	ND	0.50	08/18/22 16:29	
Chromium	mg/kg	ND	0.50	08/18/22 16:29	
Copper	mg/kg	ND	2.0	08/18/22 16:29	
Lead	mg/kg	ND	1.0	08/18/22 16:29	
Molybdenum	mg/kg	ND	2.0	08/18/22 16:29	
Nickel	mg/kg	ND	0.50	08/18/22 16:29	
Selenium	mg/kg	ND	1.5	08/18/22 16:29	
Zinc	mg/kg	ND	10.0	08/18/22 16:29	

LABORATORY CONTROL SAMPLE: 3197632

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	100	82.6	83	80-120	
Cadmium	mg/kg	100	89.4	89	80-120	
Chromium	mg/kg	100	90.8	91	80-120	
Copper	mg/kg	100	89.4	89	80-120	
Lead	mg/kg	100	90.4	90	80-120	
Molybdenum	mg/kg	100	90.6	91	80-120	
Nickel	mg/kg	100	93.2	93	80-120	
Selenium	mg/kg	100	81.0	81	80-120	
Zinc	mg/kg	100	90.2	90	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3197633 3197634

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60407272001 Result	Spike Conc.	Spike Conc.	Conc.								
Arsenic	mg/kg	557	707	719	719	1080	1150	74	82	75-125	6	20	M1
Cadmium	mg/kg	ND	707	719	719	607	681	85	94	75-125	12	20	
Chromium	mg/kg	41.7	707	719	719	655	733	87	96	75-125	11	20	
Copper	mg/kg	44.2	707	719	719	663	744	87	97	75-125	11	20	
Lead	mg/kg	ND	707	719	719	610	686	86	95	75-125	12	20	
Molybdenum	mg/kg	22.0	707	719	719	635	712	87	96	75-125	12	20	
Nickel	mg/kg	11.9	707	719	719	636	718	88	98	75-125	12	20	
Selenium	mg/kg	ND	707	719	719	538	605	76	84	75-125	12	20	
Zinc	mg/kg	ND	707	719	719	627	704	85	95	75-125	11	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 41493
 Pace Project No.: 60407676

QC Batch: 802331	Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974	Analysis Description: Dry Weight/Percent Moisture
	Laboratory: Pace Analytical Services - Kansas City

Associated Lab Samples: 60407676001, 60407676002

METHOD BLANK: 3193775 Matrix: Solid
 Associated Lab Samples: 60407676001, 60407676002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Percent Moisture	%	ND	0.50	08/11/22 16:48	

SAMPLE DUPLICATE: 3193776

Parameter	Units	60407672001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	19.1	19.4	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 41493
Pace Project No.: 60407676

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above adjusted reporting limit.
TNTC - Too Numerous To Count
J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
MDL - Adjusted Method Detection Limit.
PQL - Practical Quantitation Limit.
RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.
H1 Analysis conducted outside the EPA method holding time.
H2 Extraction or preparation conducted outside EPA method holding time.
M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 41493
 Pace Project No.: 60407676

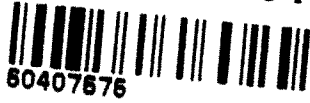
Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60407676001	110653-CLAY	EPA 3050	803377	EPA 6010	803551
60407676002	110655-SAND	EPA 3050	803377	EPA 6010	803551
60407676001	110653-CLAY	EPA 7471	802753	EPA 7471	802824
60407676002	110655-SAND	EPA 7471	802753	EPA 7471	802824
60407676001	110653-CLAY	ASTM D2974	802331		
60407676002	110655-SAND	ASTM D2974	802331		

REPORT OF LABORATORY ANALYSIS

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Pace

DC#_Title: ENV-FRM-LENE-0009_Sam



Revision: 2 Effective Date: 01/12/2022 Issued By: LER...

Client Name: ServTech -Dodge

Courier: FedEx UPS VIA Clay PEX ECI Pace Xroads Client Other

Tracking #: 1Z 696 05 03 6862 2692 Pace Shipping Label Used? Yes No

Custody Seal on Cooler/Box Present: Yes No Seals intact: Yes No

Packing Material: Bubble Wrap Bubble Bags Foam None Other 2PLC

Thermometer Used: T299 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 23.7 Corr. Factor 0-0 Corrected 23.7

Date and initials of person examining contents: JA 8/10/22

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<h1>USDA</h1>	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A		
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A		
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Samples contain multiple phases? Matrix: <u>SL</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A		
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) LOT#:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks:			
Lead acetate strip turns dark? (Record only)	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Samples from USDA Regulated Area: State:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____



C-25762

CHAIN-OF-CUSTODY / ANALYTICAL REQUEST DOCUMENT

1602 Parkwest Drive
Hastings, NE 68901

1816 East Wyatt Earp
Dodge City, KS 67801

6921 South Bell
Amarillo, TX 79109

800-557-7509

Attachment # APX-B1

Required Client Information: Section A
 Company: ServiTech-Dodge
 Address: _____
 Phone: _____ Fax: _____

Required Client Information: Section B
 Report To: Ellie Elmore/Sean Jenkins
 Invoice To: _____
 P.O.: _____
 Project Name: _____
 Project Number: 411493

Page: of

Client Information (Check quote/contract):
 Requested Due Date: _____ *TAT: _____

Turn around times less than 14 days subject to laboratory and contractual obligations and may result in a Rush Turnaround Surcharge.

Turn Around Time (TAT) in calendar days.

To Be Completed by Servi-Tech

Quote Reference: _____

Subcontract Lab: Pace

Carrier: _____

Shipping Cost: _____

Requested Analysis or Package: _____

ITEM#	Section D Required Client Information: SAMPLE ID <small>Sample IDs MUST BE UNIQUE</small>	Valid Matrix Codes MATRIX DRINKING WATER OTHER WATER ENV. SOIL SOLID WASTE AG SOIL FEED FERTILIZER PLANT OTHER	CODE DW AO SL SW AS FD PT OT	MATRIX CODE	DATE COLLECTED <small>mm/dd/yy</small>	TIME COLLECTED <small>hr: mm:ss</small>	Preservatives						Remarks
							#Containers	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	
1	(Lab Use Only) LAE*												
2	110653 - Clay			SL	7/15/22	1630							
3	110654 - Sand <i>off</i>												
4	110655 - Sand			SL	7/15/22	1535							USDA Quarantine Samples
5													
6													
7													
8													
9													
10													
11													
12													

Asst. Cd. Cr.
Cd. Pb. Hg. Se.
Mo. Ni. Zn

60407610

SAMPLER NAME AND SIGNATURE

Lab Use Only Paid

Sample Acceptable Yes No

Comments: CSX _____

Container: U B N S H O

Temp: 103.7 °C Date/Initial: _____

PRINT Name of SAMPLER: _____

SIGNATURE of SAMPLER: _____ DATE signed: (MM / DD / YY) _____

Relinquished By / Company	Date	Time	Accepted By / Company	Date	Time
			<u>Hzt</u>	<u>8-10-22</u>	<u>10:21</u>

Page 13 of 14

Page 21 of 33

Client: ServiTech - Dodge

Profile # 137 Line 13

Site: 41493

Notes _____

Attachment # APX-B1

COC Line Item	Matrix	VG9H	DG9H	DG9Q	VG9U	DG9U	DG9M	DG9B	BG1U	AG1H	AG1U	AG2U	AG3S	AG4U	AG5U	JGFU	WGKU	WGDU	BP1U	BP2U	BP3U	BP1N	BP3N	BP3F	BP3S	BP3C	BP3Z	WPDU	ZPLC	Other	
1	SL																														
2																															
3	SL																														
4																															
5																															
6																															
7																															
8																															
9																															
10																															
11																															
12																															

Container Codes

Glass				Plastic				Misc.	
DG9B	40mL bisulfate clear vial	WGKU	8oz clear soil jar	BP1C	1L NAOH plastic	I	Wipe/Swab		
DG9H	40mL HCl amber vial	WGFU	4oz clear soil jar	BP1N	1L HNO3 plastic	SP5T	120mL Coliform Na Thiosulfate		
DG9M	40mL MeOH clear vial	WG2U	2oz clear soil jar	BP1S	1L H2SO4 plastic	ZPLC	Ziploc Bag		
DG9Q	40mL TSP amber vial	JGFU	4oz unpreserved amber wide	BP1U	1L unpreserved plastic	AF	Air Filter		
DG9S	40mL H2SO4 amber vial	AG0U	100mL unores amber glass	BP1Z	1L NaOH, Zn Acetate	C	Air Cassettes		
DG9T	40mL Na Thio amber vial	AG1H	1L HCl amber glass	BP2C	500mL NAOH plastic	R	Terracore Kit		
DG9U	40mL amber unpreserved	AG1S	1L H2SO4 amber glass	BP2N	500mL HNO3 plastic	U	Summa Can		
VG9H	40mL HCl clear vial	AG1T	1L Na Thiosulfate clear/amber glass	BP2S	500mL H2SO4 plastic				
VG9T	40mL Na Thio. clear vial	AG1U	1liter unres amber glass	BP2U	500mL unpreserved plastic				
VG9U	40mL unpreserved clear vial	AG2N	500mL HNO3 amber glass	BP2Z	500mL NaOH, Zn Acetate				
BG1S	1liter H2SO4 clear glass	AG2S	500mL H2SO4 amber glass	BP3C	250mL NaOH plastic				
BG1U	1liter unres glass	AG3S	250mL H2SO4 amber glass	BP3F	250mL HNO3 plastic - field filtered	WT	Water		
BG3H	250mL HCL Clear glass	AG2U	500mL unres amber glass	BP3N	250mL HNO3 plastic	SL	Solid		
BG3U	250mL Unres Clear glass	AG3U	250mL unres amber glass	BP3U	250mL unpreserved plastic	NAL	Non-aqueous Liquid		
WGDU	16oz clear soil jar	AG4U	125mL unres amber glass	BP3S	250mL H2SO4 plastic	OL	OIL		
		AG5U	100mL unres amber glass	BP3Z	250mL NaOH, Zn Acetate	WP	Wipe		
				BP4U	125mL unpreserved plastic	DW	Drinking Water		
				BP4N	125mL HNO3 plastic				
				BP4S	125mL H2SO4 plastic				
				WPDU	16oz unpreserved plstic				

Work Order Number: 60407676

Sample													Count	X1	XL	STD1	STDL	RSTD1	RSTD2	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12									1	2	3
OKE	0.170	0.168	0.164	0.169	0.156	0.166	0.172	0.170	0.165	0.162	0.172	0.162	41	0.160	0.160	0.012	0.012	7.3	7.3	0.137 - 0.184	39	0	0
OKE	0.162	0.169	0.178	0.178	0.173	0.168	0.177	0.172	0.170				41	0.160	0.160	0.012	0.012	7.3	7.3	0.137 - 0.184	39	0	0
LAB #	99830	99854	99883	99912	99934	99999																	
ORIGINAL	0.435	0.602	0.647	0.577	0.789	0.970																	
DUPLICATE	0.439	0.642	0.640	0.566	0.763	1.071																	
% RD	0.9	6.4	1.1	1.9	3.4	9.9																	

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	27/27	100.0%
1 SD		14/21 66.7%	(>=33.3%)				
2 SD		21/21 100.0%	(>=66.7%)	(<25%)			
3 SD		21/21 100.0%	(100%)	(<75%)			

Order of Analysis: 99767-99772, 99796-99797, >99830, OKE-1, 99802-99803, 99808-99809, 99814-99815, 99820-99821, >99854, OKE-2, 99822-99829, >99883, OKE-3, 99830-99837, >99912, OKE-4, 99838-99845, >99934, OKE-5, 99846-99853, >99999, OKE-6, 99854-99862, OKE-7, 99863-99871, OKE-8, 99872-99880, OKE-9, 99881-99889, OKE-10, 99890-99898, OKE-11, 99899-99907, OKE-12, 99908-99916, OKE-13, 99917-99925, OKE-14, 99926-99934, OKE-15, 99935-99938, 99943-99944, 99949-99950, 99955, OKE-16, 99956, 99961-99962, 99967-99972, OKE-17, 99973-99974, 99979-99985, OKE-18, 99986-99994, OKE-19, 99995-100003, OKE-20, 100004-100005, OKE-21

Missing Samples:

Approved	Date / Tme	Name	Type	Comment
Y	05/27/2022 11:42 am	MicheleP	Signer	
Y	05/27/2022 10:43 am	GalenS	Analyst	

- ACCEPTABLE: May release all data upon final review of individual results.
- CAUTION: May release some or all data upon intense scrutiny of individual results.
- REJECTION: Hold all data and re-analyse part or all data.

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Sample													Count	X1	XL	STD1	STDL	RSTD1	RSTD1	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12											1	2	3
OKE	5.86	5.81	5.86	5.88	5.83	5.86	5.86	5.83	5.91	5.86	5.83	5.87	41	5.89	5.89	0.07	0.06	1.2	1.0	5.77 - 6.01	32	5	0		
OKE	5.84	5.79	5.89	5.85	5.81	5.88	5.90	5.84	5.93				41	5.89	5.89	0.07	0.06	1.2	1.0	5.77 - 6.01	32	5	0		

LAB #	99830	99854	99883	99912	99934	99999
ORIGINAL	8.92	8.43	8.04	8.50	8.02	8.76
DUPLICATE	8.86	8.35	8.04	8.45	8.03	8.82
% RD	0.7	1.0	0.0	0.5	0.1	0.7

Order of Analysis: 99767-99772, 99796-99797, >99830, OKE-1, 99802-99803, 99808-99809, 99814-99815, 99820-99821, >99854, OKE-2, 99822-99829, >99883, OKE-3, 99830-99837, >99912, OKE-4, 99838-99845, >99934, OKE-5, 99846-99853, >99999, OKE-6, 99854-99862, OKE-7, 99863-99871, OKE-8, 99872-99880, OKE-9, 99881-99889, OKE-10, 99890-99898, OKE-11, 99899-99907, OKE-12, 99908-99916, OKE-13, 99917-99925, OKE-14, 99926-99934, OKE-15, 99935-99938, 99943-99944, 99949-99950, 99955, OKE-16, 99956, 99961-99962, 99967-99972, OKE-17, 99973-99974, 99979-99985, OKE-18, 99986-99994, OKE-19, 99995-100003, OKE-20, 100004-100005, OKE-21

Missing Samples:

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)
1 SD		18/21 85.7%	(>=33.3%)		27/27 100.0%
2 SD		21/21 100.0%	(>=66.7%)	(<25%)	
3 SD		21/21 100.0%	(100%)	(<75%)	

- [X] ACCEPTABLE: May release all data upon final review of individual results.
- [] CAUTION: May release some or all data upon intense scrutiny of individual results.
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Sample													Count	X1	XL	STD1	STDL	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12									1	2	3
MB	0.2	0.1											4,268	0.1	1.1			-0.5 - 0.5					
CCV	4.0	3.8	3.8	3.9	3.9	3.9							12,189	3.9	0.2	5.9		3.8 - 4.2					
LP2	6.5	6.6	<u>6.0</u>	6.2	6.5	6.5	6.2						1,375	6.9	6.8	0.7	0.4	10.7	5.5	6.1 - 7.6	7	1	1
OKE	10.9	<u>10.2</u>	<u>10.2</u>	<u>9.8</u>	10.3	<u>9.7</u>	10.7						697	11.2	11.1	1.2	0.4	10.8	3.9	10.3 - 12.0	3	1	1
*B	10.6												224	11.5	11.5	0.7	0.6	5.8	4.9	10.4 - 12.6	31	6	0
LAB #	99815	99898	99982																				
ORIGINAL	63.9	43.5	53.4																				
DUPLICATE	67.5	41.7	54.6																				
% RD	5.5	4.2	2.2																				

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	26/26 100.0%
1 SD	0/1 0.0%	11/15 73.3%	(>=33.3%)			
2 SD	1/0 100.0%	15/15 100.0%	(>=66.7%)	(<25%)		
3 SD	1/0 100.0%	15/15 100.0%	(100%)	(<75%)		
					Agronomic Relevance	1

Order of Analysis: LP2-1, OKE-1, LP2-2, CCV-1, MB-1, 99743-99770, OKE-2, 99771-99779, *99780, 99781-99800, 99802-99803, LP2-3, CCV-2, 99804-99806, 99808-99812, 99814-99818, 99820-99837, OKE-3, 99838-99869, LP2-4, CCV-3, 99870-99900, OKE-4, 99901-99932, LP2-5, CCV-4, 99933-99941, 99943-99947, 99949-99953, 99955-99959, 99961-99965, 99967-99968, OKE-5, 99969-99977, 99979-100001, LP2-6, CCV-5, 100002-100005, >99815, >99898, >99982, OKE-6, LP2-7, OKE-7, CCV-6, MB-2

Missing Samples:

Approved	Date / Time	Name	Type	Comment
Y	05/27/2022 11:42 am	MicheleP	Signer	
Y	05/27/2022 11:36 am	JeanG	Analyst	Notes: NEW BUCKET OF CHECK OKE. STIRRED BUCKET.

- [] ACCEPTABLE: May release all data upon final review of individual results.
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Sample	Count												X1	XL	STD1	STD1	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12								1	2	3
MB	1.2	0.9											4,420	0.6	0.9		0.0 - 1.0					
CCV	2.8	2.9	2.8	2.8	2.8								11,896	3.0	0.4	12.0	2.7 - 3.3					
FRB	1.1	0.0											0				-					
HL2	89.6	81.4	88.8	82.5									1,421	93.7	93.8	8.1 5.5 8.7 5.9	82.8 - 104.9	15	1	1		
LP2	10.9	11.0	10.9	12.0									4,387	11.7	11.7	2.4 1.4 20.3 12.0	8.9 - 14.4	11	0	0		
OKE	24.9	27.6	24.8	25.1	24.8								478	27.4	27.4	1.8 1.6 6.6 5.8	24.2 - 30.6	29	3	1		
*B	26.1												225	18.3	18.4	1.4 1.2 7.4 6.6	15.9 - 20.8	34	4	0		
LAB #	99747	99898	00002																			
ORIGINAL	34.9	82.9	19.1																			
DUPLICATE	33.7	88.7	19.5																			
% RD	3.6	6.8	1.9																			

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	Agronomic Relevance
1 SD	0/1 0.0%	7/14 50.0%	(>=33.3%)		24/26 92.3%	
2 SD	0/1 0.0%	13/14 92.9%	(>=66.7%)	(<25%)		2
3 SD	0/1 0.0%	13/14 92.9%	(100%)	(<75%)		

Order of Analysis: FRB-1, FRB-2, OKE-1, HL2-1, LP2-1, CCV-1, MB-1, 99743-99768, OKE-2, 99769-99779, *99780, 99781-99797, 99802-99803, 99808, HL2-2, CCV-2, 99809, 99814-99815, 99820-99847, LP2-2, 99848-99879, OKE-3, CCV-3, 99880-99910, HL2-3, 99911-99938, 99943-99944, 99949-99950, LP2-3, CCV-4, 99955-99956, 99961-99962, 99967-99974, 99979-99997, OKE-4, 99998-100005, >99747, >99898, >100002, HL2-4, LP2-4, OKE-5, CCV-5, MB-2

Missing Samples:

Approved	Date / Time	Name	Type	Comment
Y	05/27/2022 4:34 pm	MicheleP	Signer	
Y	05/27/2022 4:33 pm	catf	Analyst	

- [] ACCEPTABLE: May release all data upon final review of individual results.
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Sample	1 2 3 4 5 6 7 8 9 10 11 12												Count	X1	XL	STD1	STDL	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12									1	2	3
MB	2	5											4,420	4		6		0 - 8					
CCV	19	18	18	20	19								11,905	20		2	8.4	18 - 22					
FRB	3	1											0					-					
HL2	210	219	211	<u>208</u>									1,421	243	242	23	16	9.7	6.6	210 - 274	16	1	1
LP2	250	242	247	227									4,411	250	249	28	17	11.3	6.8	215 - 283	11	1	0
OKE	256	271	244	270	261								478	271	271	21	18	7.6	6.8	235 - 308	33	4	0
*B	293												225	330	330	21	21	6.5	6.2	289 - 371	38	2	0

LAB #	99747	99898	00002
ORIGINAL	497	764	303
DUPLICATE	496	853	304
% RD	0.0	<u>11.0</u>	0.5

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	Agronomic Relevance
1 SD	0/1 0.0%	8/14 57.1%	(>=33.3%)		25/26 96.2%	
2 SD	1/0 100.0%	14/14 100.0%	(>=66.7%)	(<25%)		10
3 SD	1/0 100.0%	14/14 100.0%	(100%)	(<75%)		

Order of Analysis: FRB-1, FRB-2, OKE-1, HL2-1, LP2-1, CCV-1, MB-1, 99743-99768, OKE-2, 99769-99779, *99780, 99781-99797, 99802-99803, 99808, HL2-2, CCV-2, 99809, 99814-99815, 99820-99847, LP2-2, 99848-99879, OKE-3, CCV-3, 99880-99910, HL2-3, 99911-99938, 99943-99944, 99949-99950, LP2-3, CCV-4, 99955-99956, 99961-99962, 99967-99974, 99979-99997, OKE-4, 99998-100005, >99747, >99898, >100002, HL2-4, LP2-4, OKE-5, CCV-5, MB-2

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Sample													Count	X1	XL	STD1	STDL	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12									1	2	3
MB	22	0											4,420	40		38	94.8	0 - 80					
CCV	197	204	210	195	198								11,935	199		19	9.6	180 - 220					
FRB	70	49											0					-					
HL2	1,006	890	948	889									1,421	1,034	1,023	160	86	15.5 - 8.4	852 - 1,195	8	2	1	
LP2	5,295	5,438	5,500	5,356									4,413	5,605	5,599	593	456	10.6 - 8.2	4,686 - 6,512	22	2	0	
OKE	1,833	1,843	1,770	1,805	1,821								478	1,979	1,971	146	125	7.4 - 6.3	1,721 - 2,221	29	3	0	
*B	4,724												225	5,215	5,196	332	293	6.4 - 5.6	4,610 - 5,781	28	4	0	
LAB #	99747	99898	00002																				
ORIGINAL	4795	4072	6406																				
DUPLICATE	4923	4387	6273																				
% RD	2.6	7.4	2.1																				

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	Agronomic Relevance
1 SD	0/1 0.0%	9/14 64.3%	(>=33.3%)		26/26 100.0%	
2 SD	1/0 100.0%	14/14 100.0%	(>=66.7%)	(<25%)		25
3 SD	1/0 100.0%	14/14 100.0%	(100%)	(<75%)		

Order of Analysis: FRB-1, FRB-2, OKE-1, HL2-1, LP2-1, CCV-1, MB-1, 99743-99768, OKE-2, 99769-99779, *99780, 99781-99797, 99802-99803, 99808, HL2-2, CCV-2, 99809, 99814-99815, 99820-99847, LP2-2, 99848-99879, OKE-3, CCV-3, 99880-99910, HL2-3, 99911-99938, 99943-99944, 99949-99950, LP2-3, CCV-4, 99955-99956, 99961-99962, 99967-99974, 99979-99997, OKE-4, 99998-100005, >99747, >99898, >100002, HL2-4, LP2-4, OKE-5, CCV-5, MB-2

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Sample													Count	X1	XL	STD1	STDL	RSTD1	RSTDL	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12									1	2	3
MB	7	3											4,420	5	5			0 - 10					
CCV	29	29	29	30	31								11,905	30	3	11.1		27 - 33					
FRB	11	8											0					-					
HL2	138	134	130	122									1,421	146	146	15	11	124 - 167	20	2	1		
LP2	535	516	518	488									4,413	539	539	44	32	476 - 602	19	1	0		
OKE	693	715	644	690	696								478	724	725	47	41	642 - 808	31	3	0		
*B	532												225	586	584	35	32	519 - 648	34	4	0		
LAB #	99747	99898	00002																				
ORIGINAL	549	721	808																				
DUPLICATE	580	832	799																				
% RD	5.5	14.2	1.1																				

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	Agronomic Relevance
1 SD	0/1 0.0%	9/14 64.3%	(>=33.3%)		25/26 96.2%	
2 SD	1/0 100.0%	14/14 100.0%	(>=66.7%)	(<25%)		10
3 SD	1/0 100.0%	14/14 100.0%	(100%)	(<75%)		

Order of Analysis: FRB-1, FRB-2, OKE-1, HL2-1, LP2-1, CCV-1, MB-1, 99743-99768, OKE-2, 99769-99779, *99780, 99781-99797, 99802-99803, 99808, HL2-2, CCV-2, 99809, 99814-99815, 99820-99847, LP2-2, 99848-99879, OKE-3, CCV-3, 99880-99910, HL2-3, 99911-99938, 99943-99944, 99949-99950, LP2-3, CCV-4, 99955-99956, 99961-99962, 99967-99974, 99979-99997, OKE-4, 99998-100005, >99747, >99898, >100002, HL2-4, LP2-4, OKE-5, CCV-5, MB-2

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Sample	1 2 3 4 5 6 7 8 9 10 11 12												Count	X1	XL	STD1	STDL	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12									1	2	3
MB	1.7	0.1											4,420	0.4		1.5		0.0 - 2.0					
CCV	2.0	1.9	2.0	2.1	2.1								11,905	4.0		14.0		1.8 - 2.2					
FRB	5.8	4.8											0					-					
HL2	9.2	10.4	10.7	11.6									1,421	10.2	10.1	2.1	1.5	20.9	14.9	7.1 - 13.1	17	2	1
LP2	59.8	59.8	58.7	52.8									4,411	59.9	59.8	5.6	4.1	9.4	6.9	51.6 - 68.0	20	2	1
OKE	56.2	59.2	54.8	61.7	57.7								478	57.6	57.4	4.6	3.9	8.0	6.8	49.6 - 65.2	30	4	1
*B	53.3												225	58.0	57.8	3.9	3.6	6.7	6.2	50.6 - 64.9	33	3	0

LAB #	99747	99898	00002
ORIGINAL	12.7	337.8	464.9
DUPLICATE	13.1	383.5	426.5
% RD	2.6	12.7	8.6

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	25/26 96.2%
1 SD	0/1 0.0%	12/14 85.7%	(>=33.3%)			
2 SD	1/0 100.0%	14/14 100.0%	(>=66.7%)	(<25%)		
3 SD	1/0 100.0%	14/14 100.0%	(100%)	(<75%)		
					Agronomic Relevance	5

Order of Analysis: FRB-1, FRB-2, OKE-1, HL2-1, LP2-1, CCV-1, MB-1, 99743-99768, OKE-2, 99769-99779, *99780, 99781-99797, 99802-99803, 99808, HL2-2, CCV-2, 99809, 99814-99815, 99820-99847, LP2-2, 99848-99879, OKE-3, CCV-3, 99880-99910, HL2-3, 99911-99938, 99943-99944, 99949-99950, LP2-3, CCV-4, 99955-99956, 99961-99962, 99967-99974, 99979-99997, OKE-4, 99998-100005, >99747, >99898, >100002, HL2-4, LP2-4, OKE-5, CCV-5, MB-2

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Sample	1 2 3 4 5 6 7 8 9 10 11 12												Count	X1	XL	STD1	STD1	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
	1	2	3	4	5	6	7	8	9	10	11	12									1	2	3
MB	-0.4	0.3											4,420	0.4		1.2		0.0 - 2.0					
CCV	0.9	0.9	1.0	1.1	1.1								11,905	3.2		14.4		0.8 - 1.2					
FRB	0.3	0.3											0					-					
HL2	15.2	14.5	14.3	14.2									1,421	16.8	16.5	3.3	1.6	19.4 - 9.6	13.4 - 19.7	6	2	2	
LP2	16.8	20.9	19.3	16.7									4,412	18.9	18.9	2.1	1.7	11.1 - 9.1	15.4 - 22.3	26	3	1	
OKE	13.1	12.6	12.9	11.6	<u>11.0</u>								478	13.1	13.1	1.2	1.0	8.8 - 7.5	11.1 - 15.0	32	6	0	
*B	17.4												225	18.8	18.7	1.9	1.5	9.9 - 8.2	15.7 - 21.8	26	3	1	

LAB #	99747	99898	00002
ORIGINAL	8.2	33.1	31.6
DUPLICATE	7.3	33.7	31.4
% RD	11.2	1.7	0.9

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	Agronomic Relevance
1 SD	1/1 100.0%	10/14 71.4%	(>=33.3%)		25/26 96.2%	
2 SD	1/0 100.0%	14/14 100.0%	(>=66.7%)	(<25%)		5
3 SD	1/0 100.0%	14/14 100.0%	(100%)	(<75%)		

Order of Analysis: FRB-1, FRB-2, OKE-1, HL2-1, LP2-1, CCV-1, MB-1, 99743-99768, OKE-2, 99769-99779, *99780, 99781-99797, 99802-99803, 99808, HL2-2, CCV-2, 99809, 99814-99815, 99820-99847, LP2-2, 99848-99879, OKE-3, CCV-3, 99880-99910, HL2-3, 99911-99938, 99943-99944, 99949-99950, LP2-3, CCV-4, 99955-99956, 99961-99962, 99967-99974, 99979-99997, OKE-4, 99998-100005, >99747, >99898, >100002, HL2-4, LP2-4, OKE-5, CCV-5, MB-2

Missing Samples:

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Y	05/27/2022 4:34 pm	MicheleP	Signer	
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Sample	1	2	3	4	5	6	7	8	9	10	11	12	Count	X1	XL	STD1	STDL	RSTD1	RSTD1	Acceptable Range	Outliers LT(%)		
																					1	2	3
MB	0.0	0.0											250	0.3		0.6				-0.5 - 0.5			
CCV	1.1	1.1	1.1										263	1.0		0.1		6.4		0.9 - 1.1			
LP2	6.6	6.3	7.0										14	6.3	6.3	0.5	0.5	7.5	7.5	5.3 - 7.2	36	0	0
OKE	6.3	6.7	6.7										35	5.9	5.7	1.3	0.5	21.3	8.5	4.7 - 6.7	9	3	3

LAB #	99847
ORIGINAL	2.6
DUPLICATE	2.4
% RD	9.3

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)	12/12 100.0%
1 SD		5/6 83.3%	(>=33.3%)			
2 SD		6/6 100.0%	(>=66.7%)	(<25%)		
3 SD		6/6 100.0%	(100%)	(<75%)		
					Agronomic Relevance	2

Order of Analysis: OKE-1, LP2-1, CCV-1, MB-1, 99767-99772, 99796-99797, 99801-99803, 99807-99809, 99813-99815, 99819-99830, OKE-2, 99831-99862, LP2-2, CCV-2, 99863-99866, >99847, OKE-3, LP2-3, CCV-3, MB-2

Missing Samples:

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Y	05/31/2022 12:40 pm	MicheleP	Signer	
Y	05/31/2022 12:39 pm	wblecha	Analyst	

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Sample	1	2	3	4	5	6	7	8	9	10	11	12	Count	X1	XL	STD1	STDL	RSTD1	RSTDL	Acceptable Range	Outliers LT(%)		
																					1	2	3
MB	0												174	0		0				-10 - 10			
LCS	1,625												95	1,613		78		4.8		1,580 - 1,780			
NC2	1,003												171	1,002	999	80	68	8.0	6.8	864 - 1,134	31	5	1

LAB # 99803
ORIGINAL 876
DUPLICATE 902
% RD 2.9

Outliers	Blinds	All QCs	Acceptable	Reject	Total Adjusted Outliers (>66.7%)
1 SD		1/1 100.0%	(>=33.3%)		4/4 100.0%
2 SD		1/1 100.0%	(>=66.7%)	(<25%)	
3 SD		1/1 100.0%	(100%)	(<75%)	

Order of Analysis: MB-1, LCS-1, 99738, 99767-99772, 99796-99797, 99801-99803, >99803, 99807-99809, 99813, NC2-1

Missing Samples:

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Y	06/01/2022 2:59 pm	MicheleP	Signer	
Y	06/01/2022 2:58 pm	CaseyP	Analyst	

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Scale 1:9,000



Kubena Farms Soil Sample Locations Map



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Guadalupe County, Texas



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

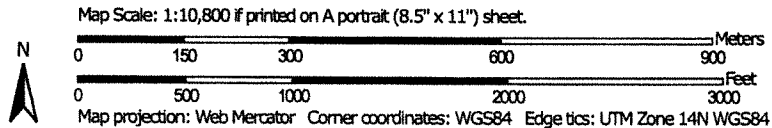
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



MAP LEGEND	MAP INFORMATION	
<p>Area of Interest (AOI)</p> <p style="padding-left: 20px;">Area of Interest (AOI)</p> <p>Soils</p> <p style="padding-left: 20px;">Soil Map Unit Polygons</p> <p style="padding-left: 20px;">Soil Map Unit Lines</p> <p style="padding-left: 20px;">Soil Map Unit Points</p> <p>Special Point Features</p> <p style="padding-left: 20px;">Blowout</p> <p style="padding-left: 20px;">Borrow Pit</p> <p style="padding-left: 20px;">Clay Spot</p> <p style="padding-left: 20px;">Closed Depression</p> <p style="padding-left: 20px;">Gravel Pit</p> <p style="padding-left: 20px;">Gravelly Spot</p> <p style="padding-left: 20px;">Landfill</p> <p style="padding-left: 20px;">Lava Flow</p> <p style="padding-left: 20px;">Marsh or swamp</p> <p style="padding-left: 20px;">Mine or Quarry</p> <p style="padding-left: 20px;">Miscellaneous Water</p> <p style="padding-left: 20px;">Perennial Water</p> <p style="padding-left: 20px;">Rock Outcrop</p> <p style="padding-left: 20px;">Saline Spot</p> <p style="padding-left: 20px;">Sandy Spot</p> <p style="padding-left: 20px;">Severely Eroded Spot</p> <p style="padding-left: 20px;">Sinkhole</p> <p style="padding-left: 20px;">Slide or Slip</p> <p style="padding-left: 20px;">Sodic Spot</p>	<p style="padding-left: 20px;">Spoil Area</p> <p style="padding-left: 20px;">Stony Spot</p> <p style="padding-left: 20px;">Very Stony Spot</p> <p style="padding-left: 20px;">Wet Spot</p> <p style="padding-left: 20px;">Other</p> <p style="padding-left: 20px;">Special Line Features</p> <p>Water Features</p> <p style="padding-left: 20px;">Streams and Canals</p> <p>Transportation</p> <p style="padding-left: 20px;">Rails</p> <p style="padding-left: 20px;">Interstate Highways</p> <p style="padding-left: 20px;">US Routes</p> <p style="padding-left: 20px;">Major Roads</p> <p style="padding-left: 20px;">Local Roads</p> <p>Background</p> <p style="padding-left: 20px;">Aerial Photography</p>	<p>The soil surveys that comprise your AOI were mapped at 1:20,000.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Warning: Soil Map may not be valid at this scale.</p> <p>Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.</p> </div> <p>Please rely on the bar scale on each map sheet for map measurements.</p> <p>Source of Map: Natural Resources Conservation Service Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)</p> <p>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: Guadalupe County, Texas Survey Area Data: Version 17, Sep 8, 2021</p> <p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p> <p>Date(s) aerial images were photographed: Nov 15, 2020—Nov 16, 2020</p> <p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p>

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CfB	Crockett fine sandy loam, 1 to 3 percent slopes	43.4	13.1%
CsC3	Crockett loam, 2 to 5 percent slopes, eroded	53.3	16.1%
DmC	Robco-Tanglewood complex, 1 to 5 percent slopes	103.1	31.2%
PaD	Patilo and Arenosa soils, 1 to 8 percent slopes	87.8	26.6%
Uw	Uhland soils frequently flooded	42.8	13.0%
Totals for Area of Interest		330.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Guadalupe County, Texas

CfB—Crockett fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2ssh8
Elevation: 200 to 810 feet
Mean annual precipitation: 36 to 47 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 239 to 276 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Crockett and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crockett

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from shale of cretaceous age

Typical profile

A - 0 to 8 inches: fine sandy loam
Btss - 8 to 25 inches: clay
Btkss - 25 to 45 inches: clay
BCK - 45 to 53 inches: clay
Cdk - 53 to 72 inches: clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: 43 to 60 inches to densic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R086AY004TX - Southern Claypan Prairie

Hydric soil rating: No

Minor Components

Normangee

Percent of map unit: 10 percent

Landform: Ridges

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: R086AY004TX - Southern Claypan Prairie

Hydric soil rating: No

Wilson

Percent of map unit: 5 percent

Landform: Stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Concave

Ecological site: R086AY004TX - Southern Claypan Prairie

Hydric soil rating: No

CsC3—Crockett loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2ssh7

Elevation: 250 to 860 feet

Mean annual precipitation: 37 to 43 inches

Mean annual air temperature: 63 to 68 degrees F

Frost-free period: 234 to 258 days

Farmland classification: Not prime farmland

Map Unit Composition

Crockett, eroded, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crockett, Eroded

Setting

Landform: Ridges

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Loamy residuum weathered from shale of cretaceous age

Typical profile

A - 0 to 8 inches: loam

Btss - 8 to 25 inches: clay

Btkss - 25 to 45 inches: clay
BCK - 45 to 53 inches: clay
Cdk - 53 to 72 inches: clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 43 to 60 inches to densic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R086AY004TX - Southern Claypan Prairie
Hydric soil rating: No

Minor Components

Normangee

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R086AY004TX - Southern Claypan Prairie
Hydric soil rating: No

Wilson

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R086AY004TX - Southern Claypan Prairie
Hydric soil rating: No

DmC—Robco-Tanglewood complex, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2wg9h
Elevation: 220 to 610 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 67 to 69 degrees F
Frost-free period: 252 to 275 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Robco and similar soils: 46 percent
Tanglewood and similar soils: 25 percent
Minor components: 29 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Robco

Setting

Landform: Ridges
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy, clayey, and loamy residuum weathered from sandstone, claystone, and shale of eocene age

Typical profile

A - 0 to 11 inches: loamy fine sand
E - 11 to 26 inches: loamy fine sand
Btg1 - 26 to 31 inches: sandy clay loam
Btg2 - 31 to 39 inches: sandy clay loam
Bt/C - 39 to 80 inches: sandy clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: R087AY006TX - Sandy
Hydric soil rating: No

Description of Tanglewood

Setting

Landform: Ridges
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy, clayey, and loamy residuum weathered from sandstone, claystone, and shale of eocene age

Typical profile

A - 0 to 5 inches: loamy fine sand
E - 5 to 23 inches: loamy fine sand
Btg1 - 23 to 33 inches: sandy clay loam
Btg2 - 33 to 68 inches: clay
Btg3 - 68 to 80 inches: sandy clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 20 to 46 inches
Frequency of flooding: None
Frequency of ponding: None
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R087AY006TX - Sandy
Hydric soil rating: No

Minor Components

Tabor

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R087AY005TX - Sandy Loam
Hydric soil rating: No

Edge

Percent of map unit: 5 percent
Landform: Ridges, ridges
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R087AY003TX - Claypan Savannah
Hydric soil rating: No

Rader

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R087AY005TX - Sandy Loam
Hydric soil rating: No

Silstid

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R087AY006TX - Sandy
Hydric soil rating: No

Straber

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R087AY006TX - Sandy
Hydric soil rating: No

Gasil

Percent of map unit: 2 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R087AY005TX - Sandy Loam
Hydric soil rating: No

Padina

Percent of map unit: 2 percent
Landform: Ridges
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave

Ecological site: R087AY007TX - Deep Sand
Hydric soil rating: No

PaD—Patilo and Arenosa soils, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: d9rh
Elevation: 400 to 1,500 feet
Mean annual precipitation: 24 to 40 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 220 to 275 days
Farmland classification: Not prime farmland

Map Unit Composition

Patilo and similar soils: 49 percent
Arenosa and similar soils: 29 percent
Minor components: 22 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Patilo

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluvium, side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from eocene sandstones of carrizo, queen city, simsboro and sparta formations

Typical profile

H1 - 0 to 8 inches: fine sand
H2 - 8 to 52 inches: fine sand
H3 - 52 to 84 inches: sandy clay loam

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s

Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: R087AY007TX - Deep Sand
Hydric soil rating: No

Description of Arenosa

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from eocene age sandstones in the carrizo, queen city and sparta formations

Typical profile

H1 - 0 to 5 inches: fine sand
H2 - 5 to 96 inches: fine sand

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: R087AY007TX - Deep Sand
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 15 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 7 percent
Hydric soil rating: No

Uw—Uhland soils frequently flooded

Map Unit Setting

National map unit symbol: d9rv
Elevation: 200 to 400 feet
Mean annual precipitation: 32 to 40 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 240 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Uhland and similar soils: 67 percent
Minor components: 33 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Uhland

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium of holocene age derived from mixed sources

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 62 inches: fine sandy loam
H3 - 62 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Gypsum, maximum content: 4 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C
Ecological site: R086AY012TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 30 percent

Hydric soil rating: No

Unnamed, hydric

Percent of map unit: 3 percent

Landform: Sloughs

Hydric soil rating: Yes

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ARENOSA SERIES

The Arenosa series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in residuum weathered from Eocene age sandstone of the Claiborne Group. These gently to strongly sloping soils occur on summits and shoulders of interfluvial broad ridges on inland dissected coastal plain. Slopes range from 1 to 12 percent. Mean annual precipitation is about 889 mm (35 in) and the mean annual temperature is about 20 degrees C (68 degrees F).

TAXONOMIC CLASS: Thermic, uncoated Ustic Quartzipsamments

TYPICAL PEDON: Arenosa fine sand, on an east-facing, convex, 1 percent slope in rangeland at an elevation of 152 m (497 ft). (Colors are for dry soil unless otherwise stated.)

A--0 to 13 cm (0 to 5 in); pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; structureless single grain; loose; many fine roots and few medium roots and few coarse roots; moderately acid; clear smooth boundary. (Thickness is 8 to 30 cm [3 to 12 in].)

C1--13 to 51 cm (5 to 20 in); very pale brown (10YR 7/3) fine sand, brown (10YR 5/3) moist; structureless single grain; loose; common fine roots and few medium roots and few coarse roots; slightly acid; gradual smooth boundary.

C2--51 to 109 cm (20 to 43 in); very pale brown (10YR 8/4) fine sand, light yellowish brown (10YR 6/4) moist; structureless single grain; loose; few fine roots and few medium roots and few coarse roots; slightly acid; diffuse smooth boundary.

C3--109 to 165 cm (43 to 65 in); very pale brown (10YR 8/3) fine sand, pale brown (10YR 6/3) moist; structureless single grain; loose; few fine roots and few medium roots; slightly acid; gradual smooth boundary.

C4--165 to 203 cm (65 to 80 in); very pale brown (10YR 8/3) fine sand, pale brown (10YR 6/3) moist; structureless single grain; loose; few fine roots; few fine distinct yellowish brown (10YR 5/8) masses of oxidized iron; slightly acid. (Combined thickness of C horizons is 173 to 195 cm [68 to 77 in].)

TYPE LOCATION: Burlison County, Texas; from the intersection of Texas Highway 21 and Texas Highway 36 in Caldwell 4.3 miles southwest on Texas Highway 21 to Farm to Market Road 908; 3.4 miles northwest on Farm to Market Road 908, 160 ft north in rangeland. USGS topographic quad: Chriesman; Latitude: 30 degrees, 30 minutes, 45 seconds N; Longitude: 100 degrees, 47 minutes, 56 seconds W; UTM Easting: 711217 m, UTM Northing: 3377641 m, UTM Zone 14N. Datum: WGS84

RANGE IN CHARACTERISTICS:

Depth of solum: more than 203 cm (80 in)

Soil moisture: Ustic soil moisture regime. The soil moisture control section is dry in some or all parts for 90 or more cumulative days in normal years, but it is not dry in all parts for more than half of the cumulative days when the soil temperature at a depth of 50 cm is higher than 5 degrees C.

Particle-size control section (weighted average):

Clay content: 0 to 3 percent

Silt content: 0 to 5 percent

Silt plus 2 times clay content: 1 to 5 percent

Sand content: 95 to 99 percent

Rock fragments: 0 to 5 percent quartzite gravels

Resistant minerals in the 0.02 to 2.0 mm fraction: 95 to 100 percent

A horizon

10YR

Attachment # SR-1
 Chroma: 2 to 4

Texture: fine sand, sand

Redox concentrations: 0 to 5 percent, fine to medium, faint to distinct, masses of oxidized iron

Reaction: very strongly acid to slightly acid

3w horizon, where present

Hue: 7.5YR or 10YR

Value: 6 to 8

Chroma: 6 to 8

Texture: fine sand, sand

Redox concentrations: 0 to 5 percent, fine to medium, faint to distinct, masses of oxidized iron

Reaction: very strongly acid to slightly acid

C horizon

Hue: 7.5YR or 10YR

Value: 6 to 8

Chroma: 3 or 4

Texture: fine sand, sand

Redox concentrations: 0 to 5 percent, fine to medium, faint to distinct, masses of oxidized iron

Rock fragments: 0 to 5 percent, fine to medium, quartzite gravels

Reaction: very strongly acid to slightly acid

COMPETING SERIES: There are no competing series in the same family. Similar soils are the Eufaula, Padina, Patilo, Ivoli, and Tonkawa series.

Eufaula soils: have an argillic horizon consisting of lamellae.

Padina and Patilo soils: have an argillic horizon between a depth of 100 to 203 cm (40 to 80 in)

Ivoli soils: have less than 90 percent resistant minerals in the 0.02 to 2.0 mm fraction within the particle-size control section

Tonkawa soils: have an udic soil moisture regime and are coated

GEOGRAPHIC SETTING:

Parent material: residuum weathered from Eocene age sandstone of the Claiborne Group

Landscape: inland dissected coastal plain

Landform: summits and shoulders of interfluves of broad ridges and side slopes of broad ridges

Slope: 1 to 12 percent

Mean annual precipitation: 762 to 1095 mm (30 to 43 in)

Precipitation pattern: Precipitation is mostly even throughout the year with the exception of May, June, and October being the wettest months of the year. July and August are the driest months.

Thornthwaite P-E index: 40 to 64

Mean annual air temperature: 18 to 21 degrees C (64 to 70 degrees F)

Frost-free period: 230 to 279 days

Elevation: 78 to 305 m (255 to 1000 ft)

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Cadelake, Eufaula, Padina, Patilo and Silstid series.

Cadelake soils: have an umbric epipedon and occur on depressional toeslopes of ridges.

Eufaula soils: have an argillic horizon and occur on lower stream terrace positions.

Padina, Patilo, and Silstid soils: have an argillic horizon and occur on slightly lower similar positions.

DRAINAGE AND PERMEABILITY: Somewhat excessively drained. Permeability is rapid. Runoff is negligible on 1 to 5 percent slopes and very low on 5 to 12 percent slopes.

USE AND VEGETATION: The major use is livestock grazing. A few areas are used to grow peanuts, watermelons, improved bermudagrass, and weeping lovegrass. The native plant community is an open savannah of sandjack oak, post oak, and blackjack oak trees. Yaupon shrubs are associated with the trees. The herbaceous component is tall and midgrasses dominated by little bluestem, yellow and slender indiagrass, and brownseed paspalum. A thin stand of purple lovegrass, red lovegrass, woolly sheath threeawn, Halls panicum, and thin paspalum occupy spaces between the tall grasses. Continuous overgrazing over rest and the absence of fire tend to allow a vegetative shift towards woody species. Ecological site number: R087AY239TX (Very Deep Sand 28-40" PZ).

of moderate extent.

Attachment # SR-1

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MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Erath County, Texas; 1970. The name "Arenosa" comes from the Spanish translation of the word sandy.

REMARKS: These soils were formerly included with the Eufaula series. The Eufaula series has an argillic horizon.

Diagnostic horizons and features recognized in this pedon are:

Particle size control section: 25 to 100 cm (10 to 40 in) [C1 and C2 horizons]

Ochric epipedon: 0 to 13 cm (0 to 5 in) [A horizon]

Other features: less than 5 percent silt plus 2 times clay content in the particle size control section

Ustic soil moisture regime

Additional comments:

The Key to Classes of Coatings of Sands was revised with the adoption of the Keys to Soil Taxonomy, Seventh Edition, 1996. Previous editions defined the uncoated class as less than 5 percent silt plus clay in the particle size control section. The series concept has been revised which excludes some soils previously classified as uncoated which are now in the coated class.

ADDITIONAL DATA: KSSL Data: Erath County, 80TX143000 (80P01618-80P01619); Leon County, S10TX289001 (10N04380-10N04384); S10TX289009 (10N04780-10N04784); TAMU Data: Type Location, Burleson County, S92TX051001 (TAMU4477-TAMU4481).

Taxonomic Version: Keys to Soil Taxonomy, Eleventh Edition, 2010.

National Cooperative Soil Survey
U.S.A.

CROCKETT SERIES

The Crockett series consists of soils that are deep to weathered shale of Cretaceous age. They are moderately well drained, and very slowly permeable. These soils are on broad ridges on the dissected plains. These nearly level to moderately sloping soils formed in alkaline residuum derived from interbedded shale and clay. Slopes are dominantly 1 to 5 percent, but range from 0 to 10 percent.

TAXONOMIC CLASS: Fine, smectitic, thermic Udertic Paleustalfs

TYPICAL PEDON: Crockett fine sandy loam--cropland. (Colors are for dry soil unless otherwise stated).

Ap--0 to 20 cm (0 to 8 in); brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; very hard, friable; few wormcasts; moderately acid; abrupt wavy boundary. (10 to 38 cm [4 to 15 in] thick)

Bt1--20 to 41 cm (8 to 16 in); distinctly and coarsely mottled reddish brown (5YR 4/4) and brown (10YR 4/3) clay, moderate fine and medium angular blocky structure; extremely hard, very firm; few fine pores; distinct clay films and dark grayish brown stains on surfaces of peds, few fine pressure faces; vertical cracks partially filled with darker soil; few fine black iron-manganese concretions; few fine and medium prominent dark red (10R 3/6) masses of iron accumulation; moderately acid; diffuse wavy boundary.

Bt2--41 to 76 cm (16 to 30 in); olive (5Y 5/4) clay, moderate medium and coarse angular blocky structure; extremely hard, very firm; few fine pores; thin clay films on surfaces of peds, few fine pressure faces; few small slickensides; few vertical streaks of dark brown soil that is less clayey; few fine black iron-manganese concretions; common medium and coarse distinct reddish brown (5YR 4/4), and yellow (10YR 7/6) masses of iron accumulation, common medium and coarse distinct grayish brown (10YR 5/2) iron depletions; slightly acid; gradual wavy boundary.

Bt3--76 to 107 cm (30 to 42 in); pale olive (5Y 6/4) clay, olive (5Y 5/4) moist; weak coarse angular blocky structure; extremely hard, very firm; thin patchy clay films; few fine pressure faces; few small slickensides; few fine black concretions; few black streaks or stains on faces of peds; common medium distinct pale yellow (5Y 7/4) masses of iron accumulation, and common medium distinct light brownish gray (2.5Y 6/2) iron depletions; neutral; gradual wavy boundary. (Combined thickness of Bt horizons is 36 to 114 cm [14 to 45 in])

BCtk--107 to 145 cm (42 to 57 in); distinctly and coarsely mottled light brownish gray (2.5Y 6/2) and pale olive (5Y 6/4) clay; weak coarse angular blocky structure; extremely hard, very firm; few thin clay films on surfaces of peds; few pressure faces and cleavage planes; few calcium carbonate concretions; few masses of calcium carbonate to 1.3 cm (1/2-in) in diameter; few fine black iron-manganese concretions; few black streaks along pressure faces and cleavage planes; slightly alkaline; abrupt smooth boundary. (25 to 76 cm [10 to 30 in] thick)

Cdk1--145 to 185 cm (57 to 73 in); pale yellow (2.5Y 7/4) stratified clay loam, light yellowish brown (2.5Y 6/4) moist; massive; extremely hard and very firm in place, friable when broken; 25 percent of weakly cemented, brittle weathered shale fragments; 20 percent white calcium carbonate masses and concretions; common medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulations, mainly along fractures of weathered shale; violently effervescent; moderately alkaline; diffuse smooth boundary. (0 to 76 cm [0 to 30 in] thick)

Cdk2--185 to 203 cm (73 to 80 in); pale yellow (2.5Y 7/4) clay loam containing about 40 percent interbedded weakly consolidated shale in layers of 1.3 to about 5 cm (1/2 to about 2 in), shale is light olive brown (2.5Y 5/4) in lower part; massive; extremely hard, very firm in place, friable when broken; 10 percent masses of calcium carbonate in the upper part grading to none in the lower part; soil matrix is violently effervescent in spots and shale is noncalcareous; moderately alkaline

APPROXIMATE LOCATION: TARRANT COUNTY, TEXAS, FROM THE INTERSECTION OF FARM ROAD 986 AND STATE HIGHWAY 80 IN TARRANT, approximately 1.5 miles north on Farm Road 986 and 250 ft east of Farm Road 986 in pastureland. USGS Terrell North topographic quadrangle, Latitude: 32 degrees, 45 minutes, 42.01 seconds N; Longitude: 96 degrees 16 minutes, 55.70 seconds W. Datum: WGS84.

RANGE IN CHARACTERISTICS:

Depth of solum: 102 to 150 cm (40 to 60 in)
Soil moisture: Dry in some or all parts of the soil moisture control section for more than 90 or more cumulative days and moist in some parts either for more than 180 cumulative days per year or for 90 or more consecutive days in normal years. Ustic soil moisture regime
Depth to abrupt texture change: 18 to 25 cm (7 to 10 in)
Depth to secondary carbonates: 76 to 150 cm (30 to 60 in)
Depth to densic materials: 145 to 203 cm (57 to 80 in)
Clay content: 40 to 50 percent
Coefficient of linear extensibility: 0.07 to 0.10 in upper 102 cm (40 in) of the Bt horizon(s)
Additional features: Some pedons do not have visible carbonates. When dry, cracks 1.3 to about 5 cm (1/2 to about 2 in) wide extend from the top of the Bt horizon to depths of 61 to 152 cm (24 to 60 in). If the A horizon is eroded or thin, the soil cracks to the surface. Pressure faces and slickensides range from few to common throughout the Bt horizon and in the BC and C horizon of some pedons.

A or Ap horizon(s):

Hue: 7.5YR or 10YR, dry or moist
Value: 3 to 6 dry or moist
Chroma: 2 to 4 dry or moist
Texture: fine sandy loam, very fine sandy loam, loam, silt loam, or their gravelly counterparts
Fragments: amount-0 to 35 percent, kind-quartzite, shape-flat and non-flat, cementation-non-cemented to indurated; size-gravel to cobble
Reaction: moderately acid to slightly alkaline
Boundary: The boundary between the A and Bt horizon is commonly wavy. It is abrupt over subsoil crests and clear in subsoil troughs with an abrupt textural change between the A and Bt horizons

Upper Bt or Btss horizon(s):

Hue: 2.5YR to 10YR dry or moist
Value: 3 to 5 dry or moist
Chroma: 1 to 6 dry or moist
Texture: clay loam, clay, sandy clay
Reaction: moderately acid to neutral
Base saturation: 75 to 100 percent
Fragments: amount-0 to 15 percent, kind- quartzite, shape-flat and non-flat, cementation-non-cemented to indurated; size-gravel to cobble

Lower Bt, Btk, Btkss, or Btss horizon(s) (where present):

Hue: 7.5YR to 2.5Y dry or moist
Value: 3 to 5 dry or moist
Chroma: 1 to 6 dry or moist
Texture: clay loam, clay, sandy clay
Reaction: slightly acid to moderately alkaline
Fragments: amount-0 to 15 percent, kind-quartzite, shape-flat and non-flat, cementation-non-cemented to indurated; size-gravel to cobble
Identifiable secondary carbonates: amount-0 to 2, size-fine or medium, kind-masses, threads, or concretions, location-throughout

BCtk, BCt, CBd, or CBdy horizon(s):

Hue: 7.5YR to 5Y dry or moist
Value: 3 to 7 dry or moist
Chroma: 1 to 8 dry or moist
Texture: clay loam, clay, sandy clay
Reaction: slightly acid to moderately alkaline

Clk or Cy horizon(s):

Hue: 7.5YR to 5Y dry or moist

Value: 4 to 7 dry or moist

Chroma: 1 to 8 dry or moist

Texture: clay, clay loam, loam, stratified loam and clay

Reaction: slightly acid to moderately alkaline

Fragments: amount-0 to 5 percent, kind-shale, shape-flat and non-flat, cementation-non-cemented to indurated; size-gravel to cobble

Identifiable secondary carbonates: amount-0 to 20, size-fine or medium, kind-masses, threads, or concretions, location-throughout

Gypsum: amount-0 to 2, size-fine or medium, kind-masses or crystals, shape-threadlike or spherical, location-throughout

COMPETING SERIES: These are the Axtell, Bremond, Crosstell, Kurten, Navo, Zack, and Zulch series. Similar soils are the Normangee and Ponder series.

Axtell, Kurten and Tabor soils: are strongly acid in the Bt1 horizon and have base saturation of less than 75 percent.

Bremond soils: have sola more than 152 cm (60 in) thick.

Crosstell and Kurten soils: have hue of 7.5YR or redder in the upper part of the Bt horizon.

Navo soils: do not have an abrupt textural change between the A and B horizons. In addition, Axtell, Navo, and Tabor soils: also have sola from 152 to greater than 203 cm (60 to greater than 80 in).

Zulch soils: have sola 51 to 102 cm (20 to 40 in) thick.

Normangee soils: do not have an abrupt textural change between the A and Bt horizons.

Ponder soils: do not have redoximorphic features in the upper part of the Bt horizon.

GEOGRAPHIC SETTING:

Parent material: residuum derived from weathered alkaline shale of Cretaceous age interbedded with sandier materials, mainly of Cretaceous age

Landscape: broad nearly level to moderately sloping ridges and plains on dissected plains

Slope: 0 to 10 percent, but are mostly between 1 and 5 percent

Mean annual precipitation: 635 to 1,143 mm (25 to 45 in)

Mean annual air temperature: 16.7 to 21.1 degrees C (62 to 70 degrees F)

Frost-free period: 230 to 276 days

Elevation: 61 to 263 m (200 to 863 ft)

Hornthwaite P-E Index: 50 to 75

GEOGRAPHICALLY ASSOCIATED SOILS: These include the Axtell, Bonham, Burlson, Mabank, Normangee, Payne and Wilson series.

Bonham soils: have mollic epipedons and have sola greater than 152 cm (60 in).

Burlson soils: are clays throughout with slickensides.

Mabank and Wilson soils: are dominated by chromas or 2 or less.

Axtell, Bonham, Normangee, and Payne soils: are on similar landscapes with Crockett soils.

Burlson, Mabank, and Wilson soils: are on lower positions.

DRAINAGE AND PERMEABILITY: Moderately well drained. Permeability is very slow. Runoff is low on slopes less than 1 percent, medium on 1 to 3 percent slopes, high on 3 to 5 percent slopes, and very high on 5 to 10 percent slopes.

USE AND VEGETATION: Mainly used for growing cotton, grain sorghums, and small grain, but more than half the acreage is now in pastures. Native vegetation is prairie grasses such as bluestems, indiangrass, switchgrass, and grammas, with scattered elm, hackberry, and mesquite trees.

Note: Crockett and Axtell soils are close competitors. Native vegetation of Crockett was dominantly prairie grasses whereas that of Axtell was trees with an understory of grasses. Morphologically, Crockett soils are less acid and leached in the upper part of the Bt horizon than Axtell soils. At present, this difference is attributed primarily to vegetation.

DISTRIBUTION AND EXTENT: Mainly in the Blackland Prairies of Texas (MLRA 86A, 86B, 87A) but minor areas are in

SERIES ESTABLISHED: Houston County, Texas; 1905.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Dystric epipedon: 0 to 20 cm (0 to 8 in), (Ap horizon). Layer is hard and massive when dry.

Moisture feature: Abrupt textural change at 20 cm (8 in).

Argillic horizon: 20 to 145 cm (8 to 57 in). (Bt1, Bt2, Bt3 and BCtk horizons)

Slickensides: 41 to 107 cm (16 to 42 in)

Densic materials: 145 to 203 cm (57 to 80 in)

Vertic properties: COLE is 0.07 to 0.10

ADDITIONAL DATA: LSL17760-17767, Kaufman County, Texas.

Soil Interpretation Record: TX0318

Taxonomic Version: Keys to Soil Taxonomy, Twelfth Edition, 2014.

National Cooperative Soil Survey
U.S.A.

PATILO SERIES

The Patilo series consists of very deep, well drained, moderately slowly permeable soils that formed in locally reworked eolian sands over residuum weathered from sandstone and siltstone. These nearly level to strongly sloping soils occur on interfluvial and side slopes of low ridges on hills. Slope range is 0 to 12 percent. Mean annual precipitation is about 800 mm (31 in) and the mean annual air temperature is about 17.6 degrees C (64 degrees F).

TAXONOMIC CLASS: Loamy, siliceous, semiactive, thermic Grossarenic Paleustalfs

TYPICAL PEDON: Patilo fine sand, on a north-facing, convex, 4 percent slope in pastureland at an elevation of 380 m (1,247 ft). (Colors are for dry soil unless otherwise stated.)

A--0 to 10 cm (0 to 4 in); light brownish gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2), moist; structureless single grain; loose, loose; common fine roots; neutral; clear smooth boundary. (Thickness is 5 to 50 cm [2 to 20 in].)

E--10 to 127 cm (4 to 50 in); white (10YR 8/2) fine sand, light gray (10YR 7/2), moist; structureless single grain; loose, loose; common fine roots in upper part, few fine roots in lower part; slightly acid; clear wavy boundary. (Thickness is 50 to 183 cm [20 to 72 in].)

Btg1--127 to 178 cm (50 to 70 in); light gray (10YR 7/1) sandy clay loam, light gray (10YR 6/1), moist; weak coarse angular blocky structure; very hard, very firm; few very fine roots; few very fine pores; common distinct clay films on surfaces of pedes; many coarse and medium prominent red (2.5YR 4/6) masses of oxidized iron and few fine distinct brownish yellow (10YR 6/6) masses of oxidized iron; strongly acid; gradual smooth boundary.

Btg2--178 to 188 cm (70 to 74 in); white (10YR 8/1) sandy clay loam, light gray (10YR 7/1), moist; weak coarse angular blocky structure; hard, firm; few distinct clay films on ped faces many coarse and medium prominent red (2.5YR 5/8) masses of oxidized iron and very few fine brownish yellow (10YR 6/6) masses of oxidized iron; strongly acid. (Combined thickness is 3 to 100 cm [3 to 40 in].)

TYPE LOCATION: Erath County, Texas; about 7.5 miles northeast of Stephenville; located about 1.1 miles southeast of Pi Knob Church to intersection of private road and county road; 0.5 mile northeast of intersection and 40 yards northwest of private road in pastureland.

USGS topographic quadrangle: Bluff Dale, Texas
 Latitude: 32 degrees, 15 minutes, 9.3 seconds N
 Longitude: 98 degrees, 5 minutes, 49.7 seconds W

Decimal Degrees
 Latitude: 32.2525826 degrees
 Longitude: -98.0971375 degrees
 Datum: WGS84

UTM Easting: 585046.92 m
 UTM Northing: 3568790.78 m
 UTM Zone: 14

RANGE IN CHARACTERISTICS:

Soil Moisture: typic ustic soil moisture regime

Depth to abrupt textural change: 100 to 102 cm (40 to 76 in)

Depth to argillic horizon: 5 to 50 cm (2 to 20 in)
 Depth to albic horizon: 5 to 50 cm (2 to 20 in)
 Depth to argillic horizon: 100 to 192 cm (40 to 76 in)
 Depth to redox concentrations: 100 to 192 cm (40 to 76 in)
 Depth to episaturation: 100 to 192 cm (40 to 76 in) from October to May
 Thickness of the solum: 165 to 200 cm (65 to 80 in)

Particle-size control section (weighted average):

Clay content: 18 to 35 percent
 Sand content: 50 to 72 percent
 Base saturation: 40 to 75 percent

A horizon

Hue: 10YR
 Value: 4 to 8
 Chroma: 2 to 4
 Texture: fine sand
 Clay content: 0 to 10 percent
 Sand content: 85 to 95 percent
 Reaction (pH): moderately acid to neutral (5.6 - 7.3)

E horizon

Hue: 7.5YR or 10YR
 Value: 5 to 8
 Chroma: 2 to 6
 Texture: fine sand or loamy fine sand
 Clay content: 0 to 12 percent
 Sand content: 75 to 98 percent
 Reaction (pH): moderately acid to neutral (5.6 - 7.3)

Btg or Bt horizons

Hue: 5YR to 5Y
 Value: 5 to 7
 Chroma: 1 to 8
 Texture: sandy clay loam or sandy loam
 Clay content: 18 to 35 percent
 Sand content: 50 to 72 percent
 Redox concentration: varied size and amount in shades of red and yellow
 Redox depletion: varied size and amount in shades of gray and yellow
 Base saturation: 40 to 75 percent
 Reaction (pH): strongly acid to slightly acid (5.1 - 6.5)

Cd layer or C horizon (where present)

Hue: 10R to 10YR
 Value: 3 to 8
 Chroma: 1 to 8
 Texture: fine sand, loamy fine sand, loamy sand, fine sandy loam, sandy clay loam, or loam
 Clay content: 1 to 25 percent
 Sand content: 45 to 95 percent
 Reaction (pH): strongly acid to slightly alkaline (5.1 - 7.8)

COMPETING SERIES:

There are no competing series in the same family. Similar soils are the Aquilla, Arenosa, Desan, Eufaula, Heaton, and Nimrc series.

Aquilla and Eufaula soils: have an argillic horizon that consists entirely of lamellae

Arenosa soils: do not have an argillic horizon

Desan soils: do not have gleyed horizons and do not have many redox depletions with chroma 2 or less in the upper part of the argillic horizon

Heaton and Nimrc soils: have an argillic horizon that consists entirely of lamellae

GEOGRAPHIC SETTING:

Attachment # SR-1
 Parent material: locally reworked eolian sands over residuum weathered from sandstone and siltstone

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Landscape: hills

Landform: interfluves and side slopes of low ridges

Slope: 0 to 12 percent

Mean annual precipitation: 648 to 953 mm (26 to 38 in)

Thornthwaite P-E Index: 26 to 48

Mean annual air temperature: 17.2 to 18.8 degrees C (63 to 66 degrees F)

Frost-free period: 217 to 243 days

Elevation: 200 to 628 m (656 to 2,060 ft)

GEOGRAPHICALLY ASSOCIATED SOILS:

These are the Arenosa, Brackett, Bunyan, Duffau, Dugout, May, Nimrod, Purves, Selden, and Windthorst series.

Arenosa and Nimrod soils: occur on similar undulating sandy interfluvesBrackett, Dugout, and Purves soils: less than 50 cm (20 in) to limestone bedrock and occur on limestone ridgesBunyan soils: do not have argillic horizons and occur on flood plainsDuffau and Windthorst soils: less than 50 cm (20 in) to argillic horizon and occur on crests and side slopesMay and Selden soils: less than 50 cm (20 in) to argillic horizon and occur on base slopes, drainageways, and stream terraces**DRAINAGE AND PERMEABILITY:**

Drainage class: well

Permeability class: moderately slow

Runoff: negligible on slopes less than 5 percent, very low on 5 to 12 percent slopes

Seasonal water table: episaturation occurs between depths of 107 to 183 cm (3.5 to 6 ft) for short periods following heavy rainfall during the months of October to May in most years

USE AND VEGETATION:

Major uses: livestock grazing and wildlife habitat with a few areas cultivated to peanuts and watermelon in the past

Native vegetation: sand post oak and blackjack oak with greenbrier, forbs, and mid-tall grasses in the openings and beneath tree cover.

Ecological site: Deep Sand 29-33" PZ (R084BY169TX)

DISTRIBUTION AND EXTENT:

General location: north-central Texas

Land Resource Region: J-Southwestern Prairies Cotton and Forage

Major Land Resource Area: 84B-West Cross Timers

Extent: moderate

SOIL SURVEY REGIONAL OFFICE (SSRO) RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Erath County, Texas; 1970. The name "Patilo" comes from a community in northeastern Erath County. The community of Patillo established in 1890 was named for pioneer area rancher John Patillo, but the post office name was recorded as "Patilo".

REMARKS: These soils were formerly included with the Nimrod series. The series was separated based on depth to the argillic horizon.

Diagnostic horizons and features recognized in this pedon are:

Particle-size control section: 127 to 177 cm (50 to 74 in) (Btg horizons)

Ochric epipedon: 0 to 10 cm (0 to 4 in) (A horizon)

Albic horizon: 10 to 127 cm (4 to 50 in) (E horizon)

Argillic horizon: 127 to 188 cm (50 to 74 in) (Btg horizons)

Redox concentrations: 127 to 188 cm (50 to 74 in) (Btg horizons)

Episaturation: 127 to 188 cm (50 to 74 in) (Btg horizons)

Abrupt textural change: 127 cm (50 in) (top of Btg horizon)

Albic materials: 10 to 127 cm (4 to 50 in) (E horizon)

Attachment # SR-1
Additional comments: The subsoil is either gleyed (Btg horizons) or coarsely mot' ' with many prominent redox depletions with chroma 2 or less. page 35 of 68

The assignment of the cation-exchange activity class is inferred from lab data from similar soils in the surrounding area.

ADDITIONAL DATA:

Texas Highway Department Data from TUD Pedon S75TX-059-003.

TAXONOMIC VERSION: Keys to Soil Taxonomy, Twelfth Edition, 2014

National Cooperative Soil Survey
J.S.A.

ROBCO SERIES

The Robco series consists of very deep, moderately well drained, slowly permeable soils that formed in loamy sediments. These nearly level to moderately sloping soils are on uplands. Slopes range from 0 to 8 percent. Mean annual precipitation is about 978 mm (38.5 in) and the mean annual air temperature is about 19.2 degrees C (66.6 degrees F).

TAXONOMIC CLASS: Loamy, siliceous, active, thermic Aquic Arenic Paleustalfs

TYPICAL PEDON: Robco loamy fine sand--in pasture. (Colors are for dry soil unless otherwise stated.)

A--0 to 38 cm (0 to 15 in); brown (10YR 5/3) loamy fine sand, brown (10YR 4/3) moist; single grained; loose, very friable, nonsticky and nonplastic; many fine grass roots; slightly acid; clear smooth boundary. (10 to 41 cm [4 to 16 in] thick)

E--38 to 71 cm (15 to 28 in); pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grained; loose, very friable, nonsticky and nonplastic; many fine grass roots; moderately acid; gradual wavy boundary. (10 to 91 cm [4 to 36 in] thick)

Bt/E--71 to 84 cm (28 to 33 in); brownish yellow (10YR 6/6) sandy clay loam (Bt part), yellowish brown (10YR 5/6) moist; 40 percent of horizon is tongues of light gray (10YR 7/2) loamy fine sand (E part); moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots, few fine pores, few patchy clay films; few fine distinct light gray (10YR 7/2) iron depletions; moderately acid; gradual wavy boundary. (0 to 18 cm [0 to 7 in] thick)

Btg1--84 to 119 cm (33 to 47 in); light gray (10YR 7/2) sandy clay loam, moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few patchy clay films; few fine pores; common coarse red (2.5YR 4/6) and yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid; gradual wavy boundary. (18 to 64 [7 to 25 in] thick)

Btg2--119 to 165 cm (47 to 65 in); light gray (10YR 7/2) clay loam, light brownish gray (10YR 6/2) moist, weak medium subangular blocky structure; very hard, very firm, sticky and plastic; very fine roots; many medium prominent red (10R 4/6) masses of iron accumulation; strongly acid; gradual wavy boundary. (18 to 51 cm [7 to 20 in] thick)

Bct--165 to 208 cm (65 to 82 in); red (2.5YR 4/6) sandy clay loam weak medium subangular blocky structure; some of red material is structureless; hard, friable, sticky and plastic; few patchy clay films; many medium prominent light gray (10YR 7/2) iron depletions; strongly acid.

TYPE LOCATION: Brazos County, Texas; from the intersection of state highway 21 and FM 2038 at Kurten, north 0.9 mile on FM 2038, west 0.3 miles on Kurten Cemetery Road, south 0.1 mile to cemetery entrance, then south 0.1 mile on private road along the east side of the cemetery. Site is 200 ft southwest of the southeast corner of cemetery in pasture.

USGS topographic quadrangle: Kurten, Texas;
 Latitude: 30 degrees 47 minutes 19.5 seconds North;
 Longitude: 96 degrees 16 minutes 51.3 seconds West;
 Datum: WGS84.

RANGE IN CHARACTERISTICS:

Solum depth: 152 to 203 cm (60 to 80 in)

Soil Moisture: An ustic soil moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 150 cumulative days in normal years.

Depth to redox concentrations: 0 to 132 cm (0 to 52 in)

Depth to redox depletions: 13 to 74 cm (5 to 52 in)

Particle-size control section (weighted average)

Clay content: 25 to 35 percent of the upper 51 cm (20 in) of the argillic horizon

A horizon:

Hue: 7.5YR or 10YR

Value: 4 to 7

Chroma: 1 to 4

Texture: loamy fine sand, fine sand or fine sandy loam

Thickness: 51 to 102 cm (20 to 40 in)

Rock fragments: amount- 0 to 11 percent; size- 2 to 75 mm; kind- quartzite

Reaction: strongly acid to slightly acid

B horizon:

Hue: 10YR or 7.5YR

Value: 4 to 7

Chroma: 2 to 6

Texture: loamy fine sand, or fine sandy loam

Redoximorphic features in shades of gray or yellow range from none to common

Rock fragments: amount- 0 to 11 percent; size- 2 to 75 mm; kind- quartzite

Reaction: very strongly acid to moderately acid

3t/E horizon (where present):

3t part

Hue: 10YR

Value: 5 to 7

Chroma: 4 to 6

Texture: sandy clay loam, loam, or clay loam

Rock fragments: amount- 0 to 11 percent; size- 2 to 75 mm; kind- quartzite

Special features: 60 to 90 percent by volume of B material

E part

Hue: 10YR

Value: 6 to 8

Chroma: 1 to 4

Texture: loamy fine sand or fine sand

Redoximorphic features in shades of gray, yellow, and red range from few to a mottled matrix of these colors

Rock fragments: amount- 0 to 11 percent; size- 2 to 75 mm; kind- quartzite

Reaction: very strongly acid to slightly acid

Location: material consists of tongues, interfingers, and pockets

3tg horizon (upper):

Hue: 2.5YR to 2.5Y

Value: 4 to 7

Chroma: 1 to 8

Texture: clay loam sandy clay, sandy clay loam, or sandy loam

Redoximorphic features in shades of gray, red, yellow, and brown range from few to many, or the matrix is mottled in shades of red, gray, and yellow

Rock fragments: amount- 0 to 1 percent; size- 2 to 75 mm; kind- quartzite

Reaction: very strongly acid to moderately acid

3tg horizon (lower)

Hue: 2.5YR to 2.5Y

Value: 4 to 7

Chroma: 1 to 8

Texture: clay loam or clay

Redoximorphic features in shades of red, yellow, brown, and gray range from few to many. In some pedons the soil is mottled

shades of red, gray and yellow.

Rock fragments: amount- 0 to 1 percent; size- 2 to 75 mm; kind- quartzite

Reaction: very strongly acid to slightly

Some pedons have interfingers of E material in the lower part

3Ct horizon (where present):

Hue: 2.5YR to 2.5Y

Value: 4 to 8

Chroma: 1 to 8

Texture: sandy clay loam, clay loam, or clay

Redoximorphic features has colors with shades of red, gray, yellow or brown with few to many mottles.

Rock fragments: amount- 0 to 1 percent; size- 2 to 75 mm; kind- quartzite

Reaction: very strongly acid to neutral

Gypsum: 0 to 5 percent

Salts: 0 to 5 percent

COMPETING SERIES: This is Nimrod (TX) series. Similar soils are the Coving, Chazos, Demona, Nueces, Rader, Rehburg, Selden, Tanglewood (TX-T), and Tremona series.

Nimrod soils: do not have a Bt/E horizon, receive less effective precipitation and are have a typic/ustic moisture regime.

Coving soils: are moderately acid to slightly alkaline throughout the argillic horizon, and are somewhat poorly drained.

Chazos soils: are in the fine family, and have surface layers less than 51 cm (20 in) thick.

Demona, Tanglewood, and Tremona soils: are in the fine family.

Nueces soils: are in the hyperthermic temperature regime.

Rader soils: do not have arenic surface layers.

Rehburg soils: are 51 to 102 cm (20 to 40 in) thick over tuffaceous materials.

Selden soils: have surface layers less than 51 cm (20 in) thick.

GEOGRAPHIC SETTING:

Parent material: loamy sediments on Pleistocene terrace deposits about 10.7 to 30.5 m (35 to 100 ft) above present streams or local outwash colluvial plains

Landscape: low oval convex ridges, footslopes and concave sideslope positions or near the heads of drainageways

Slope: 0 to 8 percent, but are mostly 0 to 5 percent

Mean annual precipitation: 891 to 1153 mm (35 to 45.4 in)

Mean annual air temperature: 17.8 to 20.3 degrees C (64 to 68.5 degrees F)

Frost-free period: 240 to 280 days

Elevation: 46 to 183 m (150 to 600 ft)

Thornthwaite P-E Index: 52 to 64

GEOGRAPHICALLY ASSOCIATED SOILS: These are Arenosa, Chazos, Hearne, Jedd, Marquez, Padina, Rader, Rosanky, Silstid, and Tanglewood (T-TX) series.

Arenosa, Padina, and Silstid soils: are mainly on broad smooth areas in higher better drained positions. Chazos soils: do not have thick sandy surface layers and are on similar land forms.

Hearne, Jedd, Rosanky, and Marquez soils: are on higher ridges and side slopes and have a thinner sola. Rader soils: are slightly lower in the landscape, and have fine sandy loam surface layers.

Tanglewood soils: occur on similar positions but are formed in loamy and clayey residuum derived primarily from claystone and shale of Eocene Age.

DRAINAGE AND PERMEABILITY:

Drainage class: Moderately well.

Permeability class: slow.

Runoff: low on slopes less than 1 percent, medium on 1 to 5 percent slopes, and high on 5 to 8 percent slopes.

Wetness: Water is perched above the argillic horizon during the cool season for short periods following heavy rains.

USE AND VEGETATION: These soils are used mainly for pasture and rangeland. Pastures are improved bermudagrass or native grasses. Tree species are mainly post oak and blackjack oak with an understory of yaupon, grasses, and other shrubs.

DISTRIBUTION AND EXTENT: Mainly in Texas Claypan Area (MLRA 87A) of east-central Texas. The series is of large extent.

SERIES ESTABLISHED: Leon Cou. , Texas, 1985.

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REMARKS: This soil was formerly included within the Demona series. The original concept was a soil with a fine textured control section. Additional data has shown that the area mapped as Robco soils typically have a clay content of 30 to 35 percent. These soils have slow permeability. In 1988, it was changed to fine-loamy family.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon: 0 to 71 cm (0 to 28 in) (A and E horizons)

Albic horizon: 38 to 71 cm (15 to 28 in)

Arenic feature: 0 to 71 cm (0 to 28 in), loamy fine sand texture.

Argillic horizon: 71 to 208 cm (28 to 82 in) (Bt/E, Btg1, and Btg2 and BCt horizons)

Reduced matrix: 84 to 165 cm (33 to 65 in) (Btg1 and Btg2 horizons)

Redoximorphic concentrations: 84 to 165 cm (33 to 65 in) (Btg1 and Btg2 horizons)

Redoximorphic depletions with chroma of 2 or less: 38 to 71 cm (15 to 28 in). (E horizons)

Episaturation: The zone of saturation at 69 to 119 cm (27 to 65 in) (Btg1, and Btg2 horizons)

ADDITIONAL DATA: Base saturation by nach Kit was 50 percent at 127 cm (50 in) below top of the argillic horizon at the type location, 91 percent at another location in Robertson County, and 77 percent from a pedon in Leon County, Texas. Result of mechanical analysis by the hydrometer method at the type location in Brazos County.

Also, NSSL data from pedon in Leon County Texas S82TX-289-26 (S82P3199- 3207).

Soil Interpretation Record No: TX0981

Taxonomic Version: Keys to Soil Taxonomy, Twelfth Edition, 2014.

National Cooperative Soil Survey
U.S.A.

TANGLEWOOD SERIES

The Tanglewood series consists of very deep, moderately well drained, slowly permeable soils formed in sandy, clayey, and loamy residuum derived from sandstone, claystone and shale. These nearly level to moderately sloping soils occur on ridges and inland dissected coastal plains. Slope ranges from 0 to 8 percent. Mean annual precipitation is about 900 mm (35.4 in), and mean annual air temperature is about 20 degrees C (68 degrees F).

TAXONOMIC CLASS: Clayey, mixed, active, thermic Aquic Arenic Paleustalfs

TYPICAL PEDON: Robco-Tanglewood complex, 1 to 5 percent slope in pasture; elevation is 122 m (400 ft) (Colors are for dry soil unless otherwise stated.)

A--0 to 13 cm (0 to 5 in); brown (10YR 5/3) loamy fine sand, brown (10YR 4/3), moist; 80 percent sand; 16 percent silt; 4 percent clay; structureless single grain; slightly hard, loose; very strongly acid, pH 4.9 by pH meter; clear smooth boundary. (Thickness is 7 to 51 cm [3 to 20 in].)

E--13 to 59 cm, (5 to 23 in); pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3), moist; 77 percent sand; 18 percent silt; 5 percent clay; structureless single grain; slightly hard, very friable; very strongly acid, pH 5.1 by pH meter; abrupt wavy boundary. (Thickness is 16 to 74 cm [6 to 29 in].)

Btg1--59 to 84 cm, (23 to 33 in); sandy clay loam, 55 percent grayish brown (10YR 5/2) reduced and 35 percent yellowish brown (10YR 5/6) oxidized and 10 percent strong brown (7.5YR 5/6) oxidized, moist; 56 percent sand; 17 percent silt; 27 percent clay; moderate medium subangular blocky structure; hard, firm; 10 percent medium distinct cylindrical brown (7.5YR 5/4), moist, iron-manganese masses throughout; very strongly acid, pH 4.9 by pH meter; gradual wavy boundary. (Combined thickness of the Btg horizons is 20 to 150 cm [8 to 59 in].)

Btg2--84 to 124 cm, (33 to 49 in); clay, 55 percent strong brown (7.5YR 5/6) oxidized and 35 percent light brownish gray (10YR 6/2) reduced and 10 percent yellowish brown (10YR 5/4) oxidized, moist; 42 percent sand; 13 percent silt; 45 percent clay; moderate medium angular blocky structure; very hard, very firm; 10 percent medium distinct cylindrical brown (7.5YR 5/4), moist, iron-manganese masses throughout; very strongly acid, pH 5.0 by pH meter; gradual wavy boundary.

Btg3--124 to 173 cm, (49 to 68 in); sandy clay, 55 percent yellowish brown (10YR 5/6) oxidized and 30 percent grayish brown (10YR 5/2) reduced and 15 percent yellowish brown (10YR 5/4) oxidized, moist; 49 percent sand; 14 percent silt; 37 percent clay; moderate medium angular blocky structure; very hard, very firm; moderately acid, pH 5.8 by pH meter; gradual wavy boundary.

Btg4--173 to 210 cm, (68 to 83 in); sandy clay loam, 60 percent light brownish gray (10YR 6/2) reduced and 25 percent yellowish red (5YR 4/6) oxidized and 15 percent strong brown (7.5YR 5/6) oxidized, moist; 59 percent sand; 11 percent silt; 30 percent clay; moderate medium subangular blocky structure; hard, firm; neutral, pH 7.0 by pH meter.

TYPE LOCATION: Caldwell County, Texas (TX); From the intersection of State Highway 183 and Farm to Market Road 1322 in Luling, Texas; about 4.6 miles East and Northeast on Farm to Market Road 1322; about 1.35 miles East on Farm to Market Road 1386; 1.3 miles South on County Road 137 to a gate; approximately .6 miles Northwest along a property line; located about 668 feet North of property line in pastureland.

USGS topographic quadrangle: Tanglewood, TX
Latitude: 29 degrees, 41 minutes, 27 seconds N
Longitude: 97 degrees, 34 minutes, 28 seconds W

Latitude: 29.6907120
Longitude: 97.5743592
Datum: WGS 84

JTM Easting: 637914 m
JTM Northing: 3285364 m
JTM Zone: 14

RANGE IN CHARACTERISTICS:

Solum depth: 142 cm to greater than 203 cm (56 in to greater than 80 in)
Soil Moisture: aquic ustic soil moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 150 cumulative days in normal years.
Mean annual soil temperature: 19.4 to 22 degrees C (67 to 71.6 degrees F)
Depth to abrupt textural change: 51 to 83 cm (20 to 33 in)
Depth to albic materials: 8 to 61 cm (3 to 24 in)
Depth to albic horizon: 8 to 61 cm (3 to 24 in)
Depth to argillic horizon: 51 to 87 cm (20 to 34 in)
Depth to aquic conditions: 51 to 68 cm (20 to 27 in)
Depth to redox concentrations: 8 to 66 cm (3 to 26 in)
Depth to redox depletions: 51 to 68 cm (20 to 27 in)
Depth to episaturation: 51 to 68 cm (20 to 27 in)
Thickness of the ochric epipedon: 8 to 87 cm (3 to 34 in)

Particle-size control section (weighted average):

Total clay content: 35 to 60 percent
Silicate clay content: 35 to 60 percent
Sand content: 30 to 65 percent
Rock fragments: 0 to 3 percent
Cation-Exchange Capacity/clay ratio: 0.4 to 0.6

A horizon:

Hue: 10YR
Value: 3 to 4 moist, 3 to 5 dry
Chroma: 2 to 4, dry or moist
Texture: loamy sand, loamy fine sand, or fine sand
Total clay content: 2 to 8 percent
Sand content: 73 to 89 percent
Rock fragments: amount-0 to 5 percent; size-fine or medium; kind-quartzite
Electrical conductivity (decisiemens per meter): 0 to 2
Reaction (pH): Very strongly acid to slightly acid (4.9 to 6.1)

E horizon:

Hue: 10YR
Value: 5 to 6, dry or moist
Chroma: 2 to 4, dry or moist
Texture: loamy sand, loamy fine sand, or fine sand
Total clay content: 3 to 9 percent
Sand content: 73 to 84 percent
Redox concentrations: amount-0 to 15 percent; size-fine or medium; contrast-faint or distinct; color-shades of yellowish brown or strong brown; boundary-clear or diffuse; location-on surfaces along root channels
Iron-manganese concentrations: amount-0 to 2 percent; size-fine; kind-concretions
Rock fragments: amount-0 to 5 percent; size-fine or medium; kind-quartzite
Electrical conductivity (decisiemens per meter): 0 to 2
Reaction (pH): Very strongly acid to slightly acid (4.8 - 6.3)

3tg or Bt horizon (upper part):

Hue: 2.5YR to 10YR
Value: 4 to 6 moist, 4 to 8 dry

Attachment # 2R1

Texture: clay, sandy clay, sandy clay loam

Total clay content: 27 to 54 percent

Sand content: 36 to 56 percent

Redox concentrations: amount-2 to 35 percent; size-fine or medium; contrast-faint or distinct; color-shades of red, yellowish red, yellowish brown, or strong brown; boundary-clear or diffuse; location-on surfaces along root channels

Redox depletions: amount-5 to 15 percent; size-fine or medium; contrast-faint or distinct; color-shades of gray or light brownish gray; boundary-clear or diffuse; location-in matrix surrounding redox concentrations

Iron-manganese concentrations: amount-0 to 5 percent; size-fine; kind-concretions

Rock fragments: amount-0 to 3 percent; size-fine or medium; kind-quartzite

Electrical conductivity (decisiemens per meter): 0 to 2

Reaction (pH): Very strongly acid to moderately acid (4.9 - 6)

3tg or Bt horizon (lower part):

Hue: 2.5YR to 10YR

Value: 4 to 6, dry or moist

Chroma: 1 to 8, dry or moist

Texture: clay, clay loam, sandy clay, sandy clay loam

Total clay content: 34 to 54 percent

Sand content: 30 to 54 percent

Redox concentrations: amount-2 to 20 percent; size-fine or medium; contrast-faint or distinct; color-shades of red, yellowish brown, yellowish red, or strong brown; boundary-clear or diffuse; location-on surfaces along root channels

Redox depletions: amount-10 to 25 percent; size-fine or medium; contrast-faint or distinct; color-shades of gray or light brownish gray; boundary-clear or diffuse; location-in matrix surrounding redox concentrations

Iron-manganese concentrations: amount-0 to 5 percent; size-fine; kind-concretions

Rock fragments: amount-0 to 3 percent; size-fine or medium; kind-quartzite

Electrical conductivity (decisiemens per meter): 0 to 2

Reaction (pH): Very strongly acid to slightly alkaline (4.6 - 7.4)

3Ct, BCtg, CBtg, CBt horizon(s) (where present):

Hue: 2.5YR to 10YR

Value: 4 to 6, dry or moist

Chroma: 1 to 8, dry or moist

Texture: clay, sandy clay, sandy clay loam, sandy loam

Total clay content: 19 to 45 percent

Sand content: 37 to 77 percent

Redox concentrations: amount-5 to 30 percent; size-fine or medium; contrast-faint or distinct; color-shades of red, yellowish red, or strong brown; boundary-clear or diffuse; location-on surfaces along root channels

Redox depletions: amount-0 to 5 percent; size-fine or medium; contrast-faint or distinct; color-shades of gray or light brownish gray; boundary-clear or diffuse; location-in matrix surrounding redox concentrations

Iron-manganese concentrations: amount-0 to 5 percent; size-fine; kind-concretions

Rock fragments: amount-0 to 3 percent; size-fine or medium; kind-quartzite

Electrical conductivity (decisiemens per meter): 0 to 2

Reaction (pH): Very strongly acid to neutral (4.9 - 7.3)

C horizon (where present):

Hue: 5YR to 10YR

Value: 4 to 6, dry or moist

Chroma: 1 to 8, dry or moist

Texture: clay, sandy clay, sandy clay loam, or sandy loam. Some pedons have stratified layers of sandy loam or clay loam.

Total clay content: 18 to 42 percent

Sand content: 45 to 70 percent

Redox concentrations: amount-0 to 30 percent; size-fine or medium; contrast-faint or distinct; color-shades of red, yellowish red, or strong brown; boundary-clear or diffuse; location-on surfaces along root channels

Redox depletions: amount-0 to 20 percent; size-fine or medium; contrast-faint or distinct; color-shades of gray or light brownish gray; boundary-clear or diffuse; location-in matrix surrounding redox concentrations

Iron-manganese concentrations: amount-; size-; kind-

Rock fragments: amount-0 to 3 percent; size-fine or medium; kind-quartzite

Electrical conductivity (decisiemens per meter): 0 to 2

COMPETING SERIES:

These are the Demona series in the same family. Similar soils are the Antosa, Coving, Ellen, Garcitas, Nimrod, Rehburg, Robco, and the Tremona series.

Demona soils: have a soil temperature that is 19 to 20 degrees C (66.2 to 68 degrees F), occur where the mean annual precipitation is 610 to 889 mm (24 to 35 in), occur where the mean annual air temperature is 17.2 to 18.9 (63 to 66 degrees F) and are formed in slope alluvium and residuum of Cretaceous age. Additionally, these soils are less acidic in the A and E horizons.

Antosa soils: have a loamy particle size control section, have siliceous mineralogy, and occur in a hyperthermic soil temperature regime

Coving soils: have a loamy particle size control section, have siliceous mineralogy, and have a superactive cation exchange capacity activity class

Ellen soils: have a loamy-skeletal particle size control section and have siliceous mineralogy

Garcitas soils: occur in a hyperthermic soil temperature regime and do not have red argillic horizons

Nimrod and Robco soils: have a loamy particle size control section and siliceous mineralogy

Rehburg soils: are 102 to 152 cm (40 to 60 in) deep to paralithic contact and have a loamy particle size control section

Tremona soils: occur in a hyperthermic soil temperature regime and do not have red argillic horizons

GEOGRAPHIC SETTING:

Parent material: sandy, clayey, and loamy residuum derived from sandstone, claystone and shale of Eocene Age mainly of the Wilcox, Reklaw, Queen City, and Sparta formations

Landscape: Inland dissected coastal plains

Landform: footslopes and toeslopes on baseslopes on broad ridges; backslopes on sideslopes on broad ridges

Slope: 0 to 8 percent

Mean annual precipitation: 891 to 1153 mm (35 to 45.4 in)

Mean annual air temperature: 19.4 to 20.6 degrees C (67 to 69 degrees F)

Frost-free period: 250 to 280 days

Elevation: 66.3 to 186 m (217.5 to 610 ft)

GEOGRAPHICALLY ASSOCIATED SOILS:

These are the Arenosa, Padina, Robco, Rosanky, and Silstid series.

Arenosa soils: have a sandy epipedon greater than 203 cm (80 in) thick and occur on convex summits

Padina soils: have a sandy epipedon 100 to 183 cm (40 to 72 in) thick, have a loamy particle size control section, and occur on convex summits and shoulders

Robco soils: have loamy particle size control sections and occur on similar positions

Rosanky soils: have fine particle size control sections, have a base saturation of less than 75 percent throughout the argillic horizon, and occur on convex summits and shoulders of ridges

Silstid soils: have a sandy epipedon 50 to 100 cm (20 to 40 in) thick, have a loamy particle size control section, and occur on sideslopes

DRAINAGE AND PERMEABILITY:

Drainage class: Moderately well

Permeability class: Slow

Runoff: low on less than 1 percent slopes, medium on 1 to 5 percent slopes, and high on 5 to 8 percent slopes

Seasonal water table: Episaturation usually occurs above or near the top of the argillic horizon between depths of 46 to 122 cm (18 to 48 in) of the surface during the months of January to April in most years.

USE AND VEGETATION:

These soils are used mainly for pasture and rangeland. Pastures are improved bermudagrass or native grasses. Tree species are mainly post oak and blackjack oak with an understory of yaupon, grasses, and other shrubs.

DISTRIBUTION AND EXTENT:

General area: South Central Texas

Land Resource Region: J-Southwestern Prairies Cotton and Forage Region

Major Land Resource Area 87A - Texas Claypan Area, Southern Part

Extent: Moderate

REMARKS: The series was formerly included in the Demona series. The series was separated based on having a warmer soil temperature, having a wetter mean annual precipitation range, having a warmer mean annual air temperature range, occurring in a different major land resource area, and different geologic material.

Diagnostic horizons and features recognized in this pedon are:

- Particle-size control section: 59 to 109 cm (23 to 43 in)
- Ochric epipedon: 0 to 13 cm (0 to 5 in) (A horizon)
- Argillic horizon: 59 to 210 cm (23 to 83 in) (Btg1, Btg2, Btg3, Btg4 horizons)
- Redoximorphic concentrations: 59 to 210 cm (23 to 83 in) (Btg1, Btg2, Btg3, Btg4 horizons)
- Redoximorphic depletions: 59 to 210 cm (23 to 83 in) (Btg1, Btg2, Btg3, Btg4 horizons)
- Episaturation: 59 to 210 cm (23 to 83 in) (Btg1, Btg2, Btg3, Btg4 horizons)
- Aquic conditions: 59 to 210 cm (23 to 83 in) (Btg1, Btg2, Btg3, Btg4 horizons)
- Reduced matrix: 59 to 210 cm (23 to 83 in)
- Abrupt textural change: 59 cm (23 in) (E to Btg1 horizon)

Additional Comments:

The assignment of the cation-exchange activity class is inferred from lab data from S09TX1870016 from Guadalupe County, Texas. This lab data is from a Robco pedon taken in a Demona mapunit.

ADDITIONAL DATA: TAMU Data from Williamson County, Texas taxonomic unit pedon S78TX-491-003. Particle-size analysis, salinity and sodicity tests were performed at the project office on 12 pedons.

Taxonomic Version: Keys to Soil Taxonomy, Twelfth Edition, 2014

UHLAND SERIES

The Umland series consists of very deep, moderately well drained, moderately slowly permeable soils that formed in alluvium. These soils are in nearly level flood plains. Slopes range from 0 to 1 percent.

TAXONOMIC CLASS: Coarse-loamy, siliceous, superactive, thermic Aquic Haplustepts

TYPICAL PEDON: Umland loam--pasture. (Colors are for moist soil unless otherwise stated).

A--0 to 3 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure parting to moderate fine granular; hard, firm, sticky and plastic; many fine and medium roots; common fine and medium tubular pores; common fine prominent reddish brown (5YR 4/4) masses of iron accumulation; few fine iron-manganese concretions; slightly acid; abrupt smooth boundary. (3 to 10 inches thick)

Bw--3 to 15 inches; dark brown (10YR 4/3) very fine sandy loam, pale brown (10YR 6/3) dry; weak coarse prismatic structure parting to weak very fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; common fine and medium tubular pores; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; few faint dark grayish brown (10YR 4/2) iron depletions along dead root channels; few very fine iron-manganese masses; slightly acid; abrupt smooth boundary. (8 to 65 inches thick)

Ab--15 to 22 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak coarse prismatic structure parting to moderate fine subangular blocky; hard, friable, sticky and plastic; common fine and medium roots; many fine and few medium tubular pores; few medium distinct dark brown (7.5YR 4/4) masses of iron accumulation; dark gray (10YR 4/1) iron depletions on surfaces of some prisms and along dead root channels; few fine iron-manganese masses; slightly acid; abrupt smooth boundary. (0 to 10 inches thick)

Bwb--22 to 43 inches; dark yellowish brown (10YR 4/4) very fine sandy loam, light yellowish brown (10YR 6/4) dry; weak coarse prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine and medium tubular pores; common medium distinct dark yellowish brown (10YR 4/6) masses of iron accumulation; grayish brown (10YR 5/2) iron depletions along dead root channels; few faint bedding planes 1/2 to 2 inches thick with slightly less clay and lighter color than the matrix; slightly acid; abrupt smooth boundary. (0 to 40 inches thick)

A'b--43 to 48 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, gray (10YR 5/1) dry; weak coarse prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine pores; common medium distinct grayish brown (10YR 5/2) iron depletions; few fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; slightly acid; clear smooth boundary. (0 to 12 inches thick)

Bgb--48 to 55 inches; gray (10YR 5/1) very fine sandy loam, light brownish gray (10YR 6/2) dry; weak coarse prismatic structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine roots; many medium distinct dark yellowish brown (10YR 4/6) masses of iron accumulation; 10 percent iron-manganese concretions; few fine siliceous pebbles; slightly acid; clear smooth boundary. (0 to 20 inches thick)

A''b--55 to 80 inches; very dark gray (10YR 3/1) clay loam, gray (10YR 5/1) dry; moderate medium prismatic structure parting to weak coarse angular blocky; very hard, firm, sticky and very plastic; few very fine roots; common fine distinct dark yellowish brown (10YR 4/6) masses of iron accumulation; 10 percent iron-manganese concretions in the upper part with iron-manganese masses in the lower part; moderately acid.

TYPE LOCATION: Robertson County, Texas: from intersection of Farm Road 46 and Farm Road 1644 in Franklin, 6.6 mi west on Farm Road 1644 to flood plain of Little Mud Creek, 0.4 mile north on pasture road, 275 feet north-northwest in flood plain. (Latitude: 31 degrees north, 00 minutes, 14 seconds; Longitude: 96 degrees west, 30 minutes, 06 seconds)

CONTROL SECTION: The depth of control sections ranges from about 0 to 15 feet. The soil is more than 30 inches thick. Reaction ranges from moderately acid to slightly alkaline throughout. Average clay content of the 10- to 40-inch particle-size control section ranges from 10 to 18 percent. There is an irregular decrease in organic carbon and most pedons have a buried A horizon within the particle-size control section. Redox depletions and aquic conditions are in some subhorizon within a depth of 20 to 30 inches of the soil surface during most years. Most pedons have few to about 5 percent siliceous and/or ironstone pebbles, mainly less than one half inch across, in some horizons. Iron manganese concretions and masses range from few to common in some horizons.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Horizons with moist value of 3 are less than 10 inches thick. Some pedons have few to common iron concentrations in shades of brown or red. Texture is very fine sandy loam, fine sandy loam, sandy clay loam, loam, or clay loam.

The Bw or Bwb horizon has hue of 7.5YR or 10YR, value of 4 to 6, chroma of 3 to 6. Iron concentrations in shades of brown yellow or red range from few to many. Iron depletions in shades of brown or gray with chroma of 2 or less range from few to common in some subhorizon within 30 inches of the soil surface. Texture is very fine sandy loam, fine sandy loam, or loam with or without subhorizons of loamy fine sand, sandy clay loam or clay loam.

Buried A horizons, where present, have hue of 10YR, value of 3 or 4, and chroma of 1 to 3. Redoximorphic features range from none to common. Texture ranges from fine sandy loam to clay loam.

3g or Bgb horizons, where present, have hue of 10YR, value of 5 or more and chroma of 2 or less are typically below a depth of 40 inches and do not occur in some pedons. Redoximorphic concentrations in shades of brown, yellow, or red range from few to many. Texture ranges from fine sandy loam to clay loam.

COMPETING SERIES: There are no competing series. Similar soils include the Coarsewood, Sandow, Weswood, Yahola, Yomont, and Zavala series. Coarsewood soils have coarse-silty control sections, and do not have a cambic horizon. Sandow soils have fine-loamy control sections. Yahola, Yomont, and Zavala soils do not have aquic soil conditions in most years. In addition, Yomont soils have coarse-silty control sections, and Zavala soils are in the hyperthermic temperature regime. Weswood soils have fine-silty control sections and do not have aquic soil conditions in most years.

GEOGRAPHIC SETTING: The Uhland series is in nearly level flood plains of central Texas. Slopes range from 0 to 1 percent. The soil formed in sandy and loamy alluvium derived from Cretaceous and Tertiary period sediments. Mean annual precipitation ranges from 32 to 40 inches, and mean annual temperature ranges from 65 to 70 degrees F. Frost free days range from 240 to 280, and elevation ranges from 200 to 400 feet. Thornthwaite P-E indices range from 44 to 64.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the competing Sandow soils and the Edge, Crockett, Padina, Rader, Tabor, and Whitesboro soils. Edge and Crockett soils have clayey Bt horizons and are on higher upland positions. Padina soils are on higher upland positions and have sandy grossarenic surface and subsurface layers and a loamy Bt horizon. Rader and Tabor soils are on slightly higher adjoining terrace positions. They have loamy and clayey Bt horizons. The fine-loamy Sandow soils are on similar flood plain positions. Whitesboro soils are on similar flood plain positions and have molli pipedons.

DRAINAGE AND PERMEABILITY: Moderately well drained. Permeability is moderately slow. Runoff is negligible. An apparent water table is at a depth of 2.0 to 3.5 feet of the surface during the spring months for a period of 30 to 60 days during most years. The frequent flooding areas commonly flood three to five times annually for brief durations.

USE AND VEGETATION: Most areas are used for improved pasture or rangeland. Native vegetation includes scattered oak, elm, and willow with an understory of indiangrass, switchgrass, panicles, sedges, and yauping.

DISTRIBUTION AND EXTENT: This soil occurs mainly in the Texas clasp area (MLRA 87A). The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Caldwell County, Texas, 1972.

REMARKS: This soil has been previously included with the Iuka series. The classification is changed from Aquic Ustifluvents to Aquic Ustochrepts (August, 1994) based on the results of a field study that indicates it has a cambic horizon. It should be noted that an alternative classification would be Fluvaquentic Ustochrepts. This subgroup is not presently in Soil Taxonomy. Texas plans to submit a proposal to include the Fluvaquentic subgroup in Ustochrepts.

Some epipedon 0 to 5 inches. (the A horizon)

Attachment # SR-15 inches, and 2. 43 inches the Bw and Bwb horizons.

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Fluentic properties - buried horizons, Ab horizon at 15 to 22 inches and Ab'1 horizon at 43 to 48 inches. Irregular decrease in organic-carbon content.

Aquic features - redox depletions with chroma of 2 or less within 30 inches of the soil surface and aquic soil conditions at a depth of 20 to 30 inches at some time during most years.

ADDITIONAL DATA: Type Location pedon STX94-395-001-001, Texas Agricultural Experiment Station Lab. data.

SOIL INTERPRETATION NUMBER: TX0007

National Cooperative Soil Survey
U.S.A.

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Report—Chemical Soil Properties

Chemical Soil Properties--Guadalupe County, Texas								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
CfB—Crockett fine sandy loam, 1 to 3 percent slopes								
Crockett	0-8	5.0-15	—	5.6-7.3	0	0	0.0-2.0	0-5
	8-25	27-50	—	5.6-7.8	0-2	0	0.0-2.0	0-5
	25-45	25-50	—	6.1-8.4	0-2	0	0.0-4.0	3-10
	45-53	20-45	—	7.4-8.4	5-30	0-2	0.0-4.0	3-10
	53-72	20-36	—	7.4-8.4	2-10	0-2	0.0-4.0	3-10
Normangee	—	—	—	—	—	—	—	—
Wilson	—	—	—	—	—	—	—	—

Chemical Soil Properties—Guadalupe County, Texas								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
DmC—Robco-Tanglewood complex, 1 to 5 percent slopes								
Robco	0-11	1.0-5.0	—	4.0-6.5	0	0	0.0-2.0	0
	11-26	1.0-5.0	—	4.7-7.2	0	0	0.0-2.0	0
	26-31	—	7.0-13	4.5-6.5	0	0	0.0-2.0	0
	31-39	—	9.0-14	4.5-6.0	0	0	0.0-2.0	0
	39-80	14-24	—	4.5-7.3	0	0-1	0.0-2.0	0
Tanglewood	0-5	—	0.4-2.9	4.9-6.1	0	0	0.0-2.0	0
	5-23	—	0.4-5.5	4.8-6.3	0	0	0.0-2.0	0
	23-33	—	6.1-23	4.9-6.0	0	0	0.0-2.0	0
	33-68	—	14-22	4.6-7.4	0	0	0.0-2.0	0
	68-80	10-28	—	4.6-7.4	0	0-1	0.0-2.0	0
Edge	—	—	—	—	—	—	—	—
Rader	—	—	—	—	—	—	—	—
Silstid	—	—	—	—	—	—	—	—
Straber	—	—	—	—	—	—	—	—
Tabor	—	—	—	—	—	—	—	—
Gasil	—	—	—	—	—	—	—	—
Padina	—	—	—	—	—	—	—	—
MaB—Mabank loam, 1 to 3 percent slopes								
Mabank	0-10	5.0-10	—	5.6-7.3	0	0	0.0-2.0	0-3
	10-40	15-30	—	5.6-8.4	0-15	2-22	0.0-2.0	2-8
	40-66	15-30	—	5.6-8.4	0-15	2-22	2.0-8.0	2-8
Unnamed	—	—	—	—	—	—	—	—

Chemical Soil Properties--Guadalupe County, Texas								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
PaD--Patilo and Arenosa soils, 1 to 8 percent slopes								
Patilo	0-8	1.0-5.0	—	5.6-7.3	0	0	0.0-2.0	0
	8-52	1.0-8.0	—	5.6-7.3	0	0	0.0-2.0	0
	52-84	10-25	—	5.1-6.5	0	0	0.0-2.0	0
Arenosa	0-5	1.0-4.0	—	4.5-6.5	0	0	0.0-2.0	0
	5-96	—	1.0-3.0	4.5-6.0	0	0	0.0-2.0	0
Unnamed	—	—	—	—	—	—	—	—
Unnamed	—	—	—	—	—	—	—	—
Uw--Uhland soils frequently flooded								
Uhland	0-7	15-30	—	5.6-7.8	0	0	0.0-2.0	0-2
	7-62	5.0-20	—	5.6-7.8	0	0	0.0-2.0	0-4
	62-80	15-30	—	5.6-7.8	0	0-4	0.0-4.0	0-4
Unnamed	—	—	—	—	—	—	—	—
Unnamed, hydric	—	—	—	—	—	—	—	—
WdC3--Windthorst fine sandy loam, 1 to 5 percent slopes, eroded								
Windthorst, eroded	0-8	3.0-7.0	—	5.6-7.3	0	0	0	0
	8-36	15-25	—	5.6-7.3	0	0	0	0
	36-48	10-20	—	5.6-8.4	0	0	0	0
	48-72	10-20	—	5.6-8.4	0-10	0	0	0
Unnamed	—	—	—	—	—	—	—	—

Data Source Information

Soil Survey Area: Guadalupe County, Texas
Survey Area Data: Version 17, Sep 8, 2021

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic layer.

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

RUSLE2 Related Attributes--Guadalupe County, Texas								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
CfB—Crockett fine sandy loam, 1 to 3 percent slopes								
Crockett	85	298	D	.49	5	64.0	23.0	13.0
DmC—Robco-Tanglewood complex, 1 to 5 percent slopes								
Robco	46	200	A	.20	5	82.0	12.0	6.0
Tanglewood	25	200	C/D	.15	5	82.0	12.0	6.0
MaB—Mabank loam, 1 to 3 percent slopes								
Mabank	85	298	D	.43	5	43.0	39.5	17.5
PaD—Patilo and Arenosa soils, 1 to 8 percent slopes								
Patilo	49	161	A	.02	5	94.9	0.6	4.5
Arenosa	29	161	A	.02	5	97.9	0.6	1.5
Uw—Uhland soils frequently flooded								
Uhland	67	98	C	.24	5	35.3	33.2	31.5
WdC3—Windthorst fine sandy loam, 1 to 5 percent slopes, eroded								
Windthorst, eroded	85	200	C	.32	5	62.5	26.0	11.5

Data Source Information

Soil Survey Area: Guadalupe County, Texas
Survey Area Data: Version 17, Sep 8, 2021

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (K_{sat}), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (K_{sat}) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (K_{sat}) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (K_w and K_f) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and K_{sat}. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor K_w indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor K_f indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

Report—Physical Soil Properties

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Physical Soil Properties—Guadalupe County, Texas														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
CfB—Crockett fine sandy loam, 1 to 3 percent slopes														
Crockett	0-8	53-64- 75	7-23- 40	7-13- 18	1.45-1.49 -1.52	14.00-28.00-42. 00	0.08-0.13-0. 16	0.4- 1.2- 2.0	0.5- 1.3- 2.0	.49	.49	5	5	56
	8-25	35-39- 50	0-15- 27	38-46- 55	1.45-1.50 -1.55	0.42-0.91-1.40	0.14-0.16-0. 18	6.0- 9.0-13.5	0.2- 0.5- 1.0	.28	.28			
	25-45	30-35- 48	2-21- 35	35-44- 55	1.40-1.48 -1.55	0.42-0.91-1.40	0.14-0.16-0. 18	5.4- 7.5-13.2	0.2- 0.3- 0.5	.28	.28			
	45-53	30-35- 48	4-24- 42	28-41- 50	1.35-1.40 -1.50	0.42-0.91-1.40	0.13-0.15-0. 17	3.0- 7.0-11.5	0.1- 0.3- 0.5	.32	.32			
	53-72	20-31- 42	18-35- 52	28-34- 40	1.60-1.70 -2.00	0.42-0.91-1.40	0.14-0.15-0. 18	2.9- 3.6- 7.1	0.1- 0.2- 0.5	.43	.43			
Normangee	—	—	—	—	—	—	—	—	—			4	6	48
Wilson	—	—	—	—	—	—	—	—	—			5	6	48

Physical Soil Properties--Guadalupe County, Texas														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
DmC—Robco-Tanglewood complex, 1 to 5 percent slopes														
Robco	0-11	80-82- 85	5-12- 18	2- 6- 10	1.55-1.58 -1.61	42.00-91.00-14 1.00	0.07-0.10-0. 12	0.1- 0.4- 0.8	0.5- 0.8- 1.0	.20	.20	5	2	134
	11-26	80-85- 95	3- 9- 18	2- 6- 10	1.56-1.60 -1.64	42.00-91.00-14 1.00	0.07-0.10-0. 12	0.1- 0.4- 0.8	0.2- 0.4- 0.8	.43	.43			
	26-31	32-50- 59	8-21- 40	22-29- 33	1.50-1.58 -1.70	4.00-9.00-14.00	0.12-0.17-0. 19	1.4- 1.9- 2.3	0.2- 0.5- 0.8	.24	.24			
	31-39	32-50- 59	7-21- 37	27-29- 34	1.50-1.58 -1.70	4.00-9.00-14.00	0.12-0.17-0. 19	1.7- 2.0- 2.4	0.1- 0.2- 0.6	.37	.37			
	39-80	28-47- 52	20-24- 38	27-29- 48	1.55-1.58 -1.60	4.00-9.00-14.00	0.12-0.17-0. 19	2.8- 3.1- 5.7	0.1- 0.2- 0.5	.20	.20			
Tanglewood	0-5	80-82- 85	5-12- 18	2- 6- 10	1.50-1.51 -1.52	42.00-91.00-14 1.00	0.06-0.08-0. 10	0.1- 0.4- 0.7	0.5- 0.8- 1.0	.15	.15	5	2	134
	5-23	80-85- 95	3- 9- 18	2- 6- 10	1.52-1.55 -1.58	42.00-91.00-14 1.00	0.06-0.08-0. 10	0.1- 0.4- 0.7	0.2- 0.4- 0.8	.17	.17			
	23-33	35-56- 60	10-17- 25	20-27- 55	1.50-1.54 -1.65	4.00-9.00-14.00	0.12-0.16-0. 17	1.6- 2.7- 7.5	0.2- 0.5- 0.8	.28	.28			
	33-68	23-40- 56	4-15- 37	40-45- 50	1.40-1.47 -1.60	0.42-0.91-1.40	0.15-0.17-0. 19	3.9- 5.2- 6.4	0.1- 0.2- 0.6	.28	.28			
	68-80	35-59- 60	10-11- 25	20-30- 55	1.50-1.54 -1.62	4.00-9.00-14.00	0.12-0.16-0. 17	1.6- 3.3- 7.2	0.1- 0.2- 0.5	.20	.20			
Edge	—	—	—	—	—	—	—	—	—			5	3	86
Rader	—	—	—	—	—	—	—	—	—			5	3	86
Silstid	—	—	—	—	—	—	—	—	—			5	2	134
Straber	—	—	—	—	—	—	—	—	—			5	2	134

Physical Soil Properties—Guadalupe County, Texas														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
Tabor	—	—	—	—	—	—	—	—	—			5	3	86
Gasil	—	—	—	—	—	—	—	—	—			5	2	134
Padina	—	—	—	—	—	—	—	—	—			5	1	250
MaB—Mabank loam, 1 to 3 percent slopes														
Mabank	0-10	-43-	-40-	10-18- 25	1.50-1.58 -1.65	4.00-9.00-14.00	0.11-0.13-0.15	0.0- 1.5- 2.9	1.0- 1.5- 2.0	.43	.43	5	5	56
	10-40	-28-	-29-	35-43- 50	1.45-1.55 -1.65	0.01-0.21-0.42	0.12-0.15-0.18	6.0- 7.5- 8.9	1.0- 1.5- 2.0	.28	.28			
	40-66	-28-	-29-	35-43- 50	1.45-1.55 -1.65	0.01-0.21-0.42	0.12-0.15-0.18	6.0- 7.5- 8.9	0.1- 0.6- 1.0	.28	.28			
Unnamed	—	—	—	—	—	—	—	—	—					

Physical Soil Properties—Guadalupe County, Texas														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
PaD—Patilo and Arenosa soils, 1 to 8 percent slopes														
Patilo	0-8	-95-	- 1-	2- 5- 7	1.50-1.58 -1.65	42.00-92.00-14 1.00	0.05-0.07-0. 08	0.0- 1.5- 2.9	0.1- 0.6- 1.0	.02	.02	5	1	250
	8-52	-92-	- 1-	2- 7- 12	1.50-1.58 -1.65	42.00-92.00-14 1.00	0.05-0.08-0. 10	0.0- 1.5- 2.9	0.1- 0.6- 1.0	.15	.15			
	52-84	-56-	-18-	18-27- 35	1.50-1.58 -1.65	1.40-2.70-4.00	0.14-0.16-0. 18	0.0- 1.5- 2.9	0.1- 0.3- 0.5	.24	.24			
Arenosa	0-5	-98-	- 1-	0- 2- 3	1.24-1.37 -1.50	42.00-92.00-14 1.00	0.05-0.07-0. 08	0.0- 1.5- 2.9	0.4- 0.7- 1.0	.02	.02	5	1	250
	5-96	-98-	- 1-	0- 2- 3	1.45-1.55 -1.65	42.00-92.00-14 1.00	0.03-0.05-0. 07	0.0- 1.5- 2.9	0.1- 0.3- 0.5	.10	.10			
Unnamed	—	—	—	—	—	—	—	—	—					
Unnamed	—	—	—	—	—	—	—	—	—					
Uw—Uhland soils frequently flooded														
Uhland	0-7	-35-	-33-	28-32- 35	1.25-1.35 -1.45	1.40-2.70-4.00	0.14-0.16-0. 18	3.0- 4.5- 5.9	1.0- 2.5- 4.0	.24	.24	5	6	48
	7-62	-66-	-20-	10-14- 18	1.25-1.40 -1.55	4.00-9.00-14.00	0.10-0.13-0. 16	0.0- 1.5- 2.9	0.3- 0.6- 1.0	.28	.28			
	62-80	-38-	-36-	18-27- 35	1.25-1.43 -1.60	1.40-2.70-4.00	0.12-0.15-0. 18	3.0- 4.5- 5.9	0.1- 0.6- 1.0	.37	.37			
Unnamed	—	—	—	—	—	—	—	—	—					
Unnamed, hydric	—	—	—	—	—	—	—	—	—					

Physical Soil Properties--Guadalupe County, Texas														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
WdC3— Windthorst fine sandy loam, 1 to 5 percent slopes, eroded														
Windthorst, eroded	0-8	-63-	-26-	5-12- 18	1.45-1.53 -1.60	4.00-9.00-14.00	0.12-0.14-0. 16	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32	5	3	86
	8-36	-28-	-29-	35-43- 50	1.45-1.55 -1.65	1.40-2.70-4.00	0.12-0.15-0. 17	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.24	.24			
	36-48	-57-	- 6-	15-37- 45	1.50-1.59 -1.68	1.40-2.70-4.00	0.12-0.14-0. 16	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.15	.15			
	48-72	-56-	-15-	15-30- 45	1.50-1.60 -1.70	1.40-2.70-4.00	0.11-0.14-0. 16	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.20	.20			
Unnamed	—	—	—	—	—	—	—	—	—					

Data Source Information

Soil Survey Area: Guadalupe County, Texas
Survey Area Data: Version 17, Sep 8, 2021

Water Features

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table. The kind of water table, apparent or perched, is given if a seasonal high water table exists in the soil. A water table is perched if free water is restricted from moving downward in the soil by a restrictive feature, in most cases a hardpan; there is a dry layer of soil underneath a wet layer. A water table is apparent if free water is present in all horizons from its upper boundary to below 2 meters or to the depth of observation. The water table kind listed is for the first major component in the map unit.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and frequency are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Report—Water Features

Map unit symbol and soil name	Hydrologic group	Surface runoff	Most likely months	Water table			Ponding			Flooding	
				Upper limit	Lower limit	Kind	Surface depth	Duration	Frequency	Duration	Frequency
				<i>Ft</i>	<i>Ft</i>		<i>Ft</i>				
CfB—Crockett fine sandy loam, 1 to 3 percent slopes											
Crockett	D	Very high	Jan-Dec	—	—	—	—	—	None	—	None
Normangee	D	Very high	Jan-Dec	—	—	—	—	—	None	—	None
Wilson	D	Very high	Jan-Dec	—	—	—	—	—	None	—	None
DmC—Robco-Tanglewood complex, 1 to 5 percent slopes											
Robco	A	Very low	Jan-Apr	1.5-3.5	2.0-4.0	Perched	—	—	None	—	None
			May-Dec	—	—	—	—	—	None	—	None
Tanglewood	C/D	Medium	Jan-Apr	1.7-3.8	2.2-6.0	Perched	—	—	None	—	None
			May-Dec	—	—	—	—	—	None	—	None
Edge	D	Very high	Jan-Dec	—	—	—	—	—	None	—	None
Rader	D	High	Jan-May	1.1-2.3	2.3-5.4	Perched	—	—	None	—	None
			Jun-Nov	—	—	—	—	—	None	—	None
			Dec	1.1-2.3	2.3-5.4	Perched	—	—	None	—	None
Silstid	B	Very low	Jan-Dec	—	—	—	—	—	None	—	None
Straber	D	Very high	Jan-May	1.7-2.5	4.9-6.0	Perched	—	—	None	—	None
			Jun-Aug	—	—	—	—	—	None	—	None
			Sep-Dec	1.7-2.5	4.9-6.0	Perched	—	—	None	—	None
Tabor	D	Very high	Jan-Dec	—	—	—	—	—	None	—	None
Gasil	B	Low	Jan-Dec	—	—	—	—	—	None	—	None
Padina	A	Low	Jan-Dec	—	—	—	—	—	None	—	None

Map unit symbol and soil name	Hydrologic group	Surface runoff	Most likely months	Water table			Ponding			Flooding	
				Upper limit	Lower limit	Kind	Surface depth	Duration	Frequency	Duration	Frequency
				<i>Ft</i>	<i>Ft</i>		<i>Ft</i>				
MaB—Mabank loam, 1 to 3 percent slopes											
Mabank	D	Very high	Jan-Dec	—	—	—	—	—	None	—	None
Unnamed			Jan-Dec	—	—	—	—	—	—	—	
PaD—Patilo and Arenosa soils, 1 to 8 percent slopes											
Patilo	A	Very low	Jan-May	4.0-6.0	4.5-6.0	Perched	—	—	None	—	None
			Jun-Sep	—	—	—	—	—	None	—	None
			Oct-Dec	4.0-6.0	4.5-6.0	Perched	—	—	None	—	None
Arenosa	A	Very low	Jan-Dec	—	—	—	—	—	None	—	None
Unnamed			Jan-Dec	—	—	—	—	—	—	—	
Unnamed			Jan-Dec	—	—	—	—	—	—	—	
Uw—Uhland soils frequently flooded											
Uhland	C	Low	Jan	—	—	—	—	—	None	—	
			Feb	—	—	—	—	—	None	Brief (2 to 7 days)	Frequent
			Mar-May	2.0-3.5	2.5-5.0	Perched	—	—	None	Brief (2 to 7 days)	Frequent
			Jun	—	—	—	—	—	None	Brief (2 to 7 days)	Frequent
			Jul-Dec	—	—	—	—	—	None	—	
Unnamed			Jan-Dec	—	—	—	—	—	—	—	
Unnamed, hydric			Jan-Dec	—	—	—	—	—	—	—	
WdC3—Windthorst fine sandy loam, 1 to 5 percent slopes, eroded											
Windthorst, eroded	C	Medium	Jan-Dec	—	—	—	—	—	None	—	None
Unnamed			Jan-Dec	—	—	—	—	—	—	—	

Data Source Information

Soil Survey Area: Guadalupe County, Texas
Survey Area Data: Version 17, Sep 8, 2021

Buffer Zone Waiver

I, Carol Werner, Cedi Werner, the owner/occupant of this dwelling
(name printed)

located at 507 O'Daniel Rd + 600 Kubena Lane
Seguin, TX 78155 (dwelling address) Seguin, TX 78155

give consent to waive the occupied dwelling buffer zone of 750 feet and/or the property

line buffer of 50 feet to the amount specified below for the purpose of land application

of domestic septage by Steven Kubena
(applicant)

0^{ft} Waiver of House Buffer

Buffer Reduced to 0^{ft}

0^{ft} Waiver of Property Buffer

Buffer Reduced to 0^{ft}

Carol Werner, Cedi Werner
(signature of owner/occupant)

May 26, 2022
Date

Buffer Zone Waiver

I, Joe Kubena, the owner/occupant of this dwelling
(name printed)

located at 520 O'Daniel School Rd. Seguin, TX 78155,
(dwelling address)

give consent to waive the occupied dwelling buffer zone of 750 feet and/or the property
line buffer of 50 feet to the amount specified below for the purpose of land application
of domestic septage by Steven Kubena.
(applicant)

0ft Waiver of House Buffer

Buffer Reduced to 0ft

0ft Waiver of Property Buffer

Buffer Reduced to 0ft

Joe Kubena
(signature of owner/occupant)

5-24-2022
Date

Buffer Zone Waiver

I, Alyssa Johnson, the owner/occupant of this dwelling
(name printed)
located at 516 O'Daniel School Rd, Spillville TX 79155,
(dwelling address)

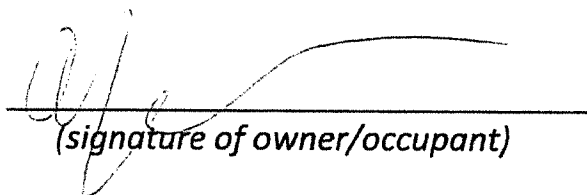
give consent to waive the occupied dwelling buffer zone of 750 feet and/or the property
line buffer of 50 feet to the amount specified below for the purpose of land application
of domestic septage by Steven Kubena.
(applicant)

0 ft Waiver of House Buffer

Buffer Reduced to 0 ft

0 ft Waiver of Property Buffer

Buffer Reduced to 0 ft


(signature of owner/occupant)

05/24/2022
Date

Buffer Zone Waiver

I, Steven Kubena, the owner/occupant of this dwelling
(name printed)

located at 911 O'Daniel Rd Seguin, TX 78155
(dwelling address)

give consent to waive the occupied dwelling buffer zone of 750 feet and/or the property

line buffer of 50 feet to the amount specified below for the purpose of land application

of domestic septage by Steven Kubena
(applicant)

0ft Waiver of House Buffer

Buffer Reduced to 0ft

0ft Waiver of Property Buffer

Buffer Reduced to 0ft

Steven Kubena
(signature of owner/occupant)

7-9-2022
Date

Long Term Lease Agreement

I, Alyssa Leanne Johnson, agree to long term lease the property,

(Land Owner's Name Printed)

O'Daniel School Rd. / ABS: 192 SUR: D JOHNSON 149.625 ACS. PT OF TRACT #2, to the Lessee,

(Property Address / Legal Description)

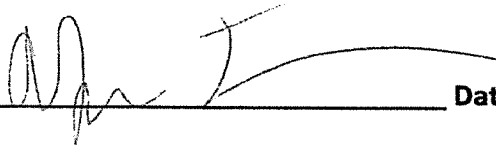
_____, only for the purpose of land applying

(Lessee's Name Printed)

domestic septage for agriculture purposes. This is a non-binding lease agreement and I, Alyssa Leanne Johnson, reserve the right to terminate this lease agreement at any time.

(Owner's Name Printed)


Property Owner's Signature: _____



Date: _____

06/06/2022

Lessee's Signature: _____



Date: _____

6/6/2022

Long Term Lease Agreement

I, Steven Lee Kubena, agree to long term lease the property,

(Land Owner's Name Printed)

O'Daniel School Rd. / ABS: 192 SUR: D JOHNSON 54.55 AC. PT OF TRACT #4 & ABS: 261 SUR: D Johnson & ABS: 261 SUR: L.H. PETERS 142.11 ACS. TOTAL TRACT #4, to the Lessee,

(Property Address / Legal Description)

Steven Kubena, only for the purpose of land applying

(Lessee's Name Printed)

domestic septage for agriculture purposes. This is a non-binding lease agreement and I, Steven Lee Kubena, reserve the right to terminate this lease agreement at any time.

(Land Owner's Name Printed)

Property Owner's Signature: Steven Kubena Date: 7-9-2022

Lessee's Signature: Steven Kubena Date: 7-9-2022