Technical Package Cover Page

This file contains the following documents:

1. Summary of application (in plain language)
   - English
   - Alternative Language (Spanish)
2. First notice (NORI-Notice of Receipt of Application and Intent to Obtain a Permit)
   - English
   - Alternative Language (Spanish)
3. Second notice (NAPD-Notice of Preliminary Decision)
   - English
   - Alternative Language (Spanish)
4. Application materials
5. Draft permit
6. Technical summary or fact sheet

Portada de Paquete Técnico

Este archivo contiene los siguientes documentos:

1. Resumen de la solicitud (en lenguaje sencillo)
   - Inglés
   - Idioma alternativo (español)
2. Primer aviso (NORI, Aviso de Recepción de Solicitud e Intención de Obtener un Permiso)
   - Inglés
   - Idioma alternativo (español)
3. Segundo aviso (NAPD, Aviso de Decisión Preliminar)
   - Inglés
   - Idioma alternativo (español)
4. Materiales de la solicitud
5. Proyecto de permiso
6. Resumen técnico u hoja de datos

TLAP Application

The following summary is *provided for this pending water quality permit application being reviewed by the Texas Commission on Environmental Quality as required by 30 Texas Administrative Code Chapter 39. The information provided in this summary may change during the technical review of the application and are not federal enforceable representations of the permit application.*

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. The facility will be located at the coordinates (29.2165071, -96.19356185), near the City of Pierce, Wharton County, Texas, 77437.

Anaerobic digestion is a process in which organic materials, such as cow manure and food waste, are broken down by microorganisms in an oxygen-free environment to produce biogas. By combining food waste with manure, a smaller volume of manure can generate sufficient biogas to make the system efficient. The digester tanks regularly receive material from both the hydrolysis and manure tanks. The material transferred from the hydrolysis tanks will contain a mix of feedstock. Once in the digester, the mixture is homogenized using mixers. Inside the digester, the blend of manure and food waste is heated and remains in the tank for several days. During this time, microbes break down the organic material in an anaerobic environment, producing biogas, which consists of methane, carbon dioxide, hydrogen, and water vapor. The biogas collected in the digester's headspace is then routed through a gas conditioning and upgrading system to remove impurities, resulting in pipeline-quality natural gas. The effluent from the digesters, known as digestate, must be regularly removed as the digester tanks have limited capacity. As more organic waste is added, the processed material is extracted throughout the day to maintain tank volume. This digestate is a nutrient-rich liquid that is stored in an on-site earthen lagoon for future land application by spreading.

Spanish Translation

El siguiente resumen se proporciona para esta solicitud de permiso de calidad del agua pendiente que está siendo revisada por la Comisión de Calidad Ambiental de Texas, según lo exige el Capítulo 39 del Título 30 del Código Administrativo de Texas. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no son representaciones federales exigibles de la solicitud de permiso.

Wharton AD1, LLC desarrolla, construye, posee y opera digestores anaeróbicos en granjas lecheras para producir energía renovable y otros subproductos agrícolas como fertilizantes líquidos y enmiendas del suelo. La instalación estará ubicada en las coordenadas (29.2165071, -96.19356185), cerca de la ciudad de Pierce, condado de Wharton, Texas, 77437.

La digestión anaeróbica es un proceso en el que los microorganismos descomponen materiales orgánicos, como el estiércol de vaca y los desechos de alimentos, en un ambiente libre de oxígeno para producir biogás. Al combinar los desechos de alimentos con estiércol, un volumen menor de estiércol puede generar suficiente biogás para que el sistema sea eficiente. Los tanques digestores reciben regularmente material tanto de los tanques de hidrólisis como de estiércol. El material transferido desde los tanques de hidrólisis contendrá una mezcla de materia prima. Una vez en el digestor, la mezcla se homogeneiza mediante mezcladores. Dentro del digestor, la mezcla de estiércol y restos de comida se calienta y permanece en el tanque durante varios días. Durante este tiempo, los microbios descomponen el material orgánico en un ambiente anaeróbico, produciendo biogás, que consiste en metano, dióxido de carbono, hidrógeno y vapor de agua. Luego, el biogás recolectado en el espacio de cabeza del digestor se conduce a través de un sistema de acondicionamiento y mejora de gas para eliminar las impurezas, lo que da como resultado gas natural con calidad de tubería. El efluente de los digestores, conocido como digestato, debe eliminarse periódicamente ya que los tanques de los digestores tienen una capacidad limitada. A medida que se agregan más desechos orgánicos, el material procesado se extrae durante el día para mantener el volumen del tanque. Este digestato puede procesarse aún más en un sistema de manejo de nutrientes, lo que da como resultado un líquido rico en nutrientes que se almacena en una laguna de tierra en el sitio para su futura aplicación en la tierra mediante esparcimiento.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

NOTICE OF RECEIPT OF APPLICATION AND INTENT TO OBTAIN WATER QUALITY PERMIT

PROPOSED PERMIT NO. WQ0005487000

APPLICATION. Wharton AD 1, LLC, 133 Boston Post Road, Building 15, Floor 2, Weston, Massachusetts 02493, which will operate an anaerobic digestion facility, has applied to the Texas Commission on Environmental Quality (TCEQ) for proposed Texas Land Application Permit (TLAP) No. WQ0005487000 to authorize the disposal of treated wastewater at a volume not to exceed a daily average flow of 75,000 gallons per day via surface application on approximately 28,955 acres. The facility will be located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59, near Pierce, in Wharton County, Texas 77437 and the disposal areas will be located across multiple tracts in a north, northeast, and southeast direction from the facility. TCEQ received this application on March 5, 2025. The permit application will be available for viewing and copying at Wharton County Library, 200 West Church Street, El Campo, in Wharton County, Texas prior to the date this notice is published in the newspaper. The application, including any updates and associated notices, is available electronically at the following webpage: https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications. 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 the exact location, refer to the application. https://gisweb.tceq.texas.gov/LocationMapper/?marker=-96.19356,29.216507&level=18

ALTERNATIVE LANGUAGE NOTICE. Alternative language notice in Spanish is available at: https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications. El aviso de idioma alternativo en español está disponible en https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications.

ADDITIONAL NOTICE. TCEQ's Executive Director has determined the application is administratively complete and will conduct a technical review of the application. After technical review of the application is complete, the Executive Director may prepare a draft permit and will issue a preliminary decision on the application. **Notice of the Application and Preliminary Decision will be published and mailed to those who are on the county-wide mailing list and to those who are on the mailing list for this application. That notice will contain the deadline for submitting public comments.**

PUBLIC COMMENT / PUBLIC MEETING. You may submit public comments or request a public meeting on this application. The purpose of a public meeting is to provide the opportunity to submit comments or to ask questions about the application. TCEQ will hold a public meeting if the Executive Director determines that there is a significant degree of public

interest in the application or if requested by a local legislator. A public meeting is not a contested case hearing.

OPPORTUNITY FOR A CONTESTED CASE HEARING. After the deadline for submitting public comments, the Executive Director will consider all timely comments and prepare a response to all relevant and material, or significant public comments. **Unless the application is directly referred for a contested case hearing, the response to comments, and the Executive Director's decision on the application, will be mailed to everyone who submitted public comments and to those persons who are on the mailing list for this application. If comments are received, the mailing will also provide instructions for requesting reconsideration of the Executive Director's decision and for requesting a contested case hearing.** A contested case hearing is a legal proceeding similar to a civil trial in state district court.

TO REQUEST A CONTESTED CASE HEARING, YOU MUST INCLUDE THE FOLLOWING ITEMS IN YOUR REQUEST: your name, address, phone number; applicant's name and proposed permit number; the location and distance of your property/activities relative to the proposed facility; a specific description of how you would be adversely affected by the facility in a way not common to the general public; a list of all disputed issues of fact that you submit during the comment period and, the statement "[I/we] request a contested case hearing." If the request for contested case hearing is filed on behalf of a group or association, the request must designate the group's representative for receiving future correspondence; identify by name and physical address an individual member of the group who would be adversely affected by the proposed facility or activity; provide the information discussed above regarding the affected member's location and distance from the facility or activity; explain how and why the member would be affected; and explain how the interests the group seeks to protect are relevant to the group's purpose.

Following the close of all applicable comment and request periods, the Executive Director will forward the application and any requests for reconsideration or for a contested case hearing to the TCEQ Commissioners for their consideration at a scheduled Commission meeting.

The Commission may only grant a request for a contested case hearing on issues the requestor submitted in their timely comments that were not subsequently withdrawn. **If a hearing is granted, the subject of a hearing will be limited to disputed issues of fact or mixed questions of fact and law relating to relevant and material water quality concerns submitted during the comment period.**

MAILING LIST. If you submit public comments, a request for a contested case hearing or a reconsideration of the Executive Director's decision, you will be added to the mailing list for this specific application to receive future public notices mailed by the Office of the Chief Clerk. In addition, you may request to be placed on: (1) the permanent mailing list for a specific applicant name and permit number; and/or (2) the mailing list for a specific county. If you wish to be placed on the permanent and/or the county mailing list, clearly specify which list(s) and send your request to TCEQ Office of the Chief Clerk at the address below.

INFORMATION AVAILABLE ONLINE. For details about the status of the application, visit the Commissioners' Integrated Database at www.tceq.texas.gov/goto/cid. Search the database using the permit number for this application, which is provided at the top of this notice.

AGENCY CONTACTS AND INFORMATION. All public comments and requests must be submitted either electronically at **https://www14.tceq.texas.gov/epic/eComment/**, or in writing to the Texas Commission on Environmental Quality, Office of the Chief Clerk, MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Please be aware that any contact information you provide, including your name, phone number, email address and physical address will become part of the agency's public record. For more information about this permit application or the permitting process, please call the TCEQ Public Education Program, Toll Free, at 1-800-687-4040 or visit their website at www.tceq.texas.gov/goto/pep. Si desea información en Español, puede llamar al 1-800-687-4040.

Further information may also be obtained from Wharton AD 1, LLC at the address stated above or by calling Ms. Sowmiya Kannappan, Environeer, LLC, at 346-441-9582.

Issuance Date: April 29, 2025

Comisión de Calidad Ambiental del Estado de Texas

AVISO DE RECEPCIÓN DE LA SOLICITUD Y
LA INTENCIÓN DE OBTENER CALIDAD DEL AGUA PERMISO

PERMISO PROPUESTO NO. WQ0005487000

SOLICITUD. Wharton AD 1, LLC, 133 Boston Post Road, Building 15, Floor 2, Weston, Massachusetts 02493, que operará una planta de digestión anaeróbica, ha solicitado a la Comisión de Calidad Ambiental de Texas (TCEQ) por un nuevo Permiso No. WQ0005487000 de disposición de aguas residuales para autorizar la distribución de digestato (efluente) de digestores anaeróbicos con un caudal promedio diario de 75,000 galones por día mediante aplicación superficial en aproximadamente 28,955 acres. La planta estará ubicada aproximadamente a 1,5 millas al sureste de la intersección de Pierce West Road y U.S. Highway 59, en el Condado de Wharton, Texas 77437 y las áreas de disposición estarán ubicadas en múltiples tramos en dirección norte, noreste y sureste desde la instalación. La TCEQ recibió esta solicitud el 5 de marzo de 2025. La solicitud para el permiso estará disponible para leerla y copiarla en Wharton County Library, 200 West Church Street, El Campo, Texas antes de la fecha de publicación de este aviso en el periódico. La solicitud (cualquier actualización y aviso inclusive) está disponible electrónicamente en la siguiente página web:
https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications.
Este enlace a un mapa electrónico de la ubicación general del sitio o de la instalación es proporcionado como una cortesía y no es parte de la solicitud o del aviso. Para la ubicación exacta, consulte la solicitud.
https://gisweb.tceq.texas.gov/LocationMapper/?marker=-96.19356,29.216507&level=18

AVISO DE IDIOMA ALTERNATIVO. El aviso de idioma alternativo en español está disponible en https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications.

AVISO ADICIONAL. El Director Ejecutivo de la TCEQ ha determinado que la solicitud es administrativamente completa y conducirá una revisión técnica de la solicitud. Después de completar la revisión técnica, el Director Ejecutivo puede preparar un borrador del permiso y emitirá una Decisión Preliminar sobre la solicitud. **El aviso de la solicitud y la decisión preliminar serán publicados y enviado a los que están en la lista de correo de las personas a lo largo del condado que desean recibir los avisos y los que están en la lista de correo que desean recibir avisos de esta solicitud. El aviso dará la fecha límite para someter comentarios públicos.**

COMENTARIO PUBLICO / REUNION PUBLICA. Usted puede presentar comentarios públicos o pedir una reunión pública sobre esta solicitud. El propósito de una reunión pública es dar la oportunidad de presentar comentarios o hacer preguntas acerca de la solicitud. La TCEQ

realiza una reunión pública si el Director Ejecutivo determina que hay un grado de interés público suficiente en la solicitud o si un legislador local lo pide. Una reunión pública no es una audiencia administrativa de lo contencioso.

OPORTUNIDAD DE UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO. Después del plazo para presentar comentarios públicos, el Director Ejecutivo considerará todos los comentarios apropiados y preparará una respuesta a todo los comentarios públicos esenciales, pertinentes, o significativos. **A menos que la solicitud haya sido referida directamente a una audiencia administrativa de lo contencioso, la respuesta a los comentarios y la decisión del Director Ejecutivo sobre la solicitud serán enviados por correo a todos los que presentaron un comentario público y a las personas que están en la lista para recibir avisos sobre esta solicitud. Si se reciben comentarios, el aviso también proveerá instrucciones para pedir una reconsideración de la decisión del Director Ejecutivo y para pedir una audiencia administrativa de lo contencioso.** Una audiencia administrativa de lo contencioso es un procedimiento legal similar a un procedimiento legal civil en un tribunal de distrito del estado.

PARA SOLICITAR UNA AUDIENCIA DE CASO IMPUGNADO, USTED DEBE INCLUIR EN SU SOLICITUD LOS SIGUIENTES DATOS: su nombre, dirección, y número de teléfono; el nombre del solicitante y número del permiso; la ubicación y distancia de su propiedad/actividad con respecto a la instalación; una descripción específica de la forma cómo usted sería afectado adversamente por el sitio de una manera no común al público en general; una lista de todas las cuestiones de hecho en disputa que usted presente durante el período de comentarios; y la declaración "[Yo/nosotros] solicito/solicitamos una audiencia de caso impugnado". Si presenta la petición para una audiencia de caso impugnado de parte de un grupo o asociación, debe identificar una persona que representa al grupo para recibir correspondencia en el futuro; identificar el nombre y la dirección de un miembro del grupo que sería afectado adversamente por la planta o la actividad propuesta; proveer la información indicada anteriormente con respecto a la ubicación del miembro afectado y su distancia de la planta o actividad propuesta; explicar cómo y porqué el miembro sería afectado; y explicar cómo los intereses que el grupo desea proteger son pertinentes al propósito del grupo.

Después del cierre de todos los períodos de comentarios y de petición que aplican, el Director Ejecutivo enviará la solicitud y cualquier petición para reconsideración o para una audiencia de caso impugnado a los Comisionados de la TCEQ para su consideración durante una reunión programada de la Comisión. La Comisión sólo puede conceder una solicitud de una audiencia de caso impugnado sobre los temas que el solicitante haya presentado en sus comentarios oportunos que no fueron retirados posteriormente. Si se concede una audiencia, el tema de la audiencia estará limitado a cuestiones de hecho en disputa o cuestiones mixtas de hecho y de derecho relacionadas a intereses pertinentes y materiales de calidad del agua que se hayan presentado durante el período de comentarios.

LISTA DE CORREO. Si somete comentarios públicos, un pedido para una audiencia administrativa de lo contencioso o una reconsideración de la decisión del Director Ejecutivo, la Oficina del Secretario Principal enviará por correo los avisos públicos en relación con la solicitud. Además, puede pedir que la TCEQ ponga su nombre en una o más de las listas correos siguientes (1) la lista de correo permanente para recibir los avisos del solicitante

indicado por nombre y número del permiso específico y/o (2) la lista de correo de todas las solicitudes en un condado especifico. Si desea que se agrega su nombre en una de las listas designe cual lista(s) y envía por correo su pedido a la Oficina del Secretario Principal de la TCEQ.

INFORMACIÓN DISPONIBLE EN LÍNEA. Para detalles sobre el estado de la solicitud, favor de visitar la Base de Datos Integrada de los Comisionados en www.tceq.texas.gov/goto/cid. Para buscar en la base de datos, utilizar el número de permiso para esta solicitud que aparece en la parte superior de este aviso.

CONTACTOS E INFORMACIÓN A LA AGENCIA. Todos los comentarios públicos y solicitudes deben ser presentadas electrónicamente vía http://www14.tceq.texas.gov/epic/eComment/ o por escrito dirigidos a la Comisión de Texas de Calidad Ambiental, Oficial de la Secretaría (Office of Chief Clerk), MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Tenga en cuenta que cualquier información personal que usted proporcione, incluyendo su nombre, número de teléfono, dirección de correo electrónico y dirección física pasarán a formar parte del registro público de la Agencia. Para obtener más información acerca de esta solicitud de permiso o el proceso de permisos, llame al programa de educación pública de la TCEQ, gratis, al 1-800-687-4040. Si desea información en Español, puede llamar al 1-800-687-4040.

También se puede obtener información adicional del Wharton AD 1, LLC a la dirección indicada arriba o llamando a Sowmiya Kannappan, Environeer, LLC, al 346-441-9582.

Fecha de emisión el 29 de abril de 2025

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

NOTICE OF APPLICATION AND PRELIMINARY DECISION FOR LAND APPLICATION PERMIT FOR INDUSTRIAL WASTEWATER

NEW

Permit No. WQ0005487000

APPLICATION AND PRELIMINARY DECISION. Wharton AD 1, LLC, 133 Boston Post Road, Building 15, Floor 2, Weston, Massachusetts 02493, which proposes to operate Pierce Ranch, a biogas production facility utilizing anaerobic digestion to produce renewable natural gas and other agricultural by-product such as liquid fertilizer, has applied to the Texas Commission on Environmental Quality (TCEQ) for new TCEQ Permit No. WQ0005487000 to authorize the disposal of process wastewater at a daily average flow not exceed 75,000 gallons per day via irrigation on 28,955 acres of corn, Bermuda grass, and cotton. This permit will not authorize a discharge of pollutants into water in the state. The TCEQ received this application on March 5, 2025.

The facility will be located approximately 1.5 miles southeast of the intersection of Pierce West Road and United States (U.S.) Highway 59, near the City of Pierce, in Wharton County, Texas 77437 and the diposal areas will be located across multiple tracts in a north, northeast, and southeast direction from the facility. The facility and land application site will be located in the drainage area of the Colorado River Below La Grange in Segment No. 1402 of the Colorado River Basin. This link to an electronic map of the site or facility's general location is provided as a public courtesy and is not part of the application or notice. For the exact location, refer to the application. https://gisweb.tceq.texas.gov/LocationMapper/?marker=-96.193611,29.216388&level=18.

The TCEQ Executive Director has completed the technical review of the application and prepared a draft permit. The draft permit, if approved, would establish the conditions under which the facility must operate. The Executive Director has made a preliminary decision that this permit, if issued, meets all statutory and regulatory requirements. The permit application, Executive Director's preliminary decision, and draft permit are available for viewing and copying at the Wharton County Library, 200 West Church Street, El Campo, Wharton County, Texas. The application, including any updates, and associated notices are available electronically at the following webpage:

https://www.tceq.texas.gov/permitting/wastewater/pending- permits/tlap-applications
ALTERNATIVE LANGUAGE NOTICE. Alternative language notice in Spanish is available at https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications. El aviso de idioma alternativo en español está disponible en https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications.
PUBLIC COMMENT / PUBLIC MEETING. You may submit public comments or request a public meeting about this application. The purpose of a public meeting is to provide the opportunity to submit comments or to ask questions about the application. TCEQ holds a public meeting if the Executive Director determines that there is a significant degree of public interest in the application or if requested by a local legislator. A public meeting is not a contested case hearing.

OPPORTUNITY FOR A CONTESTED CASE HEARING. After the deadline for submitting public comments, the Executive Director will consider the comments and prepare a response to all relevant and material, or significant public comments. **Unless the application is directly referred for a contested case hearing, the response to comments will be mailed to everyone who submitted public comments and to those persons who are on the mailing list for this application. If comments are received, the mailing will also provide instructions for requesting a contested case hearing or reconsideration of the Executive Director's decision.** A contested case hearing is a legal proceeding similar to a civil trial in a state district court.

TO REQUEST A CONTESTED CASE HEARING, YOU MUST INCLUDE THE FOLLOWING ITEMS IN YOUR REQUEST: your name, address, phone number; applicant's name and proposed permit number; the location and distance of your property/activities relative to the proposed facility; a specific description of how you would be adversely affected by the facility in a way not common to the general public; a list of all disputed issues of fact that you submit during the comment period; and the statement "[I/we] request a contested case hearing." If the request for contested case hearing is filed on behalf of a group or association, the request must designate the group's representative for receiving future correspondence; identify by name and physical address an individual member of the group who would be adversely affected by the proposed facility or activity; provide the information discussed above regarding the affected member's location and distance from the facility or activity; explain how and why the member would be affected; and explain how the interests the group seeks to protect are relevant to the group's purpose.

Following the close of all applicable comment and request periods, the Executive Director will forward the application and any requests for reconsideration or for a contested case hearing to the TCEQ Commissioners for their consideration at a scheduled Commission meeting. The Commission may only grant a request for a contested case hearing on issues the requestor submitted in their timely comments that were not subsequently withdrawn. **If a hearing is granted, the subject of a hearing will be limited to disputed issues of fact or mixed questions of fact and law relating to relevant and material water quality concerns submitted during the comment period.**

EXECUTIVE DIRECTOR ACTION. The Executive Director may issue final approval of the application unless a timely contested case hearing request or request for reconsideration is filed. If a timely hearing request or request for reconsideration is filed, the Executive Director will not issue final approval of the permit and will forward the application and request to the TCEQ Commissioners for their consideration at a scheduled Commission meeting.

MAILING LIST. If you submit public comments, a request for a contested case hearing or a reconsideration of the Executive Director's decision, you will be added to the mailing list for this specific application to receive future public notices mailed by the Office of the Chief Clerk. In addition, you may request to be placed on: (1) the permanent mailing list for a specific applicant name and permit number; and (2) the mailing list for a specific county. If you wish to be placed on the permanent or the county mailing list, clearly specify which list(s) and send your request to TCEQ Office of the Chief Clerk at the address below.

All written public comments and public meeting requests must be submitted to the Office of the Chief Clerk, MC 105, TCEQ, P.O. Box 13087, Austin, TX 78711-3087 or electronically at https://www.tceq.texas.gov/goto/comment/ within 30 days from the date of newspaper publication of this notice.

INFORMATION AVAILABLE ONLINE. For details about the status of the application, visit the Commissioners' Integrated Database at https://www.tceq.texas.gov/goto/cid/. Search the database using the permit number for this application, which is provided at the top of this notice.

AGENCY CONTACTS AND INFORMATION. Public comments and requests must be submitted either electronically at https://www.tceq.texas.gov/goto/comment/, or in writing to the Texas Commission on Environmental Quality, Office of the Chief Clerk, MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Please be aware that any contact information you provide, including your name, phone number, email address, and physical address will become part of the agency's public record. For more information about this permit application or the permitting process, please call the TCEQ Public Education Program, Toll Free, at 1-800-687-4040 or visit their website at

https://www.tceq.texas.gov/agency/decisions/participation/permitting- participation. Si desea información en Español, puede llamar al 1-800-687-4040.

Further information may also be obtained from Wharton AD 1, LLC at the address stated above or by calling Ms. Sowmiya Kannappan, Environeer, LLC, at 346-441-9582.

Issued: October 15, 2025

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

AVISO DE SOLICITUD Y DECISIÓN PRELIMINAR PARA PERMISO PARA APLICACIÓN DE LA CALIDAD DEL AGUA EN TERRENOS PARA AGUAS RESIDUALES INDUSTRIALES

NUEVO

Permiso No. WQ0005487000

SOLICITUD Y DECISIÓN PRELIMINAR. Wharton AD 1, LLC, 133 Boston Post Road, Building 15, Floor 2, Weston, Massachusetts 02493, que propone operar Pierce Ranch, una instalación de producción de biogás que utiliza digestión anaerobia para producir gas natural renovable y otros subproductos agrícolas como fertilizante líquido, ha solicitado a la Comisión de Calidad Ambiental de Texas (TCEQ) un nuevo Permiso de la TCEQ No. WQ0005487000 para autorizar la disposición de aguas residuales de proceso con un caudal promedio diario que no exceda 75,000 galones por día mediante riego en 28,955 acres de maíz, pasto Bermuda y algodón. Este permiso no autorizará una descarga de contaminantes a las aguas del estado. La TCEQ recibió esta solicitud el 5 de marzo de 2025.

La instalación estará ubicada aproximadamente a 1.5 millas al sureste de la intersección de Pierce West Road y la Carretera de los Estados Unidos (U.S. Highway) 59, cerca de la Ciudad de Pierce, en el Condado de Wharton, Texas 77437, y las áreas de disposición estarán ubicadas en varios terrenos en dirección norte, noreste y sureste de la instalación. La instalación y el sitio de aplicación de terreno estarán ubicados en el área de drenaje del Río Colorado debajo de La Grange, en el Segmento No. 1402 de la Cuenca del Río Colorado. Este enlace a un mapa electrónico del sitio o de la ubicación general de la instalación se proporciona como cortesía pública y no forma parte de la solicitud ni del aviso. Para la ubicación exacta, consulte la solicitud.

https://gisweb.tceq.texas.gov/LocationMapper/?marker=-96.193611,29.216388&level=18
El Director Ejecutivo de la TCEQ ha completado la revisión técnica de la solicitud y ha preparado un borrador del permiso. El borrador del permiso, si se aprueba, establecería las condiciones bajo las cuales debe operar la instalación. El Director Ejecutivo ha tomado una decisión preliminar de que este permiso, si se emite, cumple con todos los requisitos legales y reglamentarios. La solicitud de permiso, la decisión preliminar del Director Ejecutivo y el borrador del permiso están disponibles para su consulta y copia en la Biblioteca del Condado de Wharton, 200 West Church Street, El Campo, Condado de Wharton, Texas. La solicitud, incluidas las actualizaciones y avisos asociados, están disponibles electrónicamente en la siguiente página web:

https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications
AVISO EN IDIOMA ALTERNATIVO. El aviso en idioma alternativo en español está disponible en:

https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tlap-applications
COMENTARIOS PÚBLICOS / REUNIÓN PÚBLICA. Usted puede presentar comentarios públicos o solicitar una reunión pública sobre esta solicitud. El propósito de una reunión pública es brindar la oportunidad de presentar comentarios o hacer preguntas sobre la solicitud. La TCEQ lleva a cabo una reunión pública si el Director Ejecutivo determina que existe un grado significativo de interés público en la solicitud o si lo solicita un legislador local. Una reunión pública no es una audiencia de caso impugnado.

OPORTUNIDAD PARA UNA AUDIENCIA DE CASO IMPUGNADO. Después de la fecha límite para presentar comentarios públicos, el Director Ejecutivo considerará los comentarios y preparará una respuesta a todos los comentarios relevantes y materiales o significativos. A menos que la solicitud se remita directamente a una audiencia de caso impugnado, la respuesta a los comentarios se enviará por correo a todos los que presentaron comentarios públicos y a aquellas personas que estén en la lista de correo de esta solicitud. Si se reciben comentarios, también se proporcionarán instrucciones para solicitar una audiencia de caso impugnado o una reconsideración de la decisión del Director Ejecutivo. Una audiencia de caso impugnado es un procedimiento legal similar a un juicio civil en un tribunal de distrito estatal.

PARA SOLICITAR UNA AUDIENCIA DE CASO IMPUGNADO, DEBE INCLUIR LOS SIGUIENTES ELEMENTOS EN SU SOLICITUD: su nombre, dirección, número de teléfono; el nombre del solicitante y el número de permiso propuesto; la ubicación y distancia de su propiedad/actividades en relación con la instalación propuesta; una descripción específica de cómo se vería afectado adversamente por la instalación de una manera no común al público en general; una lista de todos los asuntos en disputa de hecho que presente durante el período de comentarios; y la declaración "[Yo/nosotros] solicitamos una audiencia de caso impugnado." Si la solicitud de audiencia de caso impugnado se presenta en nombre de un grupo o asociación, la solicitud debe designar al representante del grupo para recibir correspondencia futura; identificar por nombre y dirección física a un miembro individual del grupo que se vería afectado adversamente por la instalación o actividad propuesta; proporcionar la información antes mencionada con respecto a la ubicación y distancia del miembro afectado de la instalación o actividad; explicar cómo y por qué el miembro se vería afectado; y explicar cómo los intereses que el grupo busca proteger son relevantes para el propósito del grupo.

Una vez cerrados todos los períodos aplicables de comentarios y solicitudes, el Director Ejecutivo enviará la solicitud y cualquier solicitud de reconsideración o de audiencia de caso impugnado a los Comisionados de la TCEQ para su consideración en una reunión programada de la Comisión. La Comisión solo puede conceder una solicitud de audiencia de caso impugnado sobre asuntos que el solicitante haya presentado en sus comentarios oportunos y que no hayan sido retirados posteriormente. Si se concede una audiencia, el tema de la audiencia se limitará a asuntos en disputa de hecho o cuestiones mixtas de hecho y derecho relacionadas con preocupaciones relevantes y materiales sobre la calidad del agua presentadas durante el período de comentarios.

ACCIÓN DEL DIRECTOR EJECUTIVO. El Director Ejecutivo puede emitir la aprobación final de la solicitud a menos que se presente oportunamente una solicitud de audiencia de caso impugnado o de reconsideración. Si se presenta oportunamente una solicitud de audiencia o de reconsideración, el Director Ejecutivo no emitirá la aprobación final del permiso y enviará la solicitud y la petición a los Comisionados de la TCEQ para su consideración en una reunión programada de la Comisión.

LISTA DE CORREO. Si usted presenta comentarios públicos, una solicitud de audiencia de caso impugnado o una reconsideración de la decisión del Director Ejecutivo, se le agregará a la lista de correo de esta solicitud específica para recibir futuros avisos públicos enviados por la Oficina del Secretario Principal. Además, usted puede solicitar ser incluido en: (1) la lista de correo permanente para un nombre de solicitante y número de permiso específico; y (2) la lista de correo para un condado específico. Si desea ser incluido en la lista de correo permanente o del condado, especifique claramente en cuál(es) lista(s) y envíe su solicitud a la Oficina del Secretario Principal de la TCEQ a la dirección indicada a continuación.

Todos los comentarios públicos escritos y las solicitudes de reunión pública deben enviarse a la Oficina del Secretario Principal, MC 105, TCEQ, P.O. Box 13087, Austin, TX 78711-3087 o electrónicamente en:

https://www.tceq.texas.gov/goto/comment/
dentro de los 30 días a partir de la fecha de publicación en el periódico de este aviso.
INFORMACIÓN DISPONIBLE EN LÍNEA. Para obtener detalles sobre el estado de la solicitud, visite la Base de Datos Integrada de los Comisionados en:
https://www.tceq.texas.gov/goto/cid/

Busque en la base de datos utilizando el número de permiso de esta solicitud, que se proporciona en la parte superior de este aviso.

CONTACTOS Y INFORMACIÓN DE LA AGENCIA. Los comentarios públicos y solicitudes deben enviarse electrónicamente en:

https://www.tceq.texas.gov/goto/comment/,
o por escrito a la Comisión de Calidad Ambiental de Texas, Oficina del Secretario Principal, MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Tenga en cuenta que cualquier información de contacto que proporcione, incluidos su nombre, número de teléfono, dirección de correo electrónico y dirección física, pasará a formar parte del registro público de la agencia. Para más información sobre esta solicitud de permiso o el proceso de permisos, llame al Programa de Educación Pública de la TCEQ, línea gratuita, al 1-800-687-4040 o visite su sitio web en:
https://www.tceq.texas.gov/agency/decisions/participation/permitting-participation
Si desea información en español, puede llamar al 1-800-687-4040.

También puede obtener más información de Wharton AD 1, LLC en la dirección mencionada anteriormente o llamando a la Sra. Sowmiya Kannappan, Environeer, LLC, al 346-441-9582.

Emitido: el 15 de octubre de 2025.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION CHECKLIST

Complete and submit this checklist with the industrial wastewater permit application.

APPLICANT NAME: Wharton AD1, LLC

PERMIT NUMBER (If new, leave blank): WQ00 Click to enter text.

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

	Y	N		Y	N
Administrative Report 1.0	☒	☐	Worksheet 8.0	☐	☐
Administrative Report 1.1	☒	☐	Worksheet 9.0	☐	☐
SPIF	☐	☐	Worksheet 10.0	☐	☐
Core Data Form	☒	☐	Worksheet 11.0	☐	☐
Public Involvement Plan Form	☒	☐	Worksheet 11.1	☐	☐
Plain Language Summary	☒	☐	Worksheet 11.2	☐	☐
Technical Report 1.0	☒	☐	Worksheet 11.3	☐	☐
Worksheet 1.0	☐	☐	Original USGS Map	☒	☐
Worksheet 2.0	☐	☐	Affected Landowners Map	☒	☐
Worksheet 3.0	☒	☐	Landowner Disk or Labels	☐	☐
Worksheet 3.1	☐	☐	Flow Diagram	☒	☐
Worksheet 3.2	☐	☐	Site Drawing	☒	☐
Worksheet 3.3	☐	☐	Original Photographs	☐	☐
Worksheet 4.0	☐	☐	Design Calculations	☐	☐
Worksheet 4.1	☐	☐	Solids Management Plan	☐	☐
Worksheet 5.0	☐	☐	Water Balance	☒	☐
Worksheet 6.0	☐	☐			
Worksheet 7.0	☐	☐			

RECEIVED
MAR 05 2025
Water Quality Applications Team

00054857000

For TCEQ Use Only

Segment Number _____County _____
Expiration Date _____Region _____
Permit Number _____

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.0

This report is required for all applications for TPDES permits and TLAPs, except applications for oil and gas extraction operations subject to 40 CFR Part 435. Contact the Applications Review and Processing Team at 512-239-4671 with any questions about completing this report.

Applications for oil and gas extraction operations subject to 40 CFR Part 435 must use the Oil and Gas Exploration and Production Administrative Report (TCEQ Form-20893 and 20893-inst[1]).

Item 1. Application Information and Fees (Instructions, Page 26)

a. Complete each field with the requested information, if applicable.

Applicant Name: Wharton AD1, LLC

Permit No.: WQ000Click to enter text.

EPA ID No.: TX0Click to enter text.

Expiration Date: Click to enter text.

PAY TO THE ORDER OF STATE COMPTROLLER TCEQ
5549 39 MR -5 22

b. Check the box next to the appropriate authorization type.

☒ Industrial Wastewater (wastewater and stormwater)

☐ Industrial Stormwater (stormwater only)

c. Check the box next to the appropriate facility status.

☐ Active ☒ Inactive

d. Check the box next to the appropriate permit type.

☐ TPDES Permit ☒ TLAP ☐ TPDES with TLAP component

e. Check the box next to the appropriate application type.

☒ New

☐ Renewal with changes ☐ Renewal without changes

☐ Major amendment with renewal ☐ Major amendment without renewal

☐ Minor amendment without renewal

☐ Minor modification without renewal

f. If applying for an amendment or modification, describe the request: Click to enter text.

For TCEQ Use Only

Segment Number _____County _____

[1] https://www.tceq.texas.gov/publications/search_forms.html

g. Application Fee

EPA Classification	New	Major Amend. (with or without renewal)	Renewal (with or without changes)	Minor Amend. / Minor Mod. (without renewal)
Minor facility not subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☒ $350	☐ $350	☐ $315	☐ $150
Minor facility subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☐ $1,250	☐ $1,250	☐ $1,215	☐ $150
Major facility	N/A [2]	☐ $2,050	☐ $2,015	☐ $450

h. Payment Information

Mailed

Check or money order No.: Click to enter text.

Check or money order amt.: Click to enter text.

Named printed on check or money order: Click to enter text.

Epay

Voucher number: Click to enter text.

Copy of voucher attachment: Click to enter text.

Item 2. Applicant Information (Instructions, Pages 26)

a. Customer Number, if applicant is an existing customer: CN000000000

Note: Locate the customer number using the TCEQ's Central Registry Customer Search[3].

b. Legal name of the entity (applicant) applying for this permit: Wharton AD1, LLC

Note: The owner of the facility must apply for the permit. The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Mr. Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

d. Will the applicant have overall financial responsibility for the facility?

☒ Yes ☐ No

[2] All facilities are designated as minors until formally classified as a major by EPA.

[3] https://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 3. Co-applicant Information (Instructions, Page 27)

☒ Check this box if there is no co-applicant.; otherwise, complete the below questions.

a. Legal name of the entity (co-applicant) applying for this permit: Click to enter text.

Note: The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

b. Customer Number (if applicant is an existing customer): CNClick to enter text.

Note: Locate the customer number using the TCEQ's Central Registry Customer Search.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

Title: Click to enter text. Credential: Click to enter text.

d. Will the co-applicant have overall financial responsibility for the facility?

☐ Yes ☐ No

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 4. Core Data Form (Instructions, Pages 27)

a. Complete one Core Data Form (TCEQ Form 10400) for each customer (applicant and co-applicant(s)) and include as an attachment. If the customer type selected on the Core Data Form is Individual, complete Attachment 1 of the Administrative Report. Attachment: Click to enter text.

Item 5. Application Contact Information (Instructions, Page 27)

Provide names of two individuals who can be contact for additional information about this application. Indicate if the individual can be contact about administrative or technical information, or both.

a. ☒ Administrative Contact . ☒ Technical Contact

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. ☒ Administrative Contact ☒ Technical Contact

Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Managing Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 6. Permit Contact Information (Instructions, Page 28)

Provide two names of individuals that can be contacted throughout the permit term.

a. Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 7. Billing Contact Information (Instructions, Page 28)

The permittee is responsible for paying the annual fee. The annual fee will be assessed for permits **in effect on September 1 of each year.** The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (form TCEQ-20029).

Provide the complete mailing address where the annual fee invoice should be mailed and the name and phone number of the permittee's representative responsible for payment of the invoice.

Prefix: Mr Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

Organization Name: Wharton AD1, LLC

Mailing Address: 133 Boston Post Rd City/State/Zip: Weston, MA, 02493

Phone No: 508.360.2095 Email: smegnia@vanguardrenewable.com

Item 8. DMR/MER Contact Information (Instructions, Page 28)

Provide the name and mailing address of the person delegated to receive and submit DMRs or MERs. **Note:** DMR data must be submitted through the NetDMR system. An electronic reporting account can be established once the facility has obtained the permit number.

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: Sowmiya.kannappan@environeerconsulting.com

Item 9. Notice Information (Instructions, Pages 28)

a. Individual Publishing the Notices

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

Title: Click to enter text. Credential: Click to enter text.

Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

b. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package (only for NORI, NAPD will be sent via regular mail)

☐ E-mail: Click to enter text.

☐ Fax: Click to enter text.

☐ Regular Mail (USPS)

Mailing Address: Click to enter text.

City/State/Zip Code: Click to enter text.

c. Contact in the Notice

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

Title: Click to enter text. Credential: Click to enter text.

Organization Name: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

d. Public Viewing Location Information

Note: If the facility or outfall is located in more than one county, provide a public viewing place for each county.

Public building name: Click to enter text. Location within the building: Click to enter text.

Physical Address of Building: Click to enter text.

City: Click to enter text. County: Click to enter text.

e. Bilingual Notice Requirements

This information is required for new, major amendment, minor amendment or minor modification, and renewal applications.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine if an alternative language notice(s) is required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

☐ Yes ☐ No

If no, publication of an alternative language notice is not required; skip to Item 8 (Regulated Entity and Permitted Site Information.)

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

   ☐ Yes ☐ No

3. Do the students at these schools attend a bilingual education program at another location?

   ☐ Yes ☐ No

4. Would the school be required to provide a bilingual education program, but the school has waived out of this requirement under 19 TAC §89.1205(g)?

   ☐ Yes ☐ No ☐ N/A

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? Click to enter text.

f. Plain Language Summary Template – Complete the Plain Language Summary (TCEQ Form 20972) and include as an attachment. Attachment: A.C

g. Complete one Public Involvement Plan (PIP) Form (TCEQ Form 20960) for each application for a new permit or major amendment and include as an attachment. Attachment: A.D

Item 10. Regulated Entity and Permitted Site Information (Instructions Page 29)

a. TCEQ issued Regulated Entity Number (RN), if available: RNClick to enter text.

Note: If your business site is part of a larger business site, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search the TCEQ's Central Registry to determine the RN or to see if the larger site may already be registered as a Regulated Entity. If the site is found, provide the assigned RN.

b. Name of project or site (the name known by the community where located): Pierce Ranch

c. Is the location address of the facility in the existing permit the same?

☐ Yes ☐ No ☒ N/A (new permit)

Note: If the facility is located in Bexar, Comal, Hays, Kinney, Medina, Travis, Uvalde, or Williamson County, additional information concerning protection of the Edwards Aquifer may be required.

d. Owner of treatment facility:

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

e. Ownership of facility: ☐ Public ☒ Private ☐ Both ☐ Federal

f. Owner of land where treatment facility is or will be: Click to enter text.

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years (In some cases, a lease may not suffice - see instructions). Attachment: Click to enter text.

g. Owner of effluent TLAP disposal site (if applicable): Click to enter text.

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

h. Owner of sewage sludge disposal site (if applicable):

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

Item 11. TDPES Discharge/TLAP Disposal Information (Instructions, Page 31)

a. Is the facility located on or does the treated effluent cross Native American Land?

☐ Yes ☒ No

b. Attach an original full size USGS Topographic Map (or an 8.5"×11" reproduced portion for renewal or amendment applications) with all required information. Check the box next to each item below to confirm it has been included on the map.

☒ One-mile radius
☒ Applicant's property boundaries
☐ Labeled point(s) of discharge
☒ Effluent disposal site boundaries
☐ Sewage sludge disposal site
☐ Three-miles downstream information
☐ Treatment facility boundaries
☐ Highlighted discharge route(s)
☐ All wastewater ponds
☐ New and future construction

Attachment: Click to enter text.

c. Is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: Click to enter text.

d. Are the point(s) of discharge in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: Click to enter text.

e. Are the discharge route(s) in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new permit, provide an accurate description of the discharge route: Click to enter text.

f. City nearest the outfall(s): N/A

g. County in which the outfalls(s) is/are located: N/A

h. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If yes, indicate by a check mark if: ☐ Authorization granted ☐ Authorization pending

For new and amendment applications, attach copies of letters that show proof of contact and provide the approval letter upon receipt. Attachment: Click to enter text.

For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge: Click to enter text.

i. For TLAPs, is the location of the effluent disposal site in the existing permit accurate?

☐ Yes No or New Permit ☒ Click to enter text.

If no, or a new application, provide an accurate location description: Click to enter text.

j. City nearest the disposal site: Pierce

k. County in which the disposal site is located: Wharton

l. For TLAPs, describe how effluent is/will be routed from the treatment facility to the disposal site: N/A

m. For TLAPs, identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained: Colorado River

Item 12. Miscellaneous Information (Instructions, Page 33)

a. Did any person formerly employed by the TCEQ represent your company and get paid for service regarding this application?

☐ Yes ☒ No

If yes, list each person: Click to enter text.

b. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Account no.: Click to enter text.

Total amount due: Click to enter text.

c. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Enforcement order no.: Click to enter text.

Amount due: Click to enter text.

Item 13. Signature Page (Instructions, Page 33)

Permit No: WQ000Click to enter text.

Applicant Name: Click to enter text.

Certification: I, Click to enter text., 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 (typed or printed): Click to enter text.

Signatory title: Click to enter text.

Signature: _____ Date: _____
(Use blue ink)

Subscribed and Sworn to before me by the said _____

on this _____ day of _____, 20_____.

My commission expires on the _____ day of _____, 20_____.

_____
Notary Public [SEAL]

_____
County, Texas

Note: *If co-applicants are necessary, each entity must submit an original, separate signature page.*

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.1

The following information is required for new and amendment applications.

Item 1. Affected Landowner Information (Instructions, Page 35)

a. Attach a landowner map or drawing, with scale, as applicable. Check the box next to each item to confirm it has been provided.

- ☒ The applicant's property boundaries.
- ☒ The facility site boundaries within the applicant's property boundaries.
- ☒ The distance the buffer zone falls into adjacent properties and the property boundaries of the landowners located within the buffer zone.
- ☒ The property boundaries of all landowners surrounding the applicant's property. (Note: if the application is a major amendment for a lignite mine, the map must include the property boundaries of all landowners adjacent to the new facility (ponds).)
- ☐ The point(s) of discharge and highlighted discharge route(s) clearly shown for one mile downstream.
- ☐ The property boundaries of the landowners located on both sides of the discharge route for one full stream mile downstream of the point of discharge.
- ☐ The property boundaries of the landowners along the watercourse for a one-half mile radius from the point of discharge if the point of discharge is into a lake, bay, estuary, or affected by tides.
- ☐ The boundaries of the effluent disposal site (e.g., irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property.
- ☐ The property boundaries of all landowners surrounding the applicant's property boundaries where the effluent disposal site is located.
- ☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners within one-quarter mile of the applicant's property boundaries where the sewage sludge land application site is located.
- ☐ The property boundaries of landowners within one-half mile in all directions from the applicant's property boundaries where the sewage sludge disposal site (e.g., sludge surface disposal site or sludge monofil) is located.

Attachment: Click to enter text.

b. Check the box next to the format of the landowners list:

☐ Readable/Writeable CD ☐ Four sets of labels

Attachment: Click to enter text.

d. Provide the source of the landowners' names and mailing addresses: Wharton County Central Appraisal District (WCAD)

e. As required by Texas Water Code § 5.115, is any permanent school fund land affected by this application?

☐ Yes ☒ No

If yes, provide the location and foreseeable impacts and effects this application has on the land(s): Click to enter text.

Item 2. Original Photographs (Instructions, Page 37)

Provide original ground level photographs. Check the box next to each of the following items to indicate it is included.

☐ At least one original photograph of the new or expanded treatment unit location.

☐ At least two photographs of the existing/proposed point of discharge and as much area downstream (photo 1) and upstream (photo 2) as can be captured. If the discharge is to an open water body (e.g., lake, bay), the point of discharge should be in the right or left edge of each photograph showing the open water and with as much area on each respective side of the discharge as can be captured.

☐ At least one photograph of the existing/proposed effluent disposal site.

☒ A plot plan or map showing the location and direction of each photograph.

Attachment: Click to enter text.

INDUSTRIAL WASTEWATER PERMIT APPLICATION

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

This form applies to TPDES permit applications only. Complete and attach the Supplemental Permit information Form (SPIF) (TCEQ Form 20971).

Attachment: Click to enter text.

WATER QUALITY PERMIT

PAYMENT SUBMITTAL FORM

Use this form to submit the Application Fee, if mailing the payment. (Instructions, Page 36–37)

- Complete items 1 through 5 below.
- Staple the check or money order in the space provided at the bottom of this document.
- Do not mail this form with the application form.
- Do not mail this form to the same address as the application.
- Do not submit a copy of the application with this form as it could cause duplicate permit entries.

Mail this form and the check or money order to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, Texas 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, Texas 78753

Fee Code: WQP **Permit No:** WQ000Click to enter text.

1. Check or Money Order Number: Click to enter text.
2. Check or Money Order Amount: Click to enter text.
3. Date of Check or Money Order: Click to enter text.
4. Name on Check or Money Order: Click to enter text.
5. APPLICATION INFORMATION

   Name of Project or Site: Click to enter text.

   Physical Address of Project or Site: Click to enter text.

   If the check is for more than one application, attach a list which includes the name of each Project or Site (RE) and Physical Address, exactly as provided on the application.
   Attachment: Click to enter text.

Staple Check or Money Order in This Space

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION TECHNICAL REPORT 1.0

The following information **is required** for all applications for a TLAP or an individual TPDES discharge permit.

For **additional information** or clarification on the requested information, please refer to the Instructions for Completing the Industrial Wastewater Permit Application[1] available on the TCEQ website. Please contact the Industrial Permits Team at 512-239-4671 with any questions about this form.

If more than one outfall is included in the application, provide applicable information for each individual outfall. **If an item does not apply to the facility, enter** N/A to indicate that the item has been considered. Include separate reports or additional sheets as **clearly cross-referenced attachments** and provide the attachment number in the space provided for the item the attachment addresses.

NOTE: This application is for an industrial wastewater permit only. Additional authorizations from the TCEQ Waste Permits Division or the TCEQ Air Permits Division may be needed.

Item 1. Facility/Site Information (Instructions, Page 39)

a. Describe the general nature of the business and type(s) of industrial and commercial activities. Include all applicable SIC codes (up to 4).

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. Primary SIC Code = 4924, Primary NAICS Code = 221210

b. Describe all wastewater-generating processes at the facility.

Anaerobic digestion breaks down organic materials like cow manure and food waste in an enclosed environment to produce biogas. Combining manure with food waste enhances biogas production, making the system more efficient. Feedstock from hydrolysis and manure tanks is regularly transferred to digester tanks, where it is mixed, heated, and broken down by microbes in an oxygen-free environment. This process generates biogas, primarily methane, carbon dioxide, hydrogen, and water vapor. The collected biogas undergoes conditioning to produce pipeline-quality natural gas. As new material enters the digester, processed digestate is removed and may be treated for nutrient-rich liquid storage in an onsite lagoon for land application.

1 https://www.tceq.texas.gov/permitting/wastewater/industrial/TPDES_industrial_wastewater_steps.html

c. Provide a list of raw materials, major intermediates, and final products handled at the facility.

Materials List

Raw Materials	Intermediate Products	Final Products
Source-separated Organics	Digestate	Renewable Natural Gas
Packaged waste	Biogas	Liquid fertilizer
Canned liquid		
Liquid organics		
Dilution water		

Attachment: Click to enter text.

d. Attach a facility map (drawn to scale) with the following information:

- Production areas, maintenance areas, materials-handling areas, waste-disposal areas, and water intake structures.
- The location of each unit of the WWTP including the location of wastewater collection sumps, impoundments, outfalls, and sampling points, if significantly different from outfall locations.

Attachment: T.A

e. Is this a new permit application for an existing facility?

☐ Yes ☒ No

If **yes**, provide background discussion: Click to enter text.

f. Is/will the treatment facility/disposal site be located above the 100-year frequency flood level.

☐ Yes ☒ No

List source(s) used to determine 100-year frequency flood plain: Click to enter text.

If **no**, provide the elevation of the 100-year frequency flood plain and describe what protective measures are used/proposed to prevent flooding (including tail water and rainfall run-on controls) of the treatment facility and disposal area: Click to enter text.

Attachment: T.B

g. For **new** or **major amendment** permit applications, will any construction operations result in a discharge of fill material into a water in the state?

☐ Yes ☒ No ☐ N/A (renewal only)

h. If **yes** to Item 1.g, has the applicant applied for a USACE CWA Chapter 404 Dredge and Fill permit?

☐ Yes ☒ No

If **yes**, provide the permit number: Click to enter text.

If **no**, provide an approximate date of application submittal to the USACE: Click to enter text.

Item 2. Treatment System (Instructions, Page 40)

a. List any physical, chemical, or biological treatment process(es) used/proposed to treat wastewater at this facility. Include a description of each treatment process, starting with initial treatment and finishing with the outfall/point of disposal.

Click to enter text.

b. Attach a flow schematic **with a water balance** showing all sources of water and wastewater flow into the facility, wastewater flow into and from each treatment unit, and wastewater flow to each outfall/point of disposal.

Attachment: T.A.1

Item 3. Impoundments (Instructions, Page 40)

Does the facility use or plan to use any wastewater impoundments (e.g., lagoons or ponds?)

☒ Yes ☐ No

If **no**, proceed to Item 4. If **yes**, complete **Item 3.a** for **existing** impoundments and **Items 3.a - 3.e** for **new or proposed** impoundments. **NOTE:** See instructions, Pages 40-42, for additional information on the attachments required by Items 3.a - 3.e.

a. Complete the table with the following information for each existing, new, or proposed impoundment. Attach additional copies of the Impoundment Information table, if needed.

Use Designation: Indicate the use designation for each impoundment as Treatment (T), Disposal (D), Containment (C), or Evaporation (E).

Associated Outfall Number: Provide an outfall number if a discharge occurs or will occur.

Liner Type: Indicate the liner type as Compacted clay liner (C), In-situ clay liner (I), Synthetic/plastic/rubber liner (S), or Alternate liner (A). **NOTE:** See instructions for further detail on liner specifications. If an alternate liner (A) is selected, include an attachment that provides a description of the alternate liner and any additional technical information necessary for an evaluation.

Leak Detection System: If any leak detection systems are in place/planned, enter Y for yes. Otherwise, enter N for no.

Groundwater Monitoring Wells and Data: If groundwater monitoring wells are in place/planned, enter Y for yes. Otherwise, enter N for no. Attach any existing groundwater monitoring data.

Dimensions: Provide the dimensions, freeboard, surface area, storage capacity of the impoundments, and the maximum depth (not including freeboard). For impoundments with irregular shapes, submit surface area instead of length and width.

Compliance with 40 CFR Part 257, Subpart D: If the impoundment is required to be in compliance with 40 CFR Part 257, Subpart D, enter Y for yes. Otherwise, enter N for no.

Date of Construction: Enter the date construction of the impoundment commenced (mm/dd/yy).

Impoundment Information

Parameter	Pond #	Pond #	Pond #	Pond #
Use Designation: (T) (D) (C) or (E)	Storage			
Associated Outfall Number				
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), Not Including Freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction	TBD			

Attachment: Click to enter text.

The following information (**Items 3.b – 3.e**) is required only for **new or proposed** impoundments.

b. For new or proposed impoundments, attach any available information on the following items. If attached, check **yes** in the appropriate box. Otherwise, check **no** or **not yet designed.**

1. Liner data

☐ Yes ☐ No ☐ Not yet designed

2. Leak detection system or groundwater monitoring data

☐ Yes ☐ No ☐ Not yet designed

3. Groundwater impacts

☐ Yes ☐ No ☐ Not yet designed

NOTE: Item b.3 is required if the bottom of the pond is not above the seasonal high-water table in the shallowest water-bearing zone.

Attachment: Click to enter text.

For TLAP applications: Items 3.c – 3.e are **not required**, continue to Item 4.

c. Attach a USGS map or a color copy of original quality and scale which accurately locates and identifies all known water supply wells and monitor wells within ½-mile of the impoundments.

Attachment: Click to enter text.

d. Attach copies of State Water Well Reports (e.g., driller's logs, completion data, etc.), and data on depths to groundwater for all known water supply wells including a description of how the depths to groundwater were obtained.

Attachment: Click to enter text.

e. Attach information pertaining to the groundwater, soils, geology, pond liner, etc. used to assess the potential for migration of wastes from the impoundments or the potential for contamination of groundwater or surface water.

Attachment: Click to enter text.

Item 4. Outfall/Disposal Method Information (Instructions, Page 42)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge, and for each point of disposal for TLAP operations.

If there are more outfalls/points of disposal at the facility than the spaces provided, copies of pages 6 and/0r numbered accordingly (i.e., page 6a, 6b, etc.) may be used to provide information on the additional outfalls.

For TLAP applications: Indicate the disposal method and each individual irrigation area **I**, evaporation pond **E**, or subsurface drainage system **S** by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for **Outfall** number (e.g. **E1** for evaporation pond 1, **I2** for irrigation area No. 2, etc.).

Outfall Longitude and Latitude

Outfall No.	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)

Outfall Location Description

Outfall No.	Location Description

Description of Sampling Point(s) (if different from Outfall location)

Outfall No.	Description of sampling point

Outfall Flow Information – Permitted and Proposed

Outfall No.	Permitted Daily Avg Flow (MGD)	Permitted Daily Max Flow (MGD)	Proposed Daily Avg Flow (MGD)	Proposed Daily Max Flow (MGD)	Anticipated Discharge Date (mm/dd/yy)

Outfall Discharge – Method and Measurement

Outfall No.	Pumped Discharge? Y/N	Gravity Discharge? Y/N	Type of Flow Measurement Device Used

Outfall Discharge – Flow Characteristics

Outfall No.	Intermittent Discharge? Y/N	Continuous Discharge? Y/N	Seasonal Discharge? Y/N	Discharge Duration (hrs/day)	Discharge Duration (days/mo)	Discharge Duration (mo/yr)

Outfall Wastestream Contributions

Outfall No. T-1

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow
Process generated wastewater	0.075	100

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow

Attachment: Click to enter text.

Item 5. Blowdown and Once-Through Cooling Water Discharges (Instructions, Page 43)

a. Indicate if the facility currently or proposes to:

☐ Yes ☒ No Use cooling towers that discharge blowdown or other wastestreams

☐ Yes ☒ No Use boilers that discharge blowdown or other wastestreams

☐ Yes ☒ No Discharge once-through cooling water

NOTE: If the facility uses or plans to use cooling towers or once-through cooling water, Item 12 **is required.**

b. If **yes** to any of the above, attach an SDS with the following information for each chemical additive.

- Manufacturers Product Identification Number
- Product use (e.g., biocide, fungicide, corrosion inhibitor, etc.)
- Chemical composition including CASRN for each ingredient
- Classify product as non-persistent, persistent, or bioaccumulative
- Product or active ingredient half-life
- Frequency of product use (e.g., 2 hours/day once every two weeks)
- Product toxicity data specific to fish and aquatic invertebrate organisms
- Concentration of whole product or active ingredient, as appropriate, in wastestream.

In addition to each SDS, attach a summary of the above information for each specific wastestream and the associated chemical additives. Specify which outfalls are affected.

Attachment: Click to enter text.

c. Cooling Towers and Boilers

If the facility currently or proposes to use cooling towers or boilers that discharge blowdown or other wastestreams to the outfall(s), complete the following table.

Cooling Towers and Boilers

Type of Unit	Number of Units	Daily Avg Blowdown (gallons/day)	Daily Max Blowdown (gallons/day)
Cooling Towers			
Boilers			

Item 6. Stormwater Management (Instructions, Page 44)

Will any existing/proposed outfalls discharge stormwater associated with industrial activities, as defined at *40 CFR § 122.26(b)(14)*, commingled with any other wastestream?

☐ Yes ☒ No

If **yes**, briefly describe the industrial processes and activities that occur outdoors or in a manner which may result in exposure of the activities or materials to stormwater: Click to enter text.

Item 7. Domestic Sewage, Sewage Sludge, and Septage Management and Disposal (Instructions, Page 44)

Domestic Sewage - Waste and wastewater from humans or household operations that is discharged to a wastewater collection system or otherwise enters a treatment works.

a. Check the box next to the appropriate method of domestic sewage and domestic sewage sludge treatment or disposal. Complete Worksheet 5.0 or Item 7.b if directed to do so.

- ☐ Domestic sewage is routed (i.e., connected to or transported to) to a WWTP permitted to receive domestic sewage for treatment, disposal, or both. Complete Item 7.b.
- ☐ Domestic sewage disposed of by an on-site septic tank and drainfield system. Complete Item 7.b.
- ☐ Domestic and industrial treatment sludge ARE commingled prior to use or disposal.
- ☐ Industrial wastewater and domestic sewage are treated separately, and the respective sludge IS NOT commingled prior to sludge use or disposal. Complete Worksheet 5.0.
- ☐ Facility is a POTW. Complete Worksheet 5.0.
- ☐ Domestic sewage is not generated on-site.
- ☐ Other (e.g., portable toilets), specify and Complete Item 7.b: Click to enter text.

b. Provide the name and TCEQ, NPDES, or TPDES Permit No. of the waste-disposal facility which receives the domestic sewage/septage. If hauled by motorized vehicle, provide the name and TCEQ Registration No. of the hauler.

Domestic Sewage Plant/Hauler Name

Plant/Hauler Name	Permit/Registration No.

Item 8. Improvements or Compliance/Enforcement Requirements (Instructions, Page 45)

a. Is the permittee currently required to meet any implementation schedule for compliance or enforcement?

☐ Yes ☒ No

b. Has the permittee completed or planned for any improvements or construction projects?

☐ Yes ☒ No

c. If **yes** to either 8.a **or** 8.b, provide a brief summary of the requirements and a status update: Click to enter text.

Item 9. Toxicity Testing (Instructions, Page 45)

Have any biological tests for acute or chronic toxicity been made on any of the discharges or on a receiving water in relation to the discharge within the last three years?

☐ Yes ☒ No

If **yes**, identify the tests and describe their purposes: Click to enter text.

Additionally, attach a copy of all tests performed which **have not** been submitted to the TCEQ or EPA. **Attachment:** Click to enter text.

Item 10. Off-Site/Third Party Wastes (Instructions, Page 45)

a. Does or will the facility receive wastes from off-site sources for treatment at the facility, disposal on-site via land application, or discharge via a permitted outfall?

☒ Yes ☐ No

If **yes**, provide responses to Items 10.b through 10.d below.

If **no**, proceed to Item 11.

b. Attach the following information to the application:

- List of wastes received (including volumes, characterization, and capability with on-site wastes).
- Identify the sources of wastes received (including the legal name and addresses of the generators).
- Description of the relationship of waste source(s) with the facility's activities.

Attachment: T.H

c. Is or will wastewater from another TCEQ, NPDES, or TPDES permitted facility commingled with this facility's wastewater after final treatment and prior to discharge via the final outfall/point of disposal?

☐ Yes ☒ No

If **yes**, provide the name, address, and TCEQ, NPDES, or TPDES permit number of the contributing facility and a copy of any agreements or contracts relating to this activity.

Attachment: Click to enter text.

d. Is this facility a POTW that accepts/will accept process wastewater from any SIU and has/is required to have an approved pretreatment program under the NPDES/TPDES program?

☐ Yes ☒ No

If **yes**, **Worksheet 6.0** of this application **is required.**

Item 11. Radioactive Materials (Instructions, Page 46)

a. Are/will radioactive materials be mined, used, stored, or processed at this facility?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L.

Radioactive Materials Mined, Used, Stored, or Processed

Radioactive Material Name	Concentration (pCi/L)

b. Does the applicant or anyone at the facility have any knowledge or reason to believe that radioactive materials may be present in the discharge, including naturally occurring radioactive materials in the source waters or on the facility property?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L. Do not include information provided in response to Item 11.a.

Radioactive Materials Present in the Discharge

Radioactive Material Name	Concentration (pCi/L)

Item 12. Cooling Water (Instructions, Page 46)

a. Does the facility use or propose to use water for cooling purposes?

☐ Yes ☒ No

If **no**, stop here. If **yes**, complete Items 12.b thru 12.f.

b. Cooling water is/will be obtained from a groundwater source (e.g., on-site well).

☐ Yes ☐ No

If **yes**, stop here. If **no**, continue.

c. Cooling Water Supplier

1. Provide the name of the owner(s) and operator(s) for the CWIS that supplies or will supply water for cooling purposes to the facility.

Cooling Water Intake Structure(s) Owner(s) and Operator(s)

CWIS ID				
Owner				
Operator				

2. Cooling water is/will be obtained from a Public Water Supplier (PWS)

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the PWS Registration No. and stop here: PWS No. Click to enter text.

3. Cooling water is/will be obtained from a reclaimed water source?

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the Reuse Authorization No. and stop here: Click to enter text.

4. Cooling water is/will be obtained from an Independent Supplier

   ☐ Yes ☐ No

   If **no**, proceed to Item 12.d. If **yes**, provide the actual intake flow of the Independent Supplier's CWIS that is/will be used to provide water for cooling purposes and proceed: Click to enter text.

d. 316(b) General Criteria

1. The CWIS(s) used to provide water for cooling purposes to the facility has or will have a cumulative design intake flow of 2 MGD or greater.

   ☐ Yes ☐ No

2. At least 25% of the total water withdrawn by the CWIS is/will be used at the facility exclusively for cooling purposes on an annual average basis.

   ☐ Yes ☐ No

3. The CWIS(s) withdraw(s)/propose(s) to withdraw water for cooling purposes from surface waters that meet the definition of Waters of the United States in *40 CFR § 122.2*.

   ☐ Yes ☐ No

   If **no**, provide an explanation of how the waterbody does not meet the definition of Waters of the United States in *40 CFR § 122.2*: Click to enter text.

If **yes** to all three questions in Item 12.d, the facility **meets** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA. Proceed to **Item 12.f.**

If **no** to any of the questions in Item 12.d, the facility **does not meet** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA; however, a determination is required based upon BPJ. Proceed to **Item 12.e.**

e. The facility does not meet the minimum requirements to be subject to the fill requirements of Section 316(b) **and uses**/proposes **to use cooling towers.**

   ☐ Yes ☐ No

   If **yes**, stop here. If **no**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ.

f. Oil and Gas Exploration and Production

1. The facility is subject to requirements at 40 CFR Part 435, Subparts A or D.

☐ Yes ☐ No

If **yes**, continue. If **no**, skip to Item 12.g.

2. The facility is an existing facility as defined at 40 CFR § 125.92(k) or a new unit at an existing facility as defined at 40 CFR § 125.92(u).

☐ Yes ☐ No

If **yes**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ. If **no**, skip to Item 12.g.3.

g. Compliance Phase and Track Selection

1. Phase I – New facility subject to 40 CFR Part 125, Subpart I

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection, attach the requested information, and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – AIF greater than 2 MGD, but less than 10 MGD

- Attach information required by *40 CFR §§ 125.86(b)(2)–(4).*

☐ Track I – AIF greater than 10 MGD

- Attach information required by *40 CFR § 125.86(b).*

☐ Track II

- Attach information required by *40 CFR § 125.86(c).*

Attachment: Click to enter text.

2. Phase II – Existing facility subject to 40 CFR Part 125, Subpart J

☐ Yes ☐ No

If **yes**, complete Worksheets 11.0 through 11.3, as applicable.

3. Phase III – New facility subject to 40 CFR Part 125, Subpart N

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection and provide the requested information.

☐ Track I – Fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – Not a fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Item 2 (except CWIS latitude/longitude under Item 2.a).

☐ Track II – Fixed facility

- Attach information required by 40 CFR § 125.136(c) and complete Worksheet 11.0, Items 2 and 3.

Attachment: Click to enter text.

Item 13. Permit Change Requests (Instructions, Page 48)

This item is only applicable to existing permitted facilities.

a. Is the facility requesting a **major amendment** of an existing permit?

☐ Yes ☒ No

If **yes**, list each request individually and provide the following information: 1) detailed information regarding the scope of each request and 2) a justification for each request. Attach any supplemental information or additional data to support each request.

Click to enter text.

b. Is the facility requesting any **minor amendments** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

c. Is the facility requesting any **minor modifications** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

Item 14. Laboratory Accreditation (Instructions, Page 49)

All laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification*, which includes the following general exemptions from National Environmental Laboratory Accreditation Program (NELAP) certification requirements:

- The laboratory is an in-house laboratory and is:
  - periodically inspected by the TCEQ; or
  - located in another state and is accredited or inspected by that state; or
  - performing work for another company with a unit located in the same site; or
  - performing pro bono work for a governmental agency or charitable organization.
- The laboratory is accredited under federal law.
- The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.
- The laboratory supplies data for which the TCEQ does not offer accreditation.

The applicant should review *30 TAC Chapter 25* for specific requirements.

The following certification statement shall be signed and submitted with every application. See the *Signature Page* section in the Instructions, for a list of designated representatives who may sign the certification.

CERTIFICATION:

I certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification.*

Printed Name: Click to enter text.

Title: Click to enter text.

Signature: _____

Date: _____

INDUSTRIAL WASTEWATER PERMIT APPLICATION WORKSHEET 3.0: LAND APPLICATION OF EFFLUENT

This worksheet **is required** for all applications for a permit to disposal of wastewater by land application (i.e., TLAP)).

Item 1. Type of Disposal System (Instructions, Page 69)

Check the box next to the type of land disposal requested by this application:

- ☐ Irrigation
- ☐ Evaporation
- ☐ Evapotranspiration beds
- ☐ Drip irrigation system
- ☐ Subsurface application
- ☐ Subsurface soils absorption
- ☒ Surface application
- ☐ Other, specify: Click to enter text.

Item 2. Land Application Area (Instructions, Page 69)

Land Application Area Information

Effluent Application (gallons/day)	Irrigation Acreage (acres)	Describe land use & indicate type(s) of crop(s)	Public Access? (Y/N)
	28,955	Agricultural land and Coastal grazing - Cotton and Corn grain	N

Item 3. Annual Cropping Plan (Instructions, Page 69)

Attach the required cropping plan that includes each of the following:

- Cool and warm season plant species
- Breakdown of acreage and percent of total acreage for each crop
- Crop growing season
- Harvesting method/number of harvests
- Minimum/maximum harvest height
- Crop yield goals
- Soils map
- Nitrogen requirements per crop
- Additional fertilizer requirements
- Supplemental watering requirements
- Crop salt tolerances
- Justification for not removing existing vegetation to be irrigated

Attachment: T.C

Item 4. Well and Map Information (Instructions, Page 70)

a. Check each box to confirm the required information is shown and labeled on the attached USGS map:

- ☒ The exact boundaries of the land application area
- ☒ On-site buildings
- ☐ Waste-disposal or treatment facilities
- ☐ Effluent storage and tailwater control facilities
- ☐ Buffer zones
- ☒ All surface waters in the state onsite and within 500 feet of the property boundaries
- ☒ All water wells within ½-mile of the disposal site, wastewater ponds, or property boundaries
- ☐ All springs and seeps onsite and within 500 feet of the property boundaries

Attachment: T.D

b. List and cross reference all water wells located on or within 500 feet of the disposal site, wastewater ponds, or property boundaries in the following table. Attach additional pages as necessary to include all of the wells.

Well and Map Information Table

Well ID	Well Use	Producing? Y/N/U	Open, cased, capped, or plugged?	Proposed Best Management Practice
589679				
261011				
391981				

Attachment: T.D

c. Groundwater monitoring wells or lysimeters are/will be installed around the land application site or wastewater ponds.

☐ Yes ☒ No

If **yes**, provide the existing/proposed location of the monitoring wells or lysimeters on the site map attached for Item 4.a. Additionally, attach information on the depth of the wells or lysimeters, sampling schedule, and monitoring parameters for TCEQ review, possible modification, and approval.

Attachment: Click to enter text.

d. Attach a short groundwater technical report using *30 TAC § 309.20(a)(4)* as guidance.
Attachment:

Item 5. Soil Map and Soil Information (Instructions, Page 71)

Check each box to confirm that the following information is attached:

a. ☒ USDA NRCS Soil Survey Map depicting the area to be used for land application with the locations identified by fields and crops.

b. ☒ Breakdown of acreage and percent of total acreage for each soil type.

c. ☒ Copies of laboratory soil analyses. **Attachment:** T.C

Item 6. Effluent Monitoring Data (Instructions, Page 72)

a. Completion of Table 14 **is required** for all **renewal** and **major amendment** applications. Complete the table with monitoring data for the previous two years for all parameters regulated in the current permit. An additional table has been provided with blank headers for parameters regulated in the current permit which are not listed in Table 14.

Table 14 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre-feet/month)

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre-feet/month)

b. Use this table to provide effluent analysis for parameters regulated in the current permit which are not listed in Table 14.

Additional Parameter Effluent Analysis

Date (mo/yr)							

c. Attach an explanation of all persistent excursions to permitted parameters and corrective actions taken. **Attachment:** Click to enter text.

Item 7. Pollutant Analysis (Instructions, Page 72)

a. Provide the date range of all sampling events conducted to obtain the analytical data submitted with this application (e.g., 05/01/2018-05/30/2018): Click to enter text.

b. ☐ Check the box to confirm all samples were collected no more than 12 months prior to the date of application submittal.

c. Complete Tables 15 and 16.

Table 15 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)
BOD (5-day)				
CBOD (5-day)				
Chemical oxygen demand				
Total organic carbon				
Dissolved oxygen				
Ammonia nitrogen				
Total suspended solids				
Nitrate nitrogen				
Total organic nitrogen				
Total phosphorus				
Oil and grease				
Total residual chlorine				
Total dissolved solids				
Sulfate				
Chloride				
Fluoride				
Total alkalinity (mg/L as CaCO3)				
Temperature (°F)				
pH (standard units)				

Table 16 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Aluminum, total					2.5
Antimony, total					5

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Arsenic, total					0.5
Barium, total					3
Beryllium, total					0.5
Cadmium, total					1
Chromium, total					3
Chromium, hexavalent					3
Chromium, trivalent					N/A
Copper, total					2
Cyanide, available					2/10
Lead, total					0.5
Mercury, total					0.005/0.0005
Nickel, total					2
Selenium, total					5
Silver, total					0.5
Thallium, total					0.5
Zinc, total					5.0

ENVIRONEER
ENGINEERING CONSULTING

Texas Land Application Permit (TLAP)
Admin Package

Report Date: November 18th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

List of Figures i
List of Tables i
A.A: TCEQ APPLICATION FEE 1
A.B: CORE DATA FORMS & LEASE AGREEMENT 2
A.C: PLAIN LANGUAGE SUMMARY 3
A.D: PUBLIC INVOLVEMENT PLAN 4
A.E: 7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE 4
A.E.1 7.5-Minute USGS Topographic Quadrangle Map 6
A.F: AFFECTED LANDOWNER INFORMATION 7
A.F.1 Adjacent Landowners Map 7
A.F.2 Landowners List 7
A.G: PHOTOGRAPHS 8
A.G.1 Photograph Location Map 9

List of Figures

Figure A.E.1: 7.5-Minute USGS Topographic Quadrangle Map 6
Figure A.F.1: Adjacent Landowners Map 7
Figure A.G.1: Photograph Location Map 9

List of Tables

Table A.F.1. Adjacent Landowners 7

A.A: TCEQ APPLICATION FEE

A.B: CORE DATA FORMS & LEASE AGREEMENT

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions on completing 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.)*

☒ New Permit, Registration or Authorization *(Core Data Form should be submitted with the program application.)*

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ 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 606111664		RN 112167820

SECTION II: Customer Information

4. General Customer Information	5. Effective Date for Customer Information Updates (mm/dd/yyyy)	11/20/2024

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

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:*
Wharton AD1, LLC	

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID	10. DUNS Number *(if applicable)*
804859489	32087676543	(33-3670329	

11. Type of Customer: ☒ Corporation ☐ Individual Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees
☐ 0-20 ☒ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?
☐ Yes ☐ No

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*

☒ Owner ☐ Operator ☐ Owner & Operator ☐ Other:
☐ Occupational Licensee ☐ Responsible Party ☐ VCP/BSA Applicant

15. Mailing Address:	133 Boston Post Road, Building 15, 2nd Floor						
	City	Weston	State	MA	ZIP	02493	ZIP + 4

16. Country Mailing Information *(if outside USA)*	17. E-Mail Address *(if applicable)*
	development@vanguardrenewables.com

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(248) 259-4031		(781) 232-7491

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected, a new permit application is also required.)*

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core 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.)*

Pierce Ranch

23. Street Address of the Regulated Entity:								
(No PO Boxes)	**City**	Pierce	**State**	TX	**ZIP**	77437	**ZIP + 4**	
24. County	Wharton							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:	Site is located 5.4 miles from Wharton Regional Airport via US-59 S and Pierce West Rd.				
26. Nearest City			**State**		**Nearest ZIP Code**
Pierce			TX		77437

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	29.2165071		**28. Longitude (W) In Decimal:**	-96.19356185	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	12	55	96	11	39

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)
4924		221210	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Renewable Energy Production

34. Mailing Address:	**133 Boston Post Road, Building 15, 2nd Floor**							
	City	**Weston**	**State**	**MA**	**ZIP**	**02493**	**ZIP + 4**	
35. E-Mail Address:	**development@vanguardrenewables.com**							

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
(248) 259-4031		**(781) 232-7491**

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.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:
				TLAP

SECTION IV: Preparer Information

40. Name:	Michael Zhang	**41. Title:**	Managing Consultant

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(832) -817-9116		( ) -	michael.zhang@environeerconsulting.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:		**Job Title:**	
Name *(In Print):*		**Phone:**	( ) -
Signature:		**Date:**	

MEMORANDUM OF LEASE

This is a Memorandum of Lease ("Memorandum") made and entered into as of this 24th day of February, 2025, by and between **Pierce Ranch GP** ("Lessor"), located at Post Office Box 538, Pierce, Texas, 77467; and **VR Development Services LLC**, a Massachusetts limited liability company ("Lessee"), located at 133 Boston Post Rd, Building 15, 2nd Floor, Weston, MA 02493, upon the following terms:

1. Lease. The provisions set forth in a written lease between the parties hereto dated January 13th, 2025 (the "Lease") are hereby incorporated by reference into this Memorandum.

2. Leased Area. The Leased Area which is the subject of the Lease is located on a portion of Lessor's Property more particularly described on the attached Exhibit A.

3. Commencement Date of Lease. The Lease commenced January 13th, 2025, as set forth in the Lease.

4. Term. The Term of the Lease is twenty-five (25) years from the Operations Date as defined in the Lease, with three (3) additional automatic renewal periods of five (5) years each unless either party exercises the non-renewal options provided in the Lease.

5. Duplicate Copies. Copies of the originals of the Lease are in the possession of Lessor and Lessee, and reference should be made thereto for a more detailed description thereof.

6. Purpose. It is expressly understood and agreed by all parties that the sole purpose of this Memorandum of Lease is to give record notice of the Lease; it being distinctly understood and agreed that said Lease constitutes the entire lease and agreement between the parties with respect to the Leased Area and is hereby incorporated by reference. The Lease contains and sets forth additional rights, terms, conditions, duties, and obligations not enumerated within this instrument which govern the Lease. This Memorandum is for information purposes only and nothing contained herein may be deemed in any way to modify or vary any of the terms or conditions of the Lease. In the event of any inconsistency between the terms of the Lease and this instrument, the terms of the Lease shall control. The rights and obligations set forth herein shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, representatives, successors, and assigns.

[signature pages follow]

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of Lease pursuant to due authorization on the dates herein acknowledged.

LESSOR:

Pierce Ranch GP

By: _____

Name: Laurance H. Armour, III

Title: General Manager

ACKNOWLEDGMENT

STATE OF Texas)
) SS
COUNTY OF Wharton)

On this 26th day of February, 2025, before me appeared Laurance H. Armour, III to me personally known, who, being by me duly sworn did say that he or she is the person of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in Pierce, TX, the day and year last above written.

_____
Notary Public Signature

My Commission expires 05-05-2025

VELDA VONDERAU
NOTARY PUBLIC
STATE OF TEXAS
ID # 761496-8
My Comm. Expires 05-05-2025

LESSEE:

VR Development Services LLC

By: Kevin Chase
Name: _____ Feb 28, 2025
Title: Chief Development Officer

ACKNOWLEDGMENT

STATE OF _____)
) SS
COUNTY OF _____)

On this ___ day of _____, 20___, before me appeared _____ to me personally known, who, being by me duly sworn did say that he or she is the _____ of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in _____, the day and year last above written.

_____
Notary Public Signature

My Commission expires _____

Pierce Ranch Lease Memo

Final Audit Report 2025-02-28

Created:	2025-02-28
By:	Stephen Megnia (smegnia@vanguardrenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAcrt8WX5POxl_PZtyZmcR6SqUQdY7Mhss

"Pierce Ranch Lease Memo" History

Document created by Stephen Megnia (smegnia@vanguardrenewables.com)
2025-02-28 - 6:36:36 PM GMT

Document emailed to Kevin Chase (kchase@vanguardrenewables.com) for signature
2025-02-28 - 6:37:09 PM GMT

Email viewed by Kevin Chase (kchase@vanguardrenewables.com)
2025-02-28 - 6:39:53 PM GMT

Document e-signed by Kevin Chase (kchase@vanguardrenewables.com)
Signature Date: 2025-02-28 - 6:40:14 PM GMT - Time Source: server

Agreement completed.
2025-02-28 - 6:40:14 PM GMT

A.C: PLAIN LANGUAGE SUMMARY

TLAP Application

The following summary is *provided for this pending water quality permit application being reviewed by the Texas Commission on Environmental Quality as required by 30 Texas Administrative Code Chapter 39. The information provided in this summary may change during the technical review of the application and are not federal enforceable representations of the permit application.*

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. The facility will be located at the coordinates (29.2165071, -96.19356185), near the City of Pierce, Wharton County, Texas, 77437.

Anaerobic digestion is a process in which organic materials, such as cow manure and food waste, are broken down by microorganisms in an oxygen-free environment to produce biogas. By combining food waste with manure, a smaller volume of manure can generate sufficient biogas to make the system efficient. The digester tanks regularly receive material from both the hydrolysis and manure tanks. The material transferred from the hydrolysis tanks will contain a mix of feedstock. Once in the digester, the mixture is homogenized using mixers. Inside the digester, the blend of manure and food waste is heated and remains in the tank for several days. During this time, microbes break down the organic material in an anaerobic environment, producing biogas, which consists of methane, carbon dioxide, hydrogen, and water vapor. The biogas collected in the digester's headspace is then routed through a gas conditioning and upgrading system to remove impurities, resulting in pipeline-quality natural gas. The effluent from the digesters, known as digestate, must be regularly removed as the digester tanks have limited capacity. As more organic waste is added, the processed material is extracted throughout the day to maintain tank volume. This digestate is a nutrient-rich liquid that is stored in an on-site earthen lagoon for future land application by spreading.

Spanish Translation

El siguiente resumen se proporciona para esta solicitud de permiso de calidad del agua pendiente que está siendo revisada por la Comisión de Calidad Ambiental de Texas, según lo exige el Capítulo 39 del Título 30 del Código Administrativo de Texas. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no son representaciones federales exigibles de la solicitud de permiso.

Wharton AD1, LLC desarrolla, construye, posee y opera digestores anaeróbicos en granjas lecheras para producir energía renovable y otros subproductos agrícolas como fertilizantes líquidos y enmiendas del suelo. La instalación estará ubicada en las coordenadas (29.2165071, -96.19356185), cerca de la ciudad de Pierce, condado de Wharton, Texas, 77437.

La digestión anaeróbica es un proceso en el que los microorganismos descomponen materiales orgánicos, como el estiércol de vaca y los desechos de alimentos, en un ambiente libre de oxígeno para producir biogás. Al combinar los desechos de alimentos con estiércol, un volumen menor de estiércol puede generar suficiente biogás para que el sistema sea eficiente. Los tanques digestores reciben regularmente material tanto de los tanques de hidrólisis como de estiércol. El material transferido desde los tanques de hidrólisis contendrá una mezcla de materia prima. Una vez en el digestor, la mezcla se homogeneiza mediante mezcladores. Dentro del digestor, la mezcla de estiércol y restos de comida se calienta y permanece en el tanque durante varios días. Durante este tiempo, los microbios descomponen el material orgánico en un ambiente anaeróbico, produciendo biogás, que consiste en metano, dióxido de carbono, hidrógeno y vapor de agua. Luego, el biogás recolectado en el espacio de cabeza del digestor se conduce a través de un sistema de acondicionamiento y mejora de gas para eliminar las impurezas, lo que da como resultado gas natural con calidad de tubería. El efluente de los digestores, conocido como digestato, debe eliminarse periódicamente ya que los tanques de los digestores tienen una capacidad limitada. A medida que se agregan más desechos orgánicos, el material procesado se extrae durante el día para mantener el volumen del tanque. Este digestato puede procesarse aún más en un sistema de manejo de nutrientes, lo que da como resultado un líquido rico en nutrientes que se almacena en una laguna de tierra en el sitio para su futura aplicación en la tierra mediante esparcimiento.

PUBLIC INVOLVEMENT PLAN

Texas Commission on Environmental Quality

Public Involvement Plan Form for Permit and Registration Applications

The Public Involvement Plan is intended to provide applicants and the agency with information about how public outreach will be accomplished for certain types of applications in certain geographical areas of the state. It is intended to apply to new activities; major changes at existing plants, facilities, and processes; and to activities which are likely to have significant interest from the public. This preliminary screening is designed to identify applications that will benefit from an initial assessment of the need for enhanced public outreach.

All applicable sections of this form should be completed and submitted with the permit or registration application. For instructions on how to complete this form, see TCEQ-20960-inst.

Section 1. Preliminary Screening

☒ New Permit or Registration Application

☐ New Activity – modification, registration, amendment, facility, etc. (see instructions)

If neither of the above boxes are checked, completion of the form is not required and does not need to be submitted.

Section 2. Secondary Screening

☒ Requires public notice,

☐ Considered to have significant public interest, **and**

☐ Located within any of the following geographical locations:

- Austin
- Dallas
- Fort Worth
- Houston
- San Antonio
- West Texas
- Texas Panhandle
- Along the Texas/Mexico Border
- Other geographical locations should be decided on a case-by-case basis

If all the above boxes are not checked, a Public Involvement Plan is not necessary. Stop after Section 2 and submit the form.

☐ Public Involvement Plan not applicable to this application. Provide **brief** explanation.

Section 3. Application Information

Type of Application (check all that apply):

Air ☐ Initial ☐ Federal ☐ Amendment ☐ Standard Permit ☐ Title V

Waste ☐ Municipal Solid Waste ☐ Industrial and Hazardous Waste ☐ Scrap Tire
☐ Radioactive Material Licensing ☐ Underground Injection Control

Water Quality

☐ Texas Pollutant Discharge Elimination System (TPDES)

☒ Texas Land Application Permit (TLAP)

☐ State Only Concentrated Animal Feeding Operation (CAFO)

☐ Water Treatment Plant Residuals Disposal Permit

☐ Class B Biosolids Land Application Permit

☐ Domestic Septage Land Application Registration

Water Rights New Permit

☐ New Appropriation of Water

☐ New or existing reservoir

Amendment to an Existing Water Right

☐ Add a New Appropriation of Water

☐ Add a New or Existing Reservoir

☐ Major Amendment that could affect other water rights or the environment

Section 4. Plain Language Summary

Provide a brief description of planned activities.

Wharton AD1, LLC develops and operates anaerobic digesters to convert cow manure and food waste into renewable energy and agricultural by-products. The facility near Pierce, Texas, will use anaerobic digestion to break down organic materials in an oxygen-free environment, producing biogas. This biogas, primarily methane, is purified into pipeline-quality natural gas. The remaining digestate is processed into nutrient-rich liquid fertilizer and soil amendments. The liquid by-product is stored in a lagoon for future land application on farms.

Section 5. Community and Demographic Information

Community information can be found using EPA's EJ Screen, U.S. Census Bureau information, or generally available demographic tools.

Information gathered in this section can assist with the determination of whether alternative language notice is necessary. Please provide the following information.

Pierce

(City)

Wharton

(County)

(Census Tract)

Please indicate which of these three is the level used for gathering the following information.

☒ City ☐ County ☒ Census Tract

(a) Percent of people over 25 years of age who at least graduated from high school

60.0%

(b) Per capita income for population near the specified location

$35,139 (Household Income)

(c) Percent of minority population and percent of population by race within the specified location

27.9%

(d) Percent of Linguistically Isolated Households by language within the specified location

N/A

(e) Languages commonly spoken in area by percentage

N/A

(f) Community and/or Stakeholder Groups

N/A

(g) Historic public interest or involvement

N/A

Section 6. Planned Public Outreach Activities

(a) Is this application subject to the public participation requirements of Title 30 Texas Administrative Code (30 TAC) Chapter 39?

☒ Yes ☐ No

(b) If yes, do you intend at this time to provide public outreach other than what is required by rule?

☒ Yes ☐ No

If Yes, please describe.

Vanguard Renewables plans to host a series of community conversations to both en

If you answered "yes" that this application is subject to 30 TAC Chapter 39, answering the remaining questions in Section 6 is not required.

(c) Will you provide notice of this application in alternative languages?

☐ Yes ☒ No

Please refer to Section 5. If more than 5% of the population potentially affected by your application is Limited English Proficient, then you are required to provide notice in the alternative language.

If yes, how will you provide notice in alternative languages?

☐ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

(d) Is there an opportunity for some type of public meeting, including after notice?

☐ Yes ☐ No

(e) If a public meeting is held, will a translator be provided if requested?

☐ Yes ☐ No

(f) Hard copies of the application will be available at the following (check all that apply):

☐ TCEQ Regional Office ☐ TCEQ Central Office
☐ Public Place (specify)

Section 7. Voluntary Submittal

For applicants voluntarily providing this Public Involvement Plan, who are not subject to formal public participation requirements.

Will you provide notice of this application, including notice in alternative languages?

☒ Yes ☐ No

What types of notice will be provided?

☒ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE MAP

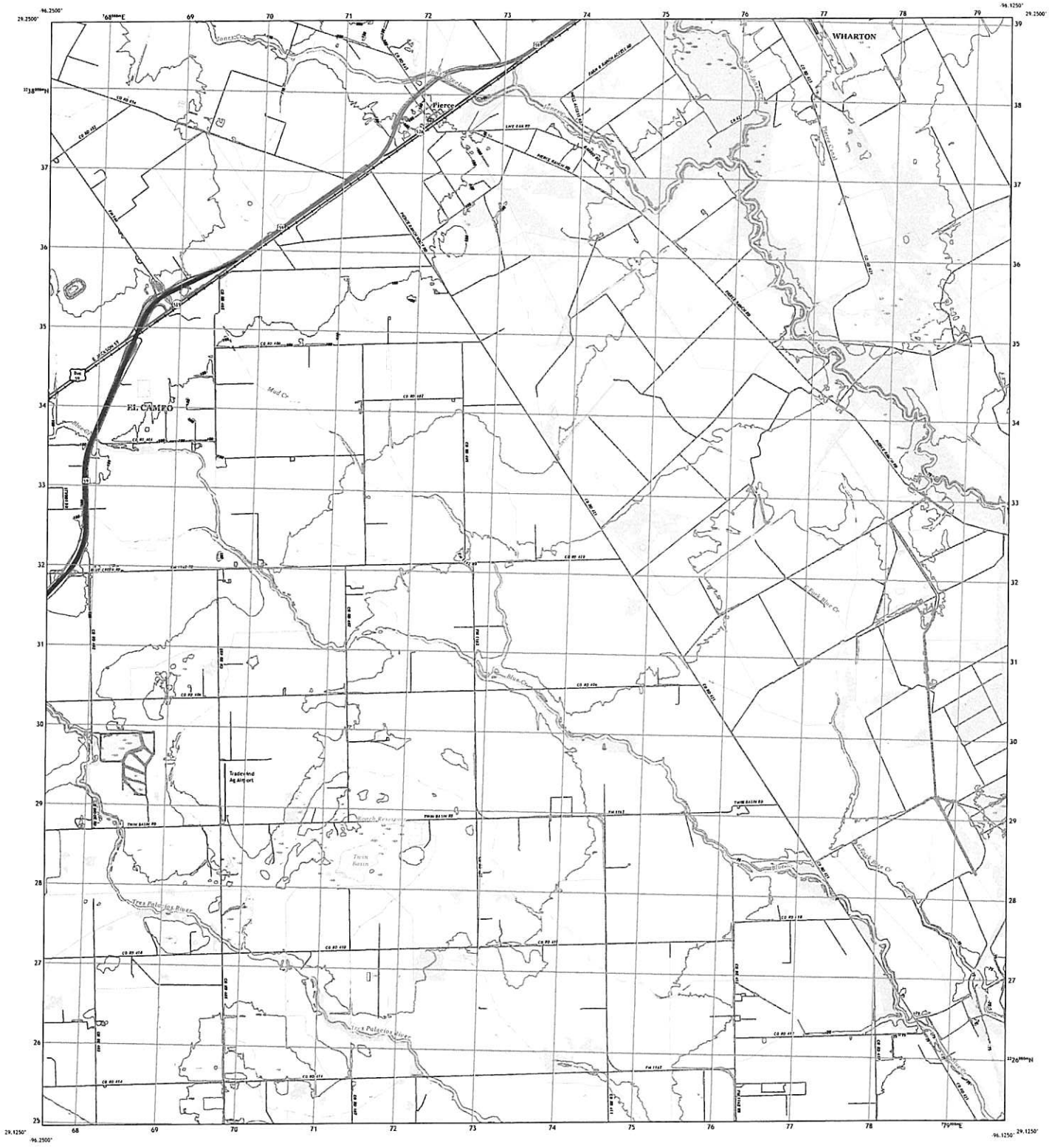
7.5-Minute USGS Topographic Quadrangle Map

Figure A.E.l, 7.5-Minute USGS Topographic Quadrangle Map, is an original 7.5-Minute USGS Topographic Map of the Pierce, Texas Quadrangle. This map shows the major highways, county roads, water bodies, and elevation lines near the property.

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

PIERCE QUADRANGLE
TEXAS - WHARTON COUNTY
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid Universal Transverse Mercator, Zone 14R
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery..... NAIP, September 2016 - November 2016
Roads..... U.S. Census Bureau, 1915 - 2018
Names..... GNIS, 1979 - 2021
Hydrography..... National Hydrography Dataset, 2003 - 2018
Contours..... National Elevation Dataset, 2019
Boundaries..... Multiple sources; see metadata file 2019 - 2021

Wetlands..... FWS National Wetlands Inventory Not Available

UTM GRID AND 2018 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 0 0.5 0 KILOMETERS 1
1000 500 0 METERS 1000 2000
1 0 0.5 0 MILES 1
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard.

TEXAS
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES

1 New Taiton
2 Glen Flora
3 Wharton
4 El Campo
5 Lane City
6 El Campo SE
7 Danevang
8 Lane City SE

ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
State Route	

PIERCE, TX
2022

MAP LAYOUT BY THE NATIONAL MAP

A.F: AFFECTED LANDOWNER INFORMATION

A.F.1 Adjacent Landowners Map

Figure A.F.1 shows the information required in item 1.a. of the Industrial Administrative Report 1.1. Property boundaries were obtained from the Wharton County Appraisal District Interactive Map as of November 2024. The tracts identified on the map correspond to Table A.F. l, below.

A.F.2 Landowners List

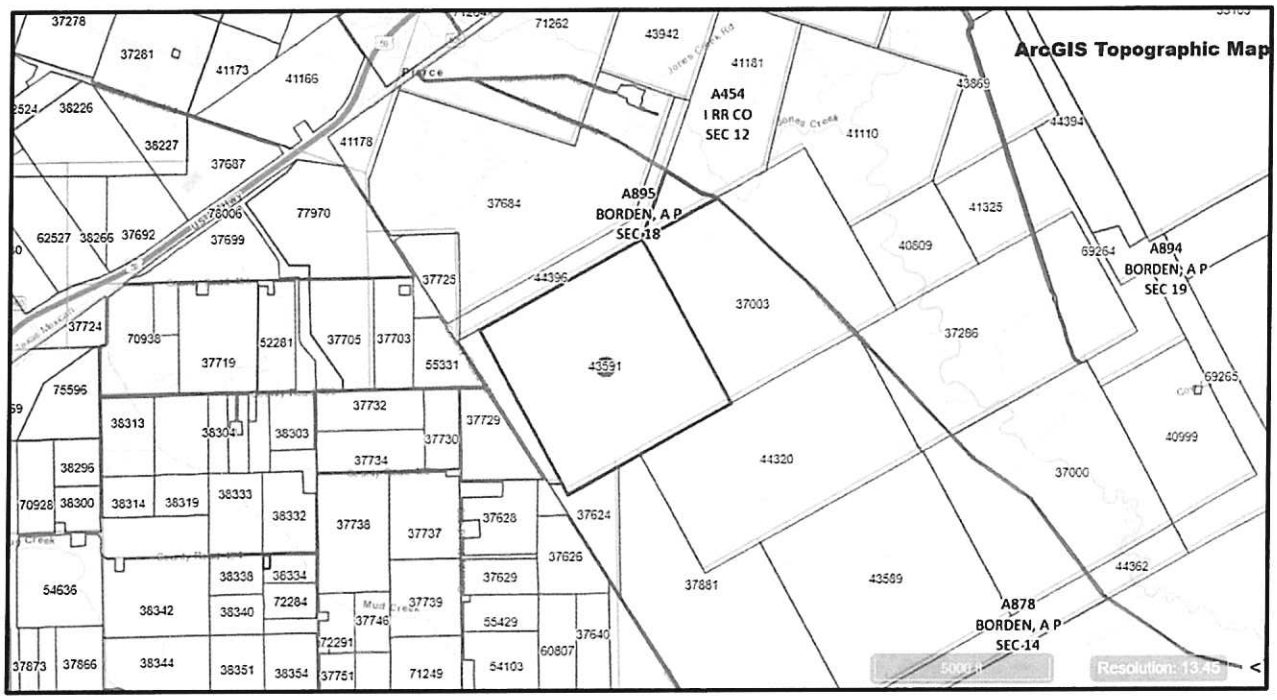
The landowner names and addresses in Table A.F.1 were obtained from the Wharton Appraisal District Property Search web databases, retrieved 11/2024.

Table 1. Adjacent Landowners

Table 1. Adjacent Landowners

Map Property ID	Owner Name	Mailing Address
37703	Kocurek Joseph John	1098 CR 421 El Campo TX 77437
55331	Bartos Vlasta Kocurek	PO BOX 542 El Campo TX 77437
77970	Z&B Ptnrship	1306 AVE K El Campo TX 77437
37640	Zalman Joe A Jr Est 2000 Family Ltd Prtnship	191 Westmoor Rd El Campo TX 77437
41166	Wilbeck M P LLC	205 Silver Saddle Dr Angleton TX 77515
29688	Mcmillan Barbara A & Mcmillan Sherry L	2622 Haverhill Dr Houston TX 77008
29671	Kresta Keith A & Sara	2394 FM 961 Rd Wharton TX 77488
29660	Beard Michael P Etux Kimberley R	558 CR 423 Wharton TX 77488
54782	Beard Rosalie W	774 CR 423 Wharton TX 77488
33103	Boettcher & Quirey	PO BOX 384 East Bernard TX 77435
28650	Buckeye Hamilton M3 Management LP	7 Inwood Cir Bay City TX 77414
28644	Blue Creek Real Properties LLC	1375 Enclave Pkwy Houston TX 77077
39694	Kopecky Anna J Est	8427 Tavenor LN Houston TX 77075

A.F.2 Wharton County Appraisal District Map/Adjacent Landowners Map



PHOTOGRAPH

Photograph Location Map

The Photograph Location Map shows the location of each photograph and the direction the camera was facing when the photograph was taken.

Photograph Location Map



Pierce, Texas Wharton County Wharton AD1, LLC	Photograph Location Map	ENVIRONEER ENGINEERING CONSULTING

ENVIRONEER
ENGINEERING CONSULTING

Texas Land Application Permit (TLAP)
Technical Package

Prepared on: December 17th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

LIST OF FIGURES.....i
LIST OF TABLES.....i
T.A: FACILITY MAPS.....1
T.B: FLOODPLAIN INFORMATION.....8
T.C: AGRONOMIC MANAGEMENT PLAN.....11
T.D: WATER WELL INFORMATION.....13
T.E: GROUNDWATER TECHNICAL REPORT.....16
T.F: SOILS INFORMATION.....18
T.G: ENGINEERING REPORT.....19
T.H: OFF-SITE WASTES.....22
T.I: POLLUTANT ANALYSIS DATA.....23

LIST OF FIGURES

Figure T.A.1: Process Flow Diagram.....2
Figure T.A.2: Vicinity Map.....3
Figure T.A.3: 7.5 Minute USGS Map.....4
Figure T.A.4: Site Map.....5
Figure T.A.5: Production Area Map.....10
Figure T.B.1: FEMA Floodplain Map.....12
Figure T.D.1: Water Well Map.....15
Figure T.E.1: Geologic Atlas Map.....17
Figure T.G.1: Water Balance Calculations.....22
Figure T.G.2: Storage Calculations.....23

LIST OF TABLES

Table T.D.1: Well and Map Information Table.....16

T.A: FACILITY MAPS

T.A.1 Process Flow Diagram

Figure 1, Process Flow Diagram, provides an overall schematic of the plant processes at the site.

T.A.2 Vicinity Map

Figure 2, Vicinity Map, is a general highway map showing the property and several adjacent properties in the area. The facility's location is depicted on the map.

T.A.3 7.5 Minute USGS Map

Figure 3, entitled 7.5 Minute USGS Map, is a seamless, high-quality copy of the 7.5 Minute USGS quadrangle map [Pierce TX quadrangle) that shows the boundary of the land owned, operated, or controlled by the facility and used as part of the application; and all springs, lakes, or ponds located on-site and within 1 mile of the property boundary.

T.A.4 Site Map

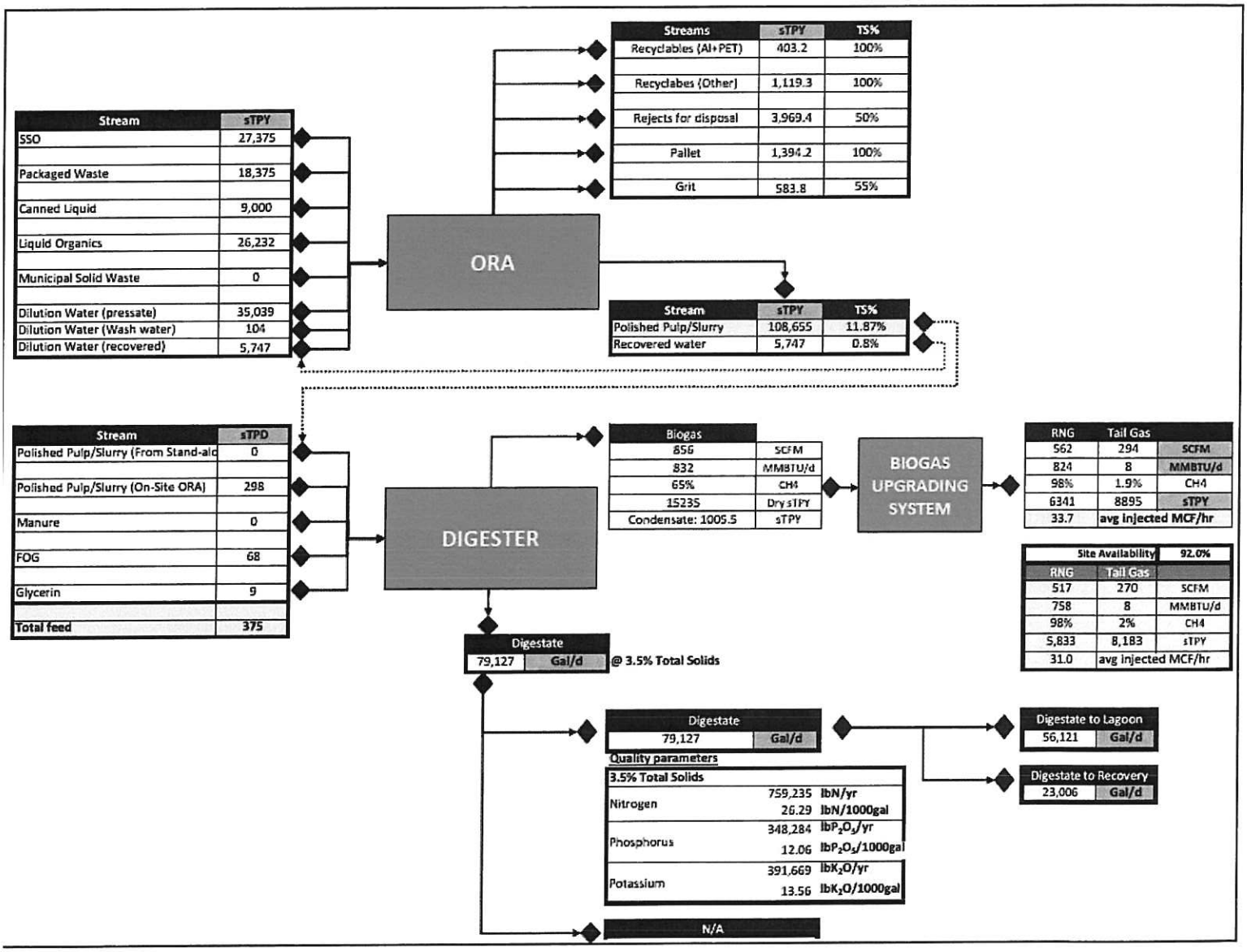
Figure 4, Site Map, is a scaled drawing of the entire property to be permitted showing the locations of the following:

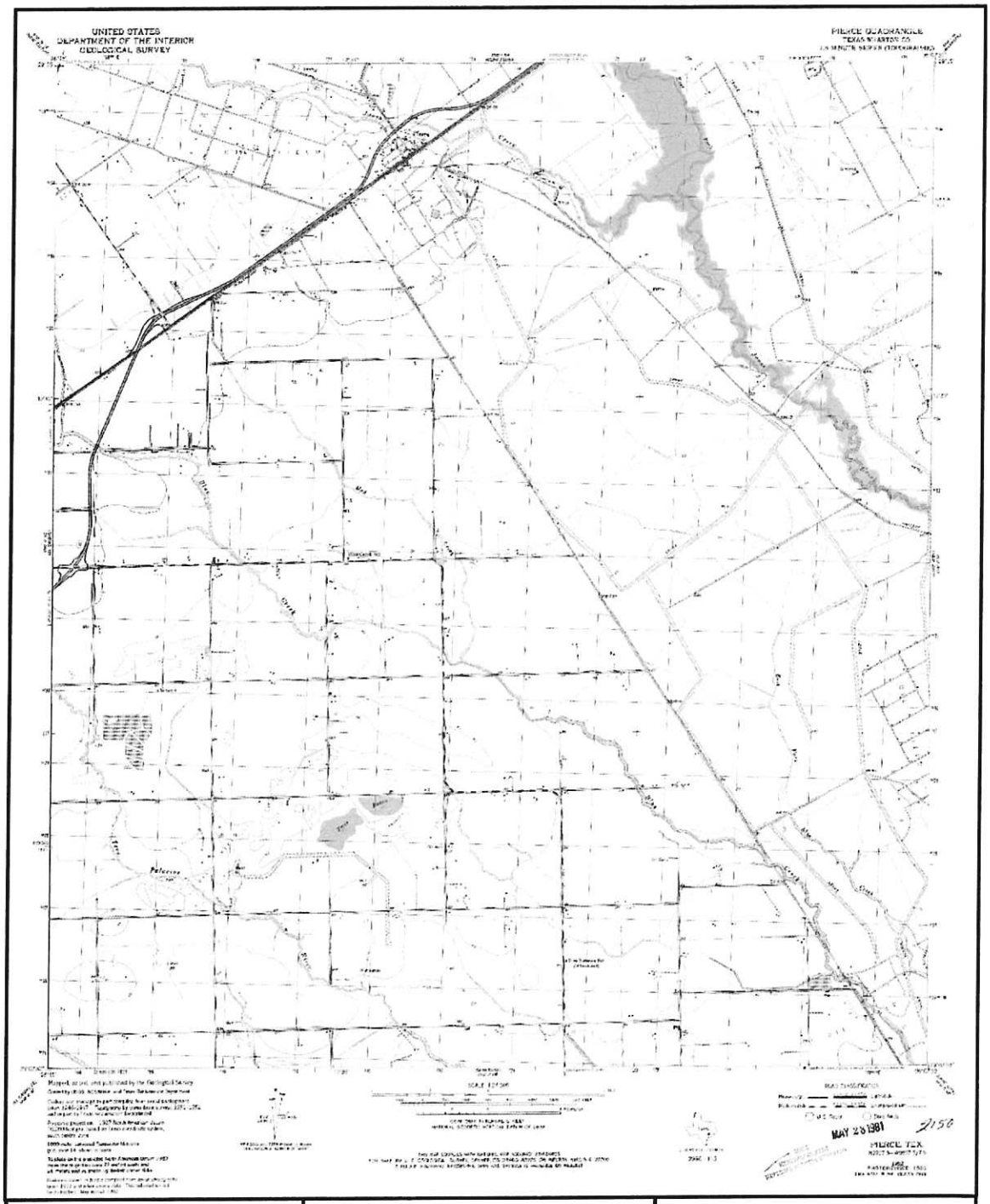
- Digesters
- Hydrolysis tanks
- Heat exchangers
- Transformers
- Containers
- Tank locations
- Loading and off-loading area

T.A.5 Production Area Map

Figure 5, Production Area Map, is a scaled drawing of the production area showing the locations of the digester tanks, organics receiving building, separator & nutrient management building, digestate storage pond, buffer tanks and RNG building

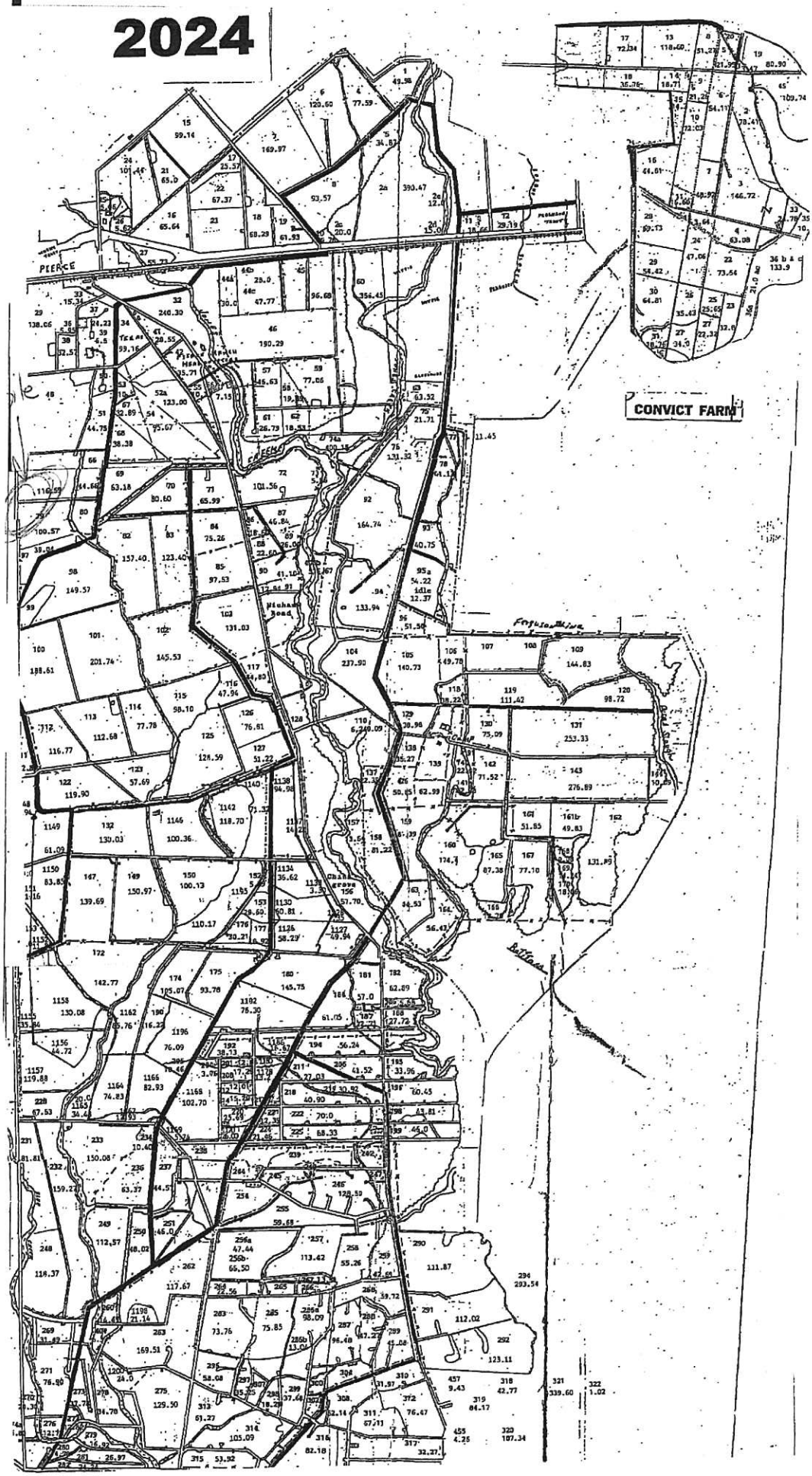
FigT.A.1PROCESS FLOW DIAGRAM





Pierce Ranch, GP Pierce, TX Wharton County	Vicinity Map Pg: 2	ENVIRONEER ENGINEERING CONSULTING

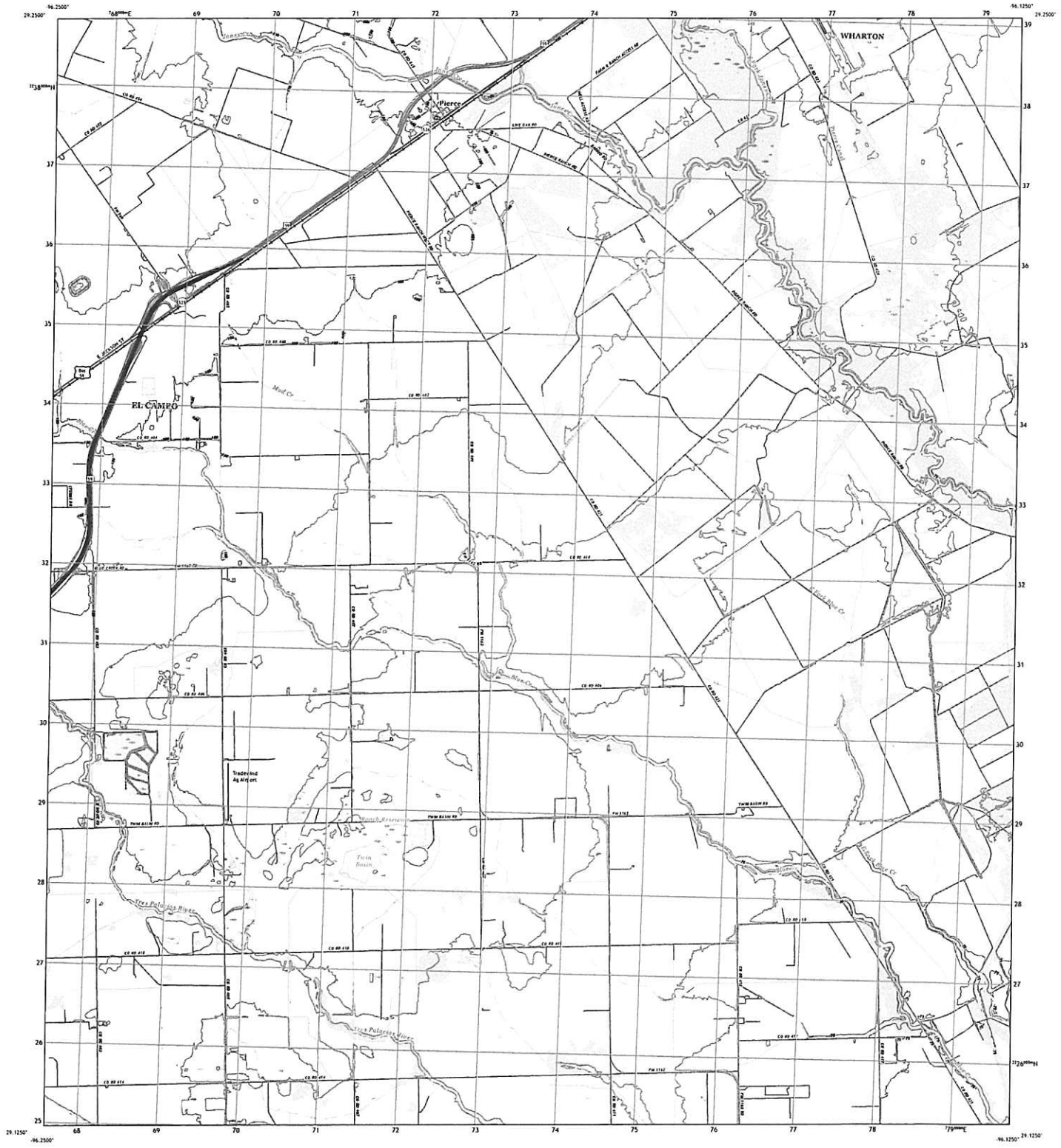
2024



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

PIERCE QUADRANGLE
TEXAS - WHARTON COUNTY
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid Universal Transverse Mercator, Zone 14R
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, September 2016 - November 2016
Roads.....U.S. Census Bureau, 2015 - 2018
Names.....GNIS, 1979 - 2021
Hydrography.....National Hydrography Dataset, 2003 - 2018
Contours.....National Elevation Dataset, 2019
Boundaries.....Multiple sources; see metadata file 2019 - 2021

Wetlands.....FWS National Wetlands Inventory Not Available

UTM GRID AND 2018 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 0 1 KILOMETERS
1 0.5 0 1 MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

TEXAS
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 New Taiton
2 Glen Flora
3 Wharton
4 El Campo
5 Lane City
6 El Campo SE
7 Danevang
8 Lane City SE

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

PIERCE, TX
2022

MAP ID 1035243



Map Generated 12/17/2024

N

W E

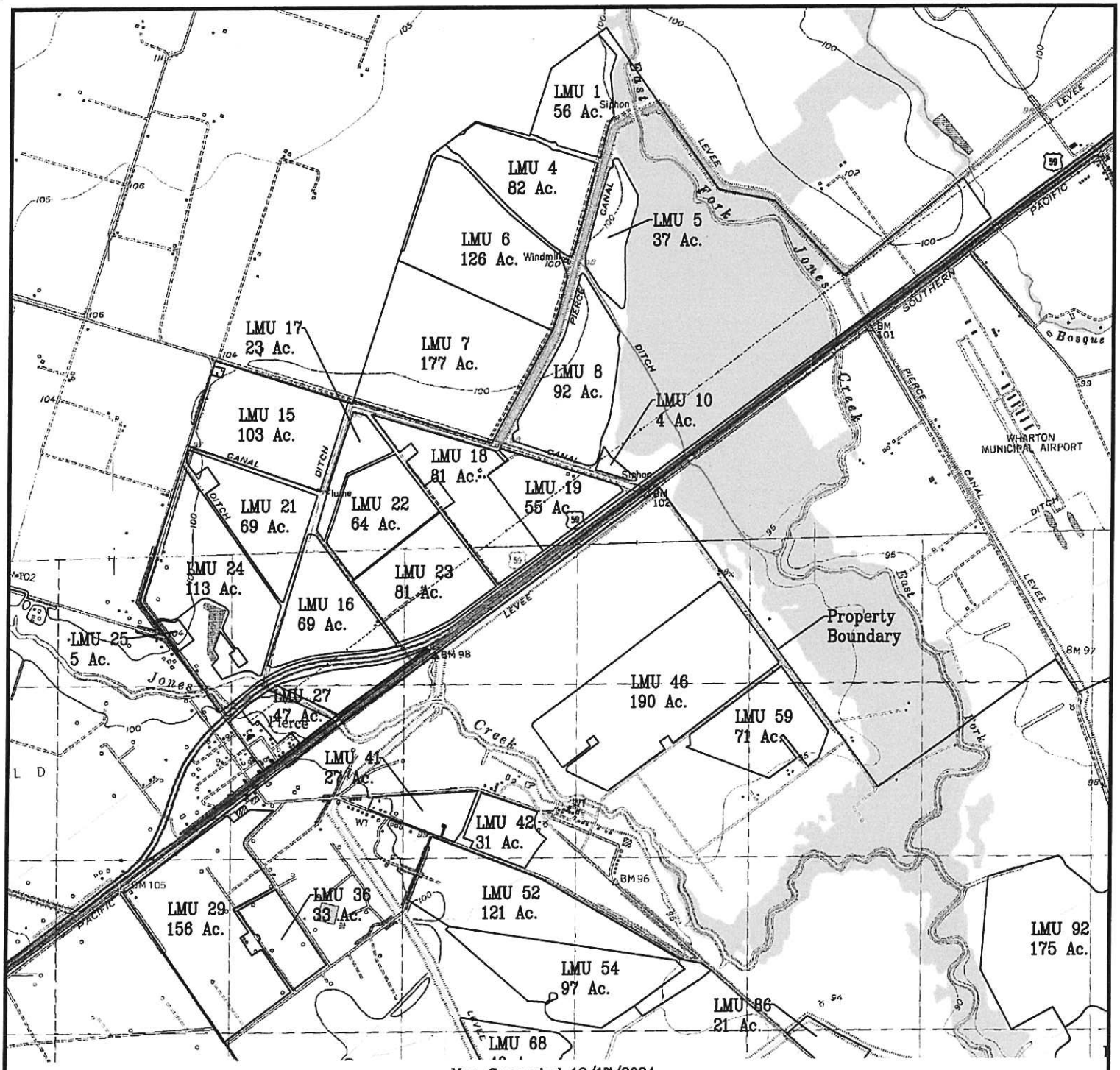
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map A Pg: 2	ENVIROENGINEER ENGINEERING CONSULTING



Map Generated 12/17/2024

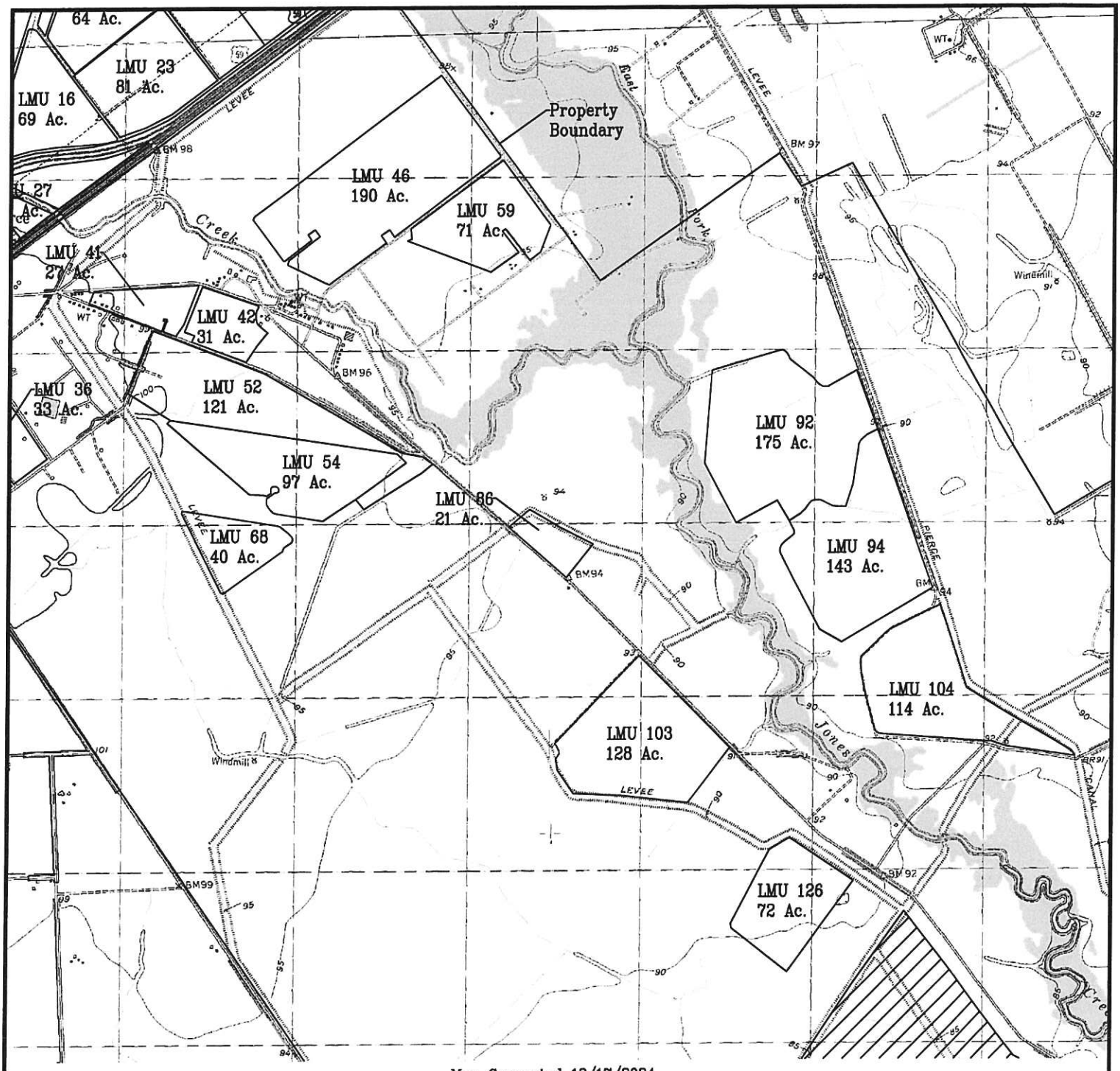
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map B Pg: 3	ENVIRONEER ENGINEERING CONSULTING

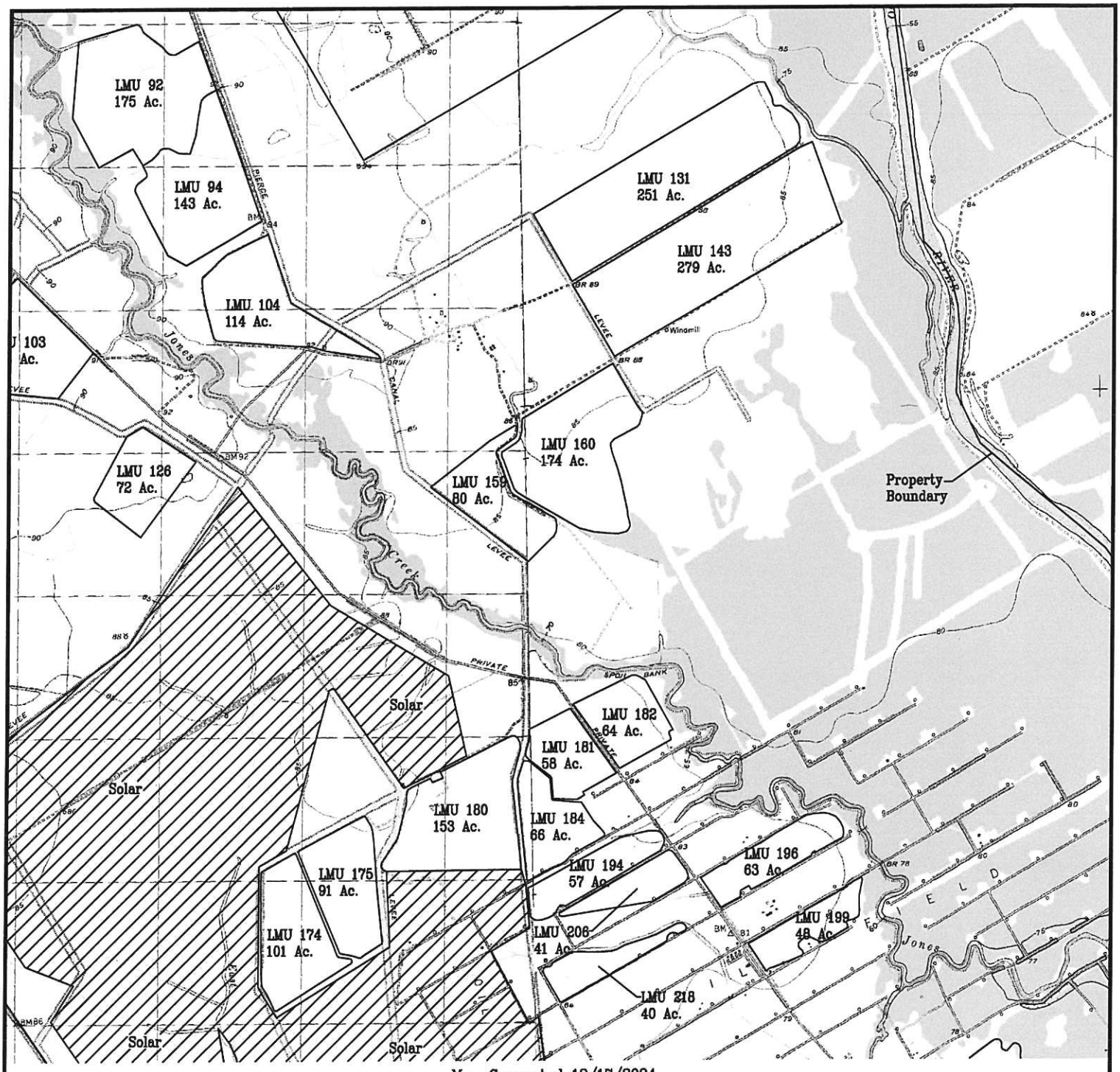


Map Generated 12/17/2024

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map C Pg: 4	ENVIROENGINEER ENGINEERING CONSULTING

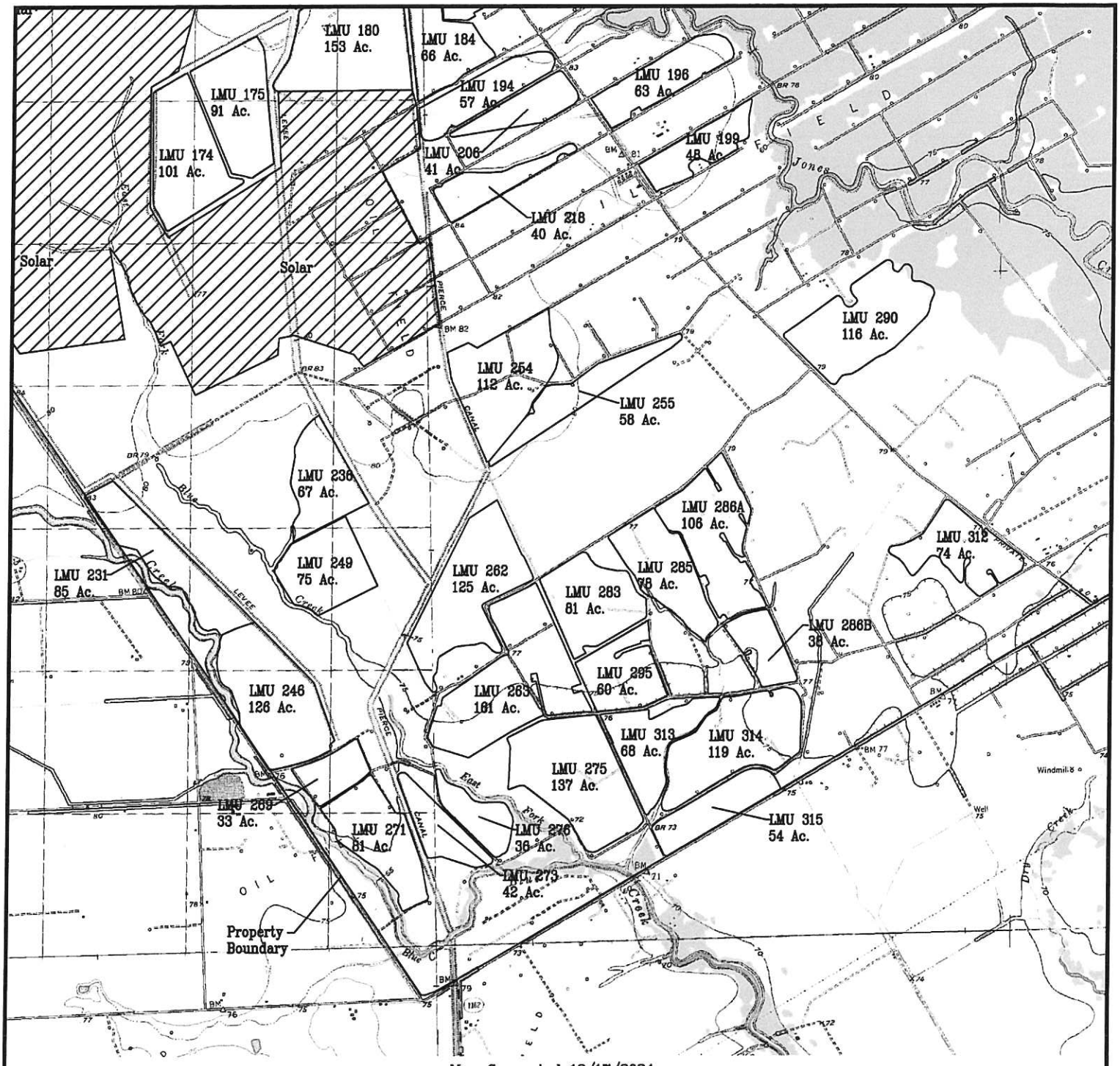


Map Generated 12/17/2024

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map D Pg: 5	ENVIRONEER ENGINEERING CONSULTING



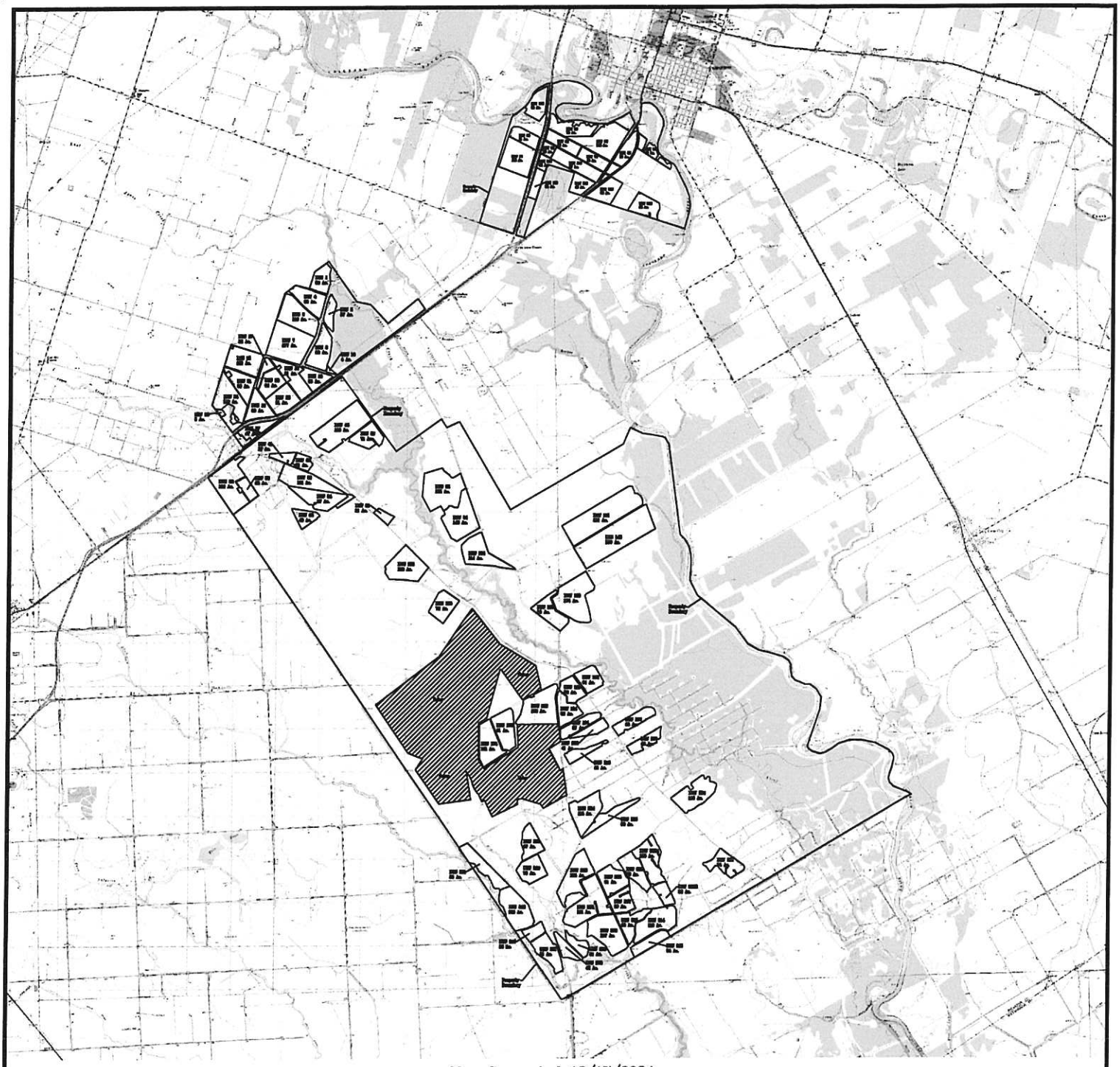
Map Generated 12/17/2024

N
W E
S

1600' 0 1600' 3200'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Production Area Map Pg: 7	ENVIRONEER ENGINEERING CONSULTING

T.B. FLOODPLAIN INFORMATION

FEMA Floodplain Map

Figure 6, FEMA Floodplain Map, shows the production areas and waste disposal areas overlain on a copy of the FEMA map panels for this area of Wharton County.

Protective Measures

According to the FEMA map for Wharton County, the production area and waste disposal areas are not located in a 100-year floodplain and are in an area of minimal flood hazard.

National Flood Hazard Layer FIRMette

FEMA

96°11'56"W 29°13'15"N



96°11'18"W 29°12'44"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Pg: 9 *Basemap Imagery Source: USGS National Map 2023*

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- **SPECIAL FLOOD HAZARD AREAS**
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - Regulatory Floodway
- **OTHER AREAS OF FLOOD HAZARD**
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee, See Notes, *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- **OTHER AREAS**
  - NO SCREEN Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone D*
- **GENERAL STRUCTURES**
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- **OTHER FEATURES**
  - 20.2 Cross Sections with 1% Annual Chance
  - 17.5 Water Surface Elevation
  - Coastal Transect
  - 513 Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- **MAP PANELS**
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/16/2024 at 8:31 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

T.C. AGRONOMIC MANAGEMENT PLAN

TABLE OF CONTENTS

List of Figures

Figure 1: Land Application Map 3

List of Tables

Table 1: Estimated Soil Properties
Table 2: Nutrient Budgets

Attachment A - Permitted Crops for Growing 3

AGRONOMIC MANAGEMENT PLAN

Purpose

This document is in support of the Wharton AD1, LLC land application of wastes as prescribed by the Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). It is the purpose of this Agronomic Management Plan (AMP) to illustrate the beneficial use of the effluent from the proposed facility. All effluent application is managed in a manner that ensures environmental stability and maximum crop production.

This plan is updated on an annual basis to address current soil and waste analysis, climatic data, previous water demands, and proposed crop water usage for the next plan year. Application rate calculations will be developed and maintained on-site for use by the operator to determine application timing and rates.

Background

Wharton AD1, LLC is applying for a TLAP authorization through the TCEQ to beneficially irrigate effluent from the renewable energy facility located near Pierce, Wharton County, Texas. The treated effluent generated is 0.075 MGD. Effluent from the storage pond is land applied on 28,955 acres of irrigated farmland.

General Objectives of AMP

- Present information about the effluent, soils, and crops.
- Present information about crop rotations and yield goals to illustrate the appropriateness of the selected crops for use with this project.
- A description of effluent usage for land application. This will include information pertaining to actual application rates of effluent to meet the crop hydraulic/nutrient demands and maximize crop yield goals.
- An estimation of the annual loading of nutrients supplied by the effluent.
- An overview of wastewater/nutrient storage needed in the soil profile and a pre-plant scenario to serve as a starter fertilizer.
- Monitoring soil profiles to ensure no saturated soils are present within 3 feet of the surface.

Overview

Treated effluent is transferred to the storage lagoon at an average of 0.075 MGD. The treated effluent is distributed to high-production farmland that has been typically planted to bermudagrass and wheat. These crops are intensively managed for maximum production. The stated crop yield goals will be provided by data from the NRCS or from historical data obtained from the farmer.

Management practices are in place and used by the landowner to ensure maximized crop production. High residue crops are utilized, and deep tillage is necessary to maximize the ability of the soils to store and retain water, allowing for maximum root penetration.

All solids produced from this facility will be recycled/disposed of under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). Land application of solid wastes will occur at agronomic rates.

Site Features

The renewable energy facility, associated infrastructure, and irrigation tracts are located in Wharton County, Texas, immediately south of Pierce, Texas. This area is located in south Texas, roughly 65 miles southwest of Houston down the US Highway 59-South.

The regional climate is classified as subtropical humid, with warm summers and mild winters. The growing season averages 268 days. The average annual rainfall is 42 inches and generally occurs during the warm season months of May, June, July, and August.

The majority of the precipitation occurs during the growing seasons for bermudagrass when evapotranspiration is highest. However, optimum yields can only be achieved through supplemental irrigation of the crops due to low rainfall and high evaporative rates. Most cropping systems will require preseason irrigation with growing season application depending upon stored water to produce the maximum yield goals. These are standard operational production practices in this area. To achieve optimum production, the permittee requests preseason irrigation up to 30 days before crop planting. This will allow the facility to manage application events to build up a moisture and nutrient profile in the soil prior to planting. This management tool would reduce the need to use groundwater for pre-water and the costs associated with pre-plant starter fertilizers.

Soils

According to information in the Wharton Soil Survey, soils of the property tract and the surrounding area consist of Dacosta sandy clay loam, Bernard-Edna complex, Edna loam, Lake Charles clay and Bernard loam series. The physical and hydrological properties of these soils are illustrated in Table l below. More soil information can be found in supporting documentation.

Table 1: Estimated Soil Properties

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Total for Area of Interest		**23,766.8**	**100.0%**

As depicted in Table 1, the map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. When calculating the application rates of specific irrigation areas, care will be taken to ensure that these limitations are considered. Specifically, application rates per application event will be decreased with an increase in the total number of events to ensure that the nutrient and water demands of the crops are met.

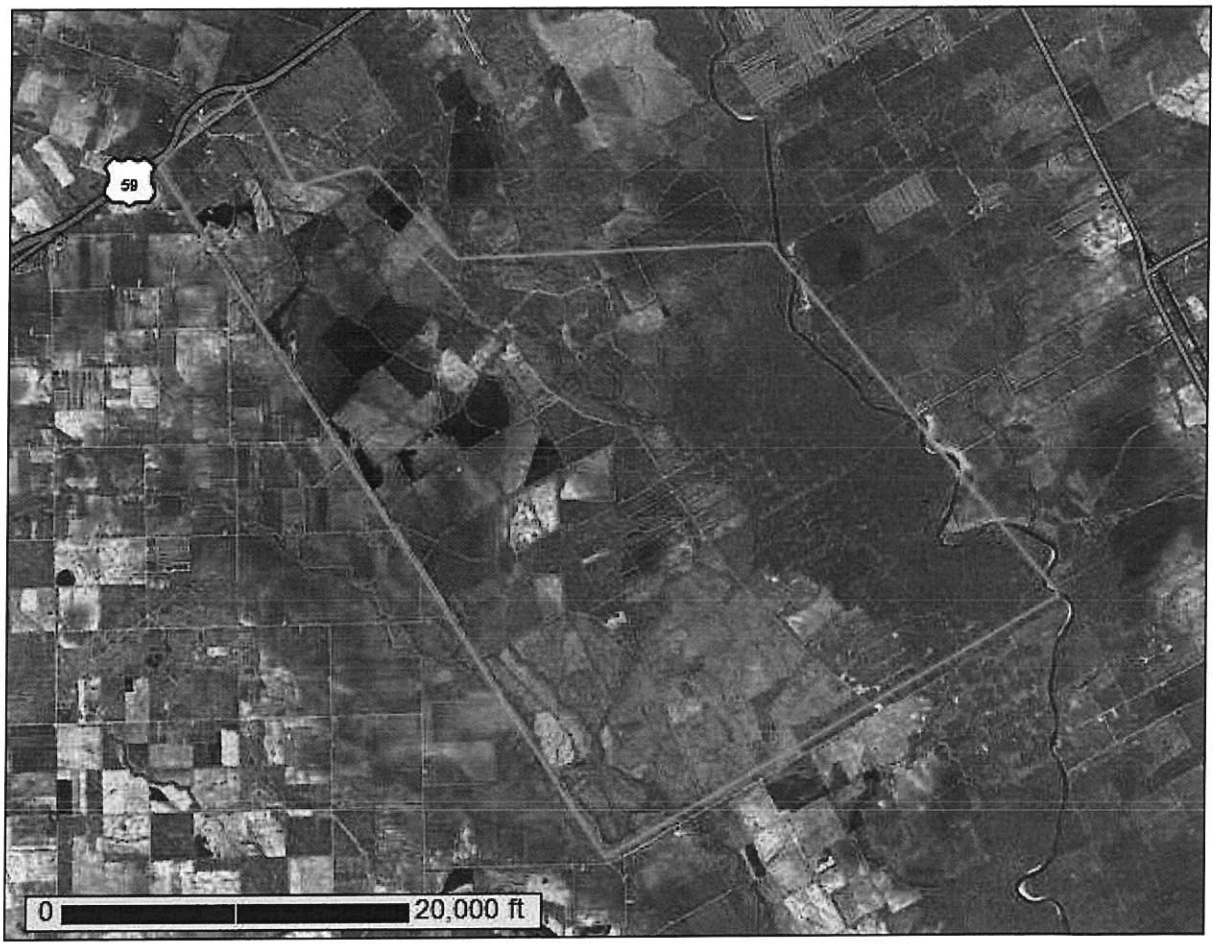
United States Department of Agriculture

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 Wharton County, Texas



February 14, 2025

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface 2
How Soil Surveys Are Made 5
Soil Map 8
Soil Map (Pierce Ranch Boundary) 9
Legend 10
Map Unit Legend (Pierce Ranch Boundary) 11
Map Unit Descriptions (Pierce Ranch Boundary) 11
Wharton County, Texas 14
BcA—Dacosta sandy clay loam, 0 to 1 percent slopes 14
BeA—Bernard-Edna complex, 0 to 1 percent slopes 15
Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded 18
Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes 19
EdA—Edna loam, 0 to 1 percent slopes 21
Eh—Edna silty clay, 0 to 1 percent slopes, overwash 23
EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes 24
LcA—Lake Charles clay, 0 to 1 percent slopes 26
Md—Bernard loam, 0 to 1 percent slopes 28
Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded 29
MidB—Midfield loam, 0 to 2 percent slopes 31
NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded 33
Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes 34
W—Water 37
References 38

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.

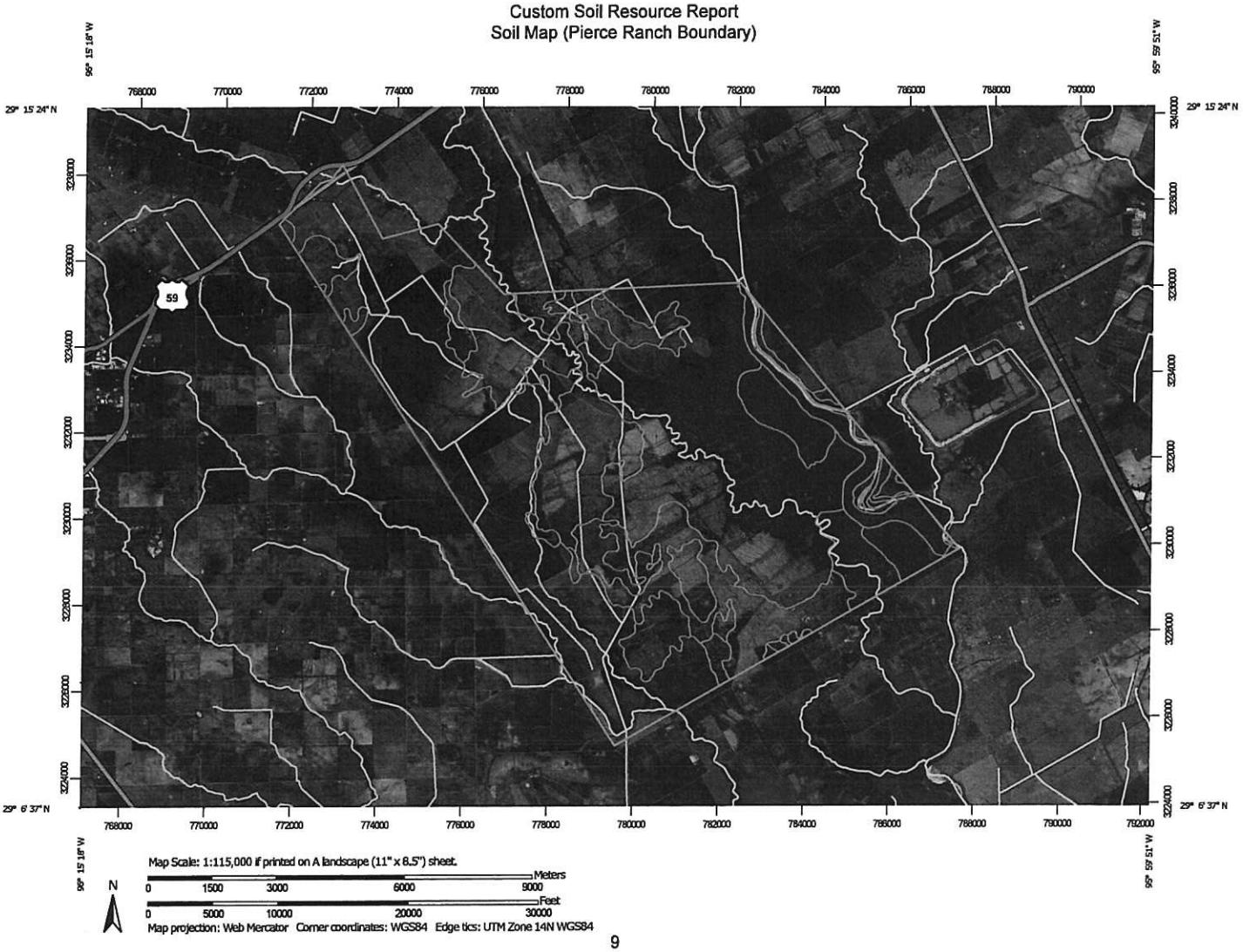
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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.

Custom Soil Resource Report
Soil Map (Pierce Ranch Boundary)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wharton County, Texas
Survey Area Data: Version 20, Aug 30, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 13, 2022—Mar 20, 2022

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.

Map Unit Legend (Pierce Ranch Boundary)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Totals for Area of Interest		**23,766.8**	**100.0%**

Map Unit Descriptions (Pierce Ranch Boundary)

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.

Wharton County, Texas

BcA—Dacosta sandy clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c1
Elevation: 10 to 220 feet
Mean annual precipitation: 30 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dacosta and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dacosta

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: sandy clay loam
Bt1 - 10 to 22 inches: sandy clay loam
Bt2 - 22 to 43 inches: clay
Btk - 43 to 74 inches: sandy clay
2BCt - 74 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Minor Components

Laewest

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Telferner

Percent of map unit: 1 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

BeA—Bernard-Edna complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cg
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 60 percent
Edna and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 6 inches: clay loam
Bt - 6 to 31 inches: clay
Btk1 - 31 to 50 inches: clay
Btk2 - 50 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.9 to 2.4 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Pimple mounds
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 4 to 10 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
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: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Verland

Percent of map unit: 10 percent
Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Lake charles

Percent of map unit: 5 percent
Landform: Flats
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Leton

Percent of map unit: 2 percent
Landform: Meandering channels
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2syc1
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Clemville

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 12 inches: silty clay loam
Bw - 12 to 30 inches: silt loam
Ab - 30 to 50 inches: silty clay
Bb - 50 to 80 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Norwood

Percent of map unit: 10 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2x3y9
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F

Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Tidehaven

Setting

Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 18 inches: fine sandy loam
Bt1 - 18 to 42 inches: clay
Bt2 - 42 to 61 inches: clay loam
2Btk - 61 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 3 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Midfield

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Edna

Percent of map unit: 1 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY542TX - Sandy Loam
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

EdA—Edna loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cc
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex

Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Eh—Edna silty clay, 0 to 1 percent slopes, overwash

Map Unit Setting

National map unit symbol: 2v3cf
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna, overwash, and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna, Overwash

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 11 inches: silty clay
A - 11 to 19 inches: fine sandy loam
Bt1 - 19 to 30 inches: clay loam
Bt2 - 30 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (1.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard
Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno
Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner
Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2vv5p
Elevation: 80 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 280 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Edna and similar soils: 70 percent
Cieno and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: loam
Bt1 - 10 to 20 inches: clay
Bt2 - 20 to 60 inches: clay
Btk - 60 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Description of Cieno

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Early pleistocene loamy fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 7 inches: loam
E/B - 7 to 27 inches: sandy clay loam
Btg1 - 27 to 48 inches: clay loam
Btg2 - 48 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 6.0
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 5 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

LcA—Lake Charles clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c4
Elevation: 20 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lake charles and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lake Charles

Setting

Landform: Backswamps
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 11 inches: clay
Bss - 11 to 53 inches: clay
Bkss1 - 53 to 69 inches: clay
Bkss2 - 69 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.5 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 6 percent
Landform: Meander scars
Landform position (three-dimensional): Talf, rise
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Meander scars
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Cieno, hydric

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Md—Bernard loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: djdp
Elevation: 10 to 150 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 68 to 70 degrees F
Frost-free period: 260 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 52 inches: clay
H3 - 52 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2v39c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Brazoria and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brazoria

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 6 inches: clay
Bss1 - 6 to 35 inches: clay
Bss2 - 35 to 57 inches: clay
Bkss - 57 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 11 percent
Maximum salinity: Nonsaline to slightly saline (0.9 to 6.8 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Minor Components

Pledger

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 3 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Norwood

Percent of map unit: 1 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

MidB—Midfield loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x3y8
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F
Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Midfield

Setting

Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 5 inches: loam
Bt1 - 5 to 32 inches: clay loam
Bt2 - 32 to 40 inches: silty clay
2Btk - 40 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Tidehaven

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Fordtran

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY543TX - Sandy Prairie
Hydric soil rating: No

NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2vv3c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Norwood and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam
Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
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: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Brazoria

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2vv3g
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Mohat and similar soils: 50 percent
Norwood and similar soils: 40 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mohat

Setting

Landform: Bars
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 8 inches: loam
Bw1 - 8 to 29 inches: very fine sandy loam
Bw2 - 29 to 48 inches: loam
Bw3 - 48 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: 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: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam

Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Asa

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Brazoria

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 100 percent

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

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

SOIL ANALYSIS REPORT

CLIENT:	
6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						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
23283	285	0 - 6	7.5		0.11	Lo	1.4	2.7	5	10	141	5	9	3393	558	85	1.4	113	52	2.0	
23284	286A	0 - 6	7.8		0.13	Lo	1.6	2.7	5	9	182	6	11	4782	761	79	1.3	95	83	2.0	
23285	286B	0 - 6	8.0		0.14	Lo	0.9	2.3	4	5	159	6	11	3872	479	44	1.4	80	68	2.1	
23286	290	0 - 6	7.6		0.16	No	1.5	3.6	6	3	228	7	13	4975	1090	103	0.6	110	55	2.1	
23287	295	0 - 6	7.6		0.19	Lo	1.3	7.3	13	4	188	4	7	5522	668	38	0.6	71	50	1.5	
23288	312	0 - 6	7.4		0.11	No	0.9	3.2	6	16	123	9	16	2532	367	35	1.8	164	36	1.8	
23289	313	0 - 6	7.4		0.15	Lo	1.6	6.6	12	11	174	5	9	4614	664	60	1.2	90	59	1.8	
23290	314	0 - 6	6.6		0.14	No	1.5	7.1	13	5	140	4	7	3526	648	74	1.3	98	70	1.6	
23291	315	0 - 6	6.3		0.15	No	1.5	6.3	11	5	144	5	9	3660	726	33	0.9	110	81	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23283	285	0 - 6	11/20/24																		
23284	286A	0 - 6	11/20/24																		
23285	286B	0 - 6	11/20/24																		
23286	290	0 - 6	11/20/24																		
23287	295	0 - 6	11/20/24																		
23288	312	0 - 6	11/20/24																		
23289	313	0 - 6	11/20/24																		
23290	314	0 - 6	11/20/24																		
23291	315	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23283	285																	22	0	2	76	21	2
23284	286A																	31	0	2	77	20	1
23285	286B																	24	0	2	81	17	1
23286	290																	35	0	2	71	26	1
23287	295																	31	0	2	80	18	1
23288	312																	16	0	2	78	19	1
23289	313																	29	0	2	79	19	1
23290	314																	24	0	2	74	23	1
23291	315																	25	0	1	74	24	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23283, 23284, 23285, 23286, 23287, 23288, 23289, 23290, 23291
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23283					
23284					
23285					
23286					
23287					
23288					
23289					
23290					
23291					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman Mullin

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/19/24
Date Shipped: 11/22/24

484

Lab Use	Sample ID/Description	Depth	Crop	YG	Test Requested
23228	1 2 Convict	0 to 6			TCEQ Complete
23229	2 3 Convict	0 to 6			
23230	3 4 Convict	0 to 6			
23231	4 6 Convict	0 to 6			
23232	5 7 Convict	0 to 6			
23233	6 8 Convict	0 to 6			
23234	7 9 Convict	0 to 6			
23235	8 10 Convict	0 to 6			
23236	9 14 Convict	0 to 6			
23237	10 16 Convict	0 to 6			
23238	11 18 Convict	0 to 6			
23239	12 19 Convict	0 to 6			
23240	13 30 Convict	0 to 6			
23241	14 36 Convict	0 to 6			
	15	0 to 6			
	16	0 to 6			
	17	0 to 6			
	18	0 to 6			
	19	0 to 6			
	20	0 to 6			
	21	0 to 6			
	22	0 to 6			
	23	0 to 6			
	24	0 to 6			
	25	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/22 9am	Date/Time:
Received By:	Received By: Kathryn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT:	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118
6224	

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23203	1	0 - 6	6.7		0.14	No	1.6	2.1	4	35	218	5	9	4153	669	52	0.8	132	66	2.0	
23204	4	0 - 6	6.1		0.13	No	1.7	3.4	6	27	204	5	9	3693	560	42	0.6	171	74	2.1	
23205	5	0 - 6	7.7		0.18	No	1.6	3.1	6	7	236	9	16	4638	868	97	0.6	117	72	2.3	
23206	6	0 - 6	6.3		0.16	No	1.7	9.8	18	19	199	6	11	4083	652	43	0.5	108	64	1.9	
23207	7	0 - 6	6.9		0.15	No	1.8	3.5	6	20	274	8	14	5272	864	65	0.6	110	64	2.0	
23208	8	0 - 6	7.4		0.22	Lo	1.9	7.1	13	16	290	13	23	5936	1094	117	0.8	128	83	2.1	
23209	10	0 - 6	6.4		0.18	No	2.8	1.5	3	4	305	8	14	4633	775	52	0.9	127	34	2.2	
23210	13	0 - 6	8.2		0.28	Hi	1.7	5.8	10	11	320	7	13	7967	437	39	0.8	78	73	2.4	
23211	15	0 - 6	6.7		0.22	No	1.7	6.5	12	10	257	8	14	5013	980	89	0.8	126	62	2.2	
23212	16	0 - 6	6.6		0.27	No	2.1	11.6	21	6	280	7	13	4652	1210	94	1.0	130	70	2.1	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23203	1	0 - 6	11/20/24																		
23204	4	0 - 6	11/20/24																		
23205	5	0 - 6	11/20/24																		
23206	6	0 - 6	11/20/24																		
23207	7	0 - 6	11/20/24																		
23208	8	0 - 6	11/20/24																		
23209	10	0 - 6	11/20/24																		
23210	13	0 - 6	11/20/24																		
23211	15	0 - 6	11/20/24																		
23212	16	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH

FIELD ID: NORMAN MULLIN

FERTILIZER RECOMMENDATIONS:

POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23203	1																
23204	4																
23205	5																
23206	6																
23207	7																
23208	8																
23209	10																
23210	13																
23211	15																
23212	16																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
27	0	2	77	21	1
24	0	2	77	20	1
31	0	2	74	23	1
27	0	2	77	20	1
33	0	2	79	22	1
35	0	2	71	26	1
31	0	3	76	21	1
30	0	3	84	12	1
34	0	2	73	24	1
34	0	2	67	29	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23203, 23204, 23205, 23206, 23207, 23208, 23209, 23210, 23211, 23212
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s):23210
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23203					
23204					
23205					
23206					
23207					
23208					
23209					
23210					
23211					
23212					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23233	8 CONVICT	0 - 6	8.3		0.25	Hi	1.7	10.2	18	22	376	9	16	7383	414	32	1.4	68	80	2.5	
23234	9 CONVICT	0 - 6	8.3		0.18	Hi	1.6	5.1	9	20	240	6	11	6721	263	30	0.7	67	90	2.1	
23235	10 CONVICT	0 - 6	7.4		0.15	Lo	1.5	2.7	5	29	182	3	5	4592	371	21	0.5	94	53	1.9	
23236	14 CONVICT	0 - 6	8.4		0.18	Hi	1.8	3.7	7	23	313	10	18	7342	363	28	1.6	77	76	3.0	
23237	16 CONVICT	0 - 6	7.4		0.13	Lo	1.5	1.8	3	28	235	4	7	5551	480	28	0.5	100	45	2.1	
23238	18 CONVICT	0 - 6	8.4		0.24	Hi	1.2	2.9	5	10	194	6	11	6525	279	23	0.5	70	70	2.3	
23239	19 CONVICT	0 - 6	8.2		0.30	Hi	3.3	2.5	5	14	463	10	18	6856	322	27	2.2	70	24	2.8	
23240	30 CONVICT	0 - 6	8.2		0.27	Hi	2.4	3.4	6	6	261	6	11	7543	328	24	0.9	72	58	2.3	
23241	36 CONVICT	0 - 6	8.2		0.32	Hi	1.9	5.9	11	14	336	11	20	7762	385	24	0.9	65	64	2.3	
23242	52	0 - 6	7.1		0.17	No	3.4	2.1	4	3	209	6	11	3485	434	40	1.6	42	11	0.7	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23233	8 CONVICT	0 - 6	11/19/24																		
23234	9 CONVICT	0 - 6	11/19/24																		
23235	10 CONVICT	0 - 6	11/19/24																		
23236	14 CONVICT	0 - 6	11/19/24																		
23237	16 CONVICT	0 - 6	11/19/24																		
23238	18 CONVICT	0 - 6	11/19/24																		
23239	19 CONVICT	0 - 6	11/19/24																		
23240	30 CONVICT	0 - 6	11/19/24																		
23241	36 CONVICT	0 - 6	11/19/24																		
23242	52	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH

FIELD ID: NORMAN MULLIN

FERTILIZER RECOMMENDATIONS:

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	POUNDS ACTUAL NUTRIENT PER ACRE N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity CEC	%H	%K	%Ca	%Mg	%Na
23233	8 CONVICT																	30	0	3	85	12	0
23234	9 CONVICT																	28	0	2	89	8	0
23235	10 CONVICT																	27	0	2	86	12	0
23236	14 CONVICT																	29	0	3	86	10	0
23237	16 CONVICT																	30	0	2	84	13	0
23238	18 CONVICT																	28	0	2	90	8	0
23239	19 CONVICT																	29	0	4	86	9	0
23240	30 CONVICT																	29	0	2	88	10	0
23241	36 CONVICT																	29	0	3	86	11	0
23242	52																	22	0	2	80	17	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23233, 23234, 23235, 23236, 23237, 23238, 23239, 23240, 23241, 23242
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s):23233, 23234, 23236, 23238, 23239, 23240, 23241
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH

FIELD ID: NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23233					
23234					
23235					
23236					
23237					
23238					
23239					
23240					
23241					
23242					

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: Amy Meier, Data Review Coordinator

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:	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118
6224	

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23213	17	0 - 6	7.2		0.20	No	1.7	4.9	9	43	292	8	14	5779	720	42	0.9	144	65	2.3	
23214	18	0 - 6	6.7		0.21	No	1.7	6.7	12	8	298	9	16	4801	1260	106	0.6	119	73	2.1	
23215	19	0 - 6	6.6		0.22	No	1.7	6.8	12	10	262	8	14	5017	1172	104	0.9	121	69	2.6	
23216	21	0 - 6	6.8		0.21	No	1.9	7.1	13	10	277	6	11	4795	1013	68	0.6	127	69	1.9	
23217	22	0 - 6	8.1		0.31	Hi	1.9	7.0	13	23	388	8	14	8045	371	28	0.9	82	83	2.9	
23218	23	0 - 6	6.4		0.26	No	3.1	4.7	8	5	258	8	14	4526	1123	121	0.6	176	77	1.9	
23219	24	0 - 6	7.4		0.25	Lo	2.1	4.5	8	14	320	11	20	6609	1046	66	0.7	94	62	1.5	
23220	25	0 - 6	7.0		0.22	No	1.7	6.2	11	13	306	8	14	4721	1036	174	0.6	111	65	1.9	
23221	27	0 - 6	8.1		0.25	Hi	2.6	4.8	9	8	323	6	11	7785	323	33	0.9	85	62	2.7	
23222	28	0 - 6	8.0		0.20	Lo	1.7	2.6	5	22	207	9	16	6182	422	31	0.5	91	40	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23213	17	0 - 6	11/20/24																		
23214	18	0 - 6	11/20/24																		
23215	19	0 - 6	11/20/24																		
23216	21	0 - 6	11/20/24																		
23217	22	0 - 6	11/20/24																		
23218	23	0 - 6	11/20/24																		
23219	24	0 - 6	11/20/24																		
23220	25	0 - 6	11/20/24																		
23221	27	0 - 6	11/20/24																		
23222	28	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

Amy Meier

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:	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118
6224	

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23213	17																	32	0	2	90	19	1
23214	18																	36	0	2	67	29	1
23215	19																	36	0	2	70	27	1
23216	21																	33	0	2	72	25	1
23217	22																	29	0	3	86	11	0
23218	23																	33	0	2	68	28	2
23219	24																	35	0	2	72	25	1
23220	25																	34	0	2	70	26	2
23221	27																	29	0	3	87	9	1
23222	28																	29	0	2	86	12	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23213, 23214, 23215, 23216, 23217, 23218, 23219, 23220, 23221, 23222
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s):23217, 23221
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23213					
23214					
23215					
23216					
23217					
23218					
23219					
23220					
23221					
23222					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20 - 11/21/24
Date Shipped: 11/22/24

284

Lab Use	Sample ID/Description		Depth	Crop	YG	Test Requested
23242	1	52	0 to 6			
23243	2	54	0 to 6			
23244	3	59	0 to 6			
23245	4	68	0 to 6			
23246	5	86	0 to 6			
23247	6	92	0 to 6			
23248	7	94	0 to 6			
23249	8	103	0 to 6			
23250	9	104	0 to 6			
23251	10	126	0 to 6			
23252	11	131	0 to 6			
23253	12	143	0 to 6			
23254	13	159	0 to 6			
23255	14	160	0 to 6			
23256	15	174	0 to 6			
23257	16	175	0 to 6			
23258	17	180	0 to 6			
23259	18	181	0 to 6			
23260	19	182	0 to 6			
23261	20	184	0 to 6			
23262	21	194	0 to 6			
23263	22	196	0 to 6			
23264	23	199	0 to 6			
23265	24	206	0 to 6			
23266	25	218	0 to 6			

Relinquished By:
Company:
Date/Time:
Received By:
Company:

Relinquished By:
Company:
Date/Time: 11/25 9am
Received By: Kaitlyn
Company:

Relinquished By:
Company:
Date/Time:
Received By:
Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						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
23243	54	0 - 6	7.0		0.22	No	2.9	3.7	7	7	238	10	18	3648	609	71	1.1	124	33	2.3	
23244	59	0 - 6	7.3		0.20	No	2.5	<1.0	<2	4	207	6	11	3632	726	74	0.7	124	42	1.9	
23245	68	0 - 6	6.0		0.14	No	3.6	6.9	12	9	305	9	16	2993	580	49	2.2	178	42	2.1	
23246	86	0 - 6	6.4		0.17	No	1.9	22.1	40	22	178	8	14	3400	532	53	1.5	144	79	2.4	
23247	92	0 - 6	6.4		0.15	No	1.7	11.6	21	18	199	9	16	2908	637	63	1.9	184	70	2.2	
23248	94	0 - 6	6.6		0.08	No	1.0	4.0	7	12	117	6	11	1756	422	46	1.9	216	32	1.3	
23249	103	0 - 6	5.9		0.07	No	1.7	1.1	<2	5	63	6	11	1008	235	49	0.8	264	40	1.0	
23250	104	0 - 6	5.6		0.07	No	1.2	2.3	4	6	82	5	9	624	161	36	0.9	288	27	0.8	
23251	126	0 - 6	6.8		0.09	No	1.3	2.6	5	6	100	5	9	1832	359	47	1.0	152	62	1.4	
23252	131	0 - 6	7.4		0.14	No	1.7	2.3	4	12	221	6	11	4500	953	92	1.0	111	69	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23243	54	0 - 6	11/20/24																		
23244	59	0 - 6	11/20/24																		
23245	68	0 - 6	11/20/24																		
23246	86	0 - 6	11/20/24																		
23247	92	0 - 6	11/20/24																		
23248	94	0 - 6	11/20/24																		
23249	103	0 - 6	11/20/24																		
23250	104	0 - 6	11/20/24																		
23251	126	0 - 6	11/20/24																		
23252	131	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH

FIELD ID: NORMAN MULLIN

FERTILIZER RECOMMENDATIONS:

POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23243	54																
23244	59																
23245	68																
23246	86																
23247	92																
23248	94																
23249	103																
23250	104																
23251	126																
23252	131																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
24	0	3	75	21	1
25	0	2	72	24	1
21	0	4	72	23	1
22	0	2	77	20	1
21	0	2	70	26	1
13	0	2	69	27	2
7	0	2	68	27	3
5	0	4	65	28	3
13	0	2	73	24	2
31	0	2	72	25	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23243, 23244, 23245, 23246, 23247, 23248, 23249, 23250, 23251, 23252
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23243					
23244					
23245					
23246					
23247					
23248					
23249					
23250					
23251					
23252					

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: Amy Meier, Data Review Coordinator

11/26/2024 4:02 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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Harmon

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20-11/21/24
Date Shipped: 11/22/24

3874

Lab Use		Sample ID/Description	Depth	Crop	YG	Test Requested
23267	1	231	0 to 6			
23268	2	234	0 to 6			
23269	3	246	0 to 6			
23270	4	248	0 to 6			
23271	5	249	0 to 6			
23272	6	254	0 to 6			
23273	7	255	0 to 6			
23274	8	262	0 to 6			
23275	9	263	0 to 6			
23276	10	269	0 to 6			
23277	11	271	0 to 6			
23278	12	273	0 to 6			
23279	13	275	0 to 6			
23280	14	276	0 to 6			
23281	15	278	0 to 6			
23282	16	283	0 to 6			
23283	17	285	0 to 6			
23284	18	286a	0 to 6			
23285	19	286b	0 to 6			
23286	20	290	0 to 6			
23287	21	295	0 to 6			
23288	22	312	0 to 6			
23289	23	313	0 to 6			
23290	24	314	0 to 6			
23291	25	315	0 to 6			

Relinquished By: _____ Company: _____ Date/Time: _____ Received By: _____ Company: _____

Relinquished By: _____ Company: _____ Date/Time: 11/25 8am Received By: Catelyn Company: _____

Relinquished By: _____ Company: _____ Date/Time: _____ Received By: _____ Company: _____

Comments: _____

SOIL ANALYSIS REPORT

CLIENT:	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118
6224	

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23223	29	0 - 6	8.1		0.21	Hi	1.8	4.5	8	21	248	6	11	7040	303	24	0.6	79	60	2.1	
23224	36	0 - 6	6.9		0.21	No	4.1	1.6	3	8	334	9	16	4684	793	88	1.5	111	60	1.8	
23225	41	0 - 6	6.8		0.18	No	4.2	3.2	6	5	322	9	16	4688	820	100	1.7	138	39	2.2	
23226	42	0 - 6	7.0		0.16	No	2.5	7.5	14	18	164	7	13	3909	593	62	1.2	129	41	1.6	
23227	46	0 - 6	6.6		0.10	No	2.7	1.1	<2	4	203	9	16	3227	911	88	0.6	122	26	1.4	
23228	2 CONVICT	0 - 6	8.1		0.33	Hi	2.0	10.3	19	13	358	7	13	8209	417	31	0.8	77	70	3.1	
23229	3 CONVICT	0 - 6	8.1		0.28	Hi	1.8	5.6	10	11	285	6	11	7826	491	34	0.6	72	53	2.3	
23230	4 CONVICT	0 - 6	7.3		0.14	Lo	2.7	<1.0	<2	5	180	4	7	5867	373	32	0.6	103	31	2.7	
23231	6 CONVICT	0 - 6	8.2		0.21	Hi	1.8	4.6	8	22	324	7	13	7513	478	38	0.8	91	84	2.7	
23232	7 CONVICT	0 - 6	7.7		0.18	Lo	1.7	5.8	10	28	260	6	11	5874	511	31	0.8	112	76	3.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23223	29	0 - 6	11/20/24																		
23224	36	0 - 6	11/20/24																		
23225	41	0 - 6	11/20/24																		
23226	42	0 - 6	11/20/24																		
23227	46	0 - 6	11/20/24																		
23228	2 CONVICT	0 - 6	11/19/24																		
23229	3 CONVICT	0 - 6	11/19/24																		
23230	4 CONVICT	0 - 6	11/19/24																		
23231	6 CONVICT	0 - 6	11/19/24																		
23232	7 CONVICT	0 - 6	11/19/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH

FIELD ID: NORMAN MULLIN

FERTILIZER RECOMMENDATIONS:

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			POUNDS ACTUAL NUTRIENT PER ACRE										Cation Exchange Capacity					
				6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	CEC	%H	%K	%Ca	%Mg	%Na
23223	29																	28	0	2	88	9	0
23224	36																	31	0	3	75	21	1
23225	41																	32	0	3	74	22	1
23226	42																	25	0	2	78	20	1
23227	46																	25	0	2	66	31	2
23228	2 CONVICT																	30	0	3	85	12	0
23229	3 CONVICT																	30	0	2	83	14	0
23230	4 CONVICT																	29	0	2	87	11	0
23231	6 CONVICT																	30	0	3	83	13	1
23232	7 CONVICT																	30	0	2	83	14	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23223, 23224, 23225, 23226, 23227, 23228, 23229, 23230, 23231, 23232
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s):23223, 23228, 23229, 23231
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23223					
23224					
23225					
23226					
23227					
23228					
23229					
23230					
23231					
23232					

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: Amy Meier, Data Review Coordinator

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:	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118
6224	

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23253	143	0 - 6	6.6		0.17	No	2.0	3.8	7	12	249	8	14	4276	917	70	1.9	123	94	2.1	
23254	159	0 - 6	6.7		0.14	No	1.7	2.5	5	17	207	8	14	3566	830	82	1.4	158	89	2.4	
23255	160	0 - 6	7.3		0.17	No	1.6	3.7	7	8	191	9	16	3152	654	126	1.0	115	91	2.2	
23256	174	0 - 6	6.9		0.16	No	1.0	10.3	19	23	156	10	18	1759	394	53	0.7	288	22	1.7	
23257	175	0 - 6	7.2		0.11	No	0.8	2.3	4	18	109	9	16	1353	276	52	0.9	219	17	1.2	
23258	180	0 - 6	7.2		0.16	No	1.5	6.2	11	9	178	10	18	2735	481	53	0.9	151	70	1.9	
23259	181	0 - 6	7.0		0.10	No	1.3	4.3	8	7	147	6	11	3507	814	79	0.5	110	68	2.1	
23260	182	0 - 6	7.7		0.16	No	1.0	3.0	5	8	183	5	9	4517	857	75	0.4	90	41	1.7	
23261	184	0 - 6	7.3		0.13	No	1.0	4.2	8	5	139	6	11	3151	628	69	0.6	101	69	2.1	
23262	194	0 - 6	7.9		0.22	Lo	1.3	3.0	5	6	198	6	11	4841	716	76	1.0	101	92	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23253	143	0 - 6	11/20/24																		
23254	159	0 - 6	11/20/24																		
23255	160	0 - 6	11/20/24																		
23256	174	0 - 6	11/20/24																		
23257	175	0 - 6	11/20/24																		
23258	180	0 - 6	11/20/24																		
23259	181	0 - 6	11/20/24																		
23260	182	0 - 6	11/20/24																		
23261	184	0 - 6	11/20/24																		
23262	194	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

Amy Meier

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity CEC	%H	%K	%Ca	%Mg	%Na
23253	143																	30	0	2	71	26	1
23254	159																	26	0	2	70	27	1
23255	160																	22	0	2	71	24	2
23256	174																	13	0	3	69	26	2
23257	175																	10	0	3	71	24	2
23258	180																	18	0	2	74	22	1
23259	181																	25	0	2	70	27	1
23260	182																	31	0	2	74	23	1
23261	184																	22	0	2	73	24	1
23262	194																	31	0	2	78	19	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23253, 23254, 23255, 23256, 23257, 23258, 23259, 23260, 23261, 23262
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23253					
23254					
23255					
23256					
23257					
23258					
23259					
23260					
23261					
23262					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23263	196	0 - 6	7.9		0.20	No	1.5	2.3	4	9	273	6	11	5717	1095	111	0.7	108	85	2.3	
23264	199	0 - 6	7.5		0.18	No	1.7	2.4	4	8	235	7	13	5093	978	92	0.7	105	87	2.3	
23265	206	0 - 6	7.6		0.16	No	1.2	1.6	3	6	210	7	13	4763	875	96	0.8	104	75	2.3	
23266	218	0 - 6	7.2		0.15	No	1.4	2.5	5	6	207	7	13	4067	879	89	1.0	118	95	2.6	
23267	231	0 - 6	6.4		0.16	No	1.6	4.9	9	20	224	7	13	3751	1018	69	0.8	130	55	2.0	
23268	236	0 - 6	7.4		0.16	No	1.4	3.7	7	20	172	8	14	3348	689	57	1.7	113	104	2.3	
23269	246	0 - 6	6.9		0.14	No	1.2	2.7	5	6	118	8	14	2517	501	60	1.5	136	60	1.9	
23270	248	0 - 6	6.4		0.13	No	1.5	1.1	<2	25	186	6	11	3289	836	56	0.8	131	42	1.9	
23271	249	0 - 6	6.6		0.16	No	1.5	9.2	17	12	182	6	11	3642	659	46	1.1	95	73	2.0	
23272	254	0 - 6	6.3		0.13	No	2.1	2.0	4	5	121	9	16	1614	307	145	1.0	296	13	1.4	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23263	196	0 - 6	11/20/24																		
23264	199	0 - 6	11/20/24																		
23265	206	0 - 6	11/20/24																		
23266	218	0 - 6	11/20/24																		
23267	231	0 - 6	11/20/24																		
23268	236	0 - 6	11/20/24																		
23269	246	0 - 6	11/20/24																		
23270	248	0 - 6	11/20/24																		
23271	249	0 - 6	11/20/24																		
23272	254	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity CEC	%H	%K	%Ca	%Mg	%Na
23263	196																	35	0	2	81	26	1
23264	199																	34	0	2	75	24	1
23265	206																	32	0	2	74	23	1
23266	218																	29	0	2	71	26	1
23267	231																	28	0	2	67	30	1
23268	236																	23	0	2	72	25	1
23269	246																	17	0	2	73	24	2
23270	248																	24	0	2	68	29	1
23271	249																	24	0	2	75	23	1
23272	254																	12	0	3	70	22	5

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23263, 23264, 23265, 23266, 23267, 23268, 23269, 23270, 23271, 23272
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23263					
23264					
23265					
23266					
23267					
23268					
23269					
23270					
23271					
23272					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23273	255	0 - 6	6.8		0.09	No	1.3	2.0	4	6	126	6	11	2238	453	49	1.5	147	57	1.7	
23274	262	0 - 6	7.2		0.14	No	1.4	7.0	13	9	170	7	13	3742	596	81	1.6	108	66	1.8	
23275	263	0 - 6	7.2		0.09	No	1.1	4.0	7	6	148	5	9	2910	558	76	0.9	129	54	2.1	
23276	269	0 - 6	7.4		0.19	Lo	1.6	4.1	7	21	274	10	18	4655	893	234	1.0	130	70	1.9	
23277	271	0 - 6	6.7		0.11	No	1.5	8.0	14	30	236	7	13	3740	865	53	0.9	155	58	2.0	
23278	273	0 - 6	6.8		0.15	No	1.4	8.7	16	11	190	7	13	3563	879	53	0.9	108	74	1.9	
23279	275	0 - 6	7.3		0.11	No	1.3	8.8	16	11	165	5	9	3786	633	55	0.9	114	69	2.0	
23280	276	0 - 6	6.6		0.09	No	1.5	3.4	6	18	224	7	13	3608	947	66	0.7	139	74	1.7	
23281	278	0 - 6	6.4		0.18	No	1.7	14.3	26	15	195	8	14	3558	863	53	0.8	119	67	2.1	
23282	283	0 - 6	7.3		0.10	No	1.2	4.0	7	6	145	5	9	3827	613	39	0.7	96	63	1.9	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23273	255	0 - 6	11/20/24																		
23274	262	0 - 6	11/20/24																		
23275	263	0 - 6	11/20/24																		
23276	269	0 - 6	11/20/24																		
23277	271	0 - 6	11/20/24																		
23278	273	0 - 6	11/20/24																		
23279	275	0 - 6	11/20/24																		
23280	276	0 - 6	11/20/24																		
23281	278	0 - 6	11/20/24																		
23282	283	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity CEC	%H	%K	%Ca	%Mg	%Na
23273	255																	16	0	2	72	24	1
23274	262																	24	0	2	76	20	1
23275	263																	20	0	2	73	23	2
23276	269																	32	0	2	72	23	3
23277	271																	27	0	2	70	27	1
23278	273																	26	0	2	69	28	1
23279	275																	25	0	2	76	21	1
23280	276																	27	0	2	67	29	1
23281	278																	26	0	2	69	28	1
23282	283																	25	0	2	77	21	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s):23273, 23274, 23275, 23276, 23277, 23278, 23279, 23280, 23281, 23282
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23273					
23274					
23275					
23276					
23277					
23278					
23279					
23280					
23281					
23282					

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: Amy Meier, Data Review Coordinator

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.

ENVIRO-AG ENGINEERING, INC.
EAE
AMARILLO - STEPHENVILLE- ARTESIA

Corporate Office:
3404 Airway Blvd.
Amarillo TX 79118

Central Texas:
9855 FM 847
Dublin TX 76446

New Mexico:
110 East Mill Road
Artesia NM 88210

MEMORANDUM

February 28, 2025

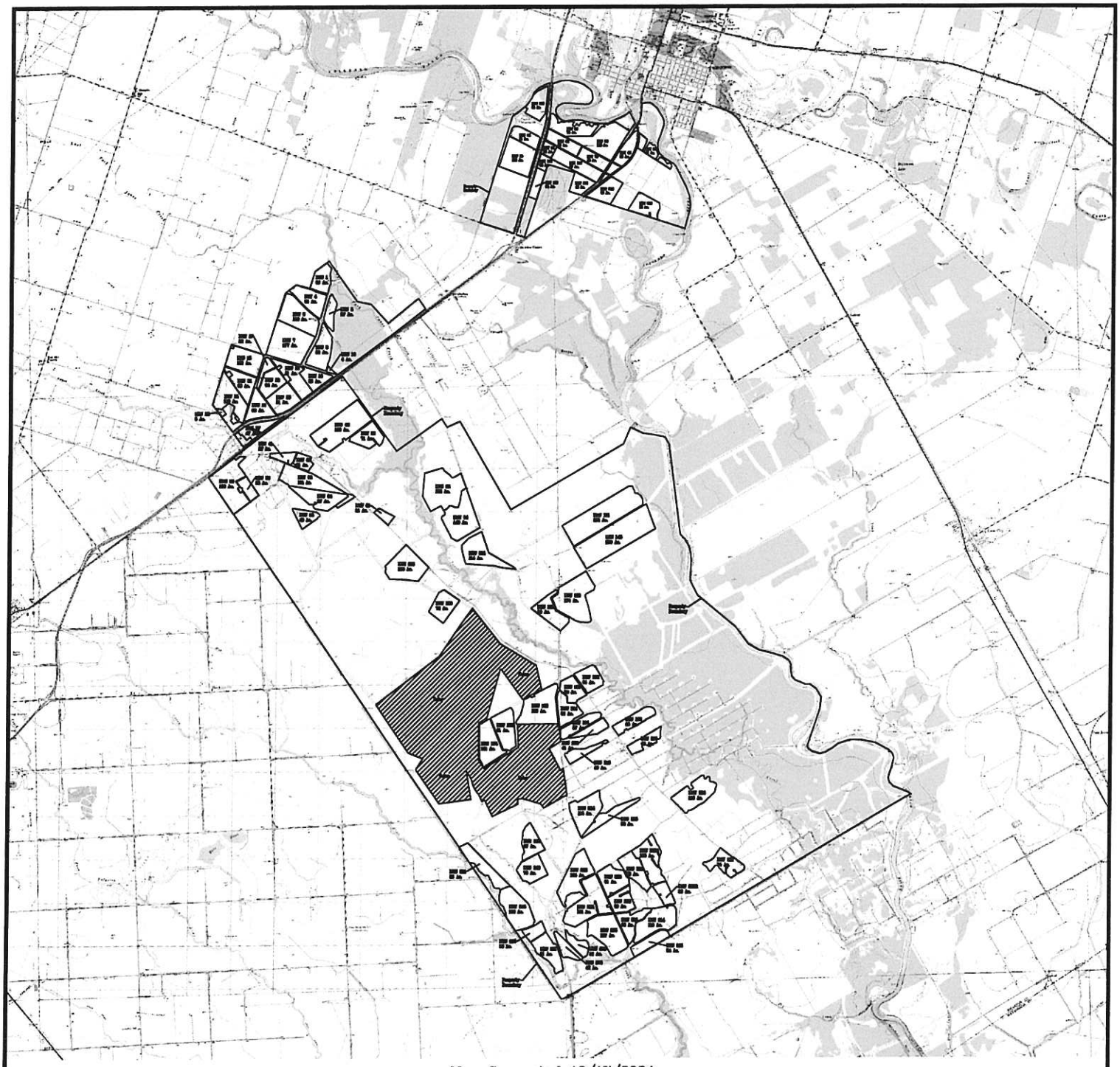
Via Email

To: Mr. Stephen Megina, Vanguard Renewables

From: Norman Mullin, P.E.

Subject: Pierce Ranch, Wharton County, Texas

Attached are the maps of the fields we sampled, the associated laboratory analysis, and the tabular summary of the nutrient budgets. There are approximately 250 fields depicted on the map provided by the Owner. The Owner identified specific fields he wanted sampled that included the two major soil textures (sandy clay and clay). We sampled those fields along with adjacent fields to ensure we captured the current nutrient loading in those areas for both cultivated and improved grass pastures. We sampled 89 fields comprising 7,373 gross acres which is a representation of the two major soil types and cropping schemes (corn, cotton, and grass) across the entire geographic area of the ranch. For permitting purposes, sampling the entirety of the fields would not be beneficial and cost prohibitive for permitting purposes. The laboratory data indicates very little residual levels of nitrogen and phosphorous in the top 6-inches. The nutrient budgets used county averages for yields and the TCEQ "S" tables for nutrient uptake. Since these fields have not been previously utilized for TCEQ regulated waste application, the results provided should remain similar for the following crop years with similar yields.



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Land Application Map Pg: 4	ENVIRONEER ENGINEERING CONSULTING

Effluent Characteristics

Wastewater Storage

The effluent from the digestion tanks is pumped to an earthen storage lagoon and it is later removed from the lagoon are hauled off-site for proper disposal or beneficial use under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). If the facility chooses to apply effluent from digestate, then before the land application, the facility will implement an NMP per the Texas NRCS Practice Standard Code 590. The NMP will be updated annually to incorporate the most recent manure, wastewater, and soil analysis.

Effluent Quality

For the purposes of this plan, the Total Nitrogen content of the effluent to be land applied is 713 lb./ac-in TKN and Total Phosphorus is 328 lb./ac-in as P2O5, based on similar projects. Based on the geographical location of the facility and farm practices, the permittee estimates 80% of the total nitrogen is available after volatilization and mineralization.

Effluent Quantity

The average annual amount of effluent available for spreading is projected to be 20.5 million gallons (62.86 ac-ft/yr.).

Annual Cropping Plan

Crop Selection

It is the goal of Wharton AD1, LLC to grow any of the permitted crops listed in Attachment A. Table 2 illustrates the amount of effluent to be applied is based upon the most limiting nutrient, nitrogen. The total ac-in was derived based upon a crop rotation that depicts the acreages planted to various permitted crops. These crops will be rotated to ensure that nutrient/salts and the hydraulic requirements of the plant are managed properly.

The following formula will be utilized to determine the annual application rates based upon the most limiting nutrient content of effluent, nutrients in the soil, and crop requirements.

Total nutrient required by crop *((lb.lac)- Soil Test (lb.lac)) I ((lb.* per *Ac-in* of *Nut. in Effl* x *0.80))* = *Annual Application* Rate *(Ac-in)*

In the event that the effluent from the digestate is land applied to an application field, the facility will deduct any applied nutrient from the solids and or fertilizer application against the planned effluent application rates.

Other Crop Inputs

Supplemental fertilizers may be needed to achieve yield goals, but determinations will be made annually on a field-by-field basis using soil test results. Based on the effluent pH, EC and sodium content, soil amendments such as elemental sulfur, gypsum or other inputs may be used to help manage soil pH and salinity.

Wharton AD1, LLC
Pierce Ranch
Attachment 1 - Nutrient Management Budget
Table 1 Generated 12/18/2024

			Columns A	B	D	E	C		H	I	J	K	L	M		
Field ID w/Acreage	Planned Crop Rotation	Projected Yield bu/ac or tons/ac (1)	Crop N Requirement rate lb/Ac (1)	Crop P2O5 Requirement Rate lb/Ac (1)	0-6" Soil N Residual lb/Ac (2)	0-6" Soil P Residual ppm (2)	Remainder Crop N required lb/Ac (3)	Manure Source (4)	Wastewater N lb/Ac-in (4a)	Adjusted Plant Available N lb/ Ac-in (5)	Maximum Ac-In/Ac of Wastewater to apply	Wastewater P2O5 lb per Ac-in (4a)	Recommended Ac-In/Ac to apply	P2O5 Applied at N Rate lb/Ac (6)	Acre-Feet of Wastewater Applied	Gallons of Wastewater Applied
1 (56 acres)	Corn Grain	120 bu/ac	144	105	3	35	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	1.2	375,366.42
4 (82 acres)	Corn Grain	120 bu/ac	144	105	6	27	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.7	537,949.14
5 (37 acres)	Corn Grain	120 bu/ac	144	105	6	7	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	0.7	242,733.15
6 (126 acres)	Corn Grain	120 bu/ac	144	105	18	19	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	2.3	754,726.10
7 (177 acres)	Corn Grain	120 bu/ac	144	105	6	20	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	3.6	1,161,182.90
8 (92 acres)	Corn Grain	120 bu/ac	144	105	13	16	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.8	572,937.70
10 (4 acres)	Coastal Grazing	1 au/3ac	160	70	3	4	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.1	23,180.39
13 (123 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.4	783,534.62
15 (103 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	2.0	646,337.62
16 (69 acres)	Corn Grain	120 bu/ac	144	105	21	6	123	Digestate	714	571.20	0.22	328.00	0.22	70.63	1.2	403,461.86
17 (23acres)	Corn Grain	120 bu/ac	144	105	9	43	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.5	147,608.00
18 (81 acres)	Corn Grain	120 bu/ac	144	105	12	8	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.6	508,284.93
19 (55 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.1	345,131.74
21 (69 acres)	Corn Grain	120 bu/ac	144	105	13	10	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.3	429,703.28
22 (64 acres)	Corn Grain	120 bu/ac	144	105	13	24	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.2	398,565.36
23 (81 acres)	Coastal Grazing	1 au/3ac	160	70	8	5	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.4	469,402.82
24 (113 acres)	Corn Grain	120 bu/ac	144	105	8	14	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	2.2	730,576.39
25 (5 acres)	Corn Grain	120 bu/ac	144	105	11	13	133	Digestate	714	571.20	0.23	328.00	0.23	76.37	0.1	31,613.31
27 (47 acres)	Coastal Grazing	1 au/3ac	160	70	9	8	151	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.8	272,369.54
28 (68 acres)	Corn Grain	120 bu/ac	144	105	5	22	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.4	449,336.81
29 (156 acres)	Coastal Grazing	1 au/3ac	160	70	8	21	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.8	904,035.06
36 (33 acres)	Coastal Grazing	1 au/3ac	160	70	3	8	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	191,238.19
41 (27 acres)	Coastal Grazing	1 au/3ac	160	70	6	5	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.5	156,467.61
42 (31 acres)	Coastal Grazing	1 au/3ac	160	70	14	18	146	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	179,647.99
46 (190 acres)	Coastal Grazing	1 au/3ac	160	70	2	4	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	3.4	1,101,068.34
2C (78 acres)	Corn Grain	120 bu/ac	144	105	19	13	125	Digestate	714	571.20	0.22	328.00	0.22	71.78	1.4	463,503.37
3C (148 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.9	942,789.62
4C (69 acres)	Corn Grain	120 bu/ac	144	105	2	5	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.4	465,785.23
6C (55 acres)	Corn Grain	120 bu/ac	144	105	8	22	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	1.1	355,590.28
7C (49 acres)	Corn Grain	120 bu/ac	144	105	10	28	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	1.0	312,139.81
8C (51 acres)	Corn Grain	120 bu/ac	144	105	18	22	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	0.9	305,484.38
9C (20 acres)	Corn Grain	120 bu/ac	144	105	9	20	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.4	128,354.78
10C (87 acres)	Corn Grain	120 bu/ac	144	105	5	29	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.8	574,886.80
14C (32 acres)	Corn Grain	120 bu/ac	144	105	7	23	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	0.6	208,410.13
16C (46 acres)	Corn Grain	120 bu/ac	144	105	3	28	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	0.9	308,336.70
18C (35 acres)	Corn Grain	120 bu/ac	144	105	5	10	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	0.7	231,276.30
19C (62 acres)	Coastal Grazing	1 au/3ac	160	70	5	14	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.1	359,295.99
30C (65 acres)	Corn Grain	120 bu/ac	144	105	6	6	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.3	426,423.10
36C (40 acres)	Coastal Grazing	1 au/3ac	160	70	11	14	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.7	231,803.86
52 (121 acres)	Coastal Grazing	1 au/3ac	160	70	4	3	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.2	701,206.68
54 (97 acres)	Corn Grain	120 bu/ac	144	105	7	7	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	1.9	631,743.21
59 (71 acres)	Corn Grain	120 bu/ac	144	105	2	4	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.5	479,286.25
61 (40 acres)	Corn Grain	120 bu/ac	144	105	12	9	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	0.8	251,004.90

86 (21 acres)	Coastal Grazing	1 au/3ac	160	70	40	22	120	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.4	121,697.03
92 (175 acres)	Cotton	2 bales/ac	100	105	21	18	79	Digestate	714	571.20	0.14	328.00	0.14	45.36	2.0	657,224.01
94 (143 acres)	Coastal Grazing	1 au/3ac	160	70	7	12	153	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.5	828,698.81
103 (128 acres)	Coastal Grazing	1 au/3ac	160	70	2	5	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.3	741,772.36
104 (114 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.0	660,641.01
126 (72 acres)	Coastal Grazing	1 au/3ac	160	70	5	6	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	417,246.95
131 (251 acres)	Cotton	2 bales/ac	100	105	4	12	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	3.5	1,145,495.10
143 (279 acres)	Cotton	2 bales/ac	100	105	7	12	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	3.8	1,233,489.43
159 (80 acres)	Cotton	2 bales/ac	100	105	5	17	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	361,294.93
160 (174 acres)	Cotton	2 bales/ac	100	105	7	8	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.4	769,272.98
174 (101 acres)	Coastal Grazing	1 au/3ac	160	70	19	23	141	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.8	585,304.75
175 (91 acres)	Coastal Grazing	1 au/3ac	160	70	4	18	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.6	527,353.79
180 (153 acres)	Coastal Grazing	1 au/3ac	160	70	11	9	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.7	886,649.77
181 (58 acres)	Cotton	2 bales/ac	100	105	8	7	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.8	253,667.08
182 (64 acres)	Cotton	2 bales/ac	100	105	5	8	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.9	289,035.95
184 (66 acres)	Cotton	2 bales/ac	100	105	8	5	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.9	288,655.64
194 (57 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.8	257,422.64
196 (63 acres)	Cotton	2 bales/ac	100	105	4	9	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.9	287,514.71
199 (48 acres)	Cotton	2 bales/ac	100	105	4	8	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.7	219,058.82
206 (41 acres)	Cotton	2 bales/ac	100	105	3	6	97	Digestate	714	571.20	0.17	328.00	0.17	55.70	0.6	189,061.84
218 (40 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.6	180,647.47
231 (85 acres)	Cotton	2 bales/ac	100	105	9	10	91	Digestate	714	571.20	0.16	328.00	0.16	52.25	1.1	367,712.67
236 (67 acres)	Cotton	2 bales/ac	100	105	7	20	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	0.9	296,214.31
246 (128 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.8	578,071.90
249 (75 acres)	Cotton	2 bales/ac	100	105	17	12	83	Digestate	714	571.20	0.15	328.00	0.15	47.66	0.9	295,929.07
254 (112 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	1.6	511,137.25
255 (58 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.0	336,115.60
262 (125 acres)	Cotton	2 bales/ac	100	105	13	9	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.6	516,934.53
263 (161 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.2	711,798.56
271 (81 acres)	Cotton	2 bales/ac	100	105	14	30	86	Digestate	714	571.20	0.15	328.00	0.15	49.38	1.0	331,155.33
273 (42 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	0.5	167,716.91
275 (137 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	1.7	547,076.59
276 (36 acres)	Cotton	2 bales/ac	100	105	6	18	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	0.5	160,871.32
283 (81 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	1.1	358,109.83
285 (78 acres)	Cotton	2 bales/ac	100	105	5	10	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	352,262.56
286A (106 acres)	Cotton	2 bales/ac	100	105	5	9	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.5	478,715.79
286B (38 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.5	173,421.57
290 (116 acres)	Cotton	2 bales/ac	100	105	6	3	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	1.6	518,363.15
295 (69 acres)	Cotton	2 bales/ac	100	105	13	4	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	0.9	285,375.46
312 (74 acres)	Coastal Grazing	1 au/3ac	160	70	6	16	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	428,837.14
313 (68 acres)	Cotton	2 bales/ac	100	105	12	11	88	Digestate	714	571.20	0.15	328.00	0.15	50.53	0.9	284,472.22
314 (119 acres)	Cotton	2 bales/ac	100	105	13	5	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.5	492,169.27
315 (54 acres)	Cotton	2 bales/ac	100	105	11	5	89	Digestate	714	571.20	0.16	328.00	0.16	51.11	0.7	228,471.51
7,207															118.20	38,539,149

Notes:

(1) From NRCS 590-633 software alternative crops.
(2) Taken from annual soil test results from November 2024. It is assumed that residual N will be utilized with the first crop rotation. The facility will conduct soil sampling every year for verification, and the budgets will be updated to reflect the latest soil analysis.
(3) Column A- Columns D = Remainder Crop N Required. Negative value indicates residual is higher than requirement. No wastewater application planned.
(4) The source shown is the primary for wastewater source, however, wastewater from any other lagoon structure can also be pumped to the field. The max rate as indicated by the Phophorous Index Rating shall no be exceeded by any sources.
(4a) Wastewater N and P from site specific analysis.
(5) Availability of N is estimated utilizing 80%.
(6) Illustrates P205 applied at the Nitrogen application rate.

Application Methods & Timing

Land Application Methods

The effluent from the digestate will be applied to the land using the spreading technique. This method ensures uniform distribution of nutrients across the application area, facilitating efficient nutrient absorption by the soil and crops. The spreading technique helps in optimizing the utilization of nitrogen, phosphorus, and potassium present in the effluent while minimizing nutrient runoff and environmental impact.

Soil Moisture Monitoring

Soil moisture monitoring is crucial for solid digestate land application, ensuring proper absorption and preventing runoff. The most important aspect of moisture management is accurately evaluating and maintaining optimal soil conditions. In application fields, soil moisture is assessed using the feel and appearance method, following USDA guidelines. This method provides a quick, practical evaluation of moisture levels before digestate spreading. Proper monitoring helps maintain soil health, nutrient efficiency, and environmental sustainability.

Operation and Maintenance

Procedures

The land application systems should be operated by the TLAP and with the following Best Management Practices (BMPs):

- Effluent application will not occur when the ground is frozen, saturated within 3 feet of the surface or during rainfall events unless necessary to prevent imminent overflow of the storage pond.
- Effluent application will not exceed maximum crop nutrient requirements.
- Effluent application will not occur to fallow lands except pre-watering as described in the previous section. Application to dormant perennial or winter crops shall be limited to the planned rate shown in the NMP.
- Records of the amount of effluent applied, the crops grown, the planting and harvest dates, and crop yields are maintained for each field.
- Personnel whose job responsibilities require the handling, storage, or land application of effluent should be trained to ensure proper procedures are followed and appropriate records are kept.

Monitoring

Monitoring should occur before and after effluent spreading to ensure proper nutrient application and prevent over-application. No puddling, runoff, or soil erosion should occur. A visual inspection should be performed during and after spreading to detect any signs of surface accumulation or runoff. Corrective actions include, but are not limited to:

- Cease effluent spreading if soil becomes saturated.
- Adjust application rates and timing to match soil absorption capacity.

Monitoring of soil moisture, rainfall, and crop ET should occur at a minimum of weekly during the growing season.

As part of monitoring, annual soil tests will be reviewed. The following best management practices (BMPs) may be utilized to minimize nutrient leaching:

- Apply effluent before planting and after harvesting to enhance nutrient availability.
- Time applications to align with crop nutrient uptake during the growing season.
- Use conventional nitrogen fertilizers in conjunction with effluent application to optimize plant uptake.
- Retain crop residues to enhance soil organic matter and moisture retention.
- Adjust application schedules based on weather, soil moisture levels, and crop needs.
- Incorporate organic amendments to improve soil structure and prevent excessive nutrient leaching.
- Implement cover cropping or double cropping to enhance nutrient retention.
- Use nitrification inhibitors to minimize nitrogen losses, especially during high leaching periods.

Soil samples will be collected from each field before and after application, following TLAP guidelines. Effluent samples will also be collected as specified in TLAP to verify nutrient levels and ensure compliance with application limits.

System Maintenance

The effluent spreading system should be operated and maintained in accordance with manufacturer recommendations to ensure long-term reliability and efficiency. Proper operation and maintenance help prevent equipment failure, ensure uniform application, and minimize environmental risks. The spreading equipment, tanks, pipelines, and distribution components should be inspected regularly to maintain functionality.

All measuring devices, valves, spreaders, distribution nozzles, and mechanical components should be checked periodically, with worn or damaged parts repaired or replaced as needed. Nozzles and spreaders must be properly aligned, in good condition, and operated at the planned

application rate to ensure even distribution and prevent excessive accumulation in localized areas.

Maintain all pumps, piping, spreader attachments, and electrical or mechanical components as per manufacturer guidelines. Regularly clean screens and filters to avoid blockages that could affect application rates. Protect equipment from rodents, insects, heat, flooding, lightning, and power failures to avoid operational disruptions. Ensure all electrical connections are secure and replace worn-out wiring or fittings when first noticed. Periodically check for leaks and unintended discharge points. Display bilingual operating instructions and safety warnings as necessary. During non-operational periods, drain and secure pipelines, valves, and movable equipment to prevent damage.

Pollution hazards to groundwater and surface water can be minimized by following proper effluent spreading management. Runoff and deep percolation should be controlled by applying effluent only when soil moisture conditions allow for proper absorption. Avoid spills of agricultural chemicals, fuels, and lubricants near application sites to prevent contamination. Regularly review and adjust application schedules based on soil conditions, weather forecasts, and nutrient management plans to ensure safe and efficient effluent use.

8.0 REFERENCES

Information used to develop this plan was obtained, in part, from the following sources:

EPA 430-B-20-001 Project Development Handbook - A Handbook for Developing Anaerobic Digestion/Biogas Systems on Farms in the United States - 3rd Edition

Maas and Grattan. 1999. Agricultural drainage water management in arid and semi-arid areas. FAO Irrigation and Drainage Paper 61, Annex l. Crop salt tolerance data. Retrieved December 2022. http://www.fao.org/docrep/005/y4263e/y4263e0e.htm

Texas A&M Agrilife Extension. Retrieved 2023. Using Animal Manure and Wastewater for Crops and Pastures. https://agrilifeextension.tamu.edu/library/farming/

Texas Almanac. Retrieved May 2023. Texas Temperature, Freeze, Growing Season and Precipitation Records by County. https://texasalmanac.com/sites/default/tiles/images/olmanac-feature/countyweaf her A.pdt

USDA - NRCS Web Soil Survey, Wharton County, accessed May 2023.

USDA- NRCS (2012/2013 TLAP Permit List). Texas Waste Utilization and Nutrient Management 590- 633 Plan. Version 5, S Tables.

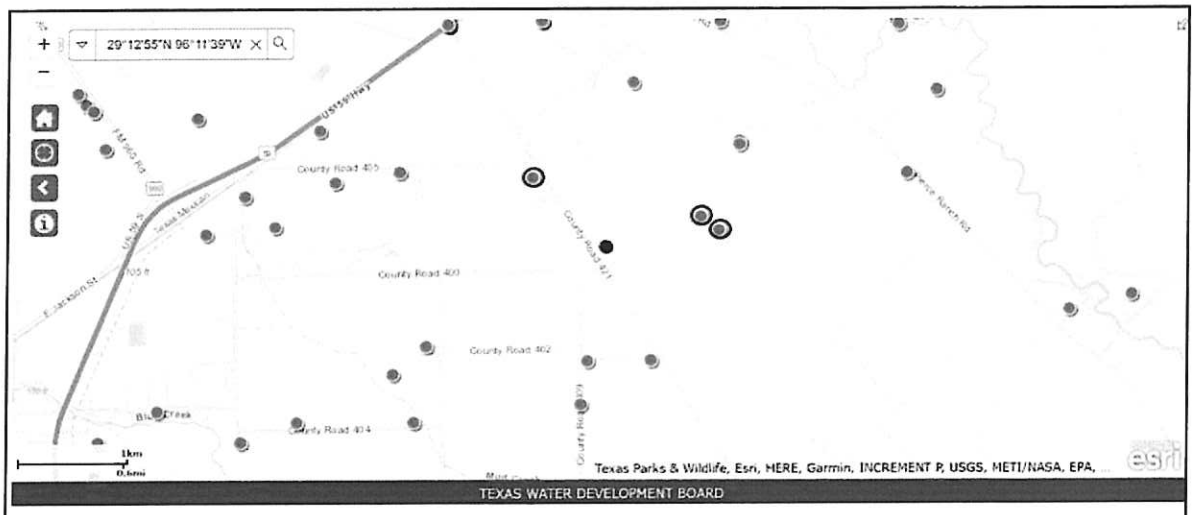
T.D. WATER WELL INFORMATION

Water Well Map

Figure 7, the Water Well Map, shows the locations of water wells within 1 mile of the property boundary. Water wells within the fields or adjacent to fields will be protected with 150-ft buffers.

Water Well Information

Water well data was obtained from a variety of sources, including on-site inspections, research, a database research firm in Toronto, ON-Canada, and the Texas Water Development Board (TWDB) WIID online database. The information provided by Environmental Risk Information Services (ERIS) was obtained from a variety of public sources. ERIS does not ensure and makes no warranty or representation as to the accuracy, reliability, quality, or errors occurring from data conversion or the interpretation of their report. The TWDB WIID database includes data from the TWDB Groundwater Database and Submitted Driller's Reports. ERIS and TWDB wells are shown on maps and in Table T.E. 1 if the location could be verified on-site or using the well log or district database information. Well information is provided in Worksheet 3-Section 4 of the Technical Report.



Map generated 1/24/2025

LEGEND:

- Denotes Vanguard LLC, Pierce Ranch
- Denotes Water Well
- Denoted Water Well with 1-mile Buffer

Source: Texas Water Development Board
Available at: https://www3.twdb.texas.gov/
Water Data Interactive

Table 1: Well and Map Information Table

Well ID	Use	BMPs
589679	Domestic	1-mile buffer from land application
261011	Domestic	1-mile buffer from land application
391981	Domestic	1-mile buffer from land application

Note: All the above information is based on interactive maps *from* TWDB. *The wells listed here were located within approximately a 1-mile radius of the subject property.*

T.E. GROUNDWATER TECHNICAL REPORT

Purpose

The purpose of this section is to provide information on the geologic features and groundwater resources at the Wharton AD1, LLC facility located near Pierce, Texas.

Geologic Atlas Map

Figure 8, Geologic Atlas Map, shows the geologic formations located at the property.

Geomorphologic/Geologic Features

The following information is from a report from the Texas Board of Water Engineers discussing soil and groundwater conditions in Wharton County.

Wharton County has around 30,000 acres of land irrigated in the early 20th century for the county's rice production. The wells used to irrigate the rice are mostly located in the western part of the county, ranging in depth from 150 to 500 feet. Periodic measurements show that the net water level in Wharton County has stayed relatively constant since 1934.

Aquifer Information

The Gulf Coast Aquifer includes several aquifers, such as the Jasper, Evangeline, and Chicot, composed of sand, silt, clay, and gravel layers. The total sand thickness of the aquifer ranges from 700 feet in the southern regions to 1,300 feet in the northern regions, with an average freshwater-saturated thickness of about 1,000 feet.

Water quality varies depending on depth and location. It tends to be good in the central and northeastern areas, where total dissolved solids are less than 500 milligrams per liter. However, it becomes more saline toward the south, with concentrations of total dissolved solids typically ranging from 1,000 to over 10,000 milligrams per liter. In these southern areas, aquifer productivity also decreases. Higher salinity levels along the central and eastern Gulf Coast are often linked to saltwater intrusion caused by groundwater pumping, brine migration due to oil field activities, or the natural flow of brine from salt domes into the aquifer.

The aquifer is used for municipal, industrial, and irrigation purposes. In counties such as Harris, Galveston, Fort Bend, Jasper, and Wharton, significant water level declines of up to 350 feet have resulted in land subsidence.

References

"Texas Water Development Board." Gulf Coast Aquifer | Texas Water Development Board, (TWDB)

www.twdb.texas.gov/groundwater/aquifer/majors/gulf-coast.asp. Accessed 17 Dec. 2024.

ERIS

TEXAS WATER WELL REPORT

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167* *El Campo TX 77437*
Project No:	
Order No:	*25012900355*
Requested by:	*Environeer Engineering Consulting*
Date Completed:	*January 30, 2025*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Table of Contents.....2
Executive Summary.....3
Executive Summary: Report Summary.....4
Executive Summary: Site Report Summary - Project Property.....5
Executive Summary: Site Report Summary - Surrounding Properties.....6
Map.....7
Aerial.....10
Detail Report.....12
Appendix: Database Descriptions.....21
Definitions.....23

Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as database review of environmental records.

License for use of information in Report: No page of this report can be used without this cover page, this notice and the project property identifier. The information in Report(s) may not be modified or re-sold.

Your Liability for misuse: Using this Service and/or its reports in a manner contrary to this Notice or your agreement will be in breach of copyright and contract and ERIS may obtain damages for such mis-use, including damages caused to third parties, and gives ERIS the right to terminate your account, rescind your license to any previous reports and to bar you from future use of the Service.

No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by ERIS Information Inc. ("ERIS") using various sources of information, including information provided by Federal and State government departments. The report applies only to the address and up to the date specified on the cover of this report, and any alterations or deviation from this description will require a new report. This report and the data contained herein does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein and does not constitute a legal opinion nor medical advice. Although ERIS has endeavored to present you with information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

Trademark and Copyright: You may not use the ERIS trademarks or attribute any work to ERIS other than as outlined above. This Service and Report (s) are protected by copyright owned by ERIS Information Inc. Copyright in data used in the Service or Report(s) (the "Data") is owned by ERIS or its licensors. The Service, Report(s) and Data may not be copied or reproduced in whole or in any substantial part without prior written consent of ERIS.

Executive Summary

Property Information:

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167 El Campo TX 77437*
Project No:	

Coordinates:

Latitude:	*29.215278*
Longitude:	*-96.194167*
UTM Northing:	*3,235,122.77*
UTM Easting:	*772,831.34*
UTM Zone:	*14R*
Target Property Geometry:	*POLYGON*

County/Parish Covered:	*Wharton (TX)*
Zipcode(s) Covered:	*El Campo TX: 77437*
State(s) Covered:	*TX*

Executive Summary: Report Summary

Database	Searched	Project Property	Within 0.50mi	Total
Federal				
FED USGS	Y	0	0	0
State				
TCEQ WELL LOGS	Y	0	2	2
SDRW WELLS	Y	0	2	2
GWDB	Y	0	1	1
WW FORT BEND	Y	0	0	0
WW HIGH PLAINS	Y	0	0	0
WW HARRIS GAL	Y	0	0	0
WUD	Y	0	0	0
	Total:	0	5	5

**** PO – Property Only***

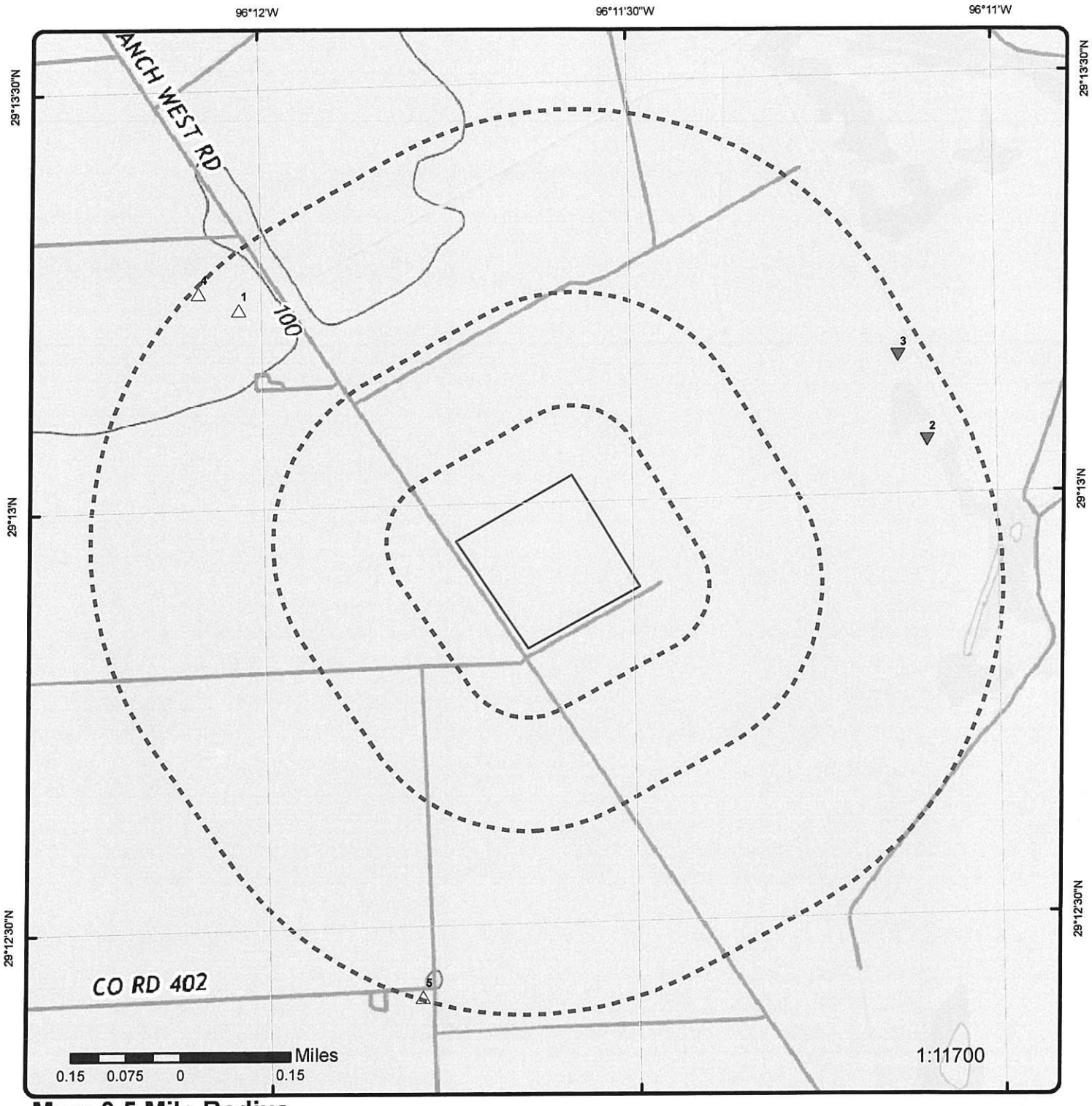
Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number
1	SDRW WELLS	Philip Kocurek	1104 Cr 421 El Camop TX 77437 ***Track NO: 589679***	NW	0.44 / 2,307.69	12
2	SDRW WELLS	Pierce Ranch	East of CR 421 and CR 400 Intersection Pierce TX 77467 ***Track NO: 261011***	ENE	0.44 / 2,322.58	13
3	TCEQ WELL LOGS	PIERCE RANCH	TX ***Grid No | Owners Name: 66-55-2E | PIERCE RANCH***	ENE	0.46 / 2,449.98	14
4	TCEQ WELL LOGS	FLOYD WATZ	TX ***Grid No | Owners Name: 66-55-2J | FLOYD WATZ***	NW	0.49 / 2,599.05	16
5	GWDB	John Boyd	TX ***State Well No | Owner Name: 6655505 | John Boyd***	SSW	0.50 / 2,616.31	18



Map: 0.5 Mile Radius
Order Number: 25012900355
Address: 29.215278, -96.194167, El Campo, TX

ERIS

Plotted Water Wells

- Project Property
- Buffer Outline
- △ Eris Sites with Higher Elevation
- ■ Eris Sites with Same Elevation
- ▼ Eris Sites with Lower Elevation
- ○ Eris Sites with Unknown Elevation
- Eris Areas with Higher Elevation
- Eris Areas with Same Elevation
- Eris Areas with Lower Elevation
- Eris Areas with Unknown Elevation

Source: © US Geological Survey

© ERIS Information Inc.



Aerial Year: 2022

Order Number: 25012900355

Address: 29.215278, -96.194167, El Campo, TX

ERIS

© ERIS Information Inc.

Source: ESRI World Imagery

Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
1	1 of 1	NW	0.44 / 2,307.69	Philip Kocurek 1104 Cr 421 El Camop TX 77437	SDRW WELLS

Track NO:	589679
Date Submitted:	2021-11-23
Owner Name:	Philip Kocurek
Owner Address:	1104 Cr 421
Owner Address2:	
Owner City:	El Camop
Owner State:	TX
Owner Zip:	77437
County:	Wharton
Type of Work:	New Well
Typ of Wrk Oth Descr:	
Proposed Use:	Domestic
Prop Use Oth Descr:	
Latitude:	29.2209
Longitude:	-96.2007
Drilling Date Started:	2021-09-09
Drilling Date Completed:	2021-09-11
Chemical Analysis:	No
Company Name:	Kight Water Well Service
Company Address:	1073 COUNTY ROAD 479
CompanyAddress2:	
Company City:	EL CAMPO
Company State:	TX
Company Zip:	77437
Company Country:	
Data Source:	Full SDR Database; SDRDB Well Location (Map)
Report Link:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=589679&Type=SDR-Well

Well Borehole Information

Top Depth:	0
Bottom Depth:	366
Top Depth:	
Bottom Depth:	366.0

Well Levels

Measurement:	62
Measurement Date:	2021-09-12

Well Strata

Water Type:

Good

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
2	1 of 1	ENE	0.44 / 2,322.58	Pierce Ranch East of CR 421 and CR 400 Intersection Pierce TX 77467	SDRW WELLS

Track NO:	261011
Date Submitted:	2011-07-29
Owner Name:	Pierce Ranch
Owner Address:	P.O. Box 538
Owner Address2:	
Owner City:	Pierce
Owner State:	TX
Owner Zip:	77467
County:	Wharton
Type of Work:	New Well
Typ of Wrk Oth Descr:	
Proposed Use:	Irrigation
Prop Use Oth Descr:	
Latitude:	29.217778
Longitude:	-96.185
Drilling Date Started:	2011-06-27
Drilling Date Completed:	2011-07-06
Chemical Analysis:	No
Company Name:	Weisinger Incorporated
Company Address:	2200 East Davis
CompanyAddress2:	
Company City:	Conroe
Company State:	TX
Company Zip:	77301
Company Country:	
Data Source:	Full SDR Database; SDRDB Well Location (Map)
Report Link:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=261011&Type=SDR-Well

Well Borehole Information

Top Depth:	0
Bottom Depth:	710
Top Depth:	0
Bottom Depth:	8
Top Depth:	
Bottom Depth:	710.0

Well Levels

Measurement:	82
Measurement Date:	2011-07-20

Well Strata

Water Type:

Fresh

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
3	1 of 1	ENE	0.46 / 2,449.98	PIERCE RANCH TX	TCEQ WELL LOGS

Grid No:	66-55-2E
Date Drilled:	11/08/1972
Owners Name:	PIERCE RANCH
County:	WHARTON
Water Usage:	DOMESTIC
Static Level:	44
Depth Drilled:	196
Latitude:	
Longtiude:	

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-45-2F
Located on map 2CC
Received: 9-7-73
9/1/73

1) OWNER:
Person having well drilled Pierce Ranch (Name) Address Pierce (Street or RFD) Tex (City) (State)
Landowner Same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Wharton 5 miles in NA (N.E., S.W., etc.) direction from P.O. Elcampo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
See MAP ON 66-45-5B
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor ____ League J. Talfener
Block 516 Survey ____
Abstract No. A-453
(NW¼ NE¼ SW¼ SE¼) of Section ____

3) TYPE OF WORK (Check): New Well ✓ Deepening; Reconditioning; Plugging
4) PROPOSED USE (Check): Domestic ✓ Industrial; Municipal; Irrigation; Test Well; Other
5) TYPE OF WELL (Check): Rotary ✓ Driven; Dug; Cable; Jetted; Bored

6) WELL LOG:
Diameter of hole 7 in. Depth drilled 196 ft. Depth of completed well 196 ft. Date drilled 11-8-72
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Top Soil
5	28	Clay R
28	55	Snd R
55	122	Clay R
122	138	Sand + Gr
138	146	Clay W
146	158	Sand
158	170	Clay R
170	196	Sand + Gr

(Use reverse side if necessary)

9) Casing: Type: Old; New ✓ Steel; Plastic ✓; Other
Cemented from ____ ft. to ____ ft.

Diameter (inches)	Setting From (ft.)	To (ft.)	Gage
4	0	194	Sch 40

10) SCREEN: Type PL
Perforated; Slotted ✓

Diameter (inches)	Setting From (ft.)	To (ft.)	Slot Size
4	194	196	014

7) COMPLETION (Check): Straight wall; Gravel packed; Other; Under reamed; Open Hole

8) WATER LEVEL:
Static level 44 ft. below land surface Date ____
Artesian pressure ____ lbs. per square inch Date ____
Depth to pump bowls, cylinder, jet, etc., ____ ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No If yes, by whom?
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.
Bailer test ____ gpm with ____ ft. drawdown after ____ hrs.
Artesian flow ____ gpm
Temperature of water ____

12) WATER QUALITY:
Was a chemical analysis made? Yes No
Did any strata contain undesirable water? Yes No
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Praytor (Type or Print) Water Well Drillers Registration No. 407
ADDRESS P.O. Box 63 (Street or RFD) Elcampo (City) Tex (State)
(Signed) W. C. Praytor (Water Well Driller) Praytor Drilling (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-6

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
4	1 of 1	NW	0.49 / 2,599.05	FLOYD WATZ TX	TCEQ WELL LOGS

Grid No:	66-55-2J
Date Drilled:	03/15/1977
Owners Name:	FLOYD WATZ
County:	WHARTON
Water Usage:	RENT
Static Level:	37
Depth Drilled:	75
Latitude:	
Longtiude:	

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-55-2 J
Located on map 1 of
Received: 7/7
dlc

1) OWNER:
Person having well drilled Floyd Watt (Name) Address Rt 1 (Street or RFD) El Campo (City) Tex (State)
Landowner Same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Wharton 3½ miles in E (N.E., S.W., etc.) direction from El Campo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
map on 66-63-39
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor _____ League _____
Block _____ Survey _____
Abstract No. _____
(NW¼ NE¼ SW¼ SE¼) of Section _____

3) TYPE OF WORK (Check):
New Well ✓ Deepening
Reconditioning Plugging

4) PROPOSED USE (Check):
Domestic Industrial Municipal
Irrigation Test Well Other Rent

5) TYPE OF WELL (Check):
Rotary ✓ Driven Dug
Cable Jetted Bored

6) WELL LOG:
Diameter of hole 4½ in. Depth drilled 75 ft. Depth of completed well 75 ft. Date drilled 7-15-77
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Topsoil
5	49	Clay &
49	75	Sand

9) Casing:
Type: Old New ✓ Steel Plastic Other
Cemented from _____ ft. to _____ ft.

Diameter (inches)	Setting From (ft.)	To (ft.)	Gage
2	0	69	Sch 40

10) SCREEN:
Type PL
Perforated Slotted ✓

Diameter (inches)	Setting From (ft.)	To (ft.)	Slot Size
2	69	75	.010

(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ✓ Gravel packed Other
Under reamed Open Hole

8) WATER LEVEL:
Static level 37 ft. below land surface Date _____
Artesian pressure _____ lbs. per square inch Date _____
Depth to pump bowls, cylinder, jet, etc. _____ ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No If yes, by whom?
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.
Bailer test _____ gpm with _____ ft. drawdown after _____ hrs.
Artesian flow _____ gpm
Temperature of water _____

12) WATER QUALITY:
Was a chemical analysis made? Yes No
Did any strata contain undesirable water? Yes No.
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Proctor (Type or Print) Water Well Drillers Registration No. 407
ADDRESS P. O. Box (Street or RFD) El Campo (City) Tex (State)
(Signed) W. C. Proctor (Water Well Driller) Proctor Drlg. (Company Name)

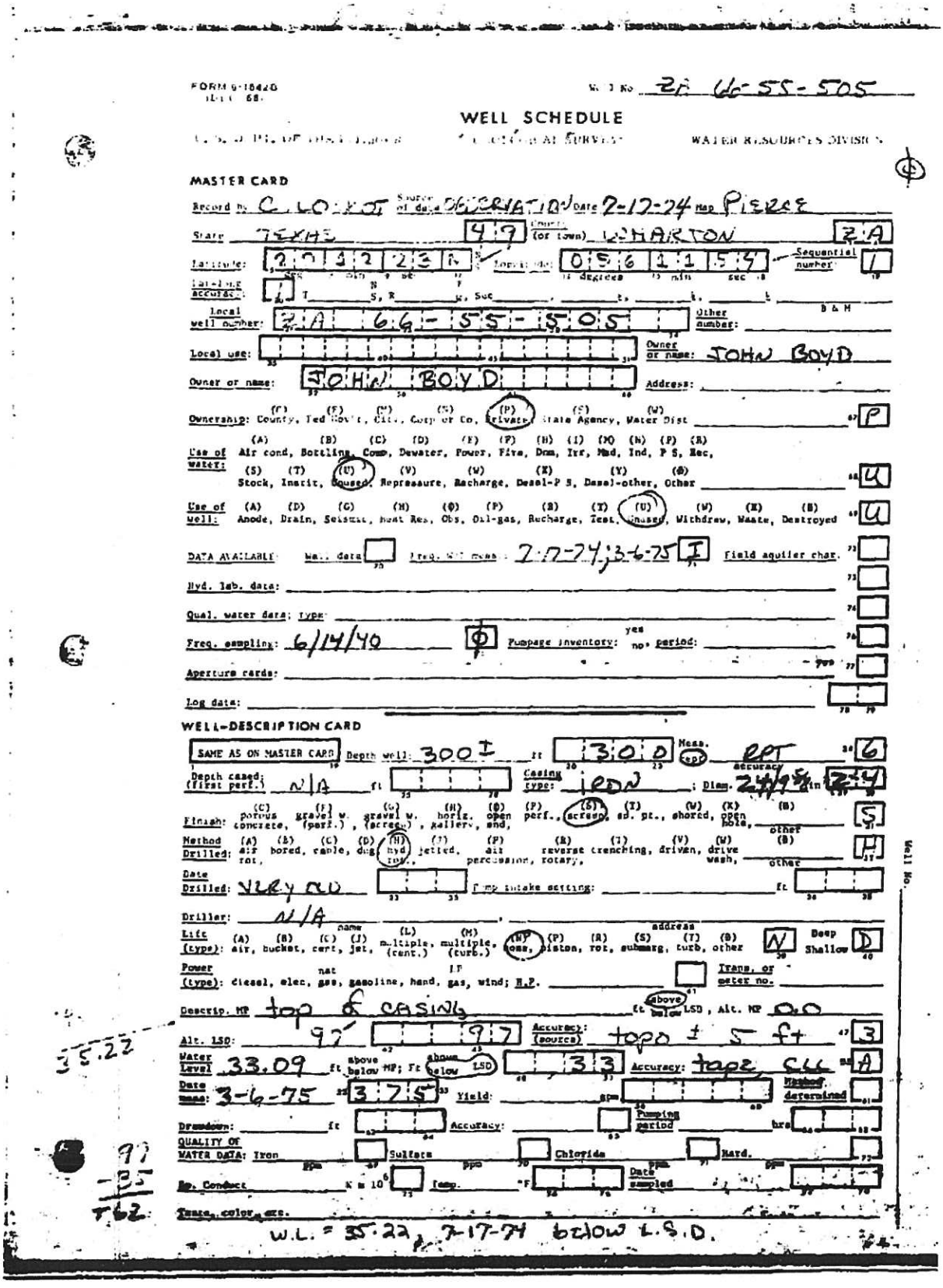
Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-6

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
5	1 of 1	SSW	0.50 / 2,616.31	John Boyd TX	GWDB

Well Rep Track No:	
State Well No:	6655505
Owner Name:	John Boyd
Drilling Start Dt:	
Drilling Month:	
Drilling Day:	
Drilling Year:	
Well Depth:	300
Well Usage:	Unused
Water Level Status:	
Latitude:	29.2066670
Longitude:	-96.1980560
Data Source:	Groundwater Database (GWDB) Reports; GIS shapefile of GWDB well locations
Well Info Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=6655505&Type=GWDB
Document Link:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetScannedImage.aspx?Num=6655505&Cnty=Wharton



FORM 9-1842B
(11-68)

W. I No. 2A-66-55-505

WELL SCHEDULE

WATER RESOURCES DIVISION

MASTER CARD

Record by: C. LOVE Source of data: OPERATION Date: 2-17-74 Map: PIERCE

State: TEXAS 49 County (or town): WHARTON 2A

Latitude: 29°32'23"N Longitude: 096°11'57" Sequential number: 1

Lat-long accuracy: 1 T. ___ N S, R. ___ W, Sec. ___, ___ ft. ___ ft. ___ ft. ___ B & M

Local well number: 2A-66-55-505 Other number: ___

Local use: ___ Owner or name: JOHN BOYD

Owner or name: JOHN BOYD Address: ___

Ownership: (F) County, (E) Fed Govt, (M) City, Corp or Co, (P) Private, (S) State Agency, Water Dist P

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (F) Power, (Fi) Fire, (Dm) Irr, (Md) Ind, (P S) Rec, (S) Stock, (Inacit) Inacit, (U) Housed, (V) Repressure, (W) Recharge, (Desal-P S) Desal-other, (O) Other U

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Rec, (O) Obs, (Oil-gas) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (Waste) Waste, (Destroyed) Destroyed U

DATA AVAILABLE: Wat. data ___ Freq. Wlt meas: 2-17-74; 3-6-75 I Field aquifer char. ___

Hyd. lab. data: ___

Qual. water data: Type: ___

Freq. sampling: 6/14/40 Pumpage inventory: yes no period: ___

Aperture cards: ___

Log date: ___

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 300 I ft 300 Meas. (opt) EST 6

Depth cased: (first perf.) N/A ft Casing type: IRON Diam. 24" in accuracy 2-4

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. collery, (O) open end, (P) perf., (S) screen, (T) sd. pt., (V) shored, (X) open hole, (B) other S

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd jet, (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (B) other H

Date Drilled: VERY OLD Pump intake setting: ___ ft

Driller: N/A name address

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple (cent.), (M) multiple (turb.), (N) none, (P) piston, (R) rot, submerg, (T) turb, (O) other N Deep Shallow D

Power (type): diesel, elec, gas, gasoline, hand, gas, wind; H.P. nat LP Trans. or meter no. ___

Descrip. MP: top of CASING ft above below LSD, Alt. MP 0.0

Alt. LSD: 97 9.7 Accuracy (source): topo ± 5 ft 3

Water Level: 33.09 ft above below MP; ft above below LSD 3.3 Accuracy: tape, S.L. A

Date meas: 3-6-75 Yield: ___ gpm Measured determined ___

Drawdown: ___ ft Accuracy: ___ Pumping period ___ hrs

QUALITY OF WATER DATA: Iron ___ ppm Sulfate ___ ppm Chloride ___ ppm Hard. ___ ppm

Sp. Conduc. ___ x 10^6 Temp. ___ °F Date sampled ___

Tastes, color, etc. ___

35.22

97 -33 T62

W.L. = 35.22, 2-17-74 below L.S.D.

Well No. 24 66-55-505

Latitude-longitude 29 12 23 / 96 11 54

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD | Physiographic Province: COASTAL PLAIN 03 | Section:

F | Drainage Basin: 5121 | Subbasin:

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, swamp, (G) offshore, (P) pediment, (B) hillside, (T) terrace, (U) undulating, (V) valley flat — F

MAJOR AQUIFER: system, series J, aquifer, formation, group C

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

MINOR AQUIFER: system, series, aquifer, formation, group

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

Intervals Screened:

Depth to consolidated rock: ft | Source of date:

Depth to basement: ft | Source of date:

Surficial material: | Infiltration characteristics:

Coefficient Trans: gpd/ft | Coefficient Storage:

Coefficient Perm: gpd/ft^2; Spec cap: gpm/ft; Number of geologic cards:

40' - 24" CSG

MEASURED ~32" CSG - WELL MAY HAVE BEEN REWORKED

Well No.

GPO 863-801

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update.

Federal

Wells from NWIS: FED USGS

The U.S. Geological Survey's (USGS) National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This select NWIS Wells dataset contains specific Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well, Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern. Applicable NWIS database information is obtained through the Water Quality Data Portal (WQP). The WQP is a cooperative service sponsored by the USGS, the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC).

Government Publication Date: Mar 11, 2024

State

Well Log Reports from Plotted Water Wells: TCEQ WELL LOGS

Locations of TCEQ Water Wells as derived from well logs in the Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer, which includes unnumbered water wells and those plotted to 2.5 minute grid locations (2-3 miles). In this collection of Well Log Reports, locations have been manually verified.

Government Publication Date: Jul 26, 2022

Select Wells from SDR: SDRW WELLS

Locations of wells from the Submitted Drillers Report (SDR) Database with select proposed usage: Domestic, Fracking Supply, Industrial, Irrigation, Other, Public Supply, Rig Supply, Stock, Unknown. SDR is populated from the online Texas Well Report Submission and Retrieval System (TWRSRS), a cooperative Texas Department of Licensing and Regulation (TDLR) and Texas Water Development Board (TWDB) application requiring registered water-well drillers to submit reports. Excludes SDR records with the following proposed usage: Closed-Loop Geothermal, De-watering, Environmental Soil Boring, Extraction, Injection, Monitor, Test Well.

Government Publication Date: Sep 24, 2024

Groundwater Database: GWDB

The Texas Water Development Board (TWDB) Groundwater Database (GWDB) contains information on selected water wells, springs, oil/gas tests (that were originally intended to be or were converted to water wells), water levels and water quality.

Government Publication Date: Apr 12, 2024

Fort Bend Subsidence District Water Wells: WW FORT BEND

List of water wells in the Fort Bend Subsidence District, boundaries of which are defined as all the territory within Fort Bend County. The Fort Bend Subsidence District was created by the Texas Legislature in 1989 as a conservation and reclamation district to control land subsidence and manage groundwater resources through regulation, conservation, and coordination with suppliers of alternative water sources to assure an adequate quantity and quality of water for the future. The District's purpose is to provide for the regulation of the withdrawal of groundwater within the District to prevent subsidence that contributes to flooding, inundation or overflow of areas within the District, including rising waters resulting from storms or hurricanes.

Government Publication Date: Sep 23, 2024

High Plains Water Wells: WW HIGH PLAINS

Inventory of water wells in the High Plains Underground Water Conservation District No. 1 (HPUWCD), which was created in 1951. As a political subdivision of Texas, HPUWCD is charged with protecting, preserving and conserving aquifers within the District's 16-county service area.

Government Publication Date: Apr 14, 2024

Harris Galveston Subsidence District Water Wells: WW HARRIS GAL

List of water wells in the Harris-Galveston Subsidence District (HGSD). The HGSD was created by the 64th Texas Legislature as an underground water conservation district in 1975 to provide regulation of groundwater withdrawal to control subsidence.

Government Publication Date: Sep 23, 2024

Water Utility Database: WUD

The Water Utility Database is defined as a collection of data from Texas Water Districts, Public Drinking Water Systems and Water and Sewer Utilities who submit information to the TCEQ. This database is an integrated database designed and developed to replace over 160 stand alone legacy systems representing over 5 million records of the former Texas Water Commission and the Texas Department of Health.

Government Publication Date: Oct 1, 2020

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

T.F. SOILS INFORMATION

Soil Features

Soil mapping units included in this section for the production area and waste disposal areas were taken from the electronic Web Soil Survey for Wharton County. Soil descriptions are included in the supporting documentation and were taken from the most current version of the soil information database for Wharton County as obtained on February 7th, 2025.

T.G. ENGINEERING REPORT

Purpose

This report is prepared as part of the application for Wharton AD1, LLC. for a Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). Water balance models have been developed to illustrate the function of the impoundment system and the hydraulic and nutrient demands of the planned crops.

Background

Wharton AD1, LLC. is applying for a new Industrial Water Quality TLAP Permit No. WQ0000000000 to dispose of digestate (effluent) from two onsite anaerobic digesters. The entire process will generate an average of 75,000 gallons per day (GPO) of effluent for land application.

Impoundment Facility

The storage system at the facility will consist of one earthen impoundment with a storage capacity of fifteen million gallons. The impoundment will contain the treated effluent from the production area.

Water Balance Calculations

Figure 9, Water Balance Calculations, is designed to evaluate the maximum application rate (hydraulic loading rate) for the land application area, estimates the inflows and withdrawals from the direct rainfall, process-generated wastewater, evaporation, and irrigation withdrawal based on crop demand.

Storage Calculations

Figure 10, Storage Calculations, is designed to evaluate the storage capacity and surface area of the storage ponds.

Figure T.G.1

WATER BALANCE CALCULATIONS

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.:

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

(1) Month	(2) Avg Rain	(3) Avg Runoff	(4) Avg Infilt Rainfall	(5) Evapo-trans.	(6) Required Leach	(7) Total Water Needs	(8) Effluent Needed in Root Zone	(9a) Raw Net Evap. from Reservoir	(9b) Reservoir Net Evap. (as inches on plot acres)	(10) Effluent Needed Based on Irrigation Efficiency	(11) Reservoir Consumtion (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.41	1.95	4.09	0.43	4.52	2.57	-1.03	0.00	3.03	3.03
February	2.15	0.58	1.57	4.09	0.50	4.59	3.03	0.11	0.00	3.56	3.56
March	2.90	1.07	1.82	0.60	0.00	0.60	0.00	0.67	0.00	0.00	0.00
April	3.07	1.20	1.87	1.30	0.00	1.30	0.00	1.34	0.00	0.00	0.00
May	4.50	2.32	2.18	3.60	0.28	3.88	1.70	0.40	0.00	2.00	2.00
June	4.08	1.97	2.10	3.40	0.26	3.66	1.55	1.66	0.00	1.83	1.83
July	3.46	1.49	1.97	4.60	0.53	5.13	3.15	2.67	0.00	3.71	3.71
August	3.40	1.44	1.96	5.05	0.62	5.67	3.71	2.87	0.00	4.37	4.37
September	3.89	1.82	2.07	5.40	0.67	6.07	4.00	1.11	0.00	4.71	4.71
October	4.10	1.99	2.11	6.70	0.92	7.62	5.51	0.07	0.00	6.48	6.48
November	3.78	1.74	2.04	4.09	0.41	4.50	2.46	-0.82	0.00	2.89	2.89
December	2.71	0.95	1.77	4.09	0.46	4.55	2.79	-0.63	0.00	3.28	3.28
Totals	41.41	18.00	23.41	47.01	5.08	52.09	30.47	8.41	0.00	35.85	35.85

Crop is	Coastal	
CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	6.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate =	2.99	*ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate =		*ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis =	N/A	*ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit =	**2.99**	*ac-in/ac/month* **OR** *ac-ft/ac/year*
Limiting factor =	Click this cell to choose from list.	
Gross rate check (from flow, acres) =	0.00	**OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = [[(*average rainfall* – (0.2*((1000/*CN*) – 10)))]^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall – average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019
(6) Required leaching =
If: *evapotranspiration – average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration – average infiltrated rainfall* > 0, *Ce* /(*Cl – Ce*)*(*evapotranspiration – avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration + required leaching*
(8) Effluent needed in root zone = *total water needs – average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface + effluent needed based on irrigation efficiency*

Figure T.G.2
STORAGE CALCULATIONS

STORAGE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: Wharton AD1, LLC
Permit No.: 0

The storage calculations are designed to evaluate the storage capacity and surface area of the applicant's storage pond (or multiple ponds). The pond must have enough surface area to evaporate all the flow to the pond under low-net evaporation and corresponding annual rainfall conditions. The pond is considered adequately sized when the adidtional storage required is equal to zero (or "none"). If the additional storage required is greater than zero, then:
(1) the pond's storage capacity must be increase, (2) the pond's surface area must be increased, (3) the effluent flow must be reduced, or (4) other approved measures must be taken to ensure that no accumulation occurs during low-net evaporation and corresponding annual rainfall conditions.

(12)	(13)	(14a)	(14b)	(15)	(16)	(17)	(18a)	(18b)	(19)	(20)
Month	Effluent Available (as inches on plot acres)	Average Rainfall Distrib. (%)	Rain Worst Year	Field Runoff Worst Year	Infiltrated Rain	Avail Water	Average Net Evap. Distrib. (%)	Low Net Evap. from Reservoir Surface	Effluent to Storage (as inches on plot acres)	Accum Storage (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	8.11%	5.04	2.77	2.27	2.27	-12.28%	0.00	-2.65	-
February	0.00	5.19%	3.22	1.31	1.91	1.92	1.31%	0.00	-3.15	-
March	0.00	6.99%	4.34	2.19	2.15	2.16	7.99%	0.00	0.00	0.01
April	0.00	7.41%	4.60	2.40	2.20	2.20	15.96%	0.00	0.00	0.01
May	0.00	10.88%	6.76	4.29	2.47	2.47	4.77%	0.00	-1.66	-
June	0.00	9.85%	6.12	3.72	2.40	2.41	19.77%	0.00	-1.48	-
July	0.00	8.37%	5.20	2.91	2.29	2.29	31.68%	0.00	-3.34	-
August	0.00	8.22%	5.10	2.83	2.27	2.28	34.09%	0.00	-3.99	-
September	0.00	9.40%	5.84	3.47	2.37	2.37	13.18%	0.00	-4.35	-
October	0.00	9.91%	6.15	3.75	2.41	2.41	0.78%	0.00	-6.13	-
November	0.00	9.13%	5.67	3.32	2.35	2.35	-9.76%	0.00	-2.52	-
December	0.00	6.55%	4.07	1.97	2.10	2.11	-7.50%	0.00	-2.88	-
Totals	0.03	100%	62.12	34.93	27.19	27.23	100%	0.00	—	-

Worst (low) net evap. =	-18.96 inches	Storage required =	29.87 *ac-ft*
Corresponding rain =	62.12 inches	Actual storage =	*ac-ft*
Worst-case net year =	2004	Additional storage required =	29.87 *ac-ft*
		Storage days =	130 *days*

(13) Effluent available for irrigation (assumes design flow is applied to entire acerage unless different flow values are justified).
(14a) Average rainfall distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(14b) Rainfall worst year = (*rainfall distribution* as fraction or %/100) **maximum annual rainfall*
(15) Field runoff worst year = [[(*rainfall worst year* – (0.2*((1000/*CN*) – 10)))]^2/((*rainfall worst year* + (0.8*((1000/*CN*) – 10))))
(16) Infiltrated rainfall = (rainfall worst year- field runoff worst year)
(17) Available water = (effluent available for land application + infiltrated rainfall check)
(18) (18a) Average net evaporation distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(18b) Net low evaporation from reservoir surface = [(|*low net evaporation*|)*(*net low evaporation avg. dist*)]* [(*pond area*)/(*irrigation area*)]
(19) Storage =
If: (*total water needs – infiltrated rainfall*) < 0, (*effluent available for land application – net low evaporation from reservoir surface*);
If: (*total water needs – infiltrated rainfall*) ≥ 0,
(effluent available for land application – net low evaporation from reservoir surface) * [(total water needs – infiltrated rainfall)/(irrigation efficiency)]
(20) Accumulated storage =
If: *net low evaporation from reservoir surface + storage* ≤ 0, 0
If: *net low evaporation from reservoir surface + storage* > 0, enter value

T.H. OFF-SITE WASTES:

Volume and Type of Incoming Feedstock

Wharton AD1, LLC estimates a capacity to digest approximately 121,872 tons of feed stock per year; approximately 80,000 tons per year ("tpy") would originate from source separated organics, packaged waste, canned liquid and liquid organics and approximately 40,000 tpy would consist of dilution water (pressate, wash water and recovered). These wastes are to be acquired from multiple sources from Greater Houston Area. The total volume and percent of each source will fluctuate based on availability and needs of the digester. A summary of the proposed waste categories is as follows:

Category 1: Source-separated Organics (SSO)

Description: Source-Separated Organics (SSO) serve as a feedstock for biogas plants, providing high-energy organic material for anaerobic digestion (AD). The process breaks down food waste, yard waste, and soiled paper in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (nutrient-rich fertilizer).

Anticipated Quantity: 75 (tpd) (27,375 tpy)

Category 2: Packaged Waste

Description: Before material is brought on-site, the material must meet quality standards and haulers must provide a manifest for each truck. The waste undergoes depackaging to separate the organic fraction from non-biodegradable materials. The organic content is then fed into an anaerobic digestion (AD) system, where it decomposes in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (fertilizer).

Anticipated Quantity: 50 tpd (18,375 tpy)

Category 3: Canned liquid

Description: Canned liquid waste, like expired beverages and dairy, serves as a high-energy feedstock for biogas plants after depackaging. Rich in sugars, fats, and proteins, it enhances biogas production while reducing landfill waste. The process generates biogas for energy and digestate for fertilizer, promoting sustainability.

Anticipated Quantity: 25 tpd (9,000 tpy)

Category 4: Liquid Organics

Description: Liquid organics, such as food processing waste, dairy waste, and expired beverages, serve as an efficient feedstock for biogas plants. High in sugars, fats, and proteins, they accelerate anaerobic digestion, boosting biogas production and energy recovery.

Anticipated Quantity: 72 tpd (26,232 tpy)

Category 5: Other

Description: Dilution water, including pressate, wash water, and recovered water, enhances biogas production by optimizing feedstock consistency in anaerobic digestion. Pressate provides soluble organics, wash water adds biodegradable residues, and recovered water improves digestion efficiency. Their use increases methane yield, stabilizes the process, and supports resource recovery.

Anticipated Quantity: 112 tpd (40,890 tpy)

T.I. POLLUTANT ANALYSIS DATA

Pollutant analysis data is not available. Once the facility is in operation, samples will be collected and submitted to the TCEQ to meet the permit requirements.

Leah Whallon

From: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Sent: Monday, April 28, 2025 10:05 AM
To: Leah Whallon
Cc: Stephen Megnia; Michael Zhang | Environeer Engineering Consulting; Development Vanguard; Earllott@outlook.com; Sol Ucciani
Subject: Re: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Leah,

Attached the updated version of the TLAP application from the drive link:
https://drive.google.com/drive/folders/1NsYaI-dCWduIXqmEtj8mzXZaNZ3vsG9g?usp=sharing

Please let us know if you have any questions.

Sowmiya Kannappan
Environmental Consultant
Office: (281)-845-9889 | Mobile: (346)-441-9582
Address: University of Houston Technology Bridge
5000 Gulf Freeway, Bldg 4, Houston, TX, 77023
www.environeerconsulting.com



From: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Sent: Monday, April 21, 2025 3:07 PM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>; Stephen Megnia <smegnia@vanguardrenewables.com>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; Development Vanguard <development@vanguardrenewables.com>; Earllott@outlook.com <earllott@outlook.com>; Sol Ucciani <succiani@vanguardrenewables.com>
Subject: RE: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Hi Sowmiya,

I'm following to let you know I was able to confirm that the lease agreement along with the assignment and assumption agreement are acceptable. Once the other items discussed below are provided we can move the application forward to technical review. Please let me know if you have any questions.

Thank you,

Leah Whallon
Texas Commission on Environmental Quality
Water Quality Division
512-239-0084
leah.whallon@tceq.texas.gov

How is our customer service? Fill out our online customer satisfaction survey at www.tceq.texas.gov/customersurvey

---

From: Leah Whallon
Sent: Wednesday, April 16, 2025 5:22 PM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>; Stephen Megnia <smegnia@vanguardrenewables.com>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; Development Vanguard <development@vanguardrenewables.com>; Earllott@outlook.com; Sol Ucciani <succiani@vanguardrenewables.com>
Subject: RE: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Thank you, Sowmiya.

The attached mailing labels do not appear to be functional as they are not in the required format described in the application instructions below:

WHARTON CITY 120 E CANEY WHARTON TX 77488	BECKER ALVIE D ETUX LAURA J 174 GREENDALE RD WHARTON TX 77488	LEO ENTERPRISES INC 2 GREENDALE RD WHART TX 77488
LEO ENTERPRISES INC 272 GREENDALE RD WHARTON TX 77488	LEO ENTERPRISES INC 272 GREENDALE RD WHARTON TX 77488	DORNAK KEITH A 719 WILDERNESS TRL WHA TX 77488

rows down, for a total of 30 labels per page.

Names and addresses must be typed in the format indicated below and in accordance with the U
Postal Service guidelines for machine readability. Each letter in the name and address must be
capitalized, contain no punctuation, and the appropriate two-character abbreviation must be use
the state. Each entity listed must be blocked and spaced consecutively as shown below.

EXAMPLES:

SHARMA DUNN
RR 1 BOX 34
SEA TX 76724

MR AND MRS EDWARD
PEABODY
1405 MONTAGUE LN
SEA TX 76710-1234

BRIAR LP
PO BOX 249
SEA TX 76710-0249

To follow up from our phone calls, I would like to clarify the items needed for administrative report 1.0 Items 10.d,f,g. As we discussed, these items are in reference to the owner of the facility proposed in the application and the land where that facility and the disposal areas will be located. We understand it may not be considered a traditional treatment facility, but in this context, the same information is required. A response is needed to these items for the application to be complete.

Likewise, for Item 4 of the technical report, as discussed and as the form describes, this section applies to both discharge and disposal methods, where irrigation areas are listed rather than outfalls for TLAP applications. An example of the requested information was also provided during our phone call.

Item 4. Outfall/Disposal Method Information (Instructions, Page 42)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge, and for each point of disposal for TLAP operations.

If there are more outfalls/points of disposal at the facility than the spaces provided, copies of pages 6 and/0r numbered accordingly (i.e., page 6a, 6b, etc.) may be used to provide information on the additional outfalls.

For TLAP applications: Indicate the disposal method and each individual irrigation area **I**, evaporation pond **E**, or subsurface drainage system **S** by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for **Outfall** number (e.g. **E1** for evaporation pond 1, **I2** for irrigation area No. 2, etc.).

I am still waiting for clarification from our legal office on the lease agreement item. I will provide an update as soon as possible.

Please let me know if you have any questions or need further clarification on what is needed to complete these items.

Thank you,

Leah Whallon
Texas Commission on Environmental Quality
Water Quality Division
512-239-0084
leah.whallon@tceq.texas.gov

How is our customer service? Fill out our online customer satisfaction survey at www.tceq.texas.gov/customersurvey

---

From: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Sent: Wednesday, April 16, 2025 3:10 PM
To: Stephen Megnia <smegnia@vanguardrenewables.com>; Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; Development Vanguard <development@vanguardrenewables.com>; Earllott@outlook.com; Sol Ucciani <succiani@vanguardrenewables.com>
Subject: Re: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Hi Leah,

Thanks for your email. I have gone through the comments to complete the TLAP application. In line with this, I would like to inform you the following:

6.

1st part - Steve addressed in the previous email

2nd part - Administrative report 1.0, Items 10.d, f, g, as we have already discussed, there is no treatment system involved in this project, so we mentioned landowner's name in 10.d and left blank 10.f and 10.g

10. Completed and attached in this email

11. Technical Report 1.0, Item 4 - The distribution of digestate (effluent) from anaerobic digesters is by the spreading method and does not have any outfalls, so this part is left blank with the necessary explanation.

Please let me know your comments on this.

Sowmiya Kannappan
Environmental Consultant
Office: (281)-845-9889 | Mobile: (346)-441-9582
Address: University of Houston Technology Bridge
5000 Gulf Freeway, Bldg 4, Houston, TX, 77023
www.environeerconsulting.com



From: Stephen Megnia <smegnia@vanguardrenewables.com>
Sent: Wednesday, April 16, 2025 9:03 AM
To: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>; Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; Development Vanguard <development@vanguardrenewables.com>; Earllott@outlook.com <earllott@outlook.com>; Sol Ucciani <succiani@vanguardrenewables.com>
Subject: RE: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Good morning Leah,

In regard to item 6, we have an executed lease agreement with the landowner, Pierce Ranch GP, but there is sensitive information in the lease that we did not want to make public. Instead, we provided a memorandum of lease. The lease was originally executed under VR Development Services, LLC and then later assigned to the project entity, Wharton AD 1, LLC and we had provided the assignment documents as part of our application.

Please let us know if you are missing any of these documents and I will provide them. If some of this information is not sufficient for this TLAP application, please let us know and can get it resolved.

I will work with the Environeer team on the rest of these items.

Thank you,
Steve Megnia
Vanguard Renewables

From: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Sent: Tuesday, April 15, 2025 11:57 AM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; Development Vanguard <development@vanguardrenewables.com>; Stephen Megnia <smegnia@vanguardrenewables.com>
Subject: RE: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Thank you, Sowmia.

I've reviewed the response and there are 3 items from the initial NOD (items 6, 10 and 11) that need attention at this time. The other items have been completed.

6. Administrative Report 1.0, Items 10.d & f-g
I'm waiting for additional clarification from our legal department whether the Assignment and Assumption Agreement between Wharton AD 1, LLC and VR Development Services LLC can be accepted in place of the lease agreement, because generally this is not an acceptable way to meet the application requirements.

   There must to be an executed lease agreement between the applicant and the owner of the land. The alternative when there is no lease agreement between the applicant and owner is for the application to be revised to include the owner as a co-applicant, including providing items 3 and 13 of the administrative report and a core data form for the co-applicant.

   Also, the application items 10.d, f, g, must be filled out accordingly. The response for these are still incomplete or missing in the revised application.

10. Administrative Report 1.1, Item 1

Please provide the updated landowner list formatted for mailing labels (Avery 5160) in a Microsoft Word document.

11. Technical Report 1.0, Item 4

No responses were provided for these items. Please provide revised and/or separate pages to list the disposal method information for each disposal area.

Please let me know if you have any questions.

Thank you,

Leah Whallon
Texas Commission on Environmental Quality
Water Quality Division
512-239-0084
leah.whallon@tceq.texas.gov

How is our customer service? Fill out our online customer satisfaction survey at www.tceq.texas.gov/customersurvey

---

From: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Sent: Sunday, April 6, 2025 10:37 AM
To: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; development@vanguardrenewables.com; Stephen Megnia <smegnia@vanguardrenewables.com>
Subject: Re: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Hi Leah,

I have uploaded the revised version of the TLAP application and the English and Spanish version of the NORI in the drive link attached: https://drive.google.com/drive/folders/11B9hC2-OzTxqH-zEl_obNzv_B2qwspr8?usp=sharing

Please let us know if you have any questions.

Sowmiya Kannappan
Environmental Consultant
Office: (281)-845-9889 | Mobile: (346)-441-9582
Address: University of Houston Technology Bridge
5000 Gulf Freeway, Bldg 4, Houston, TX, 77023
www.environeerconsulting.com

From: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Sent: Tuesday, March 25, 2025 9:20 PM
To: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; development@vanguardrenewables.com <development@vanguardrenewables.com>; Stephen Megnia <smegnia@vanguardrenewables.com>
Subject: Re: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Hi Leah,

I am attaching the drive link that has the following documents as per your suggestions to complete the TLAP application for Wharton AD1, LLC.

Drive link: https://drive.google.com/drive/folders/13Abu8R69yBitQFVAlDIGDzl7UZTrrhkw?usp=drive_link

1. Updated application document
2. Affected landowners list
3. Avery 5160 format
4. Application fee cheque

Updated portion of the NORI:

APPLICATION. Wharton AD 1, LLC, 133 Boston Post Road, Building 15, Floor 2, Weston, Massachusetts 02493, which will operate an anaerobic digestion facility, has applied to the Texas Commission on Environmental Quality (TCEQ) for proposed Texas Land Application Permit (TLAP) No. WQ0005487000 to authorize the disposal of the effluent from the biogas plant at a volume not to exceed a daily average flow of 75,000 gallons per day via surface application on approximately 28,955 acres. The facility and disposal area will be located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59, near the city of Pierce, in Wharton County, Texas 77437.

Spanish version:

Wharton AD 1, LLC, 133 Boston Post Road, Edificio 15, Piso 2, Weston, Massachusetts 02493, que operará una planta de digestión anaeróbica, ha solicitado a la Comisión de Calidad Ambiental de Texas (TCEQ) la propuesta de Permiso de Solicitud de Tierras de Texas (TLAP) n.º WQ0005487000 para autorizar la eliminación del efluente de la planta de biogás, en un volumen que no supere un caudal promedio diario de 75 000 galones por día, mediante aplicación superficial en aproximadamente 28 955 acres. La planta y el área de eliminación estarán ubicados aproximadamente a 2,4 km al sureste de la intersección de Pierce West Road y la autopista estadounidense 59, cerca de la ciudad de Pierce, en el condado de Wharton, Texas 77437.

Please let us know if you have any questions.

Sowmiya Kannappan
Environmental Consultant
Office: (281)-845-9889 | Mobile: (346)-441-9582

Address: University of Houston Technology Bridge
5000 Gulf Freeway, Bldg 4, Houston, TX, 77023
www.environeerconsulting.com

From: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Sent: Monday, March 24, 2025 12:12 PM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; development@vanguardrenewables.com <development@vanguardrenewables.com>; Stephen Megnia <smegnia@vanguardrenewables.com>
Subject: RE: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Hi Sowmiya,

There are 3 items needed – the map, the cross-reference list, and the mailing labels. The map should label the properties by number, i.e. 1,2,3, etc. The separate cross reference list should include the numbers from the map and the owner name and mailing address for each number. The mailing labels should include all mailing addresses (removing any duplicates from the cross-reference list) and be formatted in Avery 5160 mailing label format.

The instructions are attached with the affected landowner information starting on page 35. Please let me know if you have any questions.

Thanks,

Leah Whallon
Texas Commission on Environmental Quality
Water Quality Division
512-239-0084
leah.whallon@tceq.texas.gov

How is our customer service? Fill out our online customer satisfaction survey at www.tceq.texas.gov/customersurvey

---

From: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Sent: Monday, March 24, 2025 12:00 PM
To: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>;

development@vanguardrenewables.com; Stephen Megnia <smegnia@vanguardrenewables.com>
Subject: Re: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Hi Leah,

We are updating your comments on the TLAP application for Wharton AD1. We are almost done, except for Item No. 10 on affected landowners' information. The comment is:

Please provide a revised affected landowner map that labels each property, all adjacent properties should be numbered in numerical order instead of the property tax ID numbers. Please include an updated cross-reference listing all affected landowners in numerical order, and the landowner list formatted for mailing labels (Avery 5160) in a Microsoft Word document.

We request for additional clarification on numbering the affected landowner's information in the surrounding to update the application. Should the landowners numbered in simple numerical order or any other information is required?

Looking forward to hearing from you.

Sowmiya Kannappan
Environmental Consultant
Office: (281)-845-9889 | Mobile: (346)-441-9582
Address: University of Houston Technology Bridge
5000 Gulf Freeway, Bldg 4, Houston, TX, 77023
www.environeerconsulting.com



From: Leah Whallon <Leah.Whallon@Tceq.Texas.Gov>
Sent: Thursday, March 13, 2025 2:52 PM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>
Cc: Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>; development@vanguardrenewables.com <development@vanguardrenewables.com>
Subject: Application for Proposed Permit No. WQ0005487000; Wharton AD 1, LLC; Pierce Ranch

Good Afternoon,

Please see the attached Notice of Deficiency letter dated March 13, 2025 requesting additional information needed to declare the application administratively complete. Please send the complete response by March 27, 2025.

Please let me know if you have any questions.

Thank you,

Leah Whallon
Texas Commission on Environmental Quality
Water Quality Division
512-239-0084
leah.whallon@tceq.texas.gov

How is our customer service? Fill out our online customer satisfaction survey at www.tceq.texas.gov/customersurvey

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION CHECKLIST

Complete and submit this checklist with the industrial wastewater permit application.

APPLICANT NAME: Wharton AD1, LLC

PERMIT NUMBER (If new, leave blank): WQ00 Click to enter text.

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

	Y	N		Y	N
Administrative Report 1.0	☒	☐	Worksheet 8.0	☐	☐
Administrative Report 1.1	☒	☐	Worksheet 9.0	☐	☐
SPIF	☐	☐	Worksheet 10.0	☐	☐
Core Data Form	☒	☐	Worksheet 11.0	☐	☐
Public Involvement Plan Form	☒	☐	Worksheet 11.1	☐	☐
Plain Language Summary	☒	☐	Worksheet 11.2	☐	☐
Technical Report 1.0	☒	☐	Worksheet 11.3	☐	☐
Worksheet 1.0	☐	☐	Original USGS Map	☒	☐
Worksheet 2.0	☐	☐	Affected Landowners Map	☒	☐
Worksheet 3.0	☒	☐	Landowner Disk or Labels	☐	☐
Worksheet 3.1	☐	☐	Flow Diagram	☒	☐
Worksheet 3.2	☐	☐	Site Drawing	☒	☐
Worksheet 3.3	☐	☐	Original Photographs	☐	☐
Worksheet 4.0	☐	☐	Design Calculations	☐	☐
Worksheet 4.1	☐	☐	Solids Management Plan	☐	☐
Worksheet 5.0	☐	☐	Water Balance	☒	☐
Worksheet 6.0	☐	☐			
Worksheet 7.0	☐	☐			

For TCEQ Use Only

Segment Number _____County _____
Expiration Date _____Region _____
Permit Number _____

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.0

This report is required for all applications for TPDES permits and TLAPs, except applications for oil and gas extraction operations subject to 40 CFR Part 435. Contact the Applications Review and Processing Team at 512-239-4671 with any questions about completing this report.

Applications for oil and gas extraction operations subject to 40 CFR Part 435 must use the Oil and Gas Exploration and Production Administrative Report (TCEQ Form-20893 and 20893-inst[1]).

Item 1. Application Information and Fees (Instructions, Page 26)

a. Complete each field with the requested information, if applicable.

Applicant Name: Wharton AD1, LLC

Permit No.: WQ000Click to enter text.

EPA ID No.: TX0Click to enter text.

Expiration Date: Click to enter text.

b. Check the box next to the appropriate authorization type.

☒ Industrial Wastewater (wastewater and stormwater)

☐ Industrial Stormwater (stormwater only)

c. Check the box next to the appropriate facility status.

☐ Active ☒ Inactive

d. Check the box next to the appropriate permit type.

☐ TPDES Permit ☒ TLAP ☐ TPDES with TLAP component

e. Check the box next to the appropriate application type.

☒ New

☐ Renewal with changes ☐ Renewal without changes

☐ Major amendment with renewal ☐ Major amendment without renewal

☐ Minor amendment without renewal

☐ Minor modification without renewal

f. If applying for an amendment or modification, describe the request: Click to enter text.

For TCEQ Use Only

Segment Number _____County _____

[1] https://www.tceq.texas.gov/publications/search_forms.html

g. Application Fee

EPA Classification	New	Major Amend. (with or without renewal)	Renewal (with or without changes)	Minor Amend. / Minor Mod. (without renewal)
Minor facility not subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☒ $350	☐ $350	☐ $315	☐ $150
Minor facility subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☐ $1,250	☐ $1,250	☐ $1,215	☐ $150
Major facility	N/A [2]	☐ $2,050	☐ $2,015	☐ $450

h. Payment Information

Mailed

Check or money order No.: Click to enter text.

Check or money order amt.: Click to enter text.

Named printed on check or money order: Click to enter text.

Epay

Voucher number: Click to enter text.

Copy of voucher attachment: Click to enter text.

Item 2. Applicant Information (Instructions, Pages 26)

a. Customer Number, if applicant is an existing customer: CN000000000

Note: Locate the customer number using the TCEQ's Central Registry Customer Search[3].

b. Legal name of the entity (applicant) applying for this permit: Wharton AD1, LLC

Note: The owner of the facility must apply for the permit. The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Mr. Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

d. Will the applicant have overall financial responsibility for the facility?

☒ Yes ☐ No

[2] All facilities are designated as minors until formally classified as a major by EPA.

[3] https://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 3. Co–applicant Information (Instructions, Page 27)

☒ Check this box if there is no co-applicant.; otherwise, complete the below questions.

a. Legal name of the entity (co-applicant) applying for this permit: Click to enter text.

Note: The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

b. Customer Number (if applicant is an existing customer): CNClick to enter text.

Note: Locate the customer number using the TCEQ's Central Registry Customer Search.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

Title: Click to enter text. Credential: Click to enter text.

d. Will the co-applicant have overall financial responsibility for the facility?

☐ Yes ☐ No

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 4. Core Data Form (Instructions, Pages 27)

a. Complete one Core Data Form (TCEQ Form 10400) for each customer (applicant and co-applicant(s)) and include as an attachment. If the customer type selected on the Core Data Form is Individual, complete Attachment 1 of the Administrative Report. Attachment: Click to enter text.

Item 5. Application Contact Information (Instructions, Page 27)

Provide names of two individuals who can be contact for additional information about this application. Indicate if the individual can be contact about administrative or technical information, or both.

a. ☒ Administrative Contact . ☒ Technical Contact

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. ☒ Administrative Contact ☒ Technical Contact

Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Managing Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 6. Permit Contact Information (Instructions, Page 28)

Provide two names of individuals that can be contacted throughout the permit term.

a. Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 7. Billing Contact Information (Instructions, Page 28)

The permittee is responsible for paying the annual fee. The annual fee will be assessed for permits **in effect on September 1 of each year**. The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (form TCEQ-20029).

Provide the complete mailing address where the annual fee invoice should be mailed and the name and phone number of the permittee's representative responsible for payment of the invoice.

Prefix: Mr Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

Organization Name: Wharton AD1, LLC

Mailing Address: 133 Boston Post Rd City/State/Zip: Weston, MA, 02493

Phone No: 508.360.2095 Email: smegnia@vanguardrenewable.com

Item 8. DMR/MER Contact Information (Instructions, Page 28)

Provide the name and mailing address of the person delegated to receive and submit DMRs or MERs. **Note:** DMR data must be submitted through the NetDMR system. An electronic reporting account can be established once the facility has obtained the permit number.

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: Sowmiya.kannappan@environeerconsulting.com

Item 9. Notice Information (Instructions, Pages 28)

a. Individual Publishing the Notices

Prefix: Ms Full Name (Last/First Name): Sowmiya Kannappan

Title: Environment Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy, Bldg 4 City/State/Zip: Houston, TX 77054

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package (only for NORI, NAPD will be sent via regular mail)

☒ E-mail: sowmiya.kannappan@environeerconsulting.com

☐ Fax: Click to enter text.

☐ Regular Mail (USPS)

Mailing Address: Click to enter text.

City/State/Zip Code: Click to enter text.

c. Contact in the Notice

Prefix: Ms Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

d. Public Viewing Location Information

Note: If the facility or outfall is located in more than one county, provide a public viewing place for each county.

Public building name: Wharton County Library Location within the building: Click to enter text.

Physical Address of Building: 200 W Church St, El Campo, TX 77437

City: El Campo County: Wharton

e. Bilingual Notice Requirements

This information is required for new, major amendment, minor amendment or minor modification, and renewal applications.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine if an alternative language notice(s) is required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

If no, publication of an alternative language notice is not required; skip to Item 8 (Regulated Entity and Permitted Site Information.)

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

   ☒ Yes ☐ No

3. Do the students at these schools attend a bilingual education program at another location?

   ☐ Yes ☐ No

4. Would the school be required to provide a bilingual education program, but the school has waived out of this requirement under 19 TAC §89.1205(g)?

   ☐ Yes ☐ No ☒ N/A

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? Spanish

f. Plain Language Summary Template – Complete the Plain Language Summary (TCEQ Form 20972) and include as an attachment. Attachment: A.C

g. Complete one Public Involvement Plan (PIP) Form (TCEQ Form 20960) for each application for a new permit or major amendment and include as an attachment. Attachment: A.D

Item 10. Regulated Entity and Permitted Site Information (Instructions Page 29)

a. TCEQ issued Regulated Entity Number (RN), if available: RNClick to enter text.

Note: If your business site is part of a larger business site, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search the TCEQ's Central Registry to determine the RN or to see if the larger site may already be registered as a Regulated Entity. If the site is found, provide the assigned RN.

b. Name of project or site (the name known by the community where located): Pierce Ranch

c. Is the location address of the facility in the existing permit the same?

☐ Yes ☐ No ☒ N/A (new permit)

Note: If the facility is located in Bexar, Comal, Hays, Kinney, Medina, Travis, Uvalde, or Williamson County, additional information concerning protection of the Edwards Aquifer may be required.

d. Owner of treatment facility:

Prefix: Click to enter text. Full Name (Last/First Name): Stephen Megnia

or Organization Name: Wharton AD1, LLC

Mailing Address: 133 Boston Post Rd City/State/Zip: Weston MA 02493

Phone No: 508-360-2095 Email: smegnia@vanguardrenewable.com

e. Ownership of facility: ☐ Public ☒ Private ☐ Both ☐ Federal

f. Owner of land where treatment facility is or will be: Laurance Armour

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: 832-741-7411 Email: lharmour3@gmail.com

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years (In some cases, a lease may not suffice - see instructions). Attachment: Click to enter text.

g. Owner of effluent TLAP disposal site (if applicable): Click to enter text.

Prefix: Click to enter text. Full Name (Last/First Name): Laurance Armour

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: 832-741-7411 Email: lharmour3@gmail.com

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

h. Owner of sewage sludge disposal site (if applicable):

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

Item 11. TDPES Discharge/TLAP Disposal Information (Instructions, Page 31)

a. Is the facility located on or does the treated effluent cross Native American Land?

☐ Yes ☒ No

b. Attach an original full size USGS Topographic Map (or an 8.5"×11" reproduced portion for renewal or amendment applications) with all required information. Check the box next to each item below to confirm it has been included on the map.

☒ One-mile radius

☒ Applicant's property boundaries

☐ Labeled point(s) of discharge

☒ Effluent disposal site boundaries

☐ Sewage sludge disposal site

☐ Three-miles downstream information

☐ Treatment facility boundaries

☐ Highlighted discharge route(s)

☐ All wastewater ponds

☐ New and future construction

Attachment: Click to enter text.

c. Is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: Click to enter text.

If no, or a new application, provide an accurate location description: Click to enter text.

d. Are the point(s) of discharge in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: The effluent from the biogas plant is applied directly on the land without any treatment.

e. Are the discharge route(s) in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new permit, provide an accurate description of the discharge route: The effluent from the biogas plant is applied directly on the land without any treatment.

f. City nearest the outfall(s): N/A

g. County in which the outfalls(s) is/are located: N/A

h. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If yes, indicate by a check mark if: ☐ Authorization granted ☐ Authorization pending

For new and amendment applications, attach copies of letters that show proof of contact and provide the approval letter upon receipt. Attachment: Click to enter text.

For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge: Click to enter text.

i. For TLAPs, is the location of the effluent disposal site in the existing permit accurate?

☐ Yes No or New Permit ☒ New Permit

If no, or a new application, provide an accurate location description: Site is located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59

j. City nearest the disposal site: Pierce

k. County in which the disposal site is located: Wharton

l. For TLAPs, describe how effluent is/will be routed from the treatment facility to the disposal site: Effluent from the biogas plant is directly applied on the land and no treatment facility is included

m. For TLAPs, identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained: Colorado River

Item 12. Miscellaneous Information (Instructions, Page 33)

a. Did any person formerly employed by the TCEQ represent your company and get paid for service regarding this application?

☐ Yes ☒ No

If yes, list each person: Click to enter text.

b. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Account no.: Click to enter text.

Total amount due: Click to enter text.

c. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Enforcement order no.: Click to enter text.

Amount due: Click to enter text.

Item 13. Signature Page (Instructions, Page 33)

Permit No: WQ000Click to enter text.

Applicant Name: Wharton AD1, LLC

Certification: I, Kim Martin, 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 (typed or printed): Kim Martin

Signatory title: VP of Development

Signature: _____ Date: 3/17/25
(Use blue ink)

Subscribed and Sworn to before me by the said Kim Martin

on this 17th day of March, 2025.

My commission expires on the 4th day of September, 2031.

Noelle P. Fairney
Notary Public

[SEAL]

NOELLE P. FAIRNENY
Notary Public
Commonwealth of Massachusetts
My Commission Expires
September 4, 2031

Middlesex
County, Massachusetts

Note: *If co-applicants are necessary, each entity must submit an original, separate signature page.*

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.1

The following information is required for new and amendment applications.

Item 1. Affected Landowner Information (Instructions, Page 35)

a. Attach a landowner map or drawing, with scale, as applicable. Check the box next to each item to confirm it has been provided.

☒ The applicant's property boundaries.

☒ The facility site boundaries within the applicant's property boundaries.

☒ The distance the buffer zone falls into adjacent properties and the property boundaries of the landowners located within the buffer zone.

☒ The property boundaries of all landowners surrounding the applicant's property. (Note: if the application is a major amendment for a lignite mine, the map must include the property boundaries of all landowners adjacent to the new facility (ponds).)

☐ The point(s) of discharge and highlighted discharge route(s) clearly shown for one mile downstream.

☐ The property boundaries of the landowners located on both sides of the discharge route for one full stream mile downstream of the point of discharge.

☐ The property boundaries of the landowners along the watercourse for a one-half mile radius from the point of discharge if the point of discharge is into a lake, bay, estuary, or affected by tides.

☐ The boundaries of the effluent disposal site (e.g., irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property.

☐ The property boundaries of all landowners surrounding the applicant's property boundaries where the effluent disposal site is located.

☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners within one-quarter mile of the applicant's property boundaries where the sewage sludge land application site is located.

☐ The property boundaries of landowners within one-half mile in all directions from the applicant's property boundaries where the sewage sludge disposal site (e.g., sludge surface disposal site or sludge monofil) is located.

Attachment: Click to enter text.

b. Check the box next to the format of the landowners list:

☐ Readable/Writeable CD ☐ Four sets of labels

Attachment: Click to enter text.

d. Provide the source of the landowners' names and mailing addresses: Wharton County Central Appraisal District (WCAD)

e. As required by Texas Water Code § 5.115, is any permanent school fund land affected by this application?

☐ Yes ☒ No

If yes, provide the location and foreseeable impacts and effects this application has on the land(s): Click to enter text.

Item 2. Original Photographs (Instructions, Page 37)

Provide original ground level photographs. Check the box next to each of the following items to indicate it is included.

☐ At least one original photograph of the new or expanded treatment unit location.

☐ At least two photographs of the existing/proposed point of discharge and as much area downstream (photo 1) and upstream (photo 2) as can be captured. If the discharge is to an open water body (e.g., lake, bay), the point of discharge should be in the right or left edge of each photograph showing the open water and with as much area on each respective side of the discharge as can be captured.

☐ At least one photograph of the existing/proposed effluent disposal site.

☒ A plot plan or map showing the location and direction of each photograph.

Attachment: Click to enter text.

INDUSTRIAL WASTEWATER PERMIT APPLICATION

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

This form applies to TPDES permit applications only. Complete and attach the Supplemental Permit information Form (SPIF) (TCEQ Form 20971).

Attachment: Click to enter text.

WATER QUALITY PERMIT

PAYMENT SUBMITTAL FORM

Use this form to submit the Application Fee, if mailing the payment. (Instructions, Page 36–37)

- Complete items 1 through 5 below.
- Staple the check or money order in the space provided at the bottom of this document.
- Do not mail this form with the application form.
- Do not mail this form to the same address as the application.
- Do not submit a copy of the application with this form as it could cause duplicate permit entries.

Mail this form and the check or money order to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, Texas 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, Texas 78753

Fee Code: WQP **Permit No:** WQ000Click to enter text.

1. Check or Money Order Number: Click to enter text.
2. Check or Money Order Amount: Click to enter text.
3. Date of Check or Money Order: Click to enter text.
4. Name on Check or Money Order: Click to enter text.
5. APPLICATION INFORMATION

   Name of Project or Site: Click to enter text.

   Physical Address of Project or Site: Click to enter text.

   If the check is for more than one application, attach a list which includes the name of each Project or Site (RE) and Physical Address, exactly as provided on the application.
   Attachment: Click to enter text.

Staple Check or Money Order in This Space

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION TECHNICAL REPORT 1.0

The following information **is required** for all applications for a TLAP or an individual TPDES discharge permit.

For **additional information** or clarification on the requested information, please refer to the Instructions for Completing the Industrial Wastewater Permit Application[1] available on the TCEQ website. Please contact the Industrial Permits Team at 512-239-4671 with any questions about this form.

If more than one outfall is included in the application, provide applicable information for each individual outfall. **If an item does not apply to the facility, enter N/A** to indicate that the item has been considered. Include separate reports or additional sheets as **clearly cross–referenced attachments** and provide the attachment number in the space provided for the item the attachment addresses.

NOTE: This application is for an industrial wastewater permit only. Additional authorizations from the TCEQ Waste Permits Division or the TCEQ Air Permits Division may be needed.

Item 1. Facility/Site Information (Instructions, Page 39)

a. Describe the general nature of the business and type(s) of industrial and commercial activities. Include all applicable SIC codes (up to 4).

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. Primary SIC Code = 4924, Primary NAICS Code = 221210

b. Describe all wastewater-generating processes at the facility.

Anaerobic digestion breaks down organic materials like cow manure and food waste in an enclosed environment to produce biogas. Combining manure with food waste enhances biogas production, making the system more efficient. Feedstock from hydrolysis and manure tanks is regularly transferred to digester tanks, where it is mixed, heated, and broken down by microbes in an oxygen-free environment. This process generates biogas, primarily methane, carbon dioxide, hydrogen, and water vapor. The collected biogas undergoes conditioning to produce pipeline-quality natural gas. As new material enters the digester, processed digestate is removed and stored in a lagoon for land application by spreading method.

[1] https://www.tceq.texas.gov/permitting/wastewater/industrial/TPDES_industrial_wastewater_steps.html

c. Provide a list of raw materials, major intermediates, and final products handled at the facility.

Materials List

Raw Materials	Intermediate Products	Final Products
Source-separated Organics	Digestate	Renewable Natural Gas
Packaged waste	Biogas	Liquid fertilizer
Canned liquid		
Liquid organics		
Dilution water		

Attachment: Click to enter text.

d. Attach a facility map (drawn to scale) with the following information:

- Production areas, maintenance areas, materials-handling areas, waste-disposal areas, and water intake structures.
- The location of each unit of the WWTP including the location of wastewater collection sumps, impoundments, outfalls, and sampling points, if significantly different from outfall locations.

Attachment: T.A

e. Is this a new permit application for an existing facility?

☐ Yes ☒ No

If **yes**, provide background discussion: Click to enter text.

f. Is/will the treatment facility/disposal site be located above the 100-year frequency flood level.

☐ Yes ☒ No

List source(s) used to determine 100-year frequency flood plain: Click to enter text.

If **no**, provide the elevation of the 100-year frequency flood plain and describe what protective measures are used/proposed to prevent flooding (including tail water and rainfall run-on controls) of the treatment facility and disposal area: Click to enter text.

Attachment: T.B

g. For **new** or **major amendment** permit applications, will any construction operations result in a discharge of fill material into a water in the state?

☐ Yes ☒ No ☐ N/A (renewal only)

h. If **yes** to Item 1.g, has the applicant applied for a USACE CWA Chapter 404 Dredge and Fill permit?

☐ Yes ☒ No

If **yes**, provide the permit number: Click to enter text.

If **no**, provide an approximate date of application submittal to the USACE: Click to enter text.

Item 2. Treatment System (Instructions, Page 40)

a. List any physical, chemical, or biological treatment process(es) used/proposed to treat wastewater at this facility. Include a description of each treatment process, starting with initial treatment and finishing with the outfall/point of disposal.

The digestate (effluent) produced in anaerobic digesters is distributed using the spreading method without undergoing any additional treatment. The feedstock is processed within the biogas plant, and the resulting digestate is directly applied to agricultural land via spreading, with no intermediate treatment steps.

b. Attach a flow schematic **with a water balance** showing all sources of water and wastewater flow into the facility, wastewater flow into and from each treatment unit, and wastewater flow to each outfall/point of disposal.

Attachment: T.A.1

Item 3. Impoundments (Instructions, Page 40)

Does the facility use or plan to use any wastewater impoundments (e.g., lagoons or ponds?)

☒ Yes ☐ No

If **no**, proceed to Item 4. If **yes**, complete **Item 3.a** for **existing** impoundments and **Items 3.a – 3.e** for **new or proposed** impoundments. **NOTE:** See instructions, Pages 40-42, for additional information on the attachments required by Items 3.a – 3.e.

a. Complete the table with the following information for each existing, new, or proposed impoundment. Attach additional copies of the Impoundment Information table, if needed.

Use Designation: Indicate the use designation for each impoundment as Treatment (**T**), Disposal (**D**), Containment (**C**), or Evaporation (**E**).

Associated Outfall Number: Provide an outfall number if a discharge occurs or will occur.

Liner Type: Indicate the liner type as Compacted clay liner (**C**), In-situ clay liner (**I**), Synthetic/plastic/rubber liner (**S**), or Alternate liner (**A**). **NOTE:** See instructions for further detail on liner specifications. If an alternate liner (A) is selected, include an attachment that provides a description of the alternate liner and any additional technical information necessary for an evaluation.

Leak Detection System: If any leak detection systems are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no.

Groundwater Monitoring Wells and Data: If groundwater monitoring wells are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no. Attach any existing groundwater monitoring data.

Dimensions: Provide the dimensions, freeboard, surface area, storage capacity of the impoundments, and the maximum depth (not including freeboard). For impoundments with irregular shapes, submit surface area instead of length and width.

Compliance with 40 CFR Part 257, Subpart D: If the impoundment is required to be in compliance with 40 CFR Part 257, Subpart D, enter **Y** for yes. Otherwise, enter **N** for no.

Date of Construction: Enter the date construction of the impoundment commenced (mm/dd/yy).

Impoundment Information

Parameter	**Pond #**	**Pond #**	**Pond #**	**Pond #**
Use Designation: (T) (D) (C) or (E)	N/A			
Associated Outfall Number	N/A			
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), Not Including Freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction	TBD			

Attachment: Click to enter text.

The following information (**Items 3.b – 3.e**) is required only for **new or proposed** impoundments.

b. For new or proposed impoundments, attach any available information on the following items. If attached, check **yes** in the appropriate box. Otherwise, check **no** or **not yet designed**.

1. Liner data

☐ Yes ☐ No ☐ Not yet designed

2. Leak detection system or groundwater monitoring data

☐ Yes ☐ No ☐ Not yet designed

3. Groundwater impacts

☐ Yes ☐ No ☐ Not yet designed

NOTE: Item b.3 is required if the bottom of the pond is not above the seasonal high-water table in the shallowest water-bearing zone.

Attachment: Click to enter text.

For TLAP applications: Items 3.c – 3.e are **not required**, continue to Item 4.

c. Attach a USGS map or a color copy of original quality and scale which accurately locates and identifies all known water supply wells and monitor wells within ½-mile of the impoundments.

Attachment: Click to enter text.

d. Attach copies of State Water Well Reports (e.g., driller's logs, completion data, etc.), and data on depths to groundwater for all known water supply wells including a description of how the depths to groundwater were obtained.

Attachment: Click to enter text.

e. Attach information pertaining to the groundwater, soils, geology, pond liner, etc. used to assess the potential for migration of wastes from the impoundments or the potential for contamination of groundwater or surface water.

Attachment: Click to enter text.

Item 4. Outfall/Disposal Method Information (Instructions, Page 42)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge, and for each point of disposal for TLAP operations.

If there are more outfalls/points of disposal at the facility than the spaces provided, copies of pages 6 and/0r numbered accordingly (i.e., page 6a, 6b, etc.) may be used to provide information on the additional outfalls.

For TLAP applications: Indicate the disposal method and each individual irrigation area **I**, evaporation pond **E**, or subsurface drainage system **S** by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for **Outfall** number (e.g. **E1** for evaporation pond 1, **I2** for irrigation area No. 2, etc.).

Outfall Longitude and Latitude

Outfall No.	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
	Table T.A.1	

Outfall Location Description

Outfall No.	Location Description
	The Land Management Units (LMUs) are distributed throughout the property, with a higher concentration in the northern, southwest and central areas. Additionally, the small parcel located to the north accounts for more than half of the total area covered by LMUs. This accounts for 87 LMUs inside property boundary,

Description of Sampling Point(s) (if different from Outfall location)

Outfall No.	Description of sampling point

Outfall Flow Information – Permitted and Proposed

Outfall No.	Permitted Daily Avg Flow (MGD)	Permitted Daily Max Flow (MGD)	Proposed Daily Avg Flow (MGD)	Proposed Daily Max Flow (MGD)	Anticipated Discharge Date (mm/dd/yy)
	0.075	0.075	0.075	0.075	TBD

Outfall Discharge – Method and Measurement

Outfall No.	Pumped Discharge? Y/N	Gravity Discharge? Y/N	Type of Flow Measurement Device Used

Outfall Discharge – Flow Characteristics

Outfall No.	Intermittent Discharge? Y/N	Continuous Discharge? Y/N	Seasonal Discharge? Y/N	Discharge Duration (hrs/day)	Discharge Duration (days/mo)	Discharge Duration (mo/yr)

Outfall Wastestream Contributions

Outfall No. T-1

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow

Attachment: Click to enter text.

Item 5. Blowdown and Once–Through Cooling Water Discharges (Instructions, Page 43)

a. Indicate if the facility currently or proposes to:

☐ Yes ☒ No Use cooling towers that discharge blowdown or other wastestreams

☐ Yes ☒ No Use boilers that discharge blowdown or other wastestreams

☐ Yes ☒ No Discharge once-through cooling water

NOTE: If the facility uses or plans to use cooling towers or once-through cooling water, Item 12 **is required**.

b. If **yes** to any of the above, attach an SDS with the following information for each chemical additive.

- Manufacturers Product Identification Number
- Product use (e.g., biocide, fungicide, corrosion inhibitor, etc.)
- Chemical composition including CASRN for each ingredient
- Classify product as non-persistent, persistent, or bioaccumulative
- Product or active ingredient half-life
- Frequency of product use (e.g., 2 hours/day once every two weeks)
- Product toxicity data specific to fish and aquatic invertebrate organisms
- Concentration of whole product or active ingredient, as appropriate, in wastestream.

In addition to each SDS, attach a summary of the above information for each specific wastestream and the associated chemical additives. Specify which outfalls are affected.

Attachment: Click to enter text.

c. Cooling Towers and Boilers

If the facility currently or proposes to use cooling towers or boilers that discharge blowdown or other wastestreams to the outfall(s), complete the following table.

Cooling Towers and Boilers

Type of Unit	Number of Units	Daily Avg Blowdown (gallons/day)	Daily Max Blowdown (gallons/day)
Cooling Towers			
Boilers			

Item 6. Stormwater Management (Instructions, Page 44)

Will any existing/proposed outfalls discharge stormwater associated with industrial activities, as defined at *40 CFR § 122.26(b)(14)*, commingled with any other wastestream?

☐ Yes ☒ No

If **yes**, briefly describe the industrial processes and activities that occur outdoors or in a manner which may result in exposure of the activities or materials to stormwater: Click to enter text.

Item 7. Domestic Sewage, Sewage Sludge, and Septage Management and Disposal (Instructions, Page 44)

Domestic Sewage - Waste and wastewater from humans or household operations that is discharged to a wastewater collection system or otherwise enters a treatment works.

a. Check the box next to the appropriate method of domestic sewage and domestic sewage sludge treatment or disposal. Complete Worksheet 5.0 or Item 7.b if directed to do so.

☐ Domestic sewage is routed (i.e., connected to or transported to) to a WWTP permitted to receive domestic sewage for treatment, disposal, or both. Complete Item 7.b.

☐ Domestic sewage disposed of by an on-site septic tank and drainfield system. Complete Item 7.b.

☐ Domestic and industrial treatment sludge ARE commingled prior to use or disposal.

☐ Industrial wastewater and domestic sewage are treated separately, and the respective sludge IS NOT commingled prior to sludge use or disposal. Complete Worksheet 5.0.

☐ Facility is a POTW. Complete Worksheet 5.0.

☒ Domestic sewage is not generated on-site.

☐ Other (e.g., portable toilets), specify and Complete Item 7.b: Click to enter text.

b. Provide the name and TCEQ, NPDES, or TPDES Permit No. of the waste-disposal facility which receives the domestic sewage/septage. If hauled by motorized vehicle, provide the name and TCEQ Registration No. of the hauler.

Domestic Sewage Plant/Hauler Name

Plant/Hauler Name	Permit/Registration No.

Item 8. Improvements or Compliance/Enforcement Requirements (Instructions, Page 45)

a. Is the permittee currently required to meet any implementation schedule for compliance or enforcement?

☐ Yes ☒ No

b. Has the permittee completed or planned for any improvements or construction projects?

☐ Yes ☒ No

c. If **yes** to either 8.a **or** 8.b, provide a brief summary of the requirements and a status update: Click to enter text.

Item 9. Toxicity Testing (Instructions, Page 45)

Have any biological tests for acute or chronic toxicity been made on any of the discharges or on a receiving water in relation to the discharge within the last three years?

☐ Yes ☒ No

If **yes**, identify the tests and describe their purposes: Click to enter text.

Additionally, attach a copy of all tests performed which **have not** been submitted to the TCEQ or EPA. **Attachment:** Click to enter text.

Item 10. Off–Site/Third Party Wastes (Instructions, Page 45)

a. Does or will the facility receive wastes from off-site sources for treatment at the facility, disposal on-site via land application, or discharge via a permitted outfall?

☒ Yes ☐ No

If **yes**, provide responses to Items 10.b through 10.d below.

If **no**, proceed to Item 11.

b. Attach the following information to the application:

- List of wastes received (including volumes, characterization, and capability with on-site wastes).
- Identify the sources of wastes received (including the legal name and addresses of the generators).
- Description of the relationship of waste source(s) with the facility's activities.

Attachment: T.H

c. Is or will wastewater from another TCEQ, NPDES, or TPDES permitted facility commingled with this facility's wastewater after final treatment and prior to discharge via the final outfall/point of disposal?

☐ Yes ☒ No

If **yes**, provide the name, address, and TCEQ, NPDES, or TPDES permit number of the contributing facility and a copy of any agreements or contracts relating to this activity.

Attachment: Click to enter text.

d. Is this facility a POTW that accepts/will accept process wastewater from any SIU and has/is required to have an approved pretreatment program under the NPDES/TPDES program?

☐ Yes ☒ No

If **yes**, **Worksheet 6.0** of this application **is required**.

Item 11. Radioactive Materials (Instructions, Page 46)

a. Are/will radioactive materials be mined, used, stored, or processed at this facility?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L.

Radioactive Materials Mined, Used, Stored, or Processed

Radioactive Material Name	Concentration (pCi/L)

b. Does the applicant or anyone at the facility have any knowledge or reason to believe that radioactive materials may be present in the discharge, including naturally occurring radioactive materials in the source waters or on the facility property?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L. Do not include information provided in response to Item 11.a.

Radioactive Materials Present in the Discharge

Radioactive Material Name	Concentration (pCi/L)

Item 12. Cooling Water (Instructions, Page 46)

a. Does the facility use or propose to use water for cooling purposes?

☐ Yes ☒ No

If **no**, stop here. If **yes**, complete Items 12.b thru 12.f.

b. Cooling water is/will be obtained from a groundwater source (e.g., on-site well).

☐ Yes ☐ No

If **yes**, stop here. If **no**, continue.

c. Cooling Water Supplier

1. Provide the name of the owner(s) and operator(s) for the CWIS that supplies or will supply water for cooling purposes to the facility.

Cooling Water Intake Structure(s) Owner(s) and Operator(s)

CWIS ID				
Owner				
Operator				

2. Cooling water is/will be obtained from a Public Water Supplier (PWS)

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the PWS Registration No. and stop here: PWS No. Click to enter text.

3. Cooling water is/will be obtained from a reclaimed water source?

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the Reuse Authorization No. and stop here: Click to enter text.

4. Cooling water is/will be obtained from an Independent Supplier

   ☐ Yes ☐ No

   If **no**, proceed to Item 12.d. If **yes**, provide the actual intake flow of the Independent Supplier's CWIS that is/will be used to provide water for cooling purposes and proceed: Click to enter text.

d. 316(b) General Criteria

1. The CWIS(s) used to provide water for cooling purposes to the facility has or will have a cumulative design intake flow of 2 MGD or greater.

   ☐ Yes ☐ No

2. At least 25% of the total water withdrawn by the CWIS is/will be used at the facility exclusively for cooling purposes on an annual average basis.

   ☐ Yes ☐ No

3. The CWIS(s) withdraw(s)/propose(s) to withdraw water for cooling purposes from surface waters that meet the definition of Waters of the United States in *40 CFR § 122.2*.

   ☐ Yes ☐ No

   If **no**, provide an explanation of how the waterbody does not meet the definition of Waters of the United States in *40 CFR § 122.2*: Click to enter text.

If **yes** to all three questions in Item 12.d, the facility **meets** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA. Proceed to **Item 12.f**.

If **no** to any of the questions in Item 12.d, the facility **does not meet** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA; however, a determination is required based upon BPJ. Proceed to **Item 12.e**.

e. The facility does not meet the minimum requirements to be subject to the fill requirements of Section 316(b) **and uses**/proposes **to use cooling towers**.

   ☐ Yes ☐ No

   If **yes**, stop here. If **no**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ.

f. Oil and Gas Exploration and Production

1. The facility is subject to requirements at 40 CFR Part 435, Subparts A or D.

☐ Yes ☐ No

If **yes**, continue. If **no**, skip to Item 12.g.

2. The facility is an existing facility as defined at 40 CFR § 125.92(k) or a new unit at an existing facility as defined at 40 CFR § 125.92(u).

☐ Yes ☐ No

If **yes**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ. If **no**, skip to Item 12.g.3.

g. Compliance Phase and Track Selection

1. Phase I – New facility subject to 40 CFR Part 125, Subpart I

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection, attach the requested information, and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – AIF greater than 2 MGD, but less than 10 MGD

- Attach information required by *40 CFR §§ 125.86(b)(2)–(4)*.

☐ Track I – AIF greater than 10 MGD

- Attach information required by *40 CFR § 125.86(b)*.

☐ Track II

- Attach information required by *40 CFR § 125.86(c)*.

Attachment: Click to enter text.

2. Phase II – Existing facility subject to 40 CFR Part 125, Subpart J

☐ Yes ☐ No

If **yes**, complete Worksheets 11.0 through 11.3, as applicable.

3. Phase III – New facility subject to 40 CFR Part 125, Subpart N

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection and provide the requested information.

☐ Track I – Fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – Not a fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Item 2 (except CWIS latitude/longitude under Item 2.a).

☐ Track II – Fixed facility

- Attach information required by 40 CFR § 125.136(c) and complete Worksheet 11.0, Items 2 and 3.

Attachment: Click to enter text.

Item 13. Permit Change Requests (Instructions, Page 48)

This item is only applicable to existing permitted facilities.

a. Is the facility requesting a **major amendment** of an existing permit?

☐ Yes ☒ No

If **yes**, list each request individually and provide the following information: 1) detailed information regarding the scope of each request and 2) a justification for each request. Attach any supplemental information or additional data to support each request.

Click to enter text.

b. Is the facility requesting any **minor amendments** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

c. Is the facility requesting any **minor modifications** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

Item 14. Laboratory Accreditation (Instructions, Page 49)

All laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification*, which includes the following general exemptions from National Environmental Laboratory Accreditation Program (NELAP) certification requirements:

- The laboratory is an in-house laboratory and is:
  - periodically inspected by the TCEQ; or
  - located in another state and is accredited or inspected by that state; or
  - performing work for another company with a unit located in the same site; or
  - performing pro bono work for a governmental agency or charitable organization.
- The laboratory is accredited under federal law.
- The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.
- The laboratory supplies data for which the TCEQ does not offer accreditation.

The applicant should review *30 TAC Chapter 25* for specific requirements.

The following certification statement shall be signed and submitted with every application. See the *Signature Page* section in the Instructions, for a list of designated representatives who may sign the certification.

CERTIFICATION:

I certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification.*

Printed Name: Click to enter text.

Title: Click to enter text.

Signature: _____

Date: _____

INDUSTRIAL WASTEWATER PERMIT APPLICATION WORKSHEET 3.0: LAND APPLICATION OF EFFLUENT

This worksheet **is required** for all applications for a permit to disposal of wastewater by land application (i.e., TLAP)).

Item 1. Type of Disposal System (Instructions, Page 69)

Check the box next to the type of land disposal requested by this application:

- ☐ Irrigation
- ☐ Evaporation
- ☐ Evapotranspiration beds
- ☐ Drip irrigation system
- ☐ Subsurface application
- ☐ Subsurface soils absorption
- ☒ Surface application
- ☐ Other, specify: Click to enter text.

Item 2. Land Application Area (Instructions, Page 69)

Land Application Area Information

Effluent Application (gallons/day)	Irrigation Acreage (acres)	Describe land use & indicate type(s) of crop(s)	Public Access? (Y/N)
75,000	28,955	Agricultural land and Coastal grazing – Cotton and Corn grain	N

Item 3. Annual Cropping Plan (Instructions, Page 69)

Attach the required cropping plan that includes each of the following:

- Cool and warm season plant species
- Breakdown of acreage and percent of total acreage for each crop
- Crop growing season
- Harvesting method/number of harvests
- Minimum/maximum harvest height
- Crop yield goals
- Soils map
- Nitrogen requirements per crop
- Additional fertilizer requirements
- Supplemental watering requirements
- Crop salt tolerances
- Justification for not removing existing vegetation to be irrigated

Attachment: T.C

Item 4. Well and Map Information (Instructions, Page 70)

a. Check each box to confirm the required information is shown and labeled on the attached USGS map:

☒ The exact boundaries of the land application area

☒ On-site buildings

☐ Waste-disposal or treatment facilities

☐ Effluent storage and tailwater control facilities

☐ Buffer zones

☒ All surface waters in the state onsite and within 500 feet of the property boundaries

☒ All water wells within ½-mile of the disposal site, wastewater ponds, or property boundaries

☐ All springs and seeps onsite and within 500 feet of the property boundaries

Attachment: T.D

b. List and cross reference all water wells located on or within 500 feet of the disposal site, wastewater ponds, or property boundaries in the following table. Attach additional pages as necessary to include all of the wells.

Well and Map Information Table

Well ID	Well Use	Producing? Y/N/U	Open, cased, capped, or plugged?	Proposed Best Management Practice
589679				
261011				
391981				

Attachment: T.D

c. Groundwater monitoring wells or lysimeters are/will be installed around the land application site or wastewater ponds.

☐ Yes ☒ No

If **yes**, provide the existing/proposed location of the monitoring wells or lysimeters on the site map attached for Item 4.a. Additionally, attach information on the depth of the wells or lysimeters, sampling schedule, and monitoring parameters for TCEQ review, possible modification, and approval.

Attachment: Click to enter text.

d. Attach a short groundwater technical report using *30 TAC § 309.20(a)(4)* as guidance.
Attachment:

Item 5. Soil Map and Soil Information (Instructions, Page 71)

Check each box to confirm that the following information is attached:

a. ☒ USDA NRCS Soil Survey Map depicting the area to be used for land application with the locations identified by fields and crops.

b. ☒ Breakdown of acreage and percent of total acreage for each soil type.

c. ☒ Copies of laboratory soil analyses. **Attachment:** T.C

Item 6. Effluent Monitoring Data (Instructions, Page 72)

a. Completion of Table 14 **is required** for all **renewal** and **major amendment** applications. Complete the table with monitoring data for the previous two years for all parameters regulated in the current permit. An additional table has been provided with blank headers for parameters regulated in the current permit which are not listed in Table 14.

Table 14 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre–feet/month)

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre–feet/month)

b. Use this table to provide effluent analysis for parameters regulated in the current permit which are not listed in Table 14.

Additional Parameter Effluent Analysis

Date (mo/yr)							

c. Attach an explanation of all persistent excursions to permitted parameters and corrective actions taken. **Attachment:** Click to enter text.

Item 7. Pollutant Analysis (Instructions, Page 72)

a. Provide the date range of all sampling events conducted to obtain the analytical data submitted with this application (e.g., 05/01/2018-05/30/2018): Click to enter text.

b. ☐ Check the box to confirm all samples were collected no more than 12 months prior to the date of application submittal.

c. Complete Tables 15 and 16.

Table 15 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)
BOD (5-day)				
CBOD (5-day)				
Chemical oxygen demand				
Total organic carbon				
Dissolved oxygen				
Ammonia nitrogen				
Total suspended solids				
Nitrate nitrogen				
Total organic nitrogen				
Total phosphorus				
Oil and grease				
Total residual chlorine				
Total dissolved solids				
Sulfate				
Chloride				
Fluoride				
Total alkalinity (mg/L as CaCO3)				
Temperature (°F)				
pH (standard units)				

Table 16 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Aluminum, total					2.5
Antimony, total					5

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Arsenic, total					0.5
Barium, total					3
Beryllium, total					0.5
Cadmium, total					1
Chromium, total					3
Chromium, hexavalent					3
Chromium, trivalent					N/A
Copper, total					2
Cyanide, available					2/10
Lead, total					0.5
Mercury, total					0.005/0.0005
Nickel, total					2
Selenium, total					5
Silver, total					0.5
Thallium, total					0.5
Zinc, total					5.0

INSTRUCTIONS FOR INDUSTRIAL WASTEWATER PERMIT APPLICATION WORKSHEET 3.1 SURFACE LAND APPLICATION AND EVAPORATION

Worksheet 3.1 **is required** for all applications for a permit to dispose of wastewater by surface land application or evaporation. Complete the applicable section(s) and provide water balance and storage calculations, as needed.

Recommended Data Sources: Net evaporation data may be obtained from the Texas Water Development Board's Evaporation/Precipitation Data for Texas[1] website. Evapotranspiration data may be obtained from the following documents: Bulletin 6019 - Consumptive Use of Water by Major Crops in Texas[2], TWDB, November 1960, or John Borelli, Clifford B. Fedler and James M. Gregory Mean Crop Consumptive Use and Free-Water Evaporation for Texas[3], TWDB, February 1, 1998. Provide appropriate documentation if data utilized in the water balance/storage calculations are from other sources.

Item 1. Edwards Aquifer

The Edwards Aquifer boundaries are viewable on the Edwards Aquifer Map Viewer[4] on the TCEQ website.

a. If the waste disposal activities are subject to *30 TAC Chapter 213, Subchapters A and B, Edwards Aquifer Rules*, check **yes** and complete Items 1.b and 1.c. Otherwise, check **no** and proceed to Item 2.

No

b. Check the box next to the applicable subchapter. If both subchapters apply, check both boxes.

c. If *30 TAC Chapter 213, Subchapter A* applies, attach **either**: 1) a Geologic Assessment (if conducted in accordance with *30 TAC § 213.5*) **or** 2) a report that contains the following information: i) a description of the surface geological units within the proposed land application site and wastewater pond area; ii) the location and extent of any sensitive recharge features in the land application site and wastewater pond area; and iii) a list of any proposed BMPs to protect the recharge features.

Item 2. Surface Spray/Irrigation

a. Provide the following information, as applicable for the method of irrigation disposal utilized:

- acres irrigated; - 28,955 acres
- design application rate in acre-feet/acre/year; - 62.86 ac-ft/yr
- design application frequency in hours per day and days per week; - 24 hrs/day, 7 days/week
- design total nitrogen loading rate in pounds nitrogen/acre/ year;
- average and maximum slope of the irrigation site; - Average – 0.84; Maximum - 8
- estimated irrigation efficiency (85% will be used unless a more specific value is provided.) 85%
- effluent conductivity in mmhos/cm; - 1 mmhos/cm
- soil conductivity in mmhos/cm; - 5 mmhos/cm
- curve number; and 78.32
- a description of the application method and equipment (e.g., row irrigation, spray irrigation using a center pivot sprinkler system, etc.). Spreading method

b. Attach a separate engineering report which includes a water balance, storage volume calculations, and a nitrogen balance for the crop system using *30 TAC § 309.20, Subchapter C, Land Disposal of Sewage Effluent* as guidance. **NOTE:** See Appendix 6 for an example water balance and storage volume calculation. See *30 TAC § 309.20(b)(3)(C)* for an example of a nitrogen balance. – Fig T.G.1 and T.G.2

[1] https://waterdatafortexas.org/lake-evaporation-rainfall
[2] https://www.twdb.texas.gov/publications/reports/bulletins/doc/B6019/B6019.pdf
[3] http://www.twdb.texas.gov/publications/reports/contracted_reports/doc/95483137.pdf
[4] https://www.tceq.texas.gov/permitting/eapp/viewer.html

Irrigation must be limited to prevent excessive nitrogen application. The annual liquid loading must not exceed that which would introduce more nitrogen than is annually required by the crop plus 20% volatilization. Values for crop nitrogen requirements must be justified in the design report. The application rate must be calculated by the formula L = N/2.7C, where L is the annual liquid loading in acre-feet, C is the effluent nitrogen concentration in mg/L, and N is the annual crop requirement of nitrogen plus 20% volatilization in pounds per acre per year.

Item 3. Evaporation Ponds

a. Provide the actual/proposed daily average effluent flow into the pond(s) in gpd.

b. Attach a separate engineering report of evaporation calculations for average long-term and worst-case critical conditions (i.e., maximum rainfall and minimum evaporation from the past 25 years of climatological data). **NOTE:** See Appendix 7 for an example. This report is necessary to determine the maximum feasible long-term disposal volume under average conditions to prevent effluent accumulation and the adequacy of the system under extreme conditions of maximum rainfall and minimum evaporation.

Item 4. Evapotranspiration Beds

a. Provide the following information on the evapotranspiration beds:

- number of beds;
- area of bed(s) in acres;
- depth of bed(s) in feet;
- void ratio of soil in the beds;
- storage volume within the beds and provide the units; and
- a description of any lining to protect groundwater.

Visit the Texas A&M Agrilife Extension[5] for additional information on evapotranspiration beds.

b. Attach a certification by a licensed Texas professional engineer that the liner meets TCEQ requirements. – Attachment - 2

c. Attach a separate engineering report of water balance and storage volume calculations. Fig T.G.1 and T.G.2

Item 5. Overland Flow

a. Provide the following information on the overland flow:

- area used for application in acres;
- slopes for application area as a percent;
- design application rate in gallons per minute per foot of slope width;
- slope length in feet;
- design BOD5 loading rate in pounds of BOD5 per acre per day;
- design application frequency in hours per day; and
- design application frequency in days/week.

b. Attach a separate engineering report describing the method of application and design requirements according to *30 TAC § 217.212, Overland Flow Process.*

[5] https://ossf.tamu.edu/evapotranspiration-bed/

Texas Land Application Permit (TLAP)
Admin Package

Report Date: November 18th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

List of Figures..... i
List of Tables..... i
A.A: TCEQ APPLICATION FEE..... 1
A.B: CORE DATA FORMS & LEASE AGREEMENT..... 2
A.C: PLAIN LANGUAGE SUMMARY..... 3
A.D: PUBLIC INVOLVEMENT PLAN..... 4
A.E: 7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE..... 4
A.E.1 7.5-Minute USGS Topographic Quadrangle Map..... 6
A.F: AFFECTED LANDOWNER INFORMATION..... 7
A.F.1 Adjacent Landowners Map..... 7
A.F.2 Landowners List..... 7
A.G: PHOTOGRAPHS..... 8
A.G.1 Photograph Location Map..... 9

List of Figures

Figure A.E.1: 7.5-Minute USGS Topographic Quadrangle Map..... 6
Figure A.F.1: Adjacent Landowners Map..... 7
Figure A.G.1: Photograph Location Map..... 9

List of Tables

Table A.F.1. Adjacent Landowners..... 7

A.A: TCEQ APPLICATION FEE

A.B: CORE DATA FORMS & LEASE AGREEMENT

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions on completing 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.*)

☒ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ 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)*
		RN

SECTION II: Customer Information

4. General Customer Information | **5. Effective Date for Customer Information Updates** (mm/dd/yyyy) 11/20/2024

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

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:*

Wharton AD1, LLC

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID**	**10. DUNS Number** *(if applicable)*
805930283		33-3670329	

11. Type of Customer: ☒ Corporation ☐ Individual Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees
☐ 0-20 ☒ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?
☐ **Yes** ☐ **No**

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*

☒ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ VCP/BSA Applicant ☐ Other:

15. Mailing Address:

133 Boston Post Road, Building 15, 2nd Floor

City	Weston	**State**	MA	**ZIP**	02493	**ZIP + 4**	

16. Country Mailing Information *(if outside USA)*	**17. E-Mail Address** *(if applicable)*
	development@vanguardrenewables.com

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(248) 259-4031		(781) 232-7491

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected, a new permit application is also required.)*

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core 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.)*

Pierce Ranch

23. Street Address of the Regulated Entity: ***(No PO Boxes)***								
	City	Pierce	**State**	TX	**ZIP**	77437	**ZIP + 4**	
24. County	Wharton							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:	Site is located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59

26. Nearest City	State	Nearest ZIP Code
Pierce	TX	77437

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	29.2165071		28. Longitude (W) In Decimal:	-96.19356185	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	12	55	96	11	39

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)
4924		221210	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Renewable Energy Production

34. Mailing Address:	**133 Boston Post Road, Building 15, 2nd Floor**							
	City	**Weston**	**State**	**MA**	**ZIP**	**02493**	**ZIP + 4**	
35. E-Mail Address:	**development@vanguardrenewables.com**							

36. Telephone Number	37. Extension or Code	38. Fax Number *(if applicable)*
(248) 259-4031		**(781) 232-7491**

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.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:
				TLAP

SECTION IV: Preparer Information

40. Name:	Michael Zhang		**41. Title:**	Managing Consultant
42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**	
(832) -817-9116		( ) -	michael.zhang@environeerconsulting.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:	Wharton AD1, LLC	**Job Title:**	VP of Development
Name *(In Print):*	Kim Martin	**Phone:**	(508-)560–6882
Signature:	Kim Martin (Mar 17, 2025 12:46 EDT)	**Date:**	3/17/2025

ASSIGNMENT AND ASSUMPTION AGREEMENT

This ASSIGNMENT AND ASSUMPTION AGREEMENT (this "Agreement") is entered into as of March 27th, 2025 by VR Development Services LLC ("Assignor") and Wharton AD 1, LLC, a Delaware limited liability company ("Assignee"). The Assignor and Assignee are sometimes referred to herein each as a "Party" and, collectively, as the "Parties."

WHEREAS, the Assignor desires to assign and convey to Assignee, and Assignee desires to assume from Assignor, the Assigned Contracts (each, as defined below), and Assignor has agreed to delegate to Assignee, and Assignee has agreed to assume all of Assignor's rights in and obligations under the Assigned Contracts from the Assignor, as applicable; and

NOW, THEREFORE, in consideration for the mutual covenants and promises herein contained, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. Assignment of Contracts. Assignor hereby grants, bargains, sell, transfers, conveys, assigns, and delivers to Assignee, and Assignee hereby accepts the assignment of all of Assignor's right, title and interest in, to, and under those certain assigned contracts set forth on Schedule A hereto (the "Assigned Contracts").

2. Assumption. Assignee hereby accepts the Assigned Contracts and assumes all of Assignor's right, title and interest in and obligations and liabilities under, and Assignee hereby assumes and agree to perform and discharge the Assignor's obligations under, the Assigned Contracts, as applicable, as of the date hereof, in accordance with the terms set forth herein.

3. Governing Law. THIS AGREEMENT AND THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER AND THE TRANSACTIONS CONTEMPLATED HEREBY SHALL BE GOVERNED BY, ENFORCED AND INTERPRETED IN ACCORDANCE WITH THE LAWS OF THE STATE OF DELAWARE WITHOUT REGARD TO THE LAWS OF THE STATE OF DELAWARE OR ANY OTHER JURISDICTION THAT WOULD CALL FOR THE APPLICATION OF THE SUBSTANTIVE OR PROCEDURAL LAWS OF ANY JURISDICTION OTHER THAN DELAWARE.

4. Further Assurances. Each of the Parties hereby covenants that it will execute, acknowledge and deliver any and all such other and further acts, deeds, assignments, transfers, conveyances, confirmations, powers of attorney and any instruments of further assurance, approvals and consents as may be reasonably required in order to complete, insure and perfect the transfer, conveyance and assignment to Assignee of all the right, title and interest of Assignor in and to the Assigned Contracts hereby granted, bargained, sold, transferred, conveyed or assigned, or intended so to be.

5. Counterparts. This Agreement and any amendment hereto may be executed in any number of counterparts (including facsimile counterparts), all of which together shall constitute a single instrument. Any counterpart or other signature delivered by facsimile or by electronic mail shall be deemed for all purposes as being a good and valid execution and delivery of this Agreement or any amendment hereto by that Party. This Agreement and any amendment hereto may be signed or transmitted by e-mail or a .pdf document or using electronic signature technology (e.g., via DocuSign, AdobeSign or other electronic signature technology), and that such signed electronic record shall be valid and as effective to bind the Party so signing as a paper copy bearing such Party's handwritten signature. The Parties further consent and agree that (a) to the extent a party signs this Agreement or any amendment hereto using electronic signature technology, by clicking "SIGN", such Party is signing this Agreement electronically; and (b) the electronic signatures appearing on this Agreement or any amendment hereto shall be treated, for purposes of validity, enforceability and admissibility, the same as handwritten signatures.

6. Entire Agreement. This Agreement, including all schedules and exhibits hereto and thereto, supersede all prior agreements between the Parties with respect to the subject matter hereof and thereof, and contain the sole and entire agreement between the Parties hereto with respect to the subject matter hereof and thereof.

7. No Assignment; Binding Effect. No Party may transfer or assign all or any part of its rights or obligations under this Agreement without the prior written consent of the other Parties (including by operation of law). Any purported assignment or other disposition by a Party, except as permitted herein, shall be null and void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the respective successors and permitted assigns of each Party.

(Signatures appear on following page)

IN WITNESS WHEREOF, each of Assignee and each Assignor have caused this Assignment and Assumption Agreement to be executed by its respective duly authorized representative on the date first set forth above.

ASSIGNOR:

VR Development Services LLC

By: _____
Kevin Chase (Mar 27, 2025 13:16 MDT)
Name: Kevin Chase
Title: Chief Development Officer

ASSIGNEE:

Wharton AD 1, LLC

By: Victoria Lepore
Name: Victoria Lepore
Title: Authorized Person

SCHEDULE A

ASSIGNED CONTRACTS

1. Ground Lease, by and between VR Development Services LLC and Pierce Ranch GP, dated January 13, 2025.

2. Digester Products Agreement, by and between VR Development Services LLC and Pierce Ranch GP, dated January 13, 2025.

Assignment Agreement_Pierce

Final Audit Report 2025-03-27

Created:	2025-03-27
By:	Stephen Megnia (smegnia@vanguardrenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAA2zDCrnihd272le673JBLX2HKNe7_vicC

"Assignment Agreement_Pierce" History

Document created by Stephen Megnia (smegnia@vanguardrenewables.com)
2025-03-27 - 6:12:31 PM GMT

Document emailed to Kevin Chase (kchase@vanguardrenewables.com) for signature
2025-03-27 - 6:13:02 PM GMT

Email viewed by Kevin Chase (kchase@vanguardrenewables.com)
2025-03-27 - 7:14:07 PM GMT

Document e-signed by Kevin Chase (kchase@vanguardrenewables.com)
Signature Date: 2025-03-27 - 7:16:54 PM GMT - Time Source: server

Document emailed to Victoria Lepore (vlepore@vanguardrenewables.com) for signature
2025-03-27 - 7:16:55 PM GMT

Email viewed by Victoria Lepore (vlepore@vanguardrenewables.com)
2025-03-27 - 7:59:24 PM GMT

Document e-signed by Victoria Lepore (vlepore@vanguardrenewables.com)
Signature Date: 2025-03-27 - 7:59:45 PM GMT - Time Source: server

Agreement completed.
2025-03-27 - 7:59:45 PM GMT

MEMORANDUM OF LEASE

This is a Memorandum of Lease ("Memorandum") made and entered into as of this 24th day of February, 2025, by and between **Pierce Ranch GP** ("Lessor"), located at Post Office Box 538, Pierce, Texas, 77467; and **VR Development Services LLC**, a Massachusetts limited liability company ("Lessee"), located at 133 Boston Post Rd, Building 15, 2nd Floor, Weston, MA 02493, upon the following terms:

1. Lease. The provisions set forth in a written lease between the parties hereto dated January 13th, 2025 (the "Lease") are hereby incorporated by reference into this Memorandum.

2. Leased Area. The Leased Area which is the subject of the Lease is located on a portion of Lessor's Property more particularly described on the attached Exhibit A.

3. Commencement Date of Lease. The Lease commenced January 13th, 2025, as set forth in the Lease.

4. Term. The Term of the Lease is twenty-five (25) years from the Operations Date as defined in the Lease, with three (3) additional automatic renewal periods of five (5) years each unless either party exercises the non-renewal options provided in the Lease.

5. Duplicate Copies. Copies of the originals of the Lease are in the possession of Lessor and Lessee, and reference should be made thereto for a more detailed description thereof.

6. Purpose. It is expressly understood and agreed by all parties that the sole purpose of this Memorandum of Lease is to give record notice of the Lease; it being distinctly understood and agreed that said Lease constitutes the entire lease and agreement between the parties with respect to the Leased Area and is hereby incorporated by reference. The Lease contains and sets forth additional rights, terms, conditions, duties, and obligations not enumerated within this instrument which govern the Lease. This Memorandum is for information purposes only and nothing contained herein may be deemed in any way to modify or vary any of the terms or conditions of the Lease. In the event of any inconsistency between the terms of the Lease and this instrument, the terms of the Lease shall control. The rights and obligations set forth herein shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, representatives, successors, and assigns.

[signature pages follow]

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of Lease pursuant to due authorization on the dates herein acknowledged.

LESSOR:

Pierce Ranch GP

By: _____

Name: Laurance H. Armour, III

Title: General Manager

ACKNOWLEDGMENT

STATE OF Texas)
) SS
COUNTY OF Wharton)

On this 26th day of February, 2025, before me appeared Laurance H. Armour, III to me personally known, who, being by me duly sworn did say that he or she is the person of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in Pierce, TX, the day and year last above written.

_____
Notary Public Signature

My Commission expires 05-05-2025

VELDA VONDERAU
NOTARY PUBLIC
STATE OF TEXAS
ID # 761496-8
My Comm. Expires 05-05-2025

LESSEE:

VR Development Services LLC

By: Kevin Chase
Name: _____ Feb 28, 2025
Title: Chief Development Officer

ACKNOWLEDGMENT

STATE OF _____)
) SS
COUNTY OF _____)

On this ___ day of _____, 20___, before me appeared _____ to me personally known, who, being by me duly sworn did say that he or she is the _____ of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in _____, the day and year last above written.

_____
Notary Public Signature

My Commission expires _____

Pierce Ranch Lease Memo

Final Audit Report 2025-02-28

Created:	2025-02-28
By:	Stephen Megnia (smegnia@vanguardrenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAcrt8WX5POxI_PZtyZmcR6SqUQdY7Mhss

"Pierce Ranch Lease Memo" History

Document created by Stephen Megnia (smegnia@vanguardrenewables.com)
2025-02-28 - 6:36:36 PM GMT

Document emailed to Kevin Chase (kchase@vanguardrenewables.com) for signature
2025-02-28 - 6:37:09 PM GMT

Email viewed by Kevin Chase (kchase@vanguardrenewables.com)
2025-02-28 - 6:39:53 PM GMT

Document e-signed by Kevin Chase (kchase@vanguardrenewables.com)
Signature Date: 2025-02-28 - 6:40:14 PM GMT - Time Source: server

Agreement completed.
2025-02-28 - 6:40:14 PM GMT

EXHIBIT A

Leased Area



EXHIBIT "A"

The SURFACE rights in those certain tracts or parcels of land and premises lying and situated in Wharton County, Texas, and being a portion of the property commonly known as the "Pierce Ranch" and including those areas of the "Pierce Ranch" known as the "Convict Farm" and part of the "B U Ranch", more specifically described as follows:

TRACT A:

Survey	Sur. No.	Abst. No.	Acres
Convict Farm:			
Edw. Gallagher 1/4 League		23	1,040.27
Robt. Kuykendall League as described in Deed from Louise K. Hutchins to Lacy W. Armour, et al., dated February 10, 1956, recorded in Volume 287, Page 234, Wharton County Deed Records LESS AND EXCEPT 115.964 acres conveyed to the State of Texas in Deed recorded in Volume 350, Page 53, Wharton County Deed Records for highway purposes		39	944.136

TRACT B:

A portion of those lands commonly known and referred to as "the B.U. Ranch" of Pierce Estate or Pierce Ranch, located in Wharton County, Texas, (including a tract of 97.5 acres out of the Henry Griffith Survey, conveyed by J.W. Kubela, et al, to Lacy W. Armour, et al, by deed dated January 20, 1949, recorded in Vol. 218, Page 323 of the Deed Records of Wharton County, Texas), and which Ranch includes the following surveys, or the parts thereof described below:

B.U. Ranch Land North of Railroad:			
Henry Griffith League		25	1,080.00
W.C.R.R. Co. (incl. out lots)	73	368	310.95
W.C.R.R. Co.	71	389	35.62
I. & G.N.R.R. Co. (incl. out lots)	39	405	138.00
F.L. Jones & G.R. Lyons	70	448	11.12
J.S. MacNamara (W.C.R.R. Co.)	72	451	320.00
J. Telfner (H&T.C.R.R.Co.) (incl. out lots)	2	453	3.00
Day Land & Cattle Co.	1	675	126.92
Day Land & Cattle Co.	2	678	3.60
B.U. Ranch Land South of Railroad:			
John Caldwell League		10	2,746.00
Henry Griffith League		25	279.50
Wm. Pettus League		51	2,820.00
Thomas Westall League		65	4,428.40
E.T.R.R. Co.	109	108	263.75
E.T.R.R. Co.	43	115	18.50
E.T.R.R. Co.	1	138	341.50
E.T.R.R. Co.	19	147	26.50
E.T.R.R. Co.	21	148	272.00
G.& B.N. Co.	2	157	640.00
G.& B.N. Co.	4	158	640.00
Chas. Howard League		181	4,428.00

H.T. & B.R.R. Co.	1	194	640.00
I. & G.N.R.R. Co.	33	218	72.00
I. & G.N.R.R. Co.	38	221	640.00
I. & G.N.R.R. Co.	37	222	32.95
I. & G.N.R.R. Co.	35	224	193.00
I. & G.N.R.R. Co.	34	230	556.50
W.F. York		397	65.20
I. & G.N.R.R. Co. (incl. out lots)	39	405	433.43
Abram Kincheloe		412	160.00
H.E.& W.T.R.R.Co.	1	418	320.00
H.E.& W.T.R.R.Co.	7	441	534.00
I.R.R. Co.	11	447	320.00
J. Telefener	2	453	28.20
J. Telefener	12	454	320.00
John McMaster	2	468	320.00
L.P. Ogden	108	537	.50
L.P. Ogden	110	538	569.50
Mark Weiss	20	558	573.50
Joseph Hyland	2	626	410.00
A.H. Pierce	1	640	640.00
A.H. Pierce	3	641	640.00
A.H. Pierce	8	642	640.00
Day Land & Cattle Co.	1	675	21.00
Day Land & Cattle Co.	2	678	356.80
Day Land & Cattle Co.	3	679	318.00
J.M. Swisher	1	693	166.80
K.R. Ferris		856	640.00
A.P. Borden	15	877	129.88
A.P. Borden	14	878	240.11
A.P. Borden	19	894	382.50
A.P. Borden	18	895	93.44
A.P. Borden		921	85.98
W.W. King		948	193.60
Joshua Parker League		49	24.00
Joshua Parker League		49	386.00

Canals:

Henry Griffith League		25	35.55
R. Kuykendall League		39	5.00
Henry Griffith League		25	12.50

LESS AND EXCEPT 84.81 acres (described as First Tract through Sixth Tract), any interest in 3 acres, lands, canals, easements, etc. (described as Seventh Tract) and 187.4 acres [described as Ninth Tract, parcel (b)] conveyed by Laurance H. Armour, Jr., Trustee, et. al. to Blue Creek Ranch Company, recorded in Volume 696, Page 612, Wharton County Deed Records.

TRACT C:

Pumping Plant tract and pumping plant, together with canal tracts and easements connecting to and used in connection with the B.U. Ranch in Wharton County, Texas, above described, said pumping plant tract and canal and easements consisting of:

PARCEL 1 - 52 acre tract:

52 acres of land, more or less, in the Robt. Kuykendall League, Abstract 39, Wharton County, Texas, being a strip of land 300 feet in width off the West side of that certain tract of 1,060.1 acres, more or less, in the Robt. Kuykendall League which 1,060.1 acre tract is part of what is referred to as the "Convict Farm" tract of the Pierce Ranch or Pierce Estate, said 52 acres being described by metes and bounds as follows:

BEGINNING at the Southwest corner of the aforesaid "Convict Farm", which is also the Southwest corner of the said 1,060.1 acre tract, being in the intersection of the West line of said tract with the North right-of-way line of the road known as the "Rancho Grande Road";

THENCE North 20 deg. East with the West line of said "Convict Farm" tract, 7,500 feet to the Northwest corner of the 52 acre tract herein described, and being the Southwest corner of a 36 acre tract hereinafter described next below;

THENCE South 70 deg. East, crossing the Pierce Ranch Main Canal, 300 feet to the Northeast corner of this tract, being the lower Southeast corner of said 36 acre tract described below;

THENCE 20 deg. West parallel to and 300 feet from the above mentioned West line of said "Convict Farm" tract, 7,500 feet to the intersection with the North line of the above mentioned Rancho Grande Road;

THENCE North 70 deg. West with the North line of said Rancho Grande Road 300 feet to the place of beginning, containing 52 acres of land, more or less.

PARCEL 2 - Pumping Plant Tract:

36 acres of land, more or less, in the Robt. Kuykendall League, Abstract 39, Wharton County, Texas, and being a part of the above referred to 1,060.1 acre tract, and also part of what is referred to as the "Convict Farm", said 36 acres being described by metes and bounds as follows:

BEGINNING at the Northwest corner of the above described 52 acre tract, being the 300 foot wide Main Canal tract, such beginning point being in the West line of said "Convict Farm" tract;

THENCE South 70 deg. East crossing the Pierce Ranch Main Canal 300 feet to corner, being the Northeast corner of said 52 acre Main Canal tract described above;

THENCE North 48 deg. 06 min. East crossing a lateral canal 688 feet to a point for corner, said corner being 15 feet out at right angles from the center of the Northwest borrow ditch of said lateral canal;

THENCE North 86 deg. 18 min. East parallel to and 15 feet from the center of said Northwest borrow ditch of said lateral canal, 810 feet to point for corner, said point being in a projection of the East yard fence line of the farthest South house of a row of houses on this 36 acre tract;

THENCE North 30 deg. 06 min. East at 491 feet pass the Southeast corner of said East yard fence, and continuing with the said East yard fence in all 639 feet (with the total distance of this call being 639 feet) to fence post for corner, being the Northeast corner of said yard fence and also the Northeast corner of this 36 acre tract;

THENCE North 58 deg. 46 min. West with the fence forming the back yard enclosures of said row of houses at 938 feet pass the top bluff bank of the Colorado River, and continuing on said call to said River;

THENCE Southwesterly up said Colorado River, following the meanders, to its intersection with the first above mentioned West line of said "Convict Farm" tract, same being the Northwest corner of the aforesaid 1,060.01 acre tract;

THENCE South 20 deg. West with the West line of said 1,060.1 acre tract, and also with the West line of the above referred to "Convict Farm" to the place of beginning, containing 36 acres of land, more or less.

PARCEL 3 - Canal:

5 acre tract off the West side of Tract 1 of the subdivision of the Robt. Kuykendall League, Abstract 39, in Wharton County, Texas, which 5 acres was reserved in deed dated December 16, 1927, executed by J.F. Hutchins, et al Executors, to N.A. Bowers, recorded in Vol. 79, Page 427 of the Deed Records of Wharton County, Texas.

PARCEL 4 - Canal:

Two tracts of land containing 17.16 acres and 18.39 acres, respectively, out of the Henry Griffith League, Wharton County, Texas, conveyed by J.B. Ferguson to Pierce Estates, Incorporated, by deed dated February 5, 1943, recorded in Vol. 163, Page 285 of the Deed Records of Wharton County, Texas.

PARCEL 5 - Canal:

Canal easement located in the Henry Griffith League, Wharton County, Texas, reserved in deed dated November 23, 1905, executed by A.P. Borden, et al, to Valentine Heil, recorded in Vol. 14, Page 177 of the Deed Records of Wharton County, Texas, and which easement is located in the Henry Griffith League, Wharton County, Texas.

PARCEL 6 - Canal:

Canal Easement conveyed by Blue Creek Ranch Company to J.F. Hutchins by deed dated December 15, 1936, filed for record in the office of the County Clerk of Wharton County, Texas, on January 27, 1956, which deed covers 7.5 acres out of the F.C. McReynolds Survey No. 6, Wharton County, Texas.

TRACT D: (Canal)

A 200' strip of land being 100' on either side of the center line of that portion of an existing canal that runs approximately parallel to U.S. Highway 59 and a 100' strip of land being 50' on either side of the center line of that portion of an existing canal that runs approximately perpendicular to U.S. Highway 59. This TRACT D canal is located between the Southwest end of the 17.16 acre canal described as TRACT C Parcel (4) above and the northwest end of the 18.39 acre canal described as TRACT C Parcel (4) above and connects the 17.16 acre canal to the 18.39 acre canal. This TRACT D canal is shown on the Plat attached hereto as Exhibit "B", Page 1. It is in the Henry Griffith League on the B.U. Ranch North of the Railroad.

TRACT E: (Canal)

A 100' strip of land being 50' on either side of the center line of an existing canal located on that portion of B.U. Ranch lying South of the railroad and northwesterly of a line (herein called "DIVISION LINE") described as follows:

A line across the Pierce Ranch from the Southwest corner of the O.B. Ranch Co. 675.134 acre tract, in the Joshua Parker 1/2 League, Abstract No. 49 Wharton County, Texas (Volume 755, Page 281, Wharton County Deed Records) to the northeast line of the Pierce West Line Road, same being the southwest line of the Pierce Ranch and being more particularly described by metes and bounds as follows:

BEGINNING at an iron rod set at the southwest corner of the aforementioned O.B. Ranch Co. 675.134 acre tract;

THENCE S 61 deg. 24' 03" W 2575.21 feet to an iron rod set for an angle point;

THENCE S 61 deg. 24' 21" W 2550.91 feet to an iron rod set for a corner;

THENCE S 30 deg. 33' 42" E 570.81 feet to an iron rod set for a corner;

THENCE S 61 deg. 11' 31" W 2268.25 feet to an iron rod set for an angle point;

THENCE S 40 deg. 32' 26" W 1520.34 feet to an iron rod set for an angle point;

THENCE S 39 deg. 57' 12" W 2607.83 feet to an iron rod set for an angle point;

THENCE S 47 deg. 39' 40" W 6241.35 feet to an iron rod set in the east line of Pierce West Line Road, same being the west line of the Lacy W. Armour Estate.

The canal is located between the southeast end of the 18.39 acre canal tract described under TRACT C Parcel (4) above and the "DIVISION LINE" and connects the 18.39 acre canal to the canal system on TRACT B southeast of the "DIVISION LINE". The herein described canal tract is shown on the Plat attached hereto as Exhibit "B", Page 1, and is designated thereon as TRACT E.

TRACT F: (Road Easement)

A 60' strip of land being 30' on either side of the center line of an existing gravel road designated and known as the Pierce Ranch Main Ranch Road (a/k/a Texaco Road) beginning at the point where said road enters the Pierce Ranch Southeast of the Town of Pierce at the Southeast line of the Southern Pacific Railroad which parallels old U.S. Highway 59, in I & G N RR Co. Survey No. 39, Abstract 405, said point being N. 55 deg. 30' E. a distance of 3,185.22' from an iron rod set in the southeast line of Pierce West Line Road (County Road 421) at its intersection with the Southern Pacific Railroad; thence, in a Southeasterly direction across said survey, and, thence, across I & G N RR Survey No. 38, Abstract 221; A. P. Borden Survey, Abstract 895; J. Telfner Survey, Abstract 454, Galv. & Braz. Nav. Co. Survey No. 4, Abstract 158, to a point in the H.T. & B. R.R. Survey No. 1, Abstract 194 where said road intersects with the "Division Line" described above, which point is located approximately S. 61 deg. 24' 03', 7394.37' from the beginning point of the "Division Line", as more particularly shown on plat attached hereto as Exhibit "B".

TRACT G:

The following lots in the town of Pierce City, Wharton County, Texas, according to the map or plat thereof, which is recorded in Vol. P, Page 289, of the Deed Records of Wharton County, Texas:

Classification - City or Town Lots:

Block	Lots
1 (All)	1 to 16 inclusive
2	1 to 4 inclusive and 9 to 12 inclusive
3 (All)	1 to 16 inclusive
5 (All)	1 to 16 inclusive
6 (All)	1 to 16 inclusive
7	4 through 16, inclusive

8 (All)	1 to 16 inclusive
9 (All)	1 to 16 inclusive
10 (All)	1 to 16 inclusive
11 (All)	1 to 16 inclusive
12	2 to 8 inclusive and 11 to 16 inclusive
13	1 to 8 inclusive and 10 to 16 inclusive
14	1 to 8 inclusive and 10 to 16 inclusive
15 (All)	1 to 16 inclusive
16 (All)	1 to 16 inclusive
17 (All)	1 to 12 inclusive
18 (All)	1 to 12 inclusive
19 (All)	1 to 12 inclusive
22	3 to 6 inclusive and 10 to 12 inclusive
23 (All)	1 to 12 inclusive
24 (All)	1 to 12 inclusive
25 (All)	1 to 12 inclusive
26 (All)	1 to 12 inclusive
27 (All)	1 to 12 inclusive
28	1 to 5 inclusive and 8 to 10 inclusive
29 (All)	1 to 10 inclusive
30 (All)	1 to 12 inclusive
31 (All)	1 to 12 inclusive
32 (All)	1 to 12 inclusive
33 (All)	1 to 12 inclusive
34 (All)	1 to 12 inclusive
35 (All)	1 to 10 inclusive
36 (All)	1 to 12 inclusive
37 (All)	1 to 12 inclusive
38 (All)	1 to 10 inclusive
39 (All)	1 to 12 inclusive
40 (All)	1 to 12 inclusive
41 (All)	1 to 12 inclusive
42 (All)	1 to 12 inclusive
44 (All)	1 to 12 inclusive
45 (All)	1 to 12 inclusive
47 (All)	1 to 12 inclusive
48 (All)	1 to 12 inclusive
49 (All)	1 to 12 inclusive
50 (All)	1 to 12 inclusive
51 (All)	1 to 10 inclusive
52 (All)	1 to 12 inclusive
53 (All)	1 to 12 inclusive
54	4 to 10 inclusive
55 (All)	1 to 12 inclusive
56 (All)	1 to 12 inclusive
58 (All)	1 to 12 inclusive
59 (All)	1 to 12 inclusive
60 (All)	1 to 12 inclusive
61 (All)	1 to 12 inclusive
62 (All)	1 to 12 inclusive
63 (All)	1 to 12 inclusive
64 (All)	1 to 12 inclusive

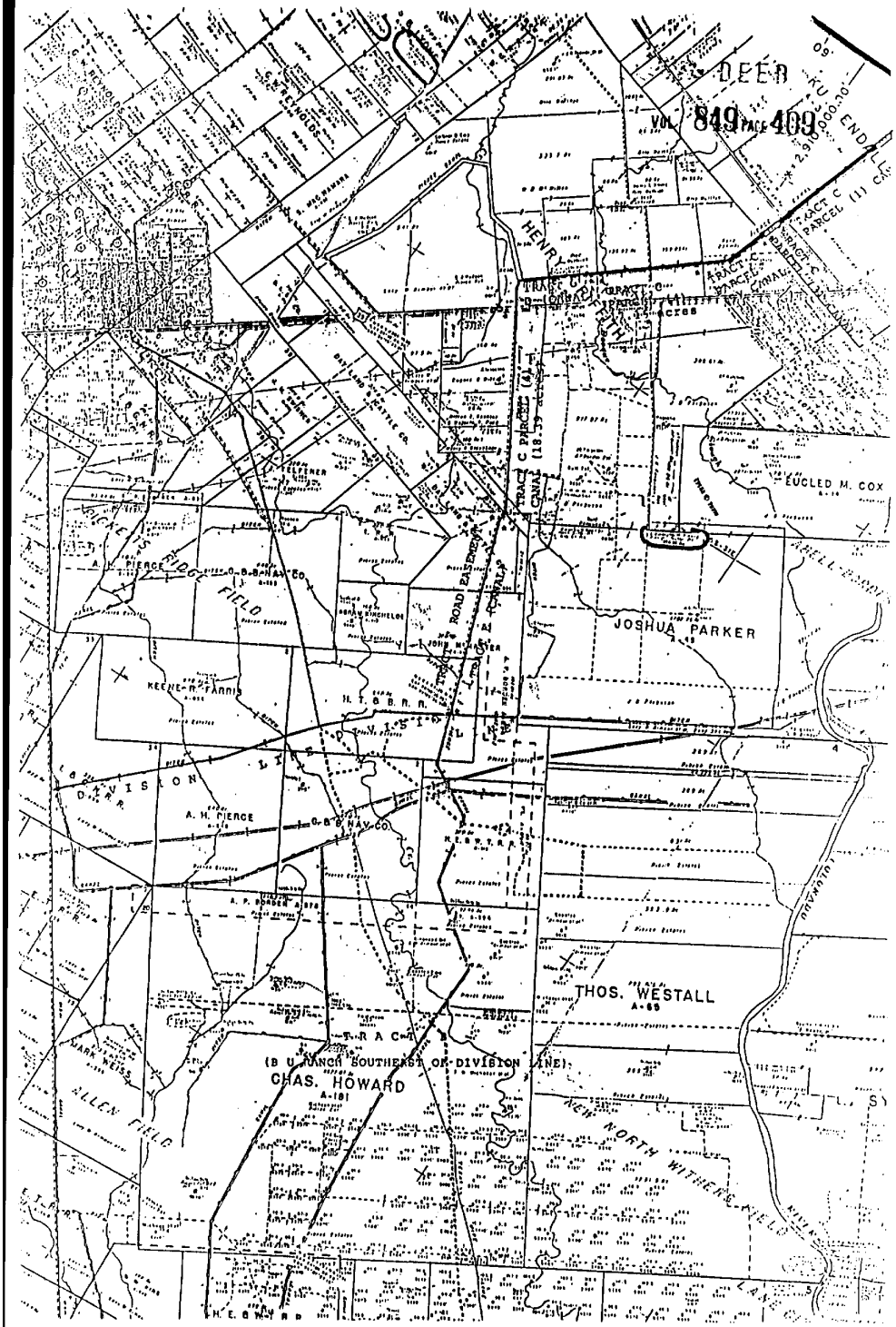


EXHIBIT B
PAGE 1

RECORDER'S MEMORANDUM
AT THE TIME OF RECORDATION, THIS INSTRUMENT WAS FOUND TO BE INADEQUATE FOR THE BEST PHOTOGRAPHIC REPRODUCTION BECAUSE OF ILLEGIBILITY, CARBON OR PHOTO COPY, DISCOLORED PAPER, ETC.

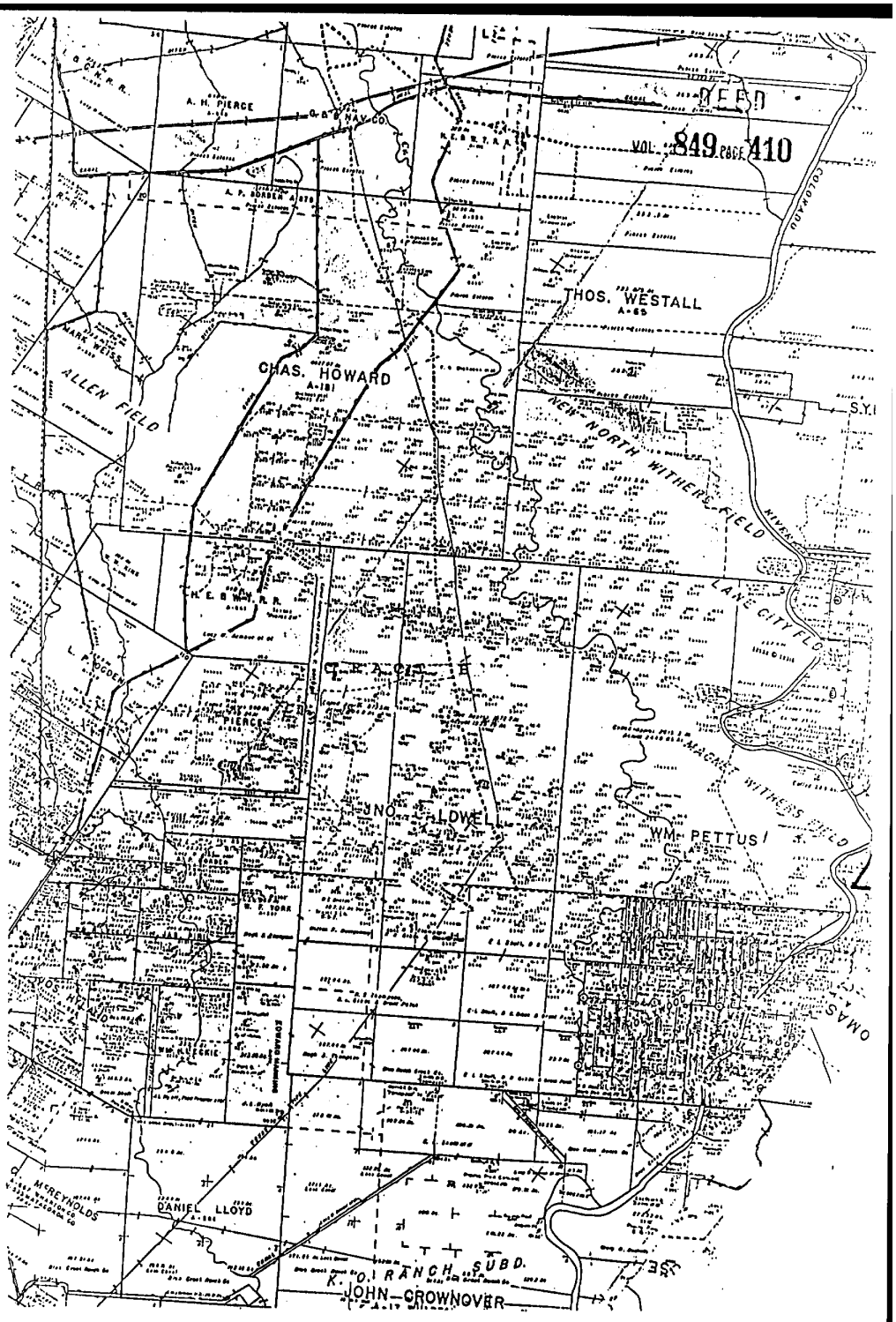


EXHIBIT B
PAGE 2

RECORDER'S MEMORANDUM

AT THE TIME OF RECORDATION, THIS INSTRUMENT WAS FOUND TO BE INADEQUATE FOR THE BEST PHOTOGRAPHIC REPRODUCTION BECAUSE OF ILLEGIBILITY, CARBON OR PHOTO COPY, DISCOLORED PAPER, ETC.

DEED

VOL 849 PAGE 411

STATE OF TEXAS COUNTY OF WHARTON

I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the volume and page of the named records of Wharton County, Texas as stamped hereon by me on

JAN 25 1991

COUNTY CLERK, Wharton County, Texas

BY _____ Deputy

FILED FOR RECORD
at 9:00 o'clock A M

JAN 24 1991

DELFIN MAREK
COUNTY CLERK, WHARTON CO., TEXAS
By Bernice Lucas

Od $31.00
Hutcheson & Grundy
Attn: Harriet H. Learnell
3300 Citicorp Center
1200 Smith St.
Houston, Tx.
77002-4579

122429

A.C: PLAIN LANGUAGE SUMMARY

TLAP Application

The following summary is *provided for this pending water quality permit application being reviewed by the Texas Commission on Environmental Quality as required by 30 Texas Administrative Code Chapter 39. The information provided in this summary may change during the technical review of the application and are not federal enforceable representations of the permit application.*

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. The facility will be located at the coordinates (29.2165071, -96.19356185), near the City of Pierce, Wharton County, Texas, 77437.

Anaerobic digestion is a process in which organic materials, such as cow manure and food waste, are broken down by microorganisms in an oxygen-free environment to produce biogas. By combining food waste with manure, a smaller volume of manure can generate sufficient biogas to make the system efficient. The digester tanks regularly receive material from both the hydrolysis and manure tanks. The material transferred from the hydrolysis tanks will contain a mix of feedstock. Once in the digester, the mixture is homogenized using mixers. Inside the digester, the blend of manure and food waste is heated and remains in the tank for several days. During this time, microbes break down the organic material in an anaerobic environment, producing biogas, which consists of methane, carbon dioxide, hydrogen, and water vapor. The biogas collected in the digester's headspace is then routed through a gas conditioning and upgrading system to remove impurities, resulting in pipeline-quality natural gas. The effluent from the digesters, known as digestate, must be regularly removed as the digester tanks have limited capacity. As more organic waste is added, the processed material is extracted throughout the day to maintain tank volume. This digestate is a nutrient-rich liquid that is stored in an on-site earthen lagoon for future land application by spreading.

Spanish Translation

El siguiente resumen se proporciona para esta solicitud de permiso de calidad del agua pendiente que está siendo revisada por la Comisión de Calidad Ambiental de Texas, según lo exige el Capítulo 39 del Título 30 del Código Administrativo de Texas. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no son representaciones federales exigibles de la solicitud de permiso.

Wharton AD1, LLC desarrolla, construye, posee y opera digestores anaeróbicos en granjas lecheras para producir energía renovable y otros subproductos agrícolas como fertilizantes líquidos y enmiendas del suelo. La instalación estará ubicada en las coordenadas (29.2165071, -96.19356185), cerca de la ciudad de Pierce, condado de Wharton, Texas, 77437.

La digestión anaeróbica es un proceso en el que los microorganismos descomponen materiales orgánicos, como el estiércol de vaca y los desechos de alimentos, en un ambiente libre de oxígeno para producir biogás. Al combinar los desechos de alimentos con estiércol, un volumen menor de estiércol puede generar suficiente biogás para que el sistema sea eficiente. Los tanques digestores reciben regularmente material tanto de los tanques de hidrólisis como de estiércol. El material transferido desde los tanques de hidrólisis contendrá una mezcla de materia prima. Una vez en el digestor, la mezcla se homogeneiza mediante mezcladores. Dentro del digestor, la mezcla de estiércol y restos de comida se calienta y permanece en el tanque durante varios días. Durante este tiempo, los microbios descomponen el material orgánico en un ambiente anaeróbico, produciendo biogás, que consiste en metano, dióxido de carbono, hidrógeno y vapor de agua. Luego, el biogás recolectado en el espacio de cabeza del digestor se conduce a través de un sistema de acondicionamiento y mejora de gas para eliminar las impurezas, lo que da como resultado gas natural con calidad de tubería. El efluente de los digestores, conocido como digestato, debe eliminarse periódicamente ya que los tanques de los digestores tienen una capacidad limitada. A medida que se agregan más desechos orgánicos, el material procesado se extrae durante el día para mantener el volumen del tanque. Este digestato puede procesarse aún más en un sistema de manejo de nutrientes, lo que da como resultado un líquido rico en nutrientes que se almacena en una laguna de tierra en el sitio para su futura aplicación en la tierra mediante esparcimiento.

PUBLIC INVOLVEMENT PLAN

Texas Commission on Environmental Quality

Public Involvement Plan Form for Permit and Registration Applications

The Public Involvement Plan is intended to provide applicants and the agency with information about how public outreach will be accomplished for certain types of applications in certain geographical areas of the state. It is intended to apply to new activities; major changes at existing plants, facilities, and processes; and to activities which are likely to have significant interest from the public. This preliminary screening is designed to identify applications that will benefit from an initial assessment of the need for enhanced public outreach.

All applicable sections of this form should be completed and submitted with the permit or registration application. For instructions on how to complete this form, see TCEQ-20960-inst.

Section 1. Preliminary Screening

☒ New Permit or Registration Application

☐ New Activity – modification, registration, amendment, facility, etc. (see instructions)

If neither of the above boxes are checked, completion of the form is not required and does not need to be submitted.

Section 2. Secondary Screening

☒ Requires public notice,

☐ Considered to have significant public interest, **and**

☐ Located within any of the following geographical locations:

- Austin
- Dallas
- Fort Worth
- Houston
- San Antonio
- West Texas
- Texas Panhandle
- Along the Texas/Mexico Border
- Other geographical locations should be decided on a case-by-case basis

If all the above boxes are not checked, a Public Involvement Plan is not necessary. Stop after Section 2 and submit the form.

☐ Public Involvement Plan not applicable to this application. Provide **brief** explanation.

Section 3. Application Information

Type of Application (check all that apply):

Air ☐ Initial ☐ Federal ☐ Amendment ☐ Standard Permit ☐ Title V

Waste ☐ Municipal Solid Waste ☐ Industrial and Hazardous Waste ☐ Scrap Tire
☐ Radioactive Material Licensing ☐ Underground Injection Control

Water Quality

☐ Texas Pollutant Discharge Elimination System (TPDES)

☒ Texas Land Application Permit (TLAP)

☐ State Only Concentrated Animal Feeding Operation (CAFO)

☐ Water Treatment Plant Residuals Disposal Permit

☐ Class B Biosolids Land Application Permit

☐ Domestic Septage Land Application Registration

Water Rights New Permit

☐ New Appropriation of Water

☐ New or existing reservoir

Amendment to an Existing Water Right

☐ Add a New Appropriation of Water

☐ Add a New or Existing Reservoir

☐ Major Amendment that could affect other water rights or the environment

Section 4. Plain Language Summary

Provide a brief description of planned activities.

Wharton AD1, LLC develops and operates anaerobic digesters to convert cow manure and food waste into renewable energy and agricultural by-products. The facility near Pierce, Texas, will use anaerobic digestion to break down organic materials in an oxygen-free environment, producing biogas. This biogas, primarily methane, is purified into pipeline-quality natural gas. The remaining digestate is processed into nutrient-rich liquid fertilizer and soil amendments. The liquid by-product is stored in a lagoon for future land application on farms.

Section 5. Community and Demographic Information

Community information can be found using EPA's EJ Screen, U.S. Census Bureau information, or generally available demographic tools.

Information gathered in this section can assist with the determination of whether alternative language notice is necessary. Please provide the following information.

Pierce

(City)

Wharton

(County)

(Census Tract)

Please indicate which of these three is the level used for gathering the following information.

☒ City ☐ County ☒ Census Tract

(a) Percent of people over 25 years of age who at least graduated from high school

60.0%

(b) Per capita income for population near the specified location

$35,139 (Household Income)

(c) Percent of minority population and percent of population by race within the specified location

27.9%

(d) Percent of Linguistically Isolated Households by language within the specified location

N/A

(e) Languages commonly spoken in area by percentage

N/A

(f) Community and/or Stakeholder Groups

N/A

(g) Historic public interest or involvement

N/A

Section 6. Planned Public Outreach Activities

(a) Is this application subject to the public participation requirements of Title 30 Texas Administrative Code (30 TAC) Chapter 39?

☒ Yes ☐ No

(b) If yes, do you intend at this time to provide public outreach other than what is required by rule?

☒ Yes ☐ No

If Yes, please describe.

Wharton AD1, LLC plans to host a series of community conversations to both engag

If you answered "yes" that this application is subject to 30 TAC Chapter 39, answering the remaining questions in Section 6 is not required.

(c) Will you provide notice of this application in alternative languages?

☐ Yes ☒ No

Please refer to Section 5. If more than 5% of the population potentially affected by your application is Limited English Proficient, then you are required to provide notice in the alternative language.

If yes, how will you provide notice in alternative languages?

☐ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

(d) Is there an opportunity for some type of public meeting, including after notice?

☐ Yes ☐ No

(e) If a public meeting is held, will a translator be provided if requested?

☐ Yes ☐ No

(f) Hard copies of the application will be available at the following (check all that apply):

☐ TCEQ Regional Office ☐ TCEQ Central Office
☐ Public Place (specify)

Section 7. Voluntary Submittal

For applicants voluntarily providing this Public Involvement Plan, who are not subject to formal public participation requirements.

Will you provide notice of this application, including notice in alternative languages?

☒ Yes ☐ No

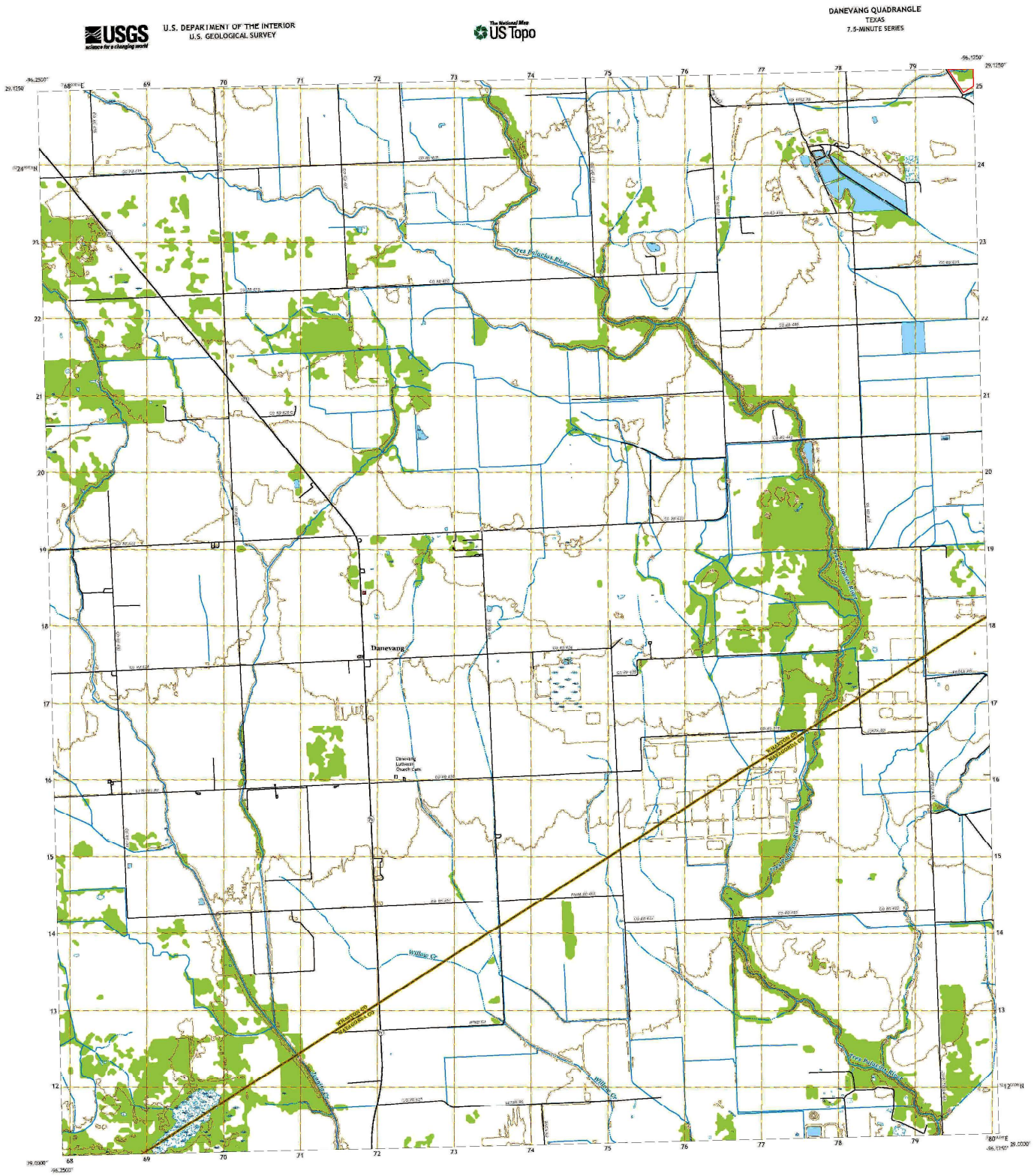
What types of notice will be provided?

☒ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE MAP

7.5-Minute USGS Topographic Quadrangle Map

Figure A.E.l, 7.5-Minute USGS Topographic Quadrangle Map, is an original 7.5-Minute USGS Topographic Map of the Pierce, Texas Quadrangle. This map shows the major highways, county roads, water bodies, and elevation lines near the property.

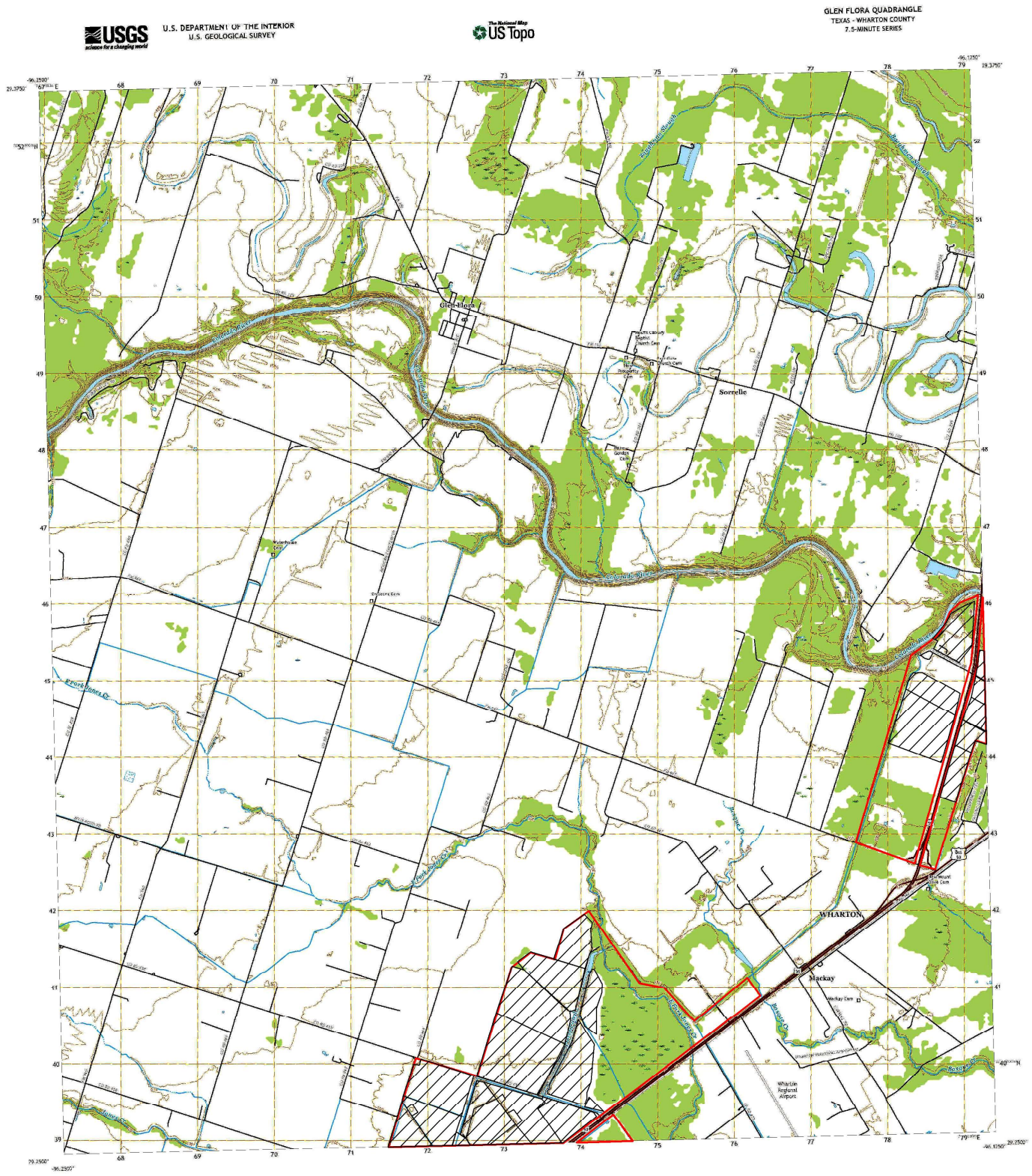


Biogas Plant

Solar Plant

Land Management Unit

Property Boundary

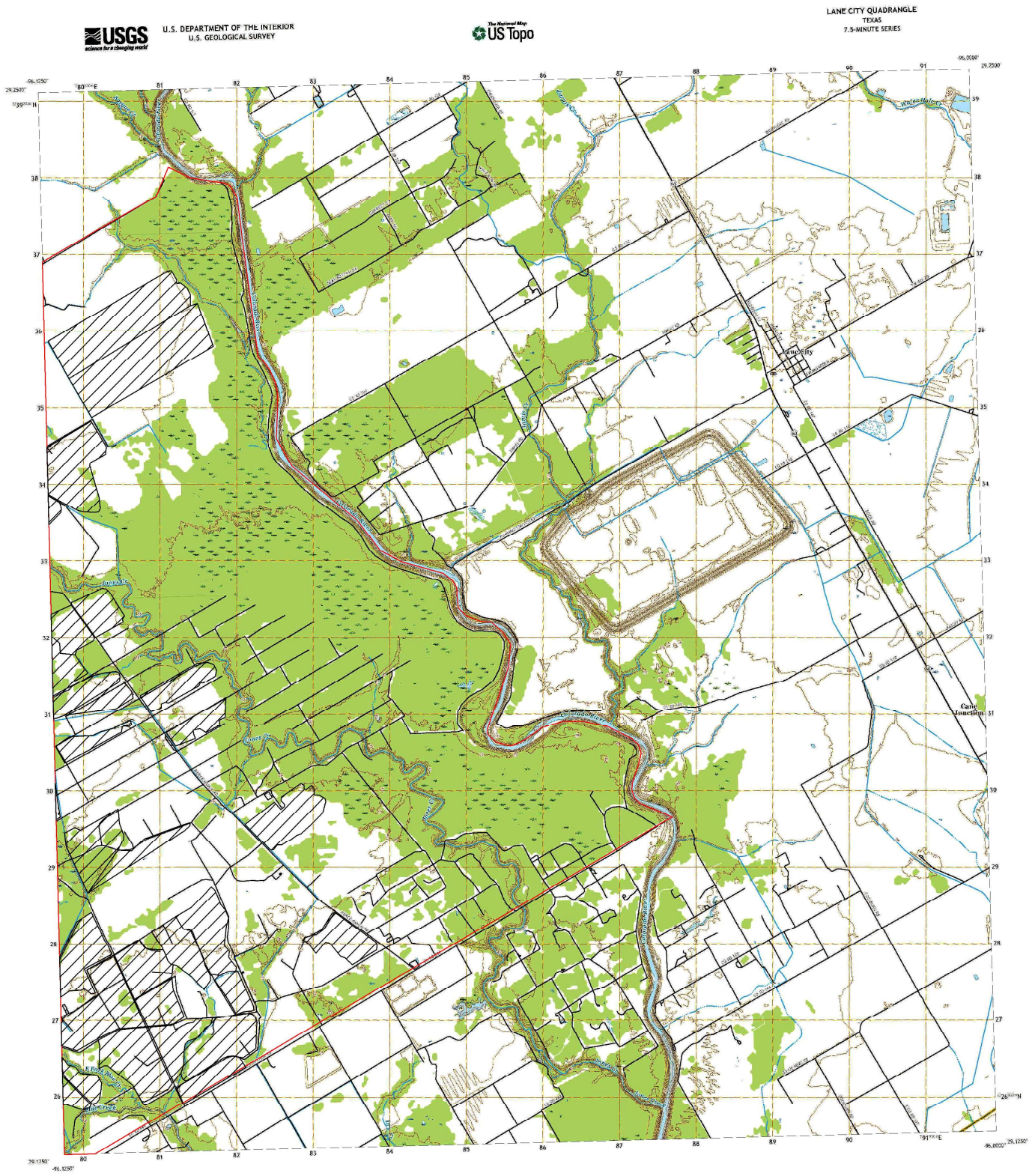


Biogas Plant

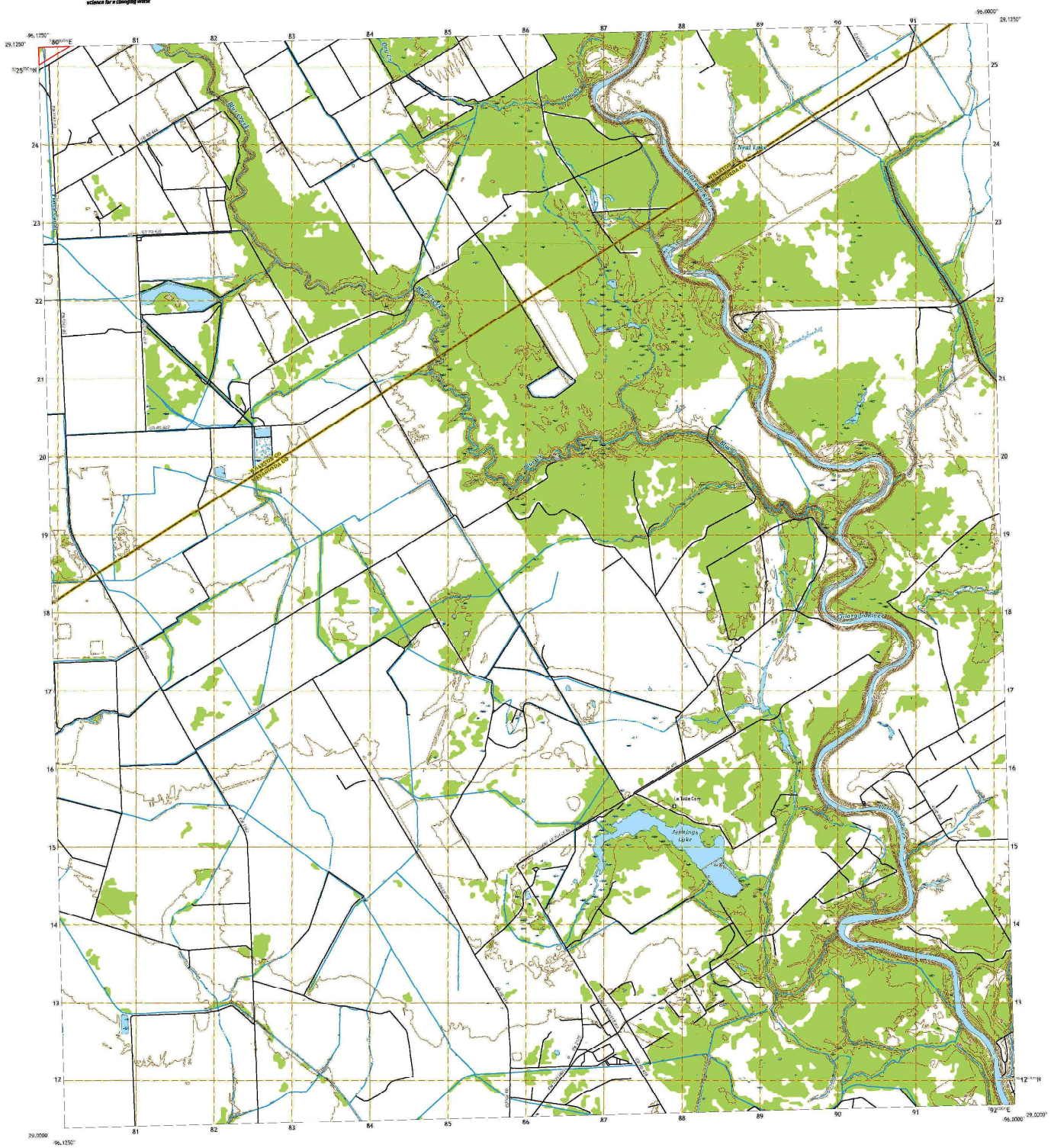
Solar Plant

Land Management Unit

Property Boundary



- Biogas Plant
- Solar Plant
- Land Management Unit
- Property Boundary

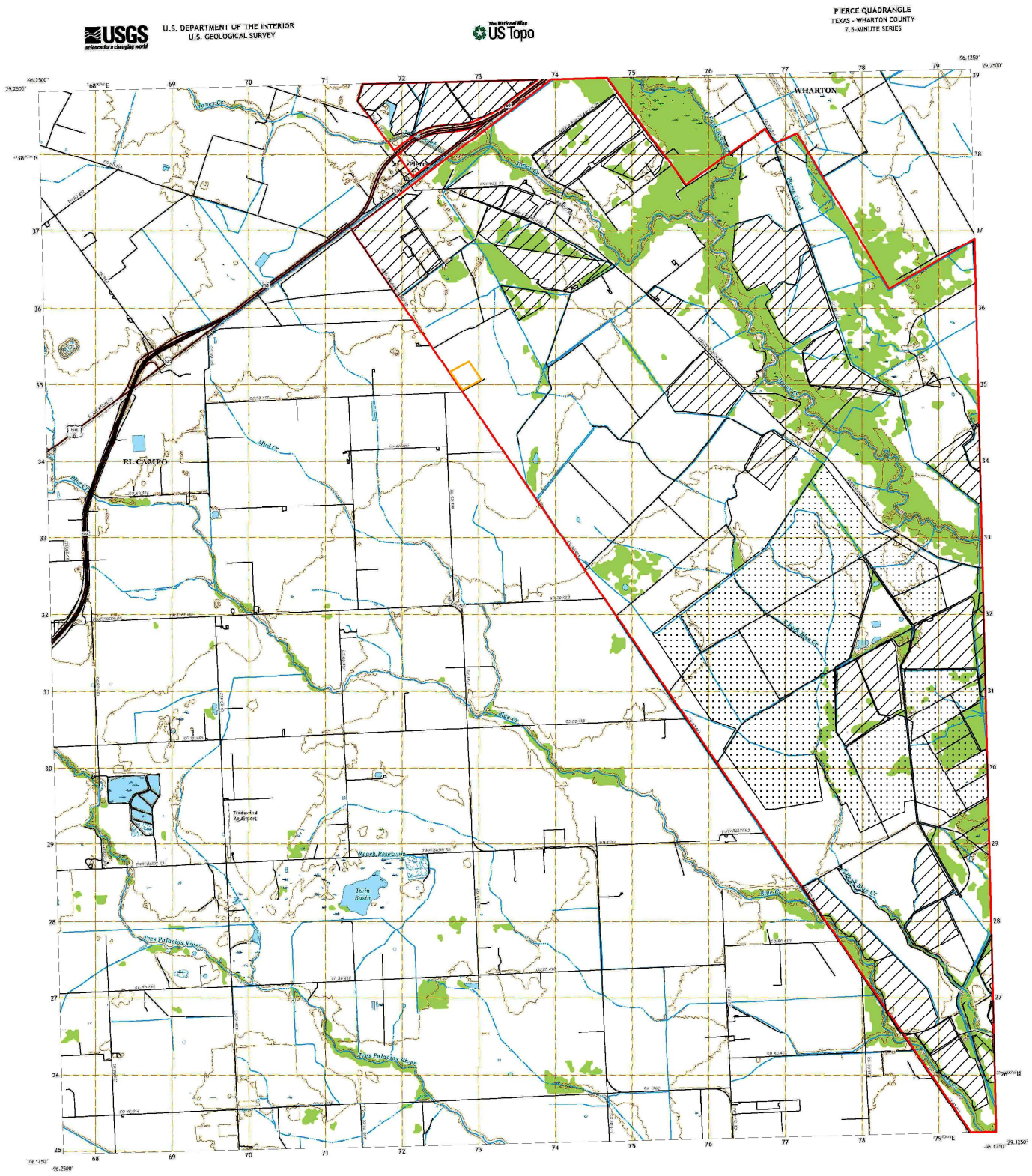


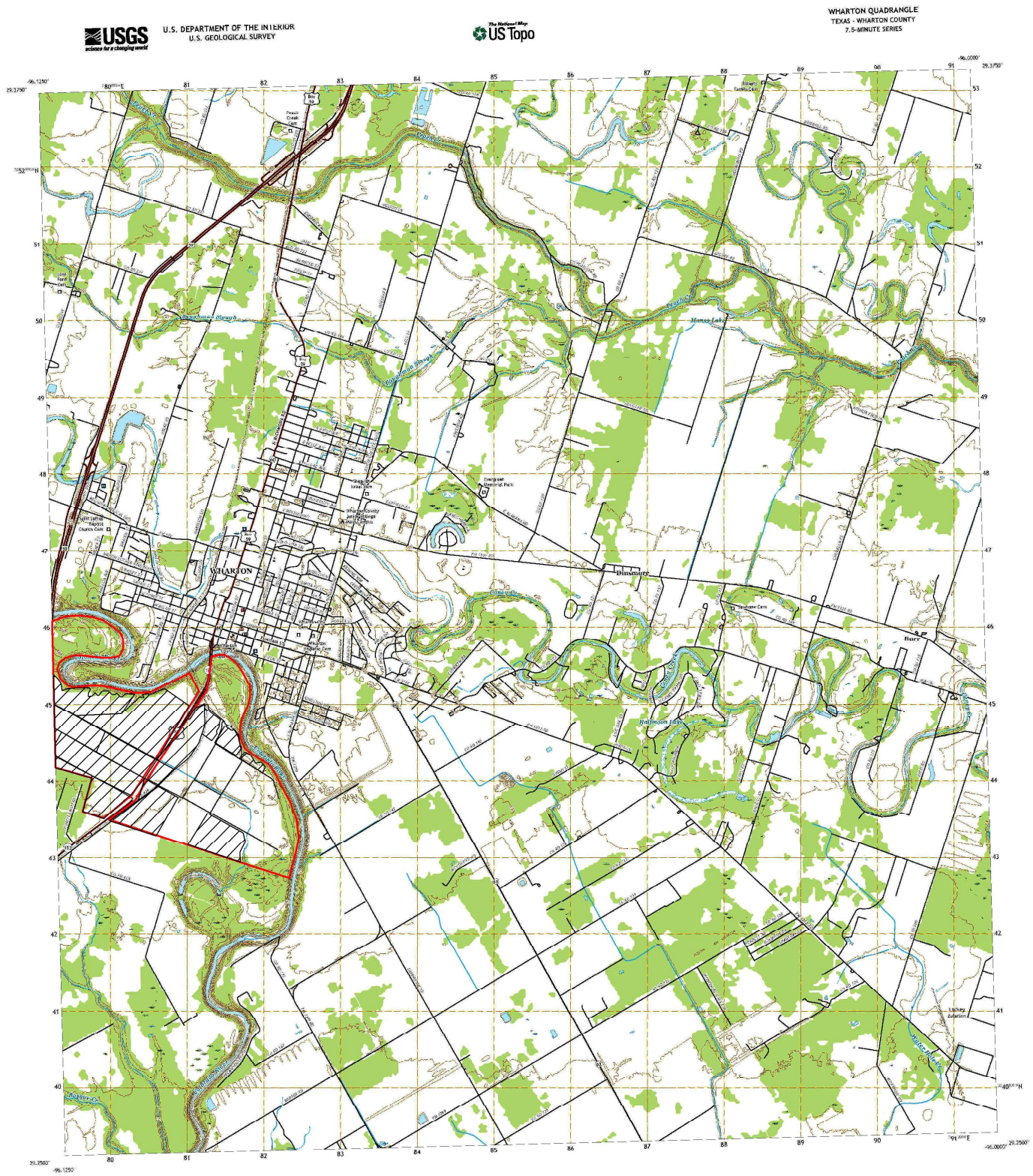
Biogas Plant

Solar Plant

Land Management Unit

Property Boundary


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
The National Map
US Topo
PIERCE QUADRANGLE
TEXAS - WHARTON COUNTY
7.5-MINUTE SERIES
WHARTON
EL CAMPO
Mud Cr
Blue Cr
Trib
Trib
Trib



Biogas Plant

Solar Plant

Land Management Unit

Property Boundary

A.F: AFFECTED LANDOWNER INFORMATION

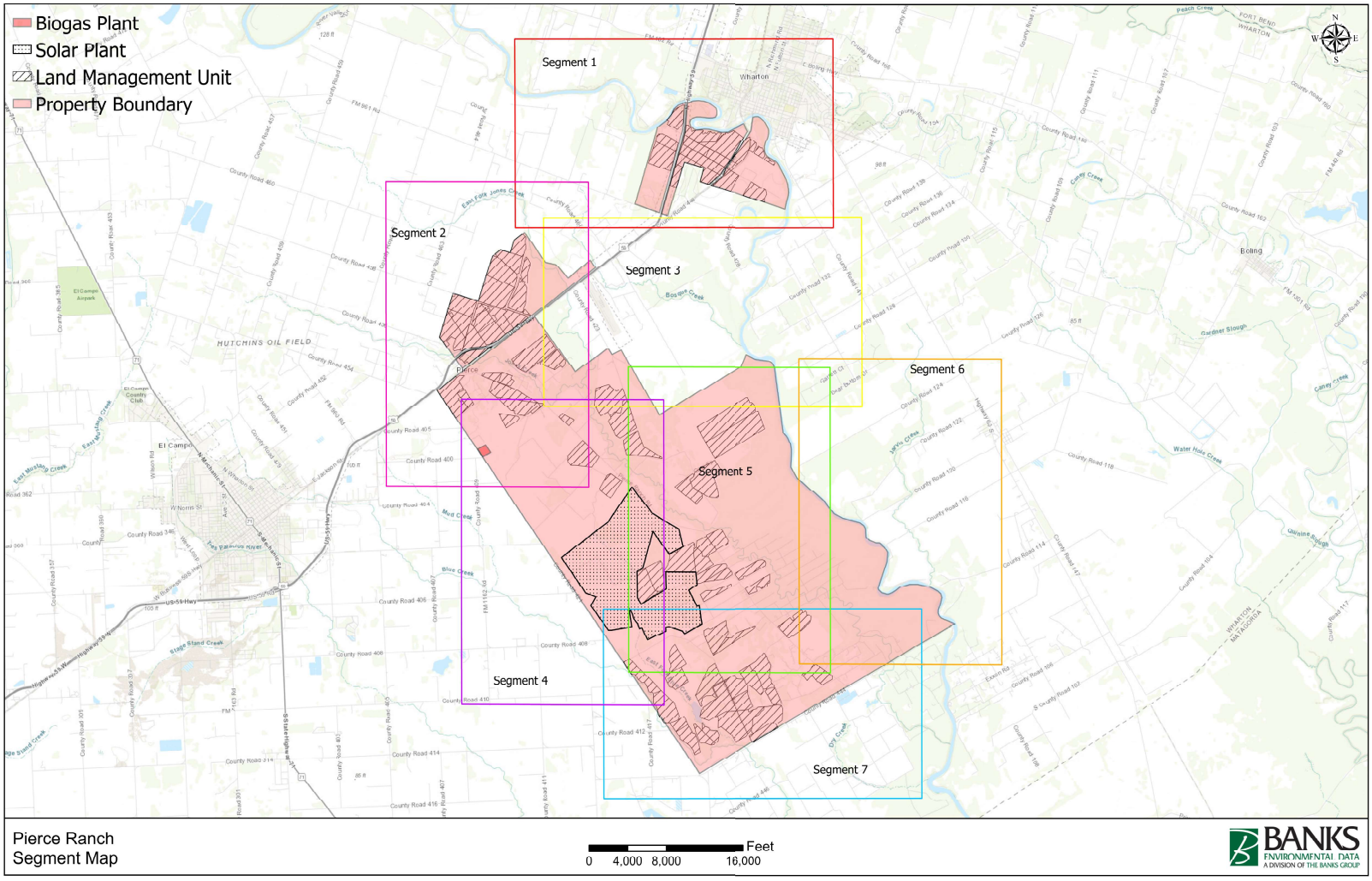
A.F.1 Adjacent Landowners Map

Figure A.F.1 shows the information required in item 1.a. of the Industrial Administrative Report 1.1. Property boundaries were obtained from the Wharton County Appraisal District Interactive Map as of November 2024. The tracts identified on the map correspond to Table A.F. l, below.

A.F.2 Landowners List

The landowner names and addresses in Table A.F.1 were obtained from the Wharton Appraisal District Property Search web databases, retrieved 11/2024.

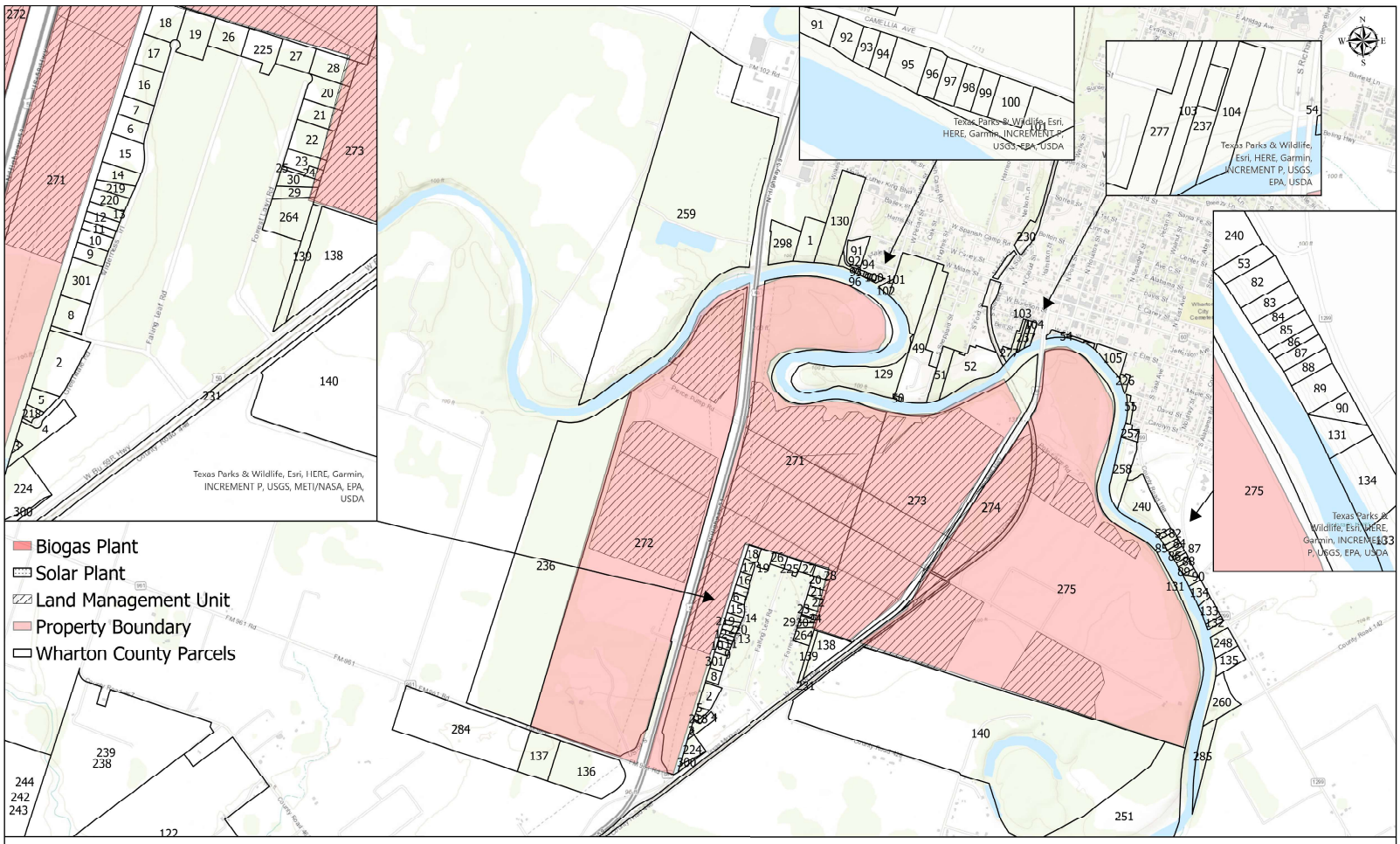
Table 1. Adjacent Landowners



Pierce Ranch
Segment Map

0 4,000 8,000 16,000 Feet

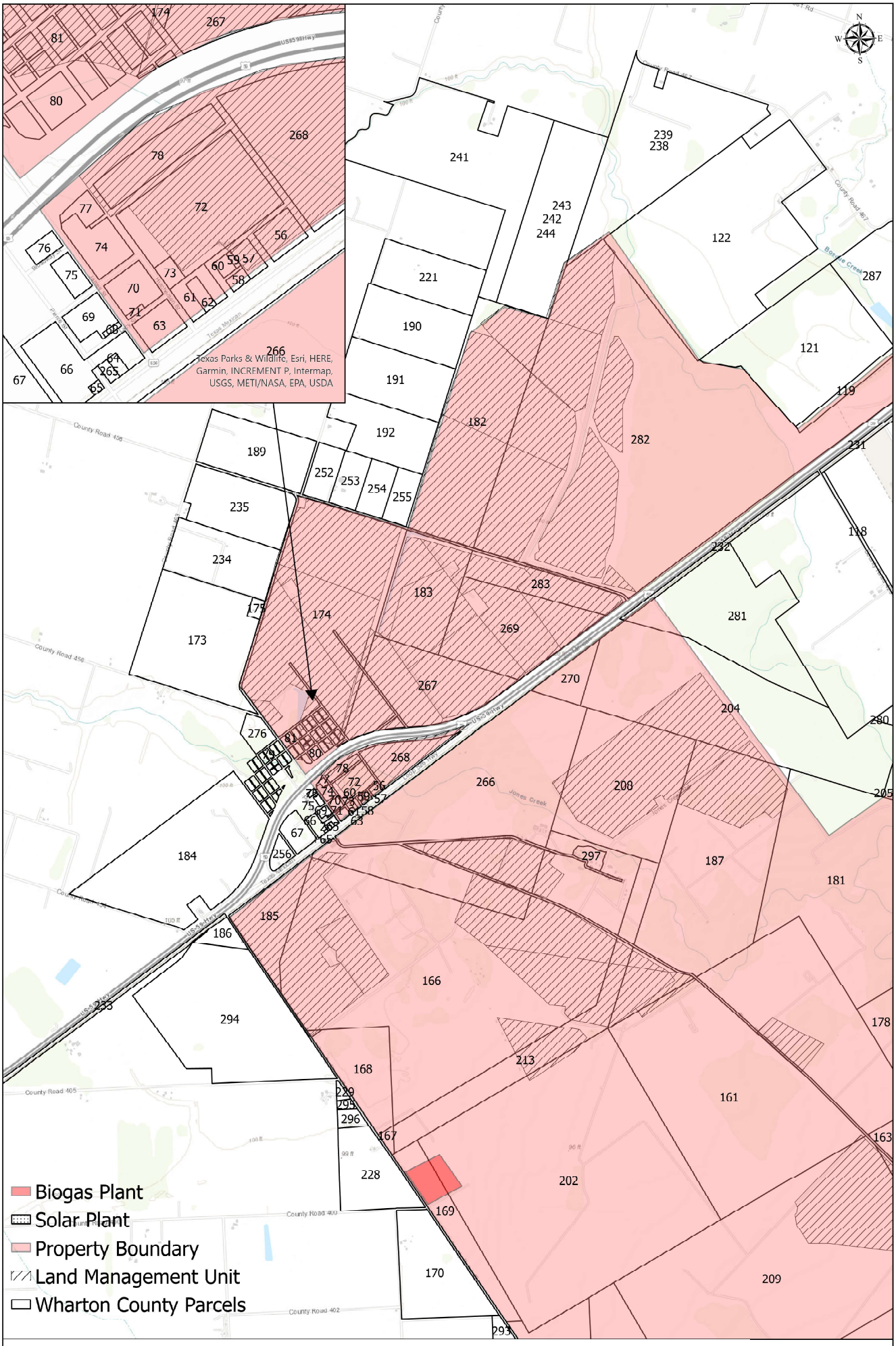
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 1

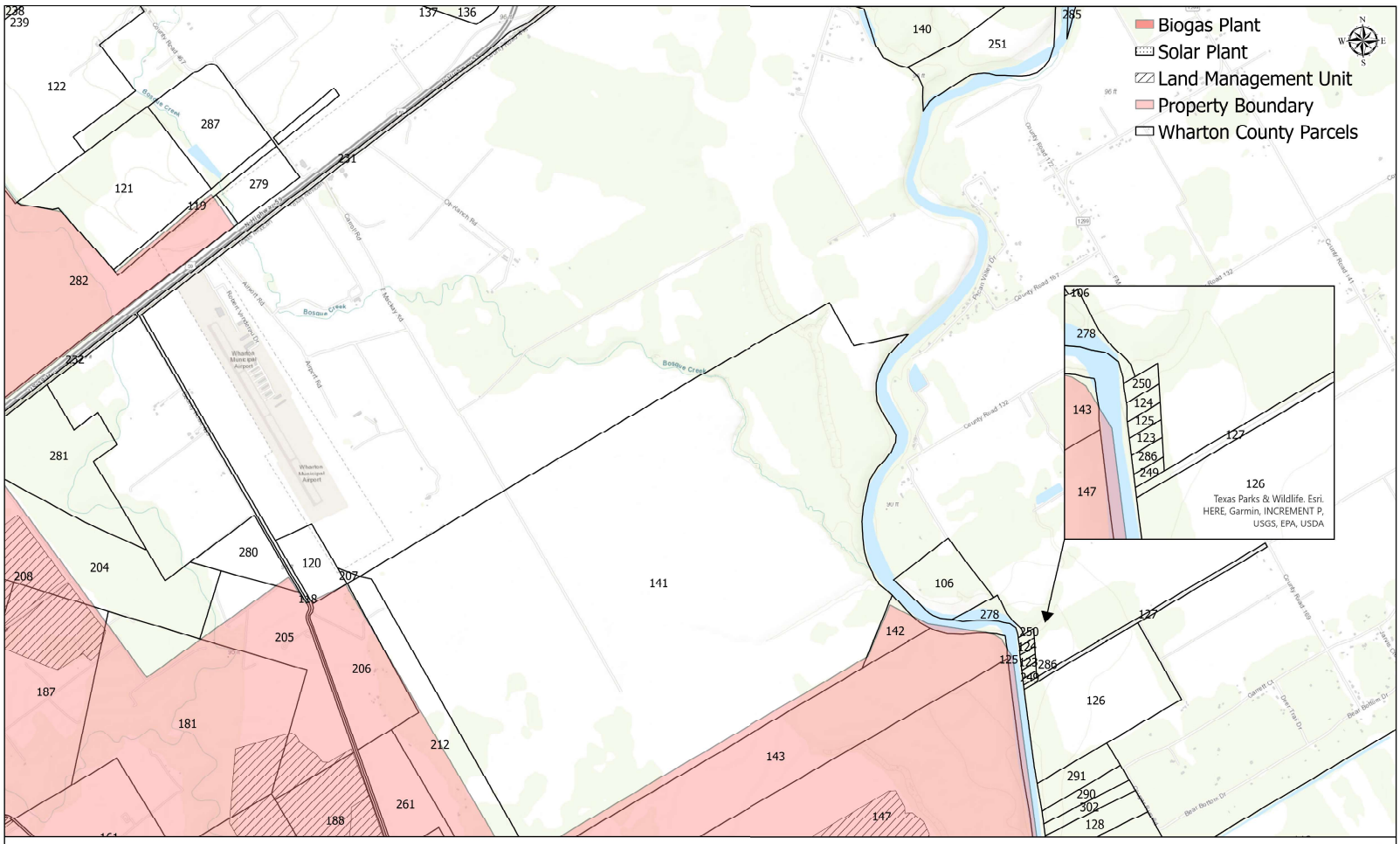
0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 2

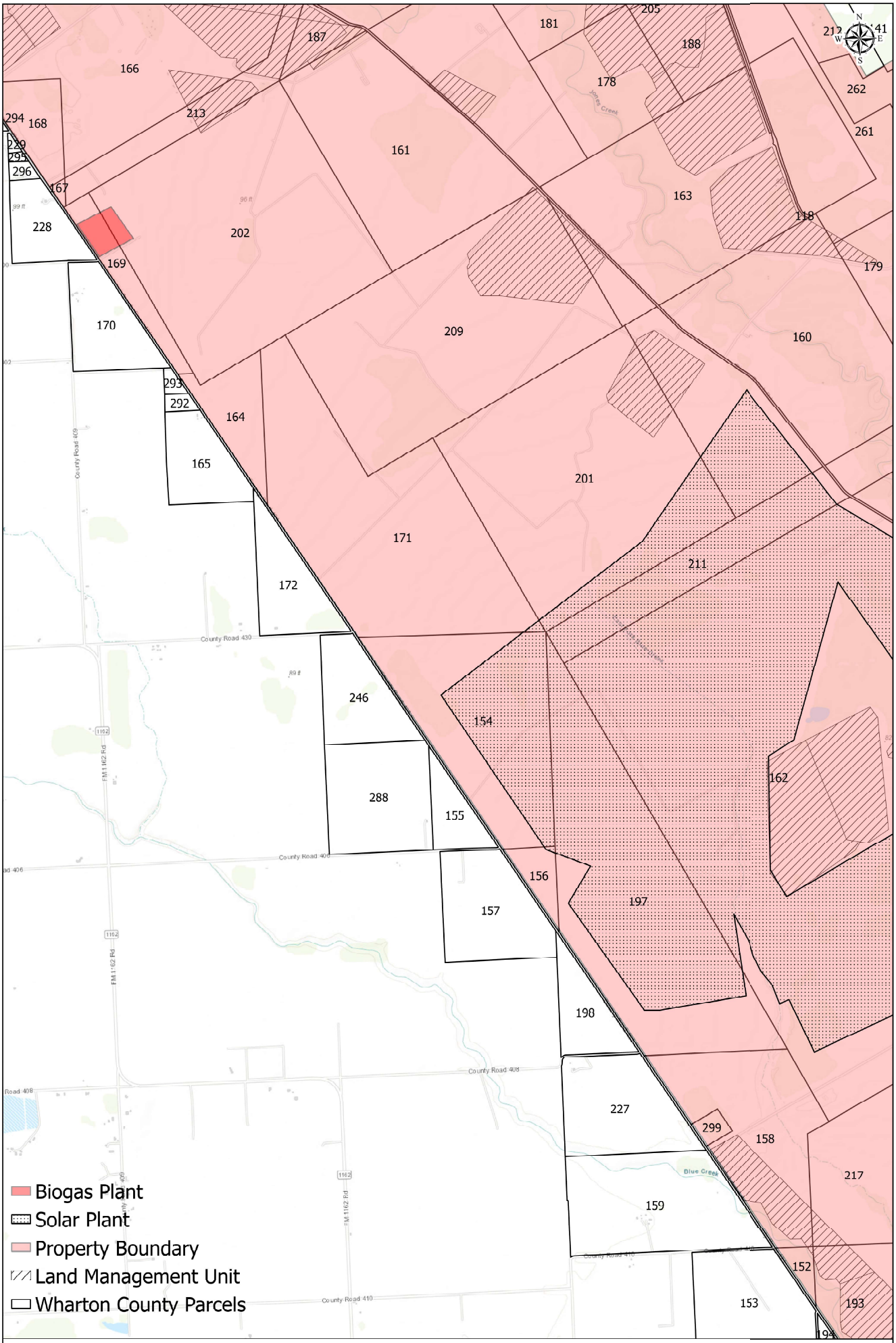
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

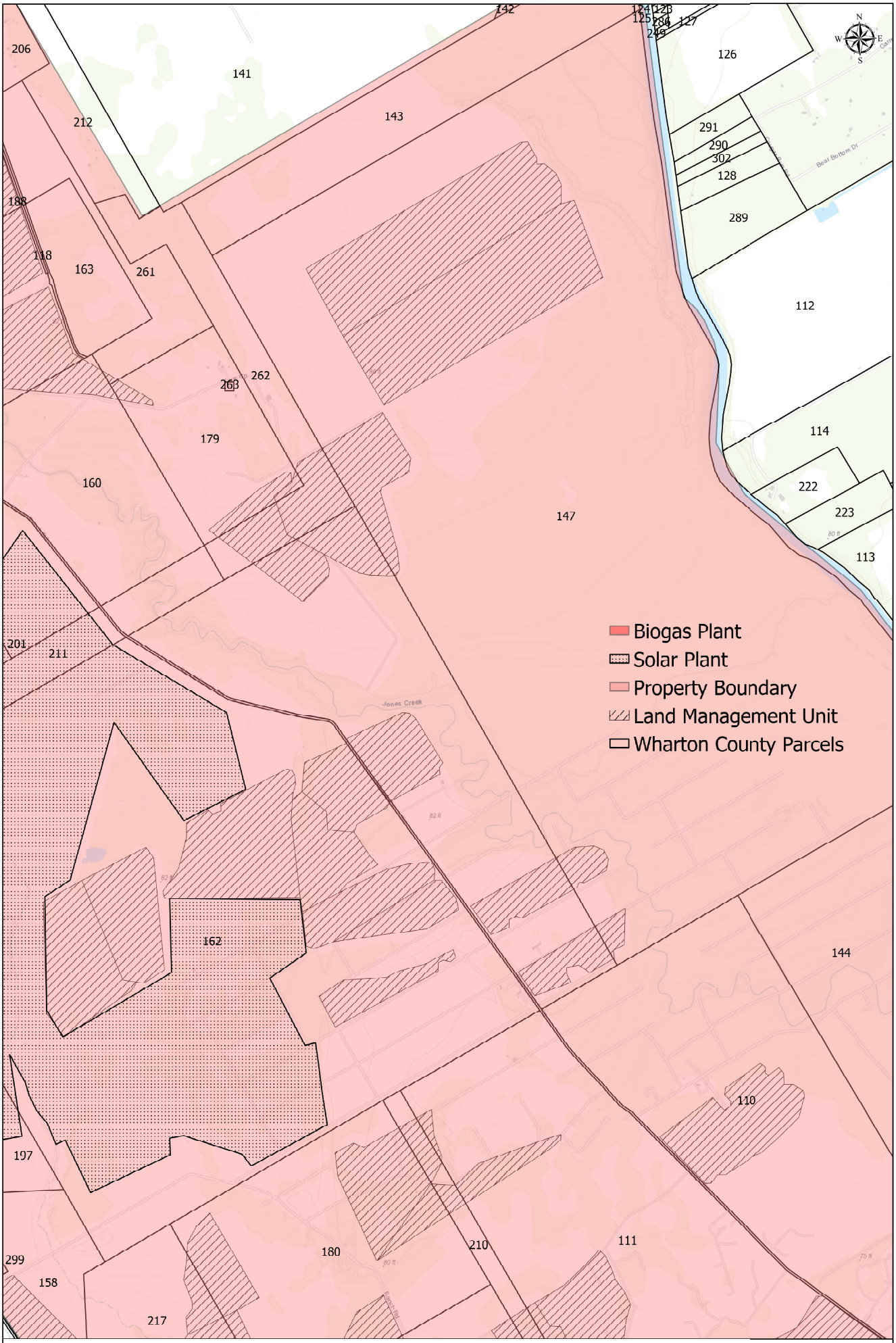


Affected Landowners Map
Segment 3

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

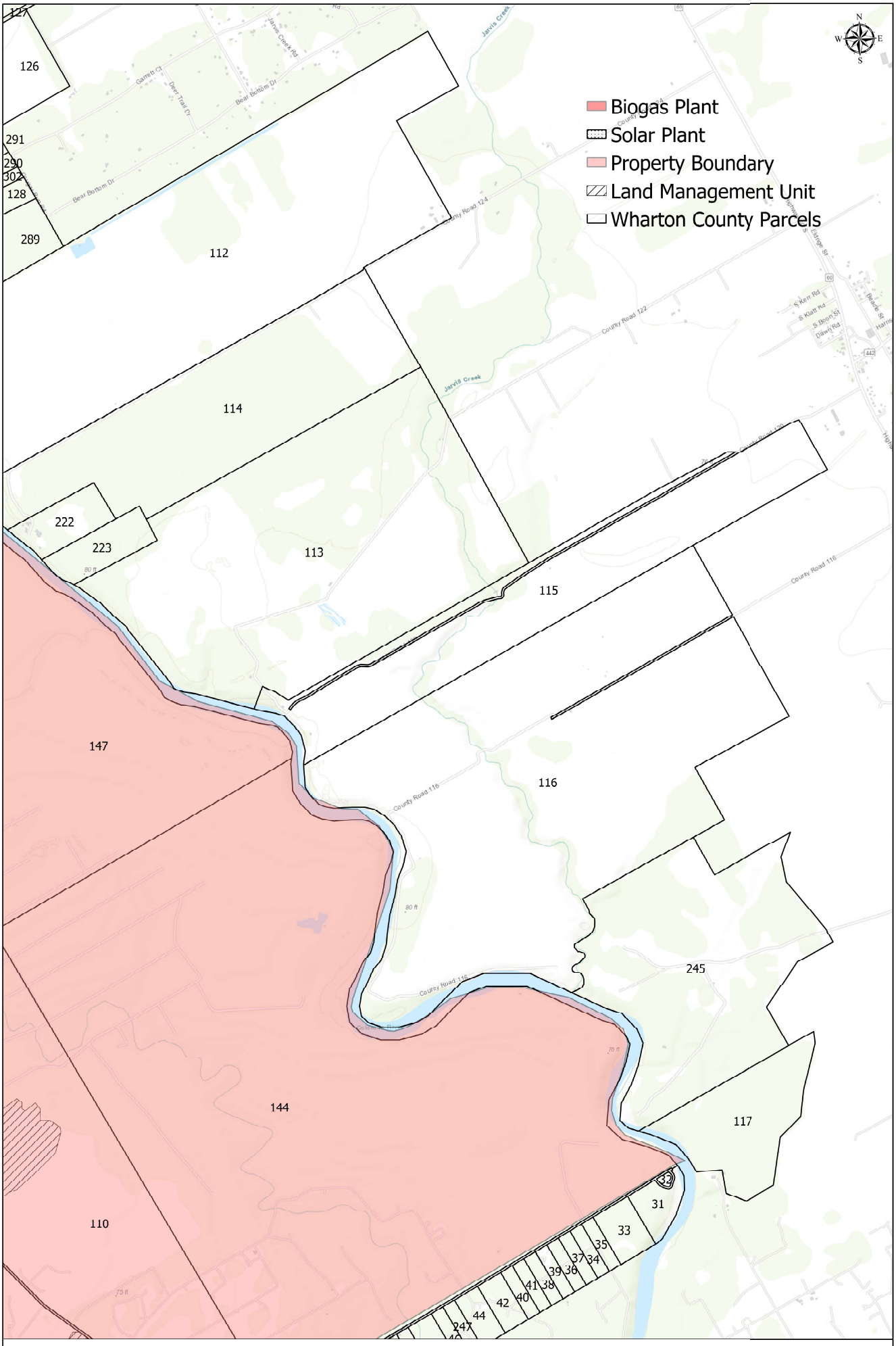

Biogas Plant
Solar Plant
Property Boundary
Land Management Unit
Wharton County Parcels
Affected Landowners Map
Segment 4
0 1,000 2,000 4,000 Feet
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 5

0 1,000 2,000 4,000 Feet

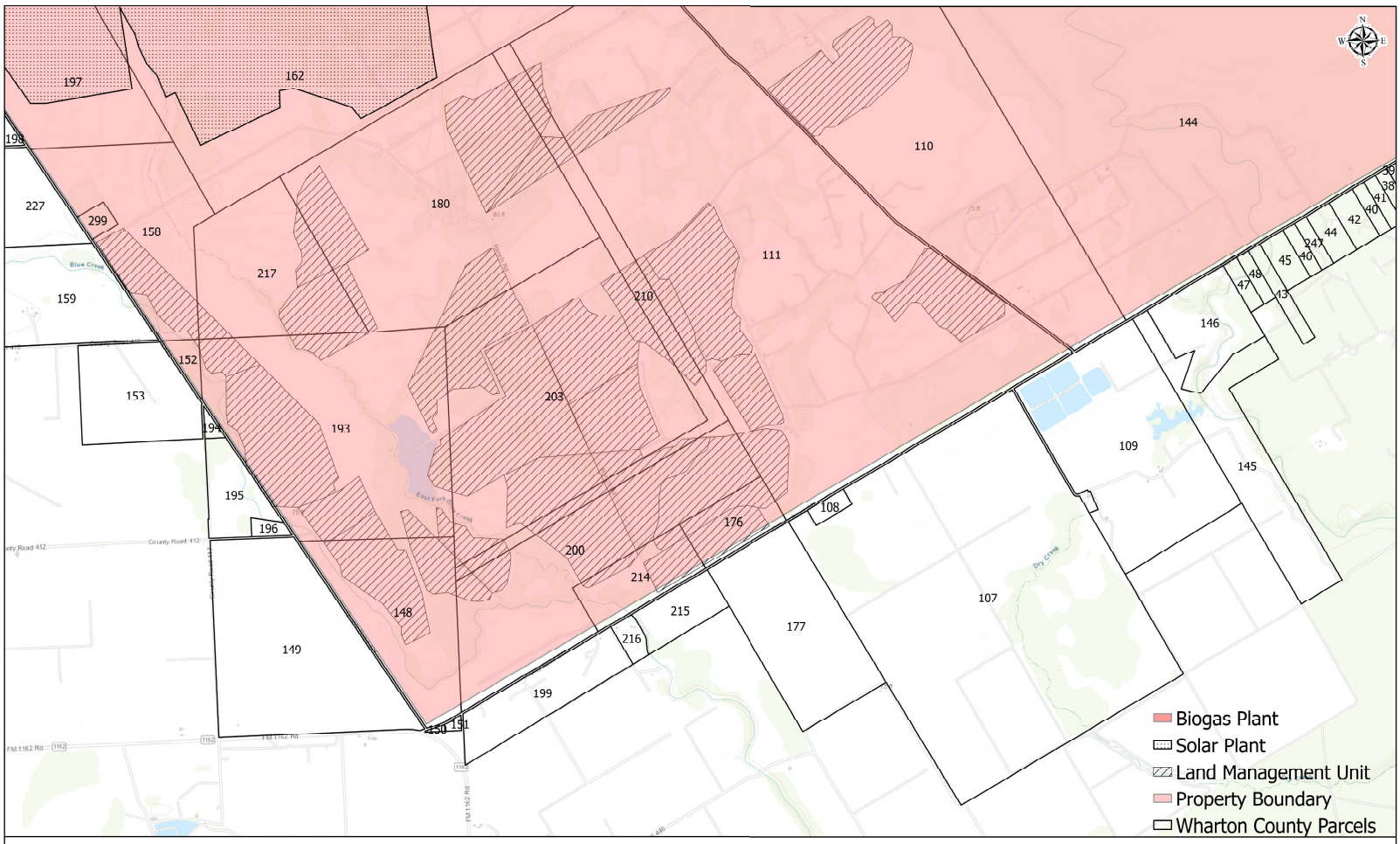
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 6

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 7

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
1	Wharton	15961	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
2	Wharton	17158	BECKER ALVIE D ETUX LAURA J	174 GREENDALE RD	WHARTON	TX	77488
3	Wharton	17159	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
4	Wharton	17160	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
5	Wharton	17161	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
6	Wharton	17166	DORNAK KEITH A	719 WILDERNESS TRL	WHARTON	TX	77488
7	Wharton	17167	PEREZ ANTHONY SR	223 SHIMEK	EL CAMPO	TX	77437
8	Wharton	17168	MCDOUGALL RUSSELL ETUX NANETTE	353 WILDERNESS TRL	WHARTON	TX	77488
9	Wharton	17170	KING LINDA	439 Wilderness Trl	Wharton	TX	77488
10	Wharton	17172	SODERQUIST MICHELLE JANSKY	477 WILDERNESS TRAIL	WHARTON	TX	77488
11	Wharton	17173	CORTES ROLANDO & MARTINEZ ESMERALDA	614 MURPHY	WHARTON	TX	77488
12	Wharton	17174	DEITERICH FRANCES LIFE ESTATE	529 WILDERNESS TRL	WHARTON	TX	77488
13	Wharton	17175	DEITERICH FRANCES LIFE ESTATE	529 WILDERNESS TRL	WHARTON	TX	77488
14	Wharton	17181	ESCAMILLA CHRISSIE M	593 WILDERNESS TRL	WHARTON	TX	77488
15	Wharton	17182	NJOKU LASANDRA	950 BOROS DRIVE	HOUSTON	TX	77024
16	Wharton	17183	CASAREZ ANTONIO	1605 AMBER	EL CAMPO	TX	77437
17	Wharton	17184	SALEM ABDEL	10001 Six Pines Dr	The Woodlands	TX	77380
18	Wharton	17185	ANZALDUA PAUL D	899 WILDERNESS TRAIL	WHARTON	TX	77488
19	Wharton	17202	OKEWUNMI JOHN & KIM	PO BOX 118	ROSHARON	TX	77583
20	Wharton	17207	BOYD CARL A III & KAILA N	586 FORREST LAWN	WHARTON	TX	77488
21	Wharton	17214	SMITH ANTHONY A	552 FORREST LAWN	WHARTON	TX	77488
22	Wharton	17216	Palacios Richard JR & Yvonna	522 Forrest Lawn	Wharton	TX	77488
23	Wharton	17222	WHARTON COUNTY	PO BOX 189	WHARTON	TX	77488
24	Wharton	17223	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
25	Wharton	17223	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
26	Wharton	17227	TRUJILLO SONIA	1502 ENCLAVE PKWY APT 205	HOUSTON	TX	77077
27	Wharton	17228	HOFFMANN PAUL LIFE EST	595 FORREST LAWN	WHARTON	TX	77488
28	Wharton	17229	PALACIOS GILBERT	594 FORREST LAWN RD	WHARTON	TX	77488
29	Wharton	17232	GUERRERO JESUS A ETUX ODETTE	304 OAK POND DR	MANVEL	TX	77578
30	Wharton	17233	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
31	Wharton	17320	LCRA	PO BOX 220	AUSTIN	TX	78767

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
32	Wharton	17320	LCRA	PO BOX 220	AUSTIN	TX	78767
33	Wharton	17323	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
34	Wharton	17325	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
35	Wharton	17327	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
36	Wharton	17329	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
37	Wharton	17331	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
38	Wharton	17333	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
39	Wharton	17335	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
40	Wharton	17337	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
41	Wharton	17339	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
42	Wharton	17341	CAPLIN LLC	4017 MOUNTAIN SHADOW PLACE	RAPID CITY	SD	57702
43	Wharton	17347	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
44	Wharton	17359	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
45	Wharton	17361	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
46	Wharton	17363	HANCOCK JOE BRUCE ETAL	PO BOX 190	EL CAMPO	TX	77437
47	Wharton	17364	LABELLE PROPERTIES LTD	PO BOX 3111	BEAUMONT	TX	77704
48	Wharton	17366	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
49	Wharton	18520	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
50	Wharton	18526	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
51	Wharton	18588	City of Wharton	120 E. Caney	Wharton	TX	77488
52	Wharton	18589	City of Wharton	120 E. Caney	Wharton	TX	77488
53	Wharton	18696	GARCIA EVA RODRIGUEZ	PO BOX 785	WHARTON	TX	77488
54	Wharton	18699	WHARTON CITY OF	PO BOX 311507	NEW BRAUNFELS	TX	78131
55	Wharton	20858	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
56	Wharton	22167	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
57	Wharton	22168	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
58	Wharton	22169	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
59	Wharton	22170	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
60	Wharton	22171	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
61	Wharton	22172	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
62	Wharton	22173	BAUER COLLEEN	5587 BRIGHT TIMBER LANDING DR	SPRING	TX	77386
63	Wharton	22174	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
64	Wharton	22175	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
65	Wharton	22176	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
66	Wharton	22177	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
67	Wharton	22178	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
68	Wharton	22183	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
69	Wharton	22184	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
70	Wharton	22187	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
71	Wharton	22188	GODSEY W R & WF	2127 SPUR TRL	GRAPEVINE	TX	76051
72	Wharton	22189	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
73	Wharton	22190	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
74	Wharton	22191	PIERCE STATION ANTIQUES LLC	PO BOX 501	PIERCE	TX	77467
75	Wharton	22193	TEXAS STATE OF		AUSTIN	TX	78768
76	Wharton	22204	TEXAS STATE OF		AUSTIN	TX	78768
77	Wharton	22207	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
78	Wharton	22210	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
79	Wharton	22218	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
80	Wharton	22223	ACADEMY SQUARE (PIERCE)		PIERCE	TX	77467
81	Wharton	22224	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
82	Wharton	22826	MEHRENS NANCY KAINER & MEHRENS DAVID RAY	1316 FM 1299	WHARTON	TX	77488
83	Wharton	22829	MEHRENS NANCY KAINER	1316 FM 1299	WHARTON	TX	77488
84	Wharton	22830	MATHEWS DARREN R ETUX KIMBERLY D	1318 FM 1299	WHARTON	TX	77488
85	Wharton	22831	Bruton Nelson	1400 FM 1299 RD	Wharton	TX	77488
86	Wharton	22832	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
87	Wharton	22833	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
88	Wharton	22834	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
89	Wharton	22835	JURASEK RUSSELL A ETUX JACQUELIN	1500 FM 1299	WHARTON	TX	77488
90	Wharton	22837	MAYNARD RANDALL C	2100 FM 1299 RD	WHARTON	TX	77488
91	Wharton	23653	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
92	Wharton	23702	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
93	Wharton	23703	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
94	Wharton	23704	WHARTON CITY	120 E CANEY	WHARTON	TX	77488

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
95	Wharton	23705	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
96	Wharton	23706	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
97	Wharton	23707	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
98	Wharton	23708	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
99	Wharton	23709	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
100	Wharton	23710	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
101	Wharton	23711	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
102	Wharton	23712	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
103	Wharton	26694	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
104	Wharton	26697	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
105	Wharton	26755	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
106	Wharton	28404	VOULGARIS MICHAEL D	404 PRICE DR	WHARTON	TX	77488
107	Wharton	28644	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
108	Wharton	28648	HEIMANN GARY W	2172 CR 444 RD	EL CAMPO	TX	77437
109	Wharton	28650	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
110	Wharton	28657	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
111	Wharton	28658	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
112	Wharton	28664	KOSCLSKSIE BARBARA B ETAL	PO BOX 331	BROOKSHIRE	TX	77423
113	Wharton	28676	HAWES BARBARA LOUISE TRUST DATED 8-17-81	PO BOX 686	WHARTON	TX	77488
114	Wharton	28705	KOSCLSKIE BARBARA B ETAL	PO BOX 331	BROOKSHIRE	TX	77423
115	Wharton	28716	LCRA	PO BOX 220	AUSTIN	TX	78767
116	Wharton	28750	LCRA	PO BOX 220	AUSTIN	TX	78767
117	Wharton	28775	SCHMIDT RICHARD E	PO BOX 784	EL CAMPO	TX	77437
118	Wharton	29621	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
119	Wharton	29621	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
120	Wharton	29637	BEARD LONNIE F FAMILY TRUST	2106 NANCY LOU	EL CAMPO	TX	77437
121	Wharton	29671	KRESTA KEITH A & SARA	2394 FM 961 RD	WHARTON	TX	77488
122	Wharton	29688	MCMILLAN BARBARA A & MCMILLAN SHERRY L	2622 HAVERHILL DR	HOUSTON	TX	77008
123	Wharton	30295	MCELVEEN JOAN	3983 FM 1735	MT PLEASANT	TX	75455

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
124	Wharton	30305	JOINES JON ETUX BLANCHE; JOINES CLINT J	1628 CR 235	WHARTON	TX	77488
125	Wharton	30308	DUSEK DOUGLAS ETUX LORRAINE	PO BOX 733	WHARTON	TX	77488
126	Wharton	30315	WHARTON TURF GRASS INC	PO BOX 1029	WHARTON	TX	77488
127	Wharton	30316	WHARTON TURF GRASS INC	PO BOX 1029	WHARTON	TX	77488
128	Wharton	30319	Brown Douglas I	6570 Cougar Crossing	Wharton	TX	77488
129	Wharton	31204	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
130	Wharton	31245	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
131	Wharton	31735	CENTERPOINT ENERGY HOUSTON ELECTRIC	PO BOX 1475	HOUSTON	TX	77251
132	Wharton	31737	MAYNARD RANDALL	2100 FM 1299 RD	WHARTON	TX	77488
133	Wharton	31738	TEXAS STATE OF		AUSTIN	TX	78768
134	Wharton	31741	HOUSTON PIPE LINE CO	PO BOX 660164	DALLAS	TX	75266
135	Wharton	31835	DUSEK DOUGLAS ETUX LORRAINE	PO BOX 733	WHARTON	TX	77488
136	Wharton	32244	BOWERS N A EST	5426 CANDLE CREST	HOUSTON	TX	77091
137	Wharton	32247	BOWERS N A EST	5426 CANDLE CREST DR	HOUSTON	TX	77091
138	Wharton	32896	DAVIS CHARLES A JR	PO BOX 1029	WHARTON	TX	77488
139	Wharton	32897	WHARTON COUNTY EASEMENTS	309 E MILAM #600	WHARTON	TX	77488
140	Wharton	32908	HORTON JM RANCH LLC	11744 SKENE WAY	HOUSTON	TX	77024
141	Wharton	33103	BOETTCHER & QUIREY	PO BOX 384	EAST BERNARD	TX	77435
142	Wharton	33107	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
143	Wharton	33108	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
144	Wharton	33243	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
145	Wharton	33244	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
146	Wharton	33245	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
147	Wharton	35151	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
148	Wharton	36126	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
149	Wharton	36128	SCHOENFIELD GARY & JEANETTE	3181 CR 405 RD	EL CAMPO	TX	77437
150	Wharton	36129	KNIPLING RICHARD F	PO BOX 309	RICHMOND	TX	77469
151	Wharton	36130	WILLIS BROTHERS	PO BOX 271	EL CAMPO	TX	77437
152	Wharton	36213	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
153	Wharton	36214	STAVINOHA ELSIE FAMILY TRUST	PO BOX 1145	EL CAMPO	TX	77437
154	Wharton	36542	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
155	Wharton	36545	ZALMAN JASON A ETUX TISHA M	191 WESTMOOR RD	EL CAMPO	TX	77437
156	Wharton	36839	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
157	Wharton	36841	SHAFER FAMILY FARMS LLC	PO BOX 7602	HORSESHOE BAY	TX	78657
158	Wharton	36850	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
159	Wharton	36856	COX PATSY R FAMILY LTD PTRNSHIP	1509 MICHAEL	EL CAMPO	TX	77437
160	Wharton	37000	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
161	Wharton	37003	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
162	Wharton	37108	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
163	Wharton	37286	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
164	Wharton	37624	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
165	Wharton	37626	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
166	Wharton	37684	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
167	Wharton	37701	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
168	Wharton	37725	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
169	Wharton	37725	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
170	Wharton	37729	HACKER WILLIAM	305 CR 409 RD	EL CAMPO	TX	77437
171	Wharton	37881	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
172	Wharton	37884	ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP	191 WESTMOOR RD	EL CAMPO	TX	77437
173	Wharton	40462	ROD MARVIN J	118 DOGWOOD	LAKE JACKSON	TX	77566
174	Wharton	40463	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
175	Wharton	40465	THOMPSON KEVIN DALE & WF	623 CR 465 RD	EL CAMPO	TX	77437
176	Wharton	40701	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
177	Wharton	40702	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
178	Wharton	40809	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
179	Wharton	40999	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
180	Wharton	41076	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
181	Wharton	41110	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
182	Wharton	41142	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
183	Wharton	41143	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
184	Wharton	41166	WILBECK M P LLC	205 SILVER SADDLE DR	ANGLETON	TX	77515

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
185	Wharton	41178	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
186	Wharton	41179	Z & B PTNRSHIP	1306 AVE K	EL CAMPO	TX	77437
187	Wharton	41181	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
188	Wharton	41325	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
189	Wharton	41548	SWANSON LINDA S	15214 FALL PLACE DR	SAN ANTONIO	TX	78247
190	Wharton	41550	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
191	Wharton	41552	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
192	Wharton	41554	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
193	Wharton	42473	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
194	Wharton	42474	STAVINOHA ELSIE FAMILY TRUST	PO BOX 1145	EL CAMPO	TX	77437
195	Wharton	42476	GANGL JAMES ALLEN	4154 FM 1163 RD	EL CAMPO	TX	77437
196	Wharton	42478	GANGL JAMES ALLEN	4154 FM 1163 RD	EL CAMPO	TX	77437
197	Wharton	42833	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
198	Wharton	42834	SHAFER FAMILY FARMS LLC	PO BOX 7602	HORSESHOE BAY	TX	78657
199	Wharton	43495	KOPECKY ANNA J EST	8427 TAVENOR LN	HOUSTON	TX	77075
200	Wharton	43508	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
201	Wharton	43589	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
202	Wharton	43591	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
203	Wharton	43592	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
204	Wharton	43866	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
205	Wharton	43869	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
206	Wharton	43869	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
207	Wharton	43870	BEARD LONNIE F FAMILY TRUST	2106 NANCY LOU	EL CAMPO	TX	77437
208	Wharton	43942	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
209	Wharton	44320	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
210	Wharton	44361	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
211	Wharton	44362	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
212	Wharton	44394	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
213	Wharton	44396	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
214	Wharton	44462	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
215	Wharton	44463	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
216	Wharton	44465	BARTA WALTER	11726 MIGHTY REDWOOD DR	HOUSTON	TX	77059
217	Wharton	44523	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
218	Wharton	50230	BOEDEKER RONALD D ETUX SHARON H	120 CR 133 RD	WHARTON	TX	77488
219	Wharton	50516	KOEHN KENNETH & ALICE	559 WILDERNESS TRL	WHARTON	TX	77488
220	Wharton	50517	KOEHN KENNETH & ALICE	559 WILDERNESS TRL	WHARTON	TX	77488
221	Wharton	50669	DESIGN SUPERVISION ANALYSIS INC	5201 GARY RD	COLLEGE STATION	TX	77845
222	Wharton	51465	PRATKA MARK C ETUX KAY	PO BOX 1596	EL CAMPO	TX	77437
223	Wharton	51466	PRATKA MARK C ETUX KAY	PO BOX 1596	EL CAMPO	TX	77437
224	Wharton	51670	DEITERICH FRANCES M	529 WILDERNESS TRL	WHARTON	TX	77488
225	Wharton	52260	GARCIA HIGNIO ETAL	2800 CR 463	EL CAMPO	TX	77437
226	Wharton	52351	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
227	Wharton	52878	POPP CEDRIC E	4612 CR 410 RD	EL CAMPO	TX	77437
228	Wharton	55331	BARTOS VLASTA KOCUREK	PO BOX 542	EL CAMPO	TX	77437
229	Wharton	55332	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
230	Wharton	55352	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
231	Wharton	55353	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
232	Wharton	55354	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
233	Wharton	55356	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
234	Wharton	55485	ROD MARVIN J	118 DOGWOOD	LAKE JACKSON	TX	77566
235	Wharton	55487	HANSEN AUDREY A	7431 FM 1095	PALACIOS	TX	77465
236	Wharton	56184	PENDRAY JANE K THORNBURG	1448 CR 428 RD	WHARTON	TX	77488
237	Wharton	56956	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
238	Wharton	59209	F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP	415 FM 2817 RD	WHARTON	TX	77488
239	Wharton	59209	F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP	415 FM 2817 RD	WHARTON	TX	77488
240	Wharton	59308	JURASEK RUSSELL A ETUX JACQUELIN	1500 FM 1299	WHARTON	TX	77488
241	Wharton	60121	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
242	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
243	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
244	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
245	Wharton	60566	D C V K LTD PRTNSHIP	580 MAXIM DR	BOLING	TX	77420
246	Wharton	60806	ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP	191 WESTMOOR RD	EL CAMPO	TX	77437

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
247	Wharton	61231	STUCKENSCHNEIDER TAMMY, HUNN EVELYN AND JETT ERVIN	PO BOX 67	MARTINSBURG	MO	65264
248	Wharton	61558	KAINER KATHRYN LIFE EST	411 AVE J	EL CAMPO	TX	77437
249	Wharton	61691	CJJ RETIREMENT LLC	1110 SUNSET ROAD	ROSHARON	TX	77583
250	Wharton	62297	JOINES JON ETUX BLANCHE	1628 CR 235	WHARTON	TX	77488
251	Wharton	62436	HORTON JM RANCH LLC	11744 SKENE WAY	HOUSTON	TX	77024
252	Wharton	62494	MAREK TRAVIS L	821 CR 123 RD	WHARTON	TX	77488
253	Wharton	62495	MAREK TERENCE D	3079 W EMBERS CT	BRYAN	TX	77808
254	Wharton	62496	MAREK THOMAS E	283 DELLA	EL CAMPO	TX	77437
255	Wharton	62497	WHEELER DEBRA G	5 TORRINGTON CT	AUSTIN	TX	78738
256	Wharton	62932	SCHULZ THERESA & GOTTFRIED O	2299 LONE STAR DR APT 515	SUGAR LAND	TX	77479
257	Wharton	62995	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
258	Wharton	62995	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
259	Wharton	68875	RUST LLOYD FAMILY LMT PRNSHP & RUST TM FAMILY LLC	PO BOX 1027	WHARTON	TX	77488
260	Wharton	69231	RACHUNEK KENNETH G	2123 FM 1299 RD	WHARTON	TX	77488
261	Wharton	69264	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
262	Wharton	69265	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
263	Wharton	69588	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
264	Wharton	70014	OTTO DIANNE	801 PECAN ST	WHARTON	TX	77488
265	Wharton	70201	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
266	Wharton	71262	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
267	Wharton	71263	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
268	Wharton	71264	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
269	Wharton	71265	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
270	Wharton	71266	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
271	Wharton	71267	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
272	Wharton	71268	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
273	Wharton	71269	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
274	Wharton	71270	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
275	Wharton	71271	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
276	Wharton	71875	MEZA RAFAEL & SUSANA	379 CR 456	EL CAMPO	TX	77437
277	Wharton	71959	WHARTON CITY	120 E CANEY	WHARTON	TX	77488

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
278	Wharton	72487	RACHUNEK TIMOTHY J & LAURIANNE ETAL	710 CR 128	WHARTON	TX	77488
279	Wharton	72914	ATTAWAY KIP RAY	24703 HARBOR TERRACE LN	RICHMOND	TX	77406
280	Wharton	72926	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
281	Wharton	72927	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
282	Wharton	72928	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
283	Wharton	72929	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
284	Wharton	72936	MATULA JULIUS & MARY FAMILY TRUST	674 CR 428 RD	WHARTON	TX	77488
285	Wharton	73712	HAWES HUGH R IV & CHRISTOPHER T TRUST	PO BOX 538	PIERCE	TX	77467
286	Wharton	73754	KAINER KATHRYN LIFE EST	411 AVE J	EL CAMPO	TX	77437
287	Wharton	74196	GAVRANOVIC F & D FARMS FLP	415 FM 2817 RD	WHARTON	TX	77488
288	Wharton	74283	BACCAM TOM N	19014 TEBROC CT	HOUSTON	TX	77094
289	Wharton	75617	J & D RIVER VIEW RANCH LLC	8003 ASH VALLEY DR	SPRING	TX	77379
290	Wharton	75852	BROWN DAVID OTIS & MARY JANE LIFE ESTATE	6420 COUGAR CROSSING	WHARTON	TX	77488
291	Wharton	75853	BROWN DAVID OTIS & MARY JANE LIFE ESTATE	6420 COUGAR CROSSING	WHARTON	TX	77488
292	Wharton	77755	JOHNSON CLINE III & CHRISTINE	854 County Road 402	El Campo	TX	77437
293	Wharton	77756	KOCUREK JOSEPH A & DANA	2440 CR 421	EL CAMPO	TX	77437
294	Wharton	77970	Z & B PTNRSHIP	1306 AVE K	EL CAMPO	TX	77437
295	Wharton	78574	KOCUREK PHILIP ETUX BRAND LAURA	1104 COUNTY ROAD 421	EL CAMPO	TX	77437
296	Wharton	78575	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
297	Wharton	78611	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
298	Wharton	78776	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
299	Wharton	79625	AEP TEXAS INC	PO BOX 16428	COLUMBUS	OH	43216
300	Wharton	80627	STATE OF TEXAS	125 E 11TH ST	AUSTIN	TX	78701
301	Wharton	17169	CONFIDENTIAL OWNER	399 WILDERNESS TRL	WHARTON	TX	77488
302	Wharton	81398	Brown Douglas I	6570 COUGAR CROSSING	WHARTON	TX	77488

PHOTOGRAPH

Photograph Location Map

The Photograph Location Map shows the location of each photograph and the direction the camera was facing when the photograph was taken.

Photograph Location Map



Pierce, Texas Wharton County Wharton AD1, LLC	Photograph Location Map	ENVIROENGINEER ENGINEERING CONSULTING

Texas Land Application Permit (TLAP)
Technical Package

Prepared on: December 17th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

LIST OF FIGURES…….....i
LIST OF TABLES……i
T.A: FACILITY MAPS……1
T.B: FLOODPLAIN INFORMATION……8
T.C: AGRONOMIC MANAGEMENT PLAN……..11
T.D: WATER WELL INFORMATION……..13
T.E: GROUNDWATER TECHNICAL REPORT……..16
T.F: SOILS INFORMATION……18
T.G: ENGINEERING REPORT……19
T.H: OFF-SITE WASTES……..22
T.I: POLLUTANT ANALYSIS DATA……...……...23

LIST OF FIGURES

Figure T.A.1: Process Flow Diagram……...2
Figure T.A.2: Vicinity Map……..3
Figure T.A.3: 7.5 Minute USGS Map……..4
Figure T.A.4: Site Map……5
Figure T.A.5: Production Area Map……...10
Figure T.B.1: FEMA Floodplain Map……12
Figure T.D.1: Water Well Map……...15
Figure T.E.1: Geologic Atlas Map……17
Figure T.G.1: Water Balance Calculations……22
Figure T.G.2: Storage Calculations……23

LIST OF TABLES

Table T.D.1: Well and Map Information Table……..16

T.A: FACILITY MAPS

T.A.1 Process Flow Diagram

Figure 1, Process Flow Diagram, provides an overall schematic of the plant processes at the site.

T.A.2 Vicinity Map

Figure 2, Vicinity Map, is a general highway map showing the property and several adjacent properties in the area. The facility's location is depicted on the map.

T.A.3 7.5 Minute USGS Map

Figure 3, entitled 7.5 Minute USGS Map, is a seamless, high-quality copy of the 7.5 Minute USGS quadrangle map [Pierce TX quadrangle) that shows the boundary of the land owned, operated, or controlled by the facility and used as part of the application; and all springs, lakes, or ponds located on-site and within 1 mile of the property boundary.

T.A.4 Site Map

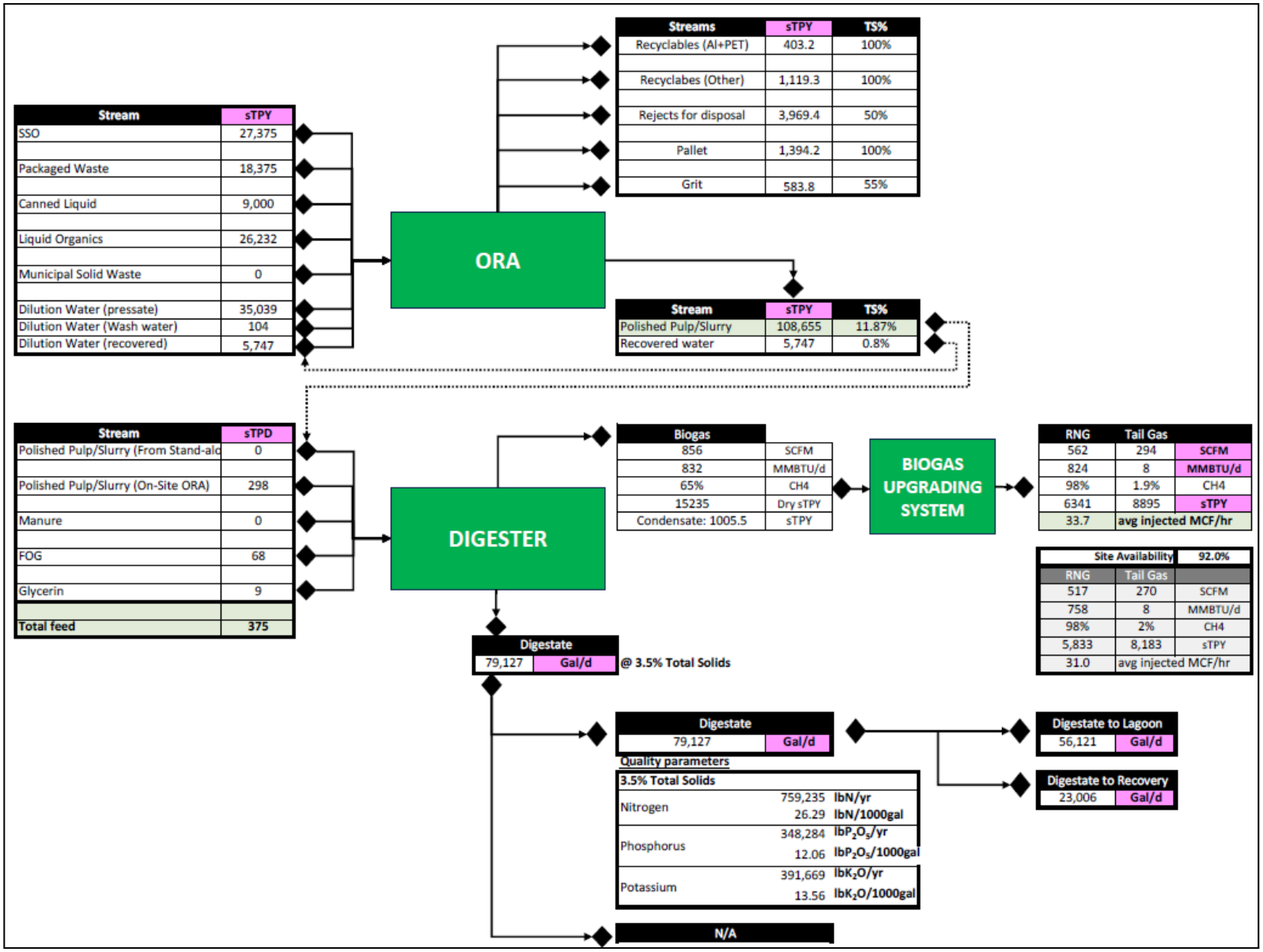
Figure 4, Site Map, is a scaled drawing of the entire property to be permitted showing the locations of the following:

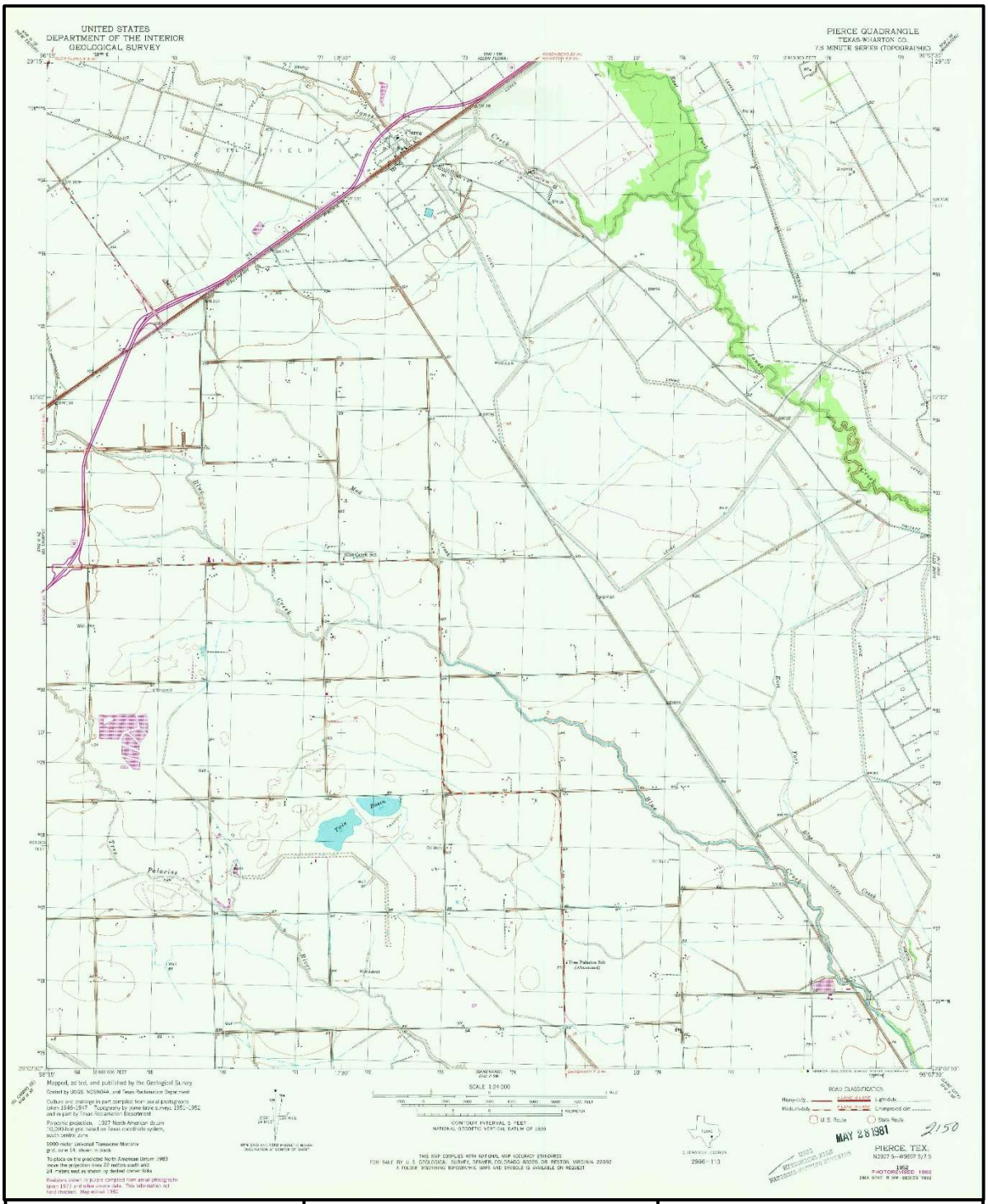
- Digesters
- Hydrolysis tanks
- Heat exchangers
- Transformers
- Containers
- Tank locations
- Loading and off-loading area

T.A.5 Production Area Map

Figure 5, Production Area Map, is a scaled drawing of the production area showing the locations of the digester tanks, organics receiving building, separator & nutrient management building, digestate storage pond, buffer tanks and RNG building

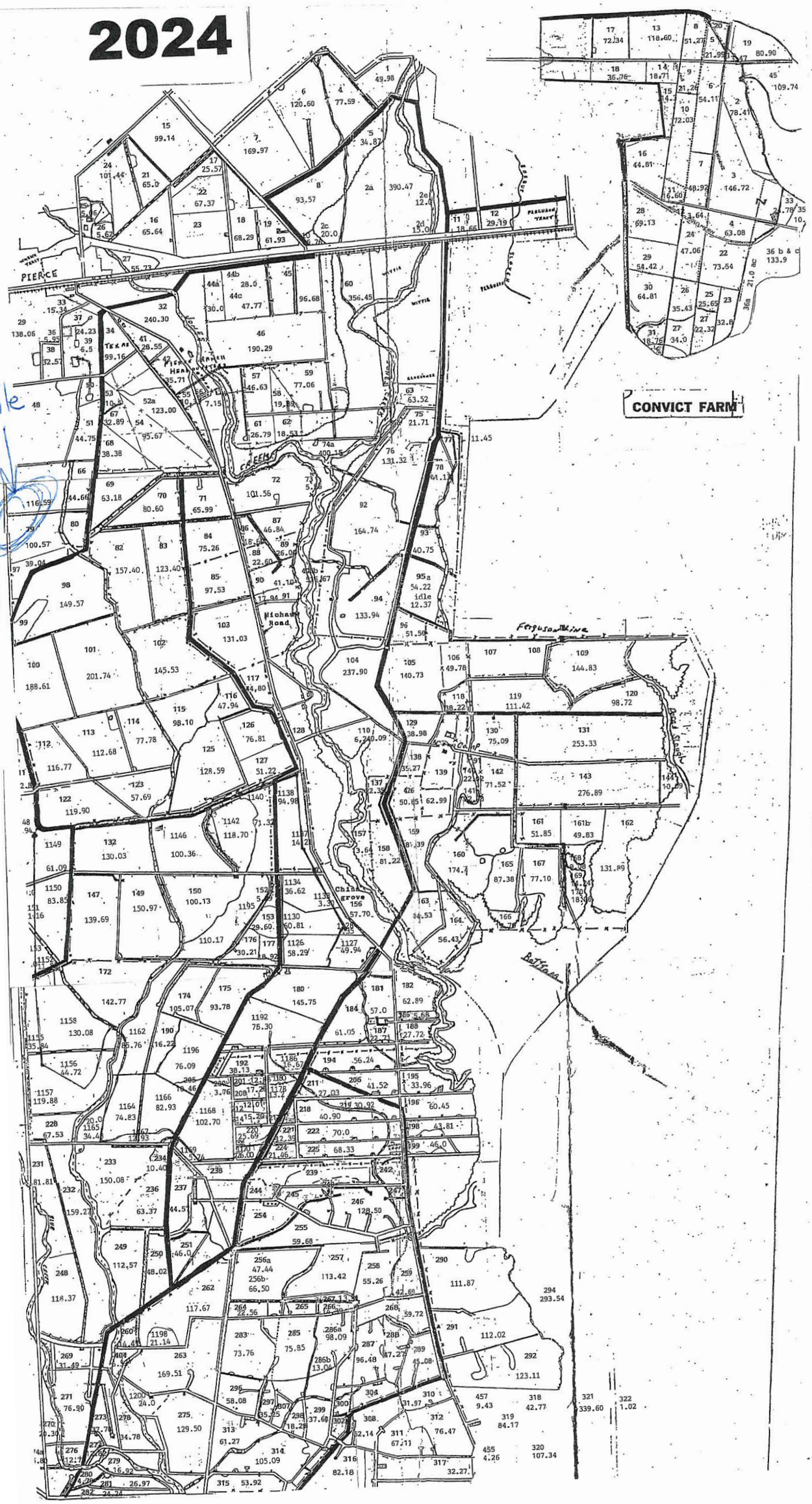
FigT.A.1PROCESS FLOW DIAGRAM

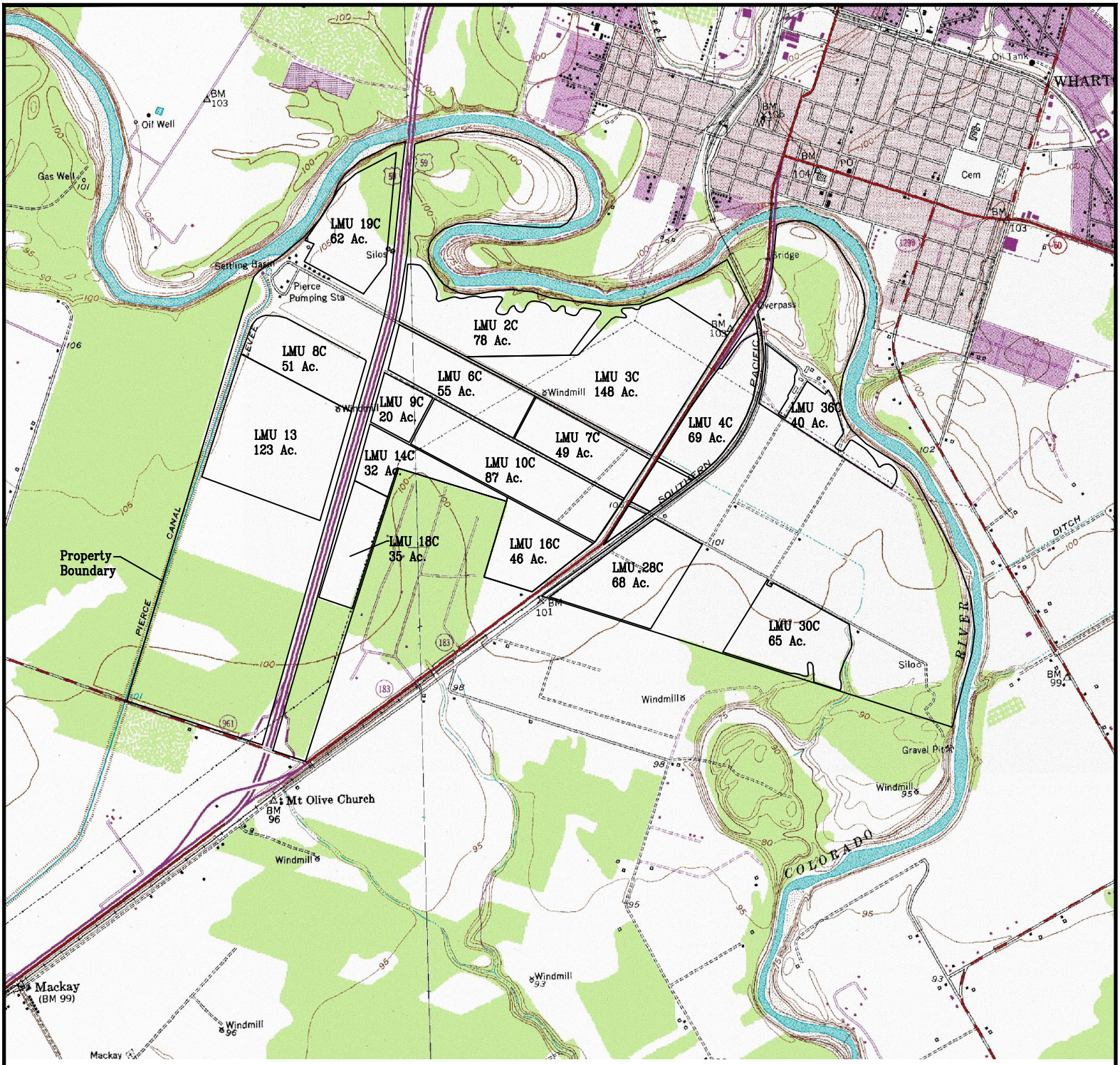




Pierce Ranch, GP Pierce, TX Wharton County	Vicinity Map Pg: 2	ENVIRONEER ENGINEERING CONSULTING

2024


PIERCE
CONVICT FARM
Michaux Road
Ferguson Mine
Chain Grove
Bottom
Camp
Road Shop



Map Generated 12/17/2024

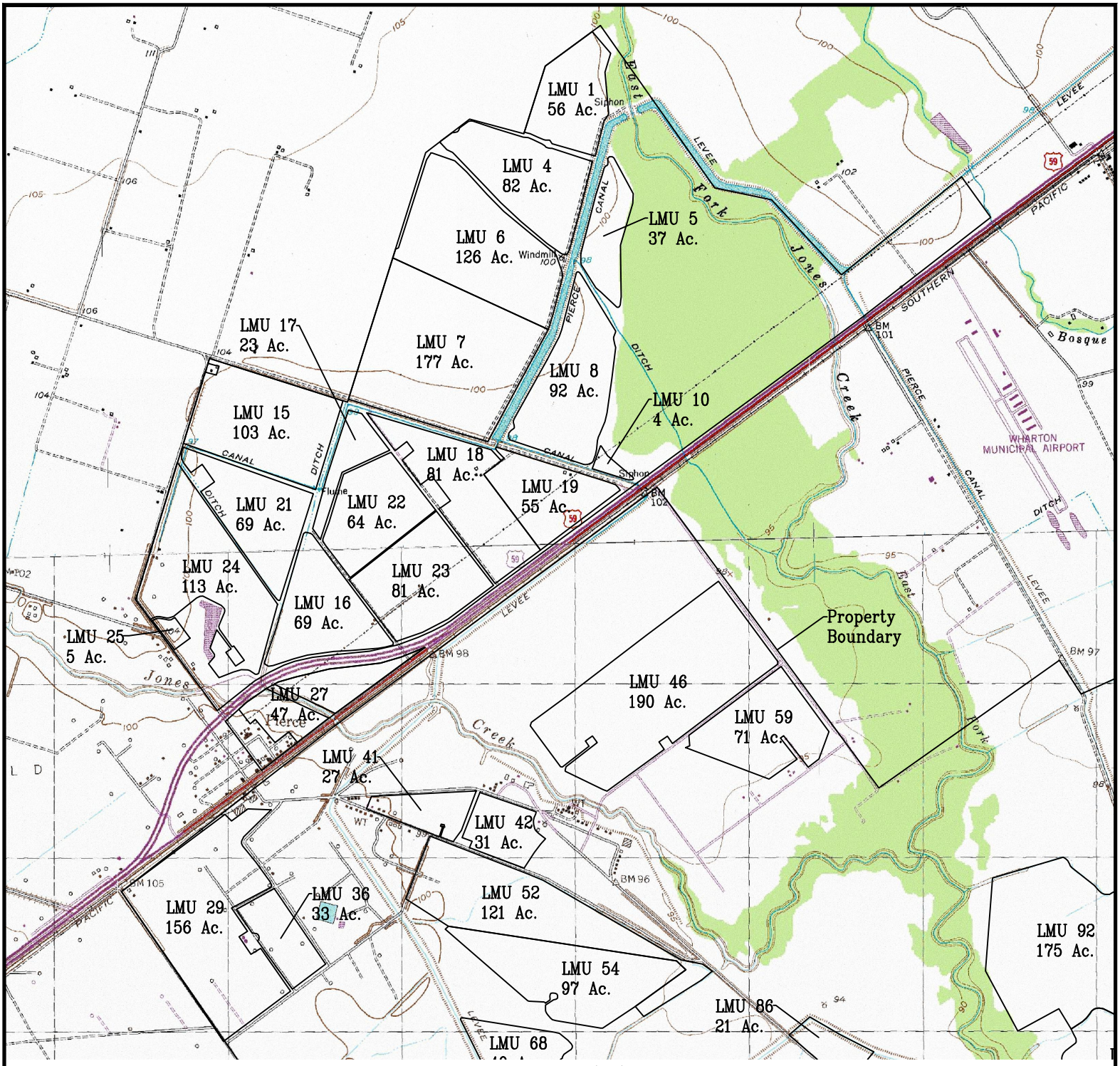
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map A Pg: 2	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

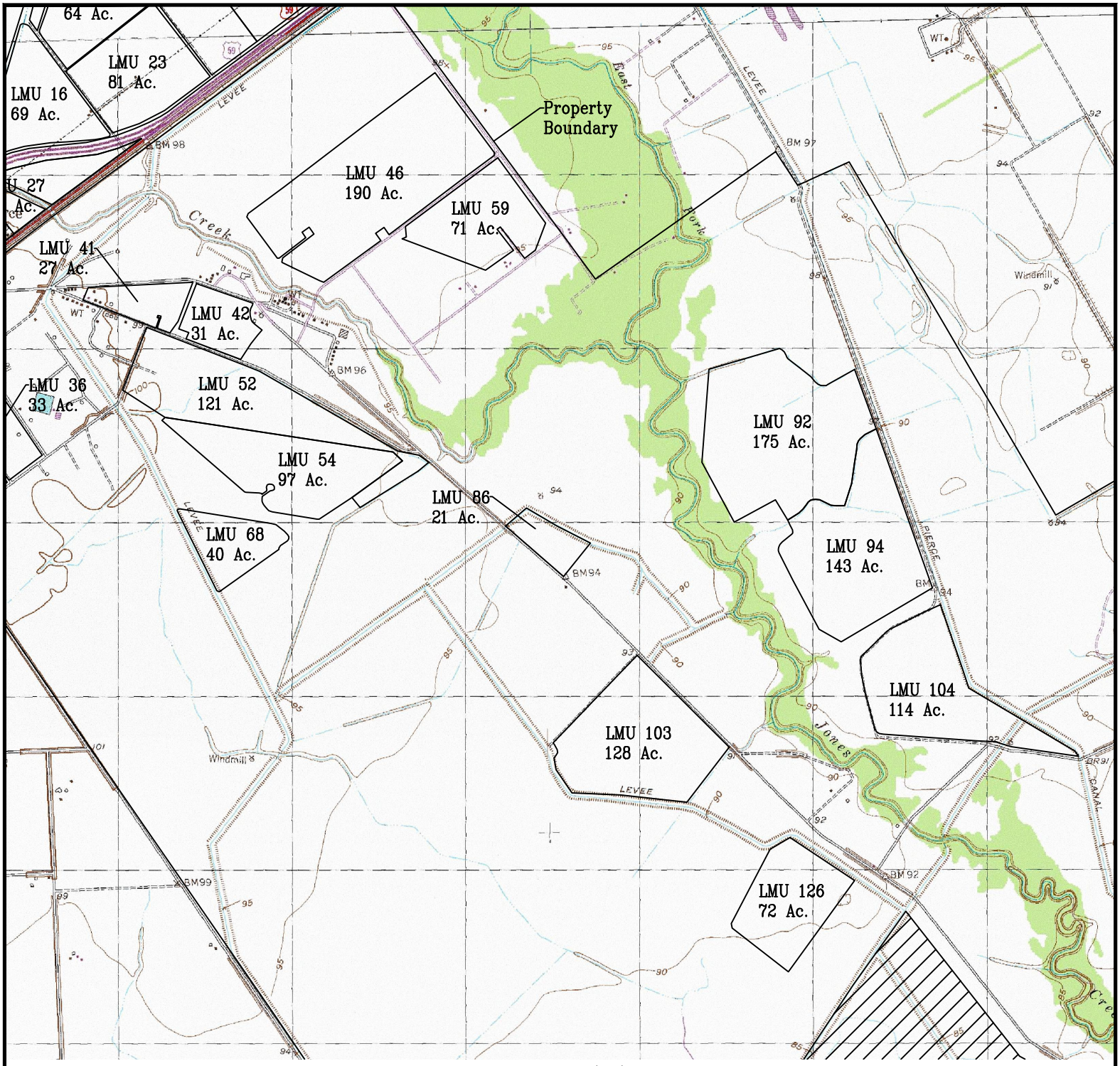
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map B Pg: 3	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

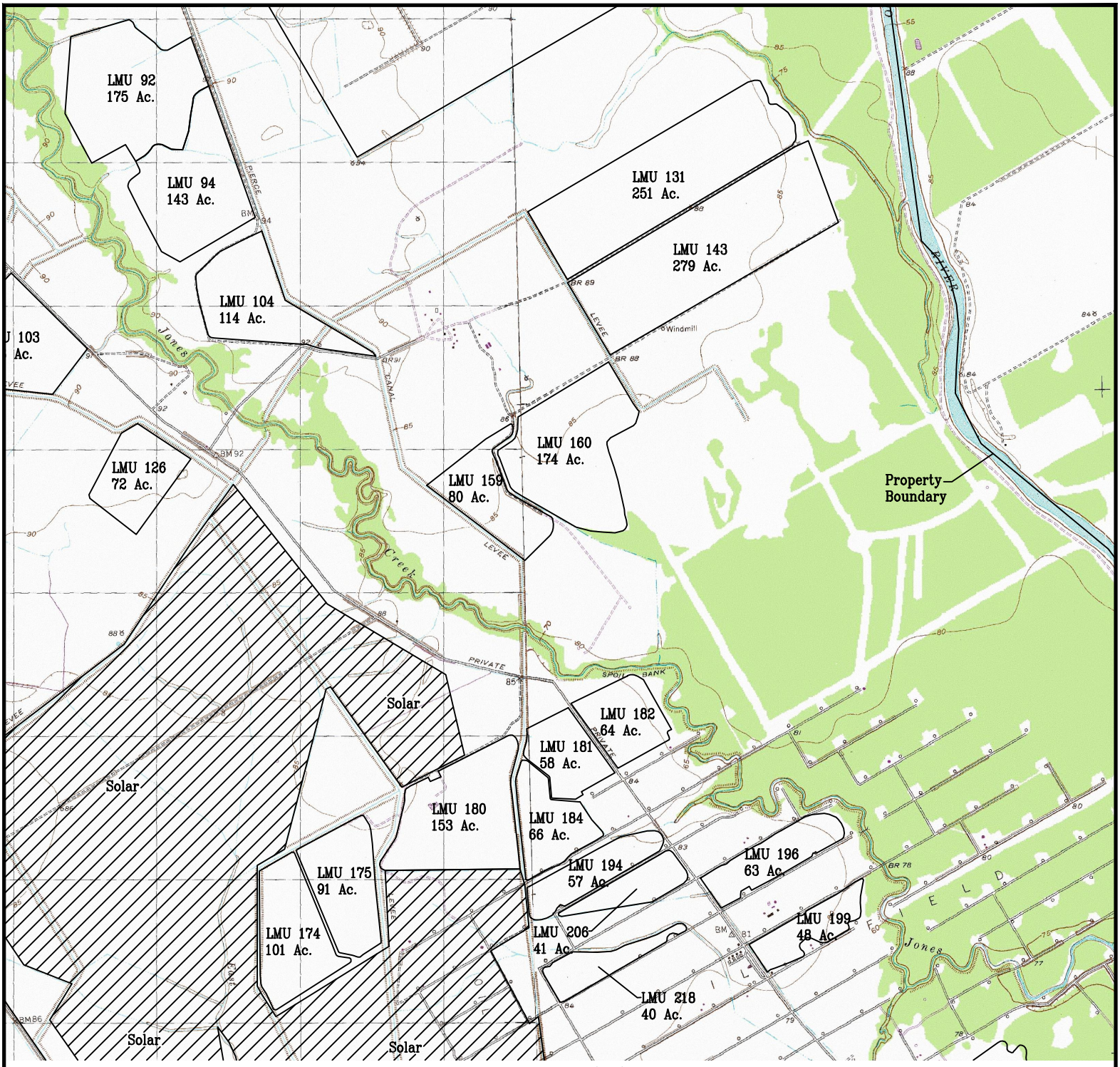
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map C Pg: 4	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

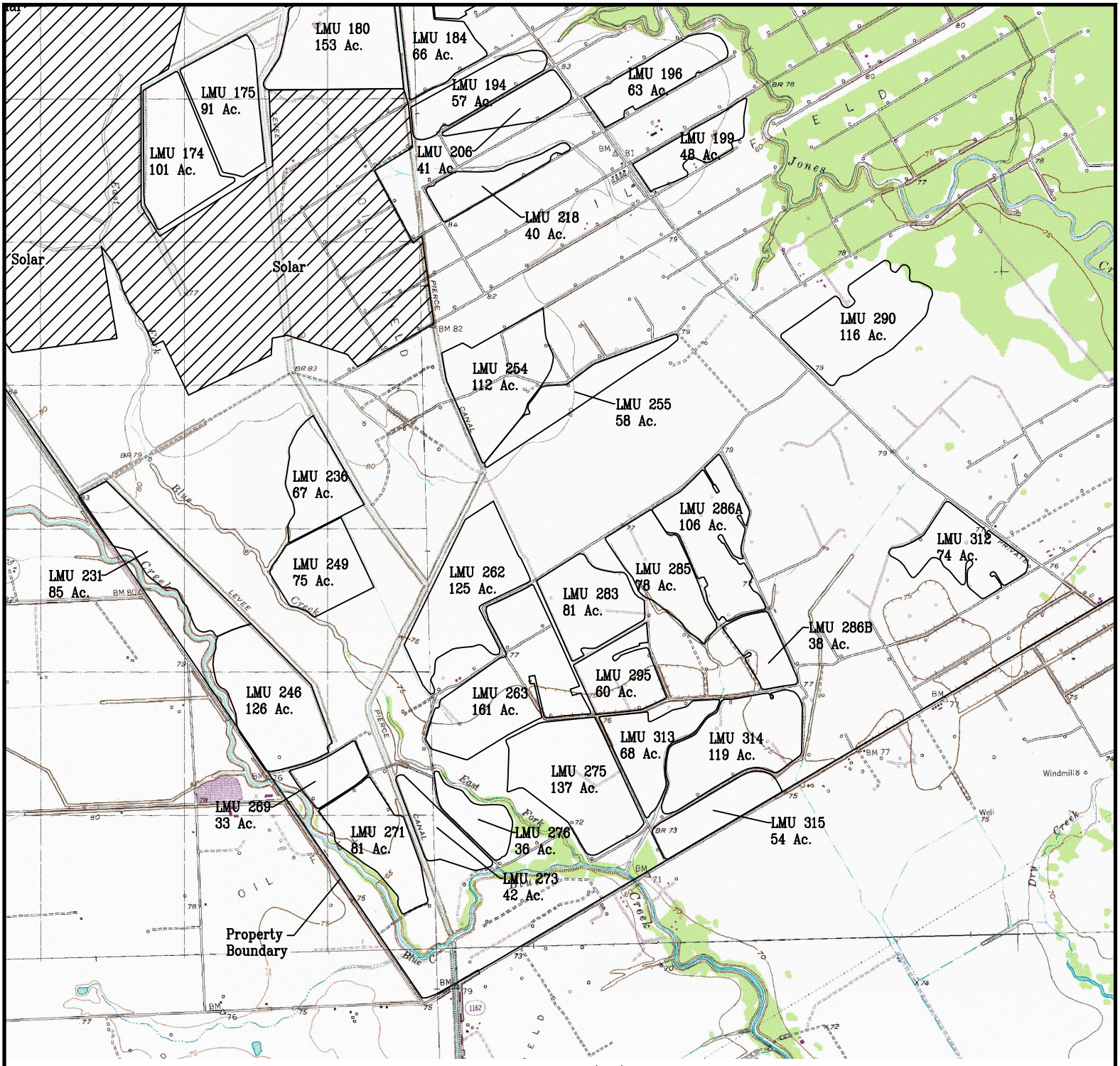
S

1600' 0 1600' 3200'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map D Pg: 5	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

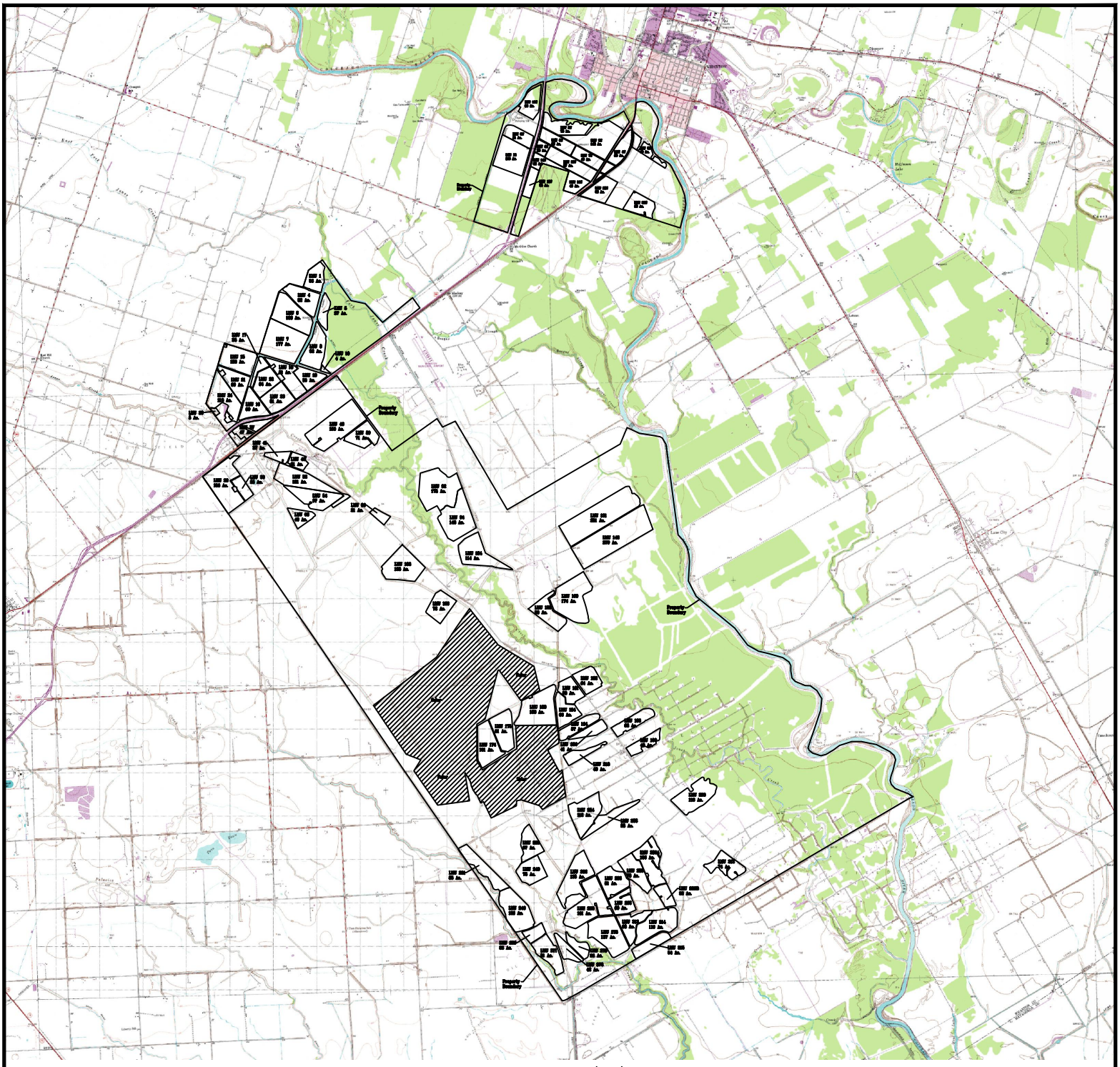
S

1600' 0 1600' 3200'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map E Pg: 6	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Production Area Map Pg: 7	ENVIRONEER ENGINEERING CONSULTING

Table T.A.1 Latitude and Longitude of Land Management Units

Land Management Unit	Latitude	Longitude
1	29.273419	-96.180713
2C	29.303528	-96.120838
3C	29.300767	-96.112987
4	29.269401	-96.183543
4C	29.29751	-96.108461
5	29.266485	-96.178798
6	29.266089	-96.186551
6C	29.300514	-96.122649
7	29.260322	-96.188761
7C	29.296914	-96.115569
8	29.258581	-96.181224
8C	29.301946	-96.131883
9C	29.299312	-96.126177
10	29.254349	-96.178986
10C	29.295921	-96.11956
13	29.297802	-96.133604
14C	29.296305	-96.125925
15	29.256923	-96.199505
16	29.247205	-96.196341
16C	29.291896	-96.118767
17	29.254823	-96.194499
18	29.252988	-96.187595
18C	29.292217	-96.129254
19	29.252906	-96.182763
19C	29.308692	-96.128604
21	29.252327	-96.200091
22	29.252253	-96.193068
23	29.24868	-96.190312
24	29.249056	-96.203011
25	29.246295	-96.205148
27	29.242714	-96.196804
28C	29.290204	-96.112739
29	29.231187	-96.203187
30C	29.28685	-96.103388
36	29.23036	-96.199174
36C	29.298304	-96.101653
41	29.236585	-96.190284
42	29.235549	-96.18604
46	29.242579	-96.176703
52	29.23178	-96.185432
54	29.22794	-96.181948
59	29.240464	-96.170242
68	29.224105	-96.185413

Land Management Unit	Latitude	Longitude
86	29.223792	-96.166735
92	29.228993	-96.152805
94	29.222918	-96.148522
103	29.21319	-96.161739
104	29.215526	-96.144041
126	29.204776	-96.153044
131	29.222631	-96.114787
143	29.218205	-96.111836
159	29.202889	-96.127427
160	29.205604	-96.121751
174	29.175734	-96.142734
175	29.178709	-96.138775
180	29.18295	-96.130305
181	29.186618	-96.122678
182	29.188757	-96.118596
184	29.182406	-96.124209
194	29.179154	-96.12137
196	29.179879	-96.108104
199	29.175341	-96.105535
206	29.178386	-96.117855
218	29.173396	-96.120729
231	29.150242	-96.144433
236	29.15485	-96.133184
246	29.141144	-96.136874
249	29.149365	-96.133054
254	29.16107	-96.119914
255	29.160146	-96.114329
262	29.147739	-96.122654
263	29.141971	-96.119603
269	29.136432	-96.132571
271	29.132253	-96.129418
273	29.132751	-96.124995
275	29.135834	-96.115193
276	29.133453	-96.122345
283	29.146714	-96.113824
285	29.148649	-96.108474
286A	29.150748	-96.104821
286B	29.143637	-96.101627
290	29.164054	-96.093922
295	29.142239	-96.111704
312	29.149467	-96.086935
313	29.137773	-96.10971
314	29.137648	-96.103761
315	29.133602	-96.105252

T.B. FLOODPLAIN INFORMATION

FEMA Floodplain Map

Figure 6, FEMA Floodplain Map, shows the production areas and waste disposal areas overlain on a copy of the FEMA map panels for this area of Wharton County.

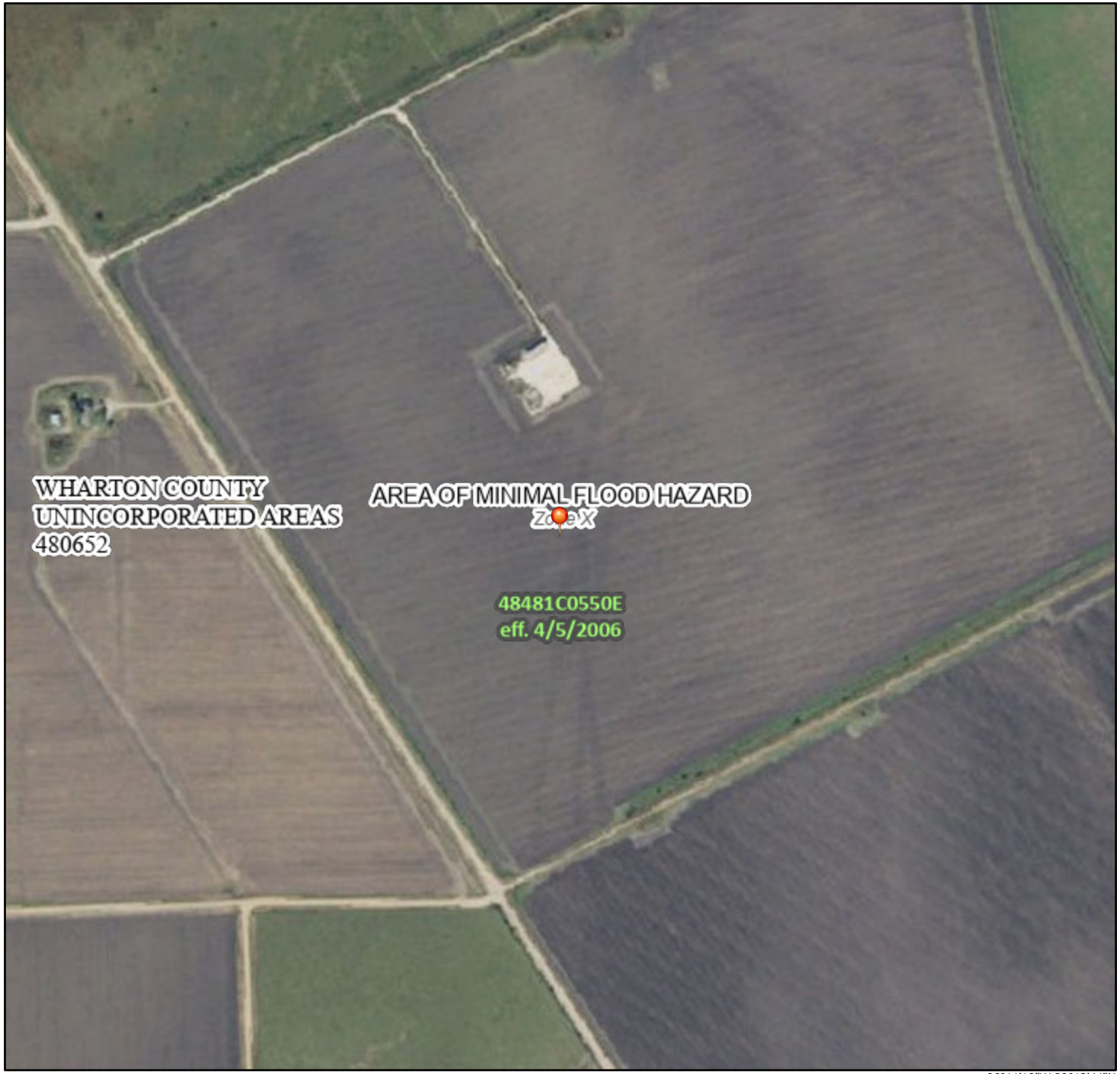
Protective Measures

According to the FEMA map for Wharton County, the production area and waste disposal areas are not located in a 100-year floodplain and are in an area of minimal flood hazard.

National Flood Hazard Layer FIRMette

FEMA

96°11'56"W 29°13'15"N



96°11'18"W 29°12'44"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Pg: 9 *Basemap Imagery Source: USGS National Map 2023*

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/16/2024 at 8:31 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

T.C. AGRONOMIC MANAGEMENT PLAN

TABLE OF CONTENTS

List of Figures

Figure 1: Land Application Map 3

List of Tables

Table 1: Estimated Soil Properties
Table 2: Nutrient Budgets

Attachment A - Permitted Crops for Growing 3

AGRONOMIC MANAGEMENT PLAN

Purpose

This document is in support of the Wharton AD1, LLC land application of wastes as prescribed by the Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). It is the purpose of this Agronomic Management Plan (AMP) to illustrate the beneficial use of the effluent from the proposed facility. All effluent application is managed in a manner that ensures environmental stability and maximum crop production.

This plan is updated on an annual basis to address current soil and waste analysis, climatic data, previous water demands, and proposed crop water usage for the next plan year. Application rate calculations will be developed and maintained on-site for use by the operator to determine application timing and rates.

Background

Wharton AD1, LLC is applying for a TLAP authorization through the TCEQ to beneficially irrigate effluent from the renewable energy facility located near Pierce, Wharton County, Texas. The treated effluent generated is 0.075 MGD. Effluent from the storage pond is land applied on 28,955 acres of irrigated farmland.

General Objectives of AMP

- Present information about the effluent, soils, and crops.
- Present information about crop rotations and yield goals to illustrate the appropriateness of the selected crops for use with this project.
- A description of effluent usage for land application. This will include information pertaining to actual application rates of effluent to meet the crop hydraulic/nutrient demands and maximize crop yield goals.
- An estimation of the annual loading of nutrients supplied by the effluent.
- An overview of wastewater/nutrient storage needed in the soil profile and a pre-plant scenario to serve as a starter fertilizer.
- Monitoring soil profiles to ensure no saturated soils are present within 3 feet of the surface.

Overview

The digestate is transferred to the storage lagoon at an average of 0.075 MGD. It is then distributed to high-production farmland that has been typically planted with corn grain and cotton. These crops are intensively managed for maximum production. The stated crop yield goals will be provided by data from the NRCS or from historical data obtained from the farmer.

Management practices are in place and used by the landowner to ensure maximized crop production. High residue crops are utilized, and deep tillage is necessary to maximize the ability of the soils to store and retain water, allowing for maximum root penetration.

All solids produced from this facility will be recycled/disposed of under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). Land application of solid wastes will occur at agronomic rates.

Site Features

The renewable energy facility, associated infrastructure, and irrigation tracts are located in Wharton County, Texas, immediately south of Pierce, Texas. This area is located in south Texas, roughly 65 miles southwest of Houston down the US Highway 59-South.

The regional climate is classified as subtropical humid, with warm summers and mild winters. The growing season averages 268 days. The average annual rainfall is 42 inches and generally occurs during the warm season months of May, June, July, and August.

The optimum yields can only be achieved through supplemental irrigation of the crops due to low rainfall and high evaporative rates. Most cropping systems will require preseason irrigation with growing season application depending upon stored water to produce the maximum yield goals. These are standard operational production practices in this area. To achieve optimum production, the permittee requests preseason irrigation up to 30 days before crop planting. This will allow the facility to manage application events to build up a moisture and nutrient profile in the soil prior to planting. This management tool would reduce the need to use groundwater for pre-water and the costs associated with pre-plant starter fertilizers.

Soils

According to information in the Wharton Soil Survey, soils of the property tract and the surrounding area consist of Dacosta sandy clay loam, Bernard-Edna complex, Edna loam, Lake Charles clay and Bernard loam series. The physical and hydrological properties of these soils are illustrated in Table l below. More soil information can be found in supporting documentation.

Table 1: Estimated Soil Properties

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Total for Area of Interest		**23,766.8**	**100.0%**

As depicted in Table l, the map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. When calculating the application rates of specific irrigation areas, care will be taken to ensure that these limitations are considered. Specifically, application rates per application event will be decreased with an increase in the total number of events to ensure that the nutrient and water demands of the crops are met.

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 Wharton County, Texas



February 14, 2025

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map (Pierce Ranch Boundary).....9
Legend.....10
Map Unit Legend (Pierce Ranch Boundary).....11
Map Unit Descriptions (Pierce Ranch Boundary).....11
Wharton County, Texas.....14
BcA—Dacosta sandy clay loam, 0 to 1 percent slopes.....14
BeA—Bernard-Edna complex, 0 to 1 percent slopes.....15
Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded.....18
Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes.....19
EdA—Edna loam, 0 to 1 percent slopes.....21
Eh—Edna silty clay, 0 to 1 percent slopes, overwash.....23
EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes.....24
LcA—Lake Charles clay, 0 to 1 percent slopes.....26
Md—Bernard loam, 0 to 1 percent slopes.....28
Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded.....29
MidB—Midfield loam, 0 to 2 percent slopes.....31
NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded.....33
Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes.....34
W—Water.....37
References.....38

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.

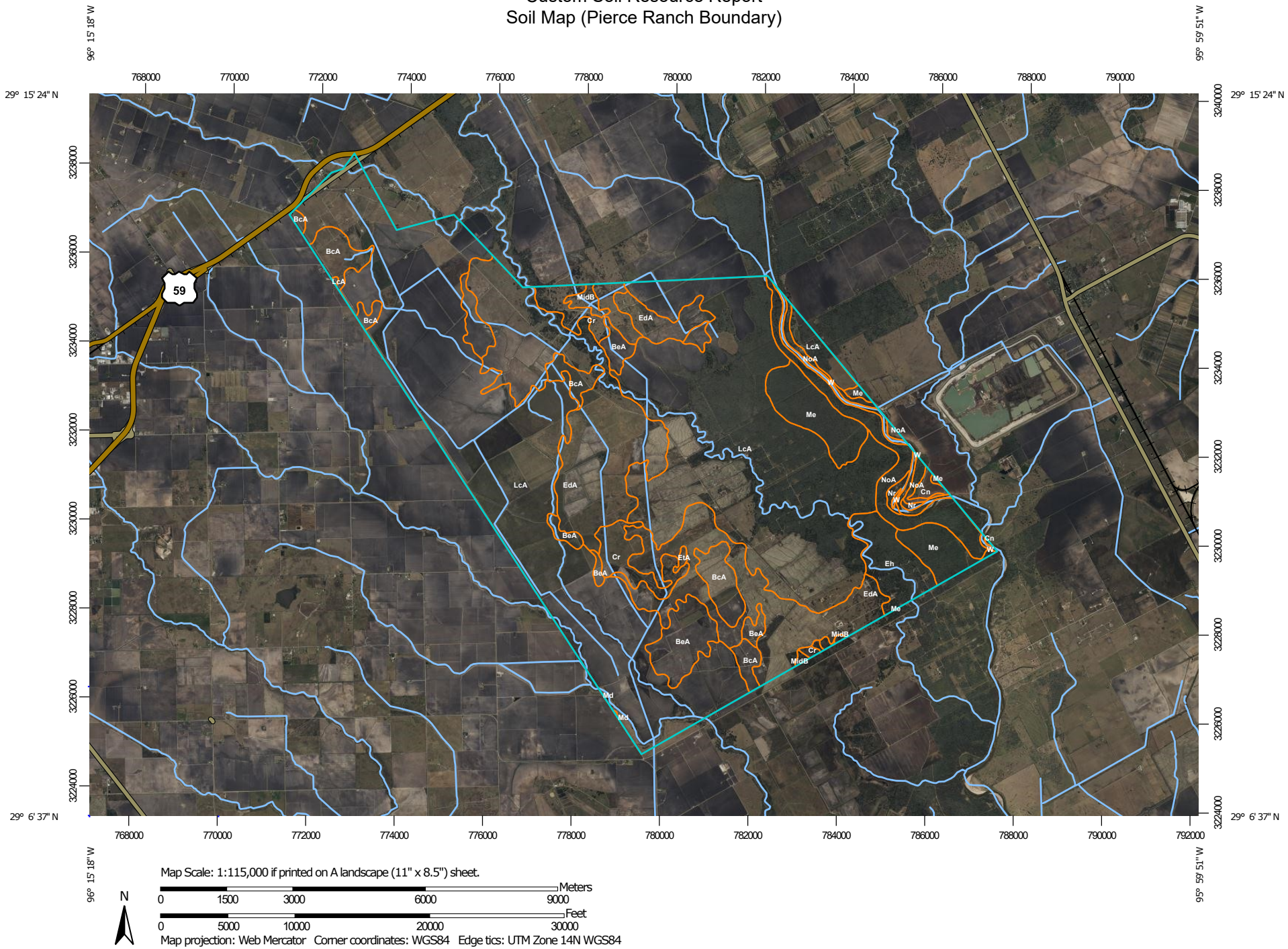
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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.

Custom Soil Resource Report
Soil Map (Pierce Ranch Boundary)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wharton County, Texas
Survey Area Data: Version 20, Aug 30, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 13, 2022—Mar 20, 2022

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.

Map Unit Legend (Pierce Ranch Boundary)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Totals for Area of Interest		**23,766.8**	**100.0%**

Map Unit Descriptions (Pierce Ranch Boundary)

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.

Wharton County, Texas

BcA—Dacosta sandy clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c1
Elevation: 10 to 220 feet
Mean annual precipitation: 30 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dacosta and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dacosta

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: sandy clay loam
Bt1 - 10 to 22 inches: sandy clay loam
Bt2 - 22 to 43 inches: clay
Btk - 43 to 74 inches: sandy clay
2BCt - 74 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Minor Components

Laewest

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Telferner

Percent of map unit: 1 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

BeA—Bernard-Edna complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cg
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 60 percent
Edna and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 6 inches: clay loam
Bt - 6 to 31 inches: clay
Btk1 - 31 to 50 inches: clay
Btk2 - 50 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.9 to 2.4 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Pimple mounds
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 4 to 10 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
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: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Verland

Percent of map unit: 10 percent
Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Lake charles

Percent of map unit: 5 percent
Landform: Flats
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Leton

Percent of map unit: 2 percent
Landform: Meandering channels
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2syc1
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Clemville

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 12 inches: silty clay loam
Bw - 12 to 30 inches: silt loam
Ab - 30 to 50 inches: silty clay
Bb - 50 to 80 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Norwood

Percent of map unit: 10 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2x3y9
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F

Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Tidehaven

Setting

Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 18 inches: fine sandy loam
Bt1 - 18 to 42 inches: clay
Bt2 - 42 to 61 inches: clay loam
2Btk - 61 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 3 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Midfield

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Edna

Percent of map unit: 1 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY542TX - Sandy Loam
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

EdA—Edna loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cc
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex

Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Eh—Edna silty clay, 0 to 1 percent slopes, overwash

Map Unit Setting

National map unit symbol: 2v3cf
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna, overwash, and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna, Overwash

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 11 inches: silty clay
A - 11 to 19 inches: fine sandy loam
Bt1 - 19 to 30 inches: clay loam
Bt2 - 30 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (1.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard
Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno
Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner
Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2vv5p
Elevation: 80 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 280 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Edna and similar soils: 70 percent
Cieno and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: loam
Bt1 - 10 to 20 inches: clay
Bt2 - 20 to 60 inches: clay
Btk - 60 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Description of Cieno

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Early pleistocene loamy fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 7 inches: loam
E/B - 7 to 27 inches: sandy clay loam
Btg1 - 27 to 48 inches: clay loam
Btg2 - 48 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 6.0
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 5 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

LcA—Lake Charles clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c4
Elevation: 20 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lake charles and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lake Charles

Setting

Landform: Backswamps
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 11 inches: clay
Bss - 11 to 53 inches: clay
Bkss1 - 53 to 69 inches: clay
Bkss2 - 69 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.5 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 6 percent
Landform: Meander scars
Landform position (three-dimensional): Talf, rise
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Meander scars
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Cieno, hydric

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Md—Bernard loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: djdp
Elevation: 10 to 150 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 68 to 70 degrees F
Frost-free period: 260 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 52 inches: clay
H3 - 52 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2v39c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Brazoria and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brazoria

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 6 inches: clay
Bss1 - 6 to 35 inches: clay
Bss2 - 35 to 57 inches: clay
Bkss - 57 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 11 percent
Maximum salinity: Nonsaline to slightly saline (0.9 to 6.8 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Minor Components

Pledger

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 3 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Norwood

Percent of map unit: 1 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

MidB—Midfield loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x3y8
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F
Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Midfield

Setting

Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 5 inches: loam
Bt1 - 5 to 32 inches: clay loam
Bt2 - 32 to 40 inches: silty clay
2Btk - 40 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Tidehaven

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Fordtran

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY543TX - Sandy Prairie
Hydric soil rating: No

NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2vv3c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Norwood and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam
Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
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: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Brazoria

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2vv3g
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Mohat and similar soils: 50 percent
Norwood and similar soils: 40 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mohat

Setting

Landform: Bars
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 8 inches: loam
Bw1 - 8 to 29 inches: very fine sandy loam
Bw2 - 29 to 48 inches: loam
Bw3 - 48 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: 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: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam

Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Asa

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Brazoria

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 100 percent

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

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

SOIL ANALYSIS REPORT

CLIENT:	
6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23283	285	0 - 6	7.5		0.11	Lo	1.4	2.7	5	10	141	5	9	3393	558	85	1.4	113	52	2.0	
23284	286A	0 - 6	7.8		0.13	Lo	1.6	2.7	5	9	182	6	11	4782	761	79	1.3	95	83	2.0	
23285	286B	0 - 6	8.0		0.14	Lo	0.9	2.3	4	5	159	6	11	3872	479	44	1.4	80	68	2.1	
23286	290	0 - 6	7.6		0.16	No	1.5	3.6	6	3	228	7	13	4975	1090	103	0.6	110	55	2.1	
23287	295	0 - 6	7.6		0.19	Lo	1.3	7.3	13	4	188	4	7	5522	668	38	0.6	71	50	1.5	
23288	312	0 - 6	7.4		0.11	No	0.9	3.2	6	16	123	9	16	2532	367	35	1.8	164	36	1.8	
23289	313	0 - 6	7.4		0.15	Lo	1.6	6.6	12	11	174	5	9	4614	664	60	1.2	90	59	1.8	
23290	314	0 - 6	6.6		0.14	No	1.5	7.1	13	5	140	4	7	3526	648	74	1.3	98	70	1.6	
23291	315	0 - 6	6.3		0.15	No	1.5	6.3	11	5	144	5	9	3660	726	33	0.9	110	81	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23283	285	0 - 6	11/20/24																		
23284	286A	0 - 6	11/20/24																		
23285	286B	0 - 6	11/20/24																		
23286	290	0 - 6	11/20/24																		
23287	295	0 - 6	11/20/24																		
23288	312	0 - 6	11/20/24																		
23289	313	0 - 6	11/20/24																		
23290	314	0 - 6	11/20/24																		
23291	315	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23283	285																
23284	286A																
23285	286B																
23286	290																
23287	295																
23288	312																
23289	313																
23290	314																
23291	315																

Cation Exchange Capacity

Lab Number	CEC	%H	%K	%Ca	%Mg	%Na
23283	22	0	2	76	21	2
23284	31	0	2	77	20	1
23285	24	0	2	81	17	1
23286	35	0	2	71	26	1
23287	31	0	2	80	18	1
23288	16	0	2	78	19	1
23289	29	0	2	79	19	1
23290	24	0	2	74	23	1
23291	25	0	1	74	24	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23283, 23284, 23285, 23286, 23287, 23288, 23289, 23290, 23291
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23283					
23284					
23285					
23286					
23287					
23288					
23289					
23290					
23291					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/19/24
Date Shipped: 11/22/24

Project Manager: Norman Mullin

484

Lab Use	Sample ID/Description	Depth	Crop	YG	Test Requested
23228	1 2 Convict	0 to 6			TCEQ Complete
23229	2 3 Convict	0 to 6			
23230	3 4 Convict	0 to 6			
23231	4 6 Convict	0 to 6			
23232	5 7 Convict	0 to 6			
23233	6 8 Convict	0 to 6			
23234	7 9 Convict	0 to 6			
23235	8 10 Convict	0 to 6			
23236	9 14 Convict	0 to 6			
23237	10 16 Convict	0 to 6			
23238	11 18 Convict	0 to 6			
23239	12 19 Convict	0 to 6			
23240	13 30 Convict	0 to 6			
23241	14 36 Convict	0 to 6			
	15	0 to 6			
	16	0 to 6			
	17	0 to 6			
	18	0 to 6			
	19	0 to 6			
	20	0 to 6			
	21	0 to 6			
	22	0 to 6			
	23	0 to 6			
	24	0 to 6			
	25	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/22 9am	Date/Time:
Received By:	Received By: Kaitlyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23203	1	0 - 6	6.7		0.14	No	1.6	2.1	4	35	218	5	9	4153	669	52	0.8	132	66	2.0	
23204	4	0 - 6	6.1		0.13	No	1.7	3.4	6	27	204	5	9	3693	560	42	0.6	171	74	2.1	
23205	5	0 - 6	7.7		0.18	No	1.6	3.1	6	7	236	9	16	4638	868	97	0.6	117	72	2.3	
23206	6	0 - 6	6.3		0.16	No	1.7	9.8	18	19	199	6	11	4083	652	43	0.5	108	64	1.9	
23207	7	0 - 6	6.9		0.15	No	1.8	3.5	6	20	274	8	14	5272	864	65	0.6	110	64	2.0	
23208	8	0 - 6	7.4		0.22	Lo	1.9	7.1	13	16	290	13	23	5936	1094	117	0.8	128	83	2.1	
23209	10	0 - 6	6.4		0.18	No	2.8	1.5	3	4	305	8	14	4633	775	52	0.9	127	34	2.2	
23210	13	0 - 6	8.2		0.28	Hi	1.7	5.8	10	11	320	7	13	7967	437	39	0.8	78	73	2.4	
23211	15	0 - 6	6.7		0.22	No	1.7	6.5	12	10	257	8	14	5013	980	89	0.8	126	62	2.2	
23212	16	0 - 6	6.6		0.27	No	2.1	11.6	21	6	280	7	13	4652	1210	94	1.0	130	70	2.1	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23203	1	0 - 6	11/20/24																		
23204	4	0 - 6	11/20/24																		
23205	5	0 - 6	11/20/24																		
23206	6	0 - 6	11/20/24																		
23207	7	0 - 6	11/20/24																		
23208	8	0 - 6	11/20/24																		
23209	10	0 - 6	11/20/24																		
23210	13	0 - 6	11/20/24																		
23211	15	0 - 6	11/20/24																		
23212	16	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23203	1																
23204	4																
23205	5																
23206	6																
23207	7																
23208	8																
23209	10																
23210	13																
23211	15																
23212	16																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
27	0	2	77	21	1
24	0	2	77	20	1
31	0	2	74	23	1
27	0	2	77	20	1
33	0	2	79	22	1
35	0	2	71	26	1
31	0	3	76	21	1
30	0	3	84	12	1
34	0	2	73	24	1
34	0	2	67	29	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23203, 23204, 23205, 23206, 23207, 23208, 23209, 23210, 23211, 23212
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23210
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23203					
23204					
23205					
23206					
23207					
23208					
23209					
23210					
23211					
23212					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23233	8 CONVICT	0 - 6	8.3		0.25	Hi	1.7	10.2	18	22	376	9	16	7383	414	32	1.4	68	80	2.5	
23234	9 CONVICT	0 - 6	8.3		0.18	Hi	1.6	5.1	9	20	240	6	11	6721	263	30	0.7	67	90	2.1	
23235	10 CONVICT	0 - 6	7.4		0.15	Lo	1.5	2.7	5	29	182	3	5	4592	371	21	0.5	94	53	1.9	
23236	14 CONVICT	0 - 6	8.4		0.18	Hi	1.8	3.7	7	23	313	10	18	7342	363	28	1.6	77	76	3.0	
23237	16 CONVICT	0 - 6	7.4		0.13	Lo	1.5	1.8	3	28	235	4	7	5551	480	28	0.5	100	45	2.1	
23238	18 CONVICT	0 - 6	8.4		0.24	Hi	1.2	2.9	5	10	194	6	11	6525	279	23	0.5	70	70	2.3	
23239	19 CONVICT	0 - 6	8.2		0.30	Hi	3.3	2.5	5	14	463	10	18	6856	322	27	2.2	70	24	2.8	
23240	30 CONVICT	0 - 6	8.2		0.27	Hi	2.4	3.4	6	6	261	6	11	7543	328	24	0.9	72	58	2.3	
23241	36 CONVICT	0 - 6	8.2		0.32	Hi	1.9	5.9	11	14	336	11	20	7762	385	24	0.9	65	64	2.3	
23242	52	0 - 6	7.1		0.17	No	3.4	2.1	4	3	209	6	11	3485	434	40	1.6	42	11	0.7	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23233	8 CONVICT	0 - 6	11/19/24																		
23234	9 CONVICT	0 - 6	11/19/24																		
23235	10 CONVICT	0 - 6	11/19/24																		
23236	14 CONVICT	0 - 6	11/19/24																		
23237	16 CONVICT	0 - 6	11/19/24																		
23238	18 CONVICT	0 - 6	11/19/24																		
23239	19 CONVICT	0 - 6	11/19/24																		
23240	30 CONVICT	0 - 6	11/19/24																		
23241	36 CONVICT	0 - 6	11/19/24																		
23242	52	0 - 6	11/20/24																		

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: Amy Meier
Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23233	8 CONVICT																	30	0	3	85	12	0
23234	9 CONVICT																	28	0	2	89	8	0
23235	10 CONVICT																	27	0	2	86	12	0
23236	14 CONVICT																	29	0	3	86	10	0
23237	16 CONVICT																	30	0	2	84	13	0
23238	18 CONVICT																	28	0	2	90	8	0
23239	19 CONVICT																	29	0	4	86	9	0
23240	30 CONVICT																	29	0	2	88	10	0
23241	36 CONVICT																	29	0	3	86	11	0
23242	52																	22	0	2	80	17	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23233, 23234, 23235, 23236, 23237, 23238, 23239, 23240, 23241, 23242
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23233, 23234, 23236, 23238, 23239, 23240, 23241
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23233					
23234					
23235					
23236					
23237					
23238					
23239					
23240					
23241					
23242					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23213	17	0 - 6	7.2		0.20	No	1.7	4.9	9	43	292	8	14	5779	720	42	0.9	144	65	2.3	
23214	18	0 - 6	6.7		0.21	No	1.7	6.7	12	8	298	9	16	4801	1260	106	0.6	119	73	2.1	
23215	19	0 - 6	6.6		0.22	No	1.7	6.8	12	10	262	8	14	5017	1172	104	0.9	121	69	2.6	
23216	21	0 - 6	6.8		0.21	No	1.9	7.1	13	10	277	6	11	4795	1013	68	0.6	127	69	1.9	
23217	22	0 - 6	8.1		0.31	Hi	1.9	7.0	13	23	388	8	14	8045	371	28	0.9	82	83	2.9	
23218	23	0 - 6	6.4		0.26	No	3.1	4.7	8	5	258	8	14	4526	1123	121	0.6	176	77	1.9	
23219	24	0 - 6	7.4		0.25	Lo	2.1	4.5	8	14	320	11	20	6609	1046	66	0.7	94	62	1.5	
23220	25	0 - 6	7.0		0.22	No	1.7	6.2	11	13	306	8	14	4721	1036	174	0.6	111	65	1.9	
23221	27	0 - 6	8.1		0.25	Hi	2.6	4.8	9	8	323	6	11	7785	323	33	0.9	85	62	2.7	
23222	28	0 - 6	8.0		0.20	Lo	1.7	2.6	5	22	207	9	16	6182	422	31	0.5	91	40	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23213	17	0 - 6	11/20/24																		
23214	18	0 - 6	11/20/24																		
23215	19	0 - 6	11/20/24																		
23216	21	0 - 6	11/20/24																		
23217	22	0 - 6	11/20/24																		
23218	23	0 - 6	11/20/24																		
23219	24	0 - 6	11/20/24																		
23220	25	0 - 6	11/20/24																		
23221	27	0 - 6	11/20/24																		
23222	28	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23213	17																
23214	18																
23215	19																
23216	21																
23217	22																
23218	23																
23219	24																
23220	25																
23221	27																
23222	28																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
32	0	2	90	19	1
36	0	2	67	29	1
36	0	2	70	27	1
33	0	2	72	25	1
29	0	3	86	11	0
33	0	2	68	28	2
35	0	2	72	25	1
34	0	2	70	26	2
29	0	3	87	9	1
29	0	2	86	12	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23213, 23214, 23215, 23216, 23217, 23218, 23219, 23220, 23221, 23222
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23217, 23221
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23213					
23214					
23215					
23216					
23217					
23218					
23219					
23220					
23221					
23222					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20 - 11/21/24
Date Shipped: 11/22/24

284

Lab Use		Sample ID/Description	Depth	Crop	YG	Test Requested
23242	1	52	0 to 6			
23243	2	54	0 to 6			
23244	3	59	0 to 6			
23245	4	68	0 to 6			
23246	5	86	0 to 6			
23247	6	92	0 to 6			
23248	7	94	0 to 6			
23249	8	103	0 to 6			
23250	9	104	0 to 6			
23251	10	126	0 to 6			
23252	11	131	0 to 6			
23253	12	143	0 to 6			
23254	13	159	0 to 6			
23255	14	160	0 to 6			
23256	15	174	0 to 6			
23257	16	175	0 to 6			
23258	17	180	0 to 6			
23259	18	181	0 to 6			
23260	19	182	0 to 6			
23261	20	184	0 to 6			
23262	21	194	0 to 6			
23263	22	196	0 to 6			
23264	23	199	0 to 6			
23265	24	206	0 to 6			
23266	25	218	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/25 9am	Date/Time:
Received By:	Received By: Katelyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23243	54	0 - 6	7.0		0.22	No	2.9	3.7	7	7	238	10	18	3648	609	71	1.1	124	33	2.3	
23244	59	0 - 6	7.3		0.20	No	2.5	<1.0	<2	4	207	6	11	3632	726	74	0.7	124	42	1.9	
23245	68	0 - 6	6.0		0.14	No	3.6	6.9	12	9	305	9	16	2993	580	49	2.2	178	42	2.1	
23246	86	0 - 6	6.4		0.17	No	1.9	22.1	40	22	178	8	14	3400	532	53	1.5	144	79	2.4	
23247	92	0 - 6	6.4		0.15	No	1.7	11.6	21	18	199	9	16	2908	637	63	1.9	184	70	2.2	
23248	94	0 - 6	6.6		0.08	No	1.0	4.0	7	12	117	6	11	1756	422	46	1.9	216	32	1.3	
23249	103	0 - 6	5.9		0.07	No	1.7	1.1	<2	5	63	6	11	1008	235	49	0.8	264	40	1.0	
23250	104	0 - 6	5.6		0.07	No	1.2	2.3	4	6	82	5	9	624	161	36	0.9	288	27	0.8	
23251	126	0 - 6	6.8		0.09	No	1.3	2.6	5	6	100	5	9	1832	359	47	1.0	152	62	1.4	
23252	131	0 - 6	7.4		0.14	No	1.7	2.3	4	12	221	6	11	4500	953	92	1.0	111	69	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23243	54	0 - 6	11/20/24																		
23244	59	0 - 6	11/20/24																		
23245	68	0 - 6	11/20/24																		
23246	86	0 - 6	11/20/24																		
23247	92	0 - 6	11/20/24																		
23248	94	0 - 6	11/20/24																		
23249	103	0 - 6	11/20/24																		
23250	104	0 - 6	11/20/24																		
23251	126	0 - 6	11/20/24																		
23252	131	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23243	54																	24	0	3	75	21	1
23244	59																	25	0	2	72	24	1
23245	68																	21	0	4	72	23	1
23246	86																	22	0	2	77	20	1
23247	92																	21	0	2	70	26	1
23248	94																	13	0	2	69	27	2
23249	103																	7	0	2	68	27	3
23250	104																	5	0	4	65	28	3
23251	126																	13	0	2	73	24	2
23252	131																	31	0	2	72	25	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23243, 23244, 23245, 23246, 23247, 23248, 23249, 23250, 23251, 23252
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23243					
23244					
23245					
23246					
23247					
23248					
23249					
23250					
23251					
23252					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20-11/21/24
Date Shipped: 11/22/24

384

Lab Use		Sample ID/Description	Depth	Crop	YG	Test Requested
23267	1	231	0 to 6			
23268	2	236	0 to 6			
23269	3	246	0 to 6			
23270	4	248	0 to 6			
23271	5	249	0 to 6			
23272	6	254	0 to 6			
23273	7	255	0 to 6			
23274	8	262	0 to 6			
23275	9	263	0 to 6			
23276	10	269	0 to 6			
23277	11	271	0 to 6			
23278	12	273	0 to 6			
23279	13	275	0 to 6			
23280	14	276	0 to 6			
23281	15	278	0 to 6			
23282	16	283	0 to 6			
23283	17	285	0 to 6			
23284	18	286a	0 to 6			
23285	19	286b	0 to 6			
23286	20	290	0 to 6			
23287	21	295	0 to 6			
23288	22	312	0 to 6			
23289	23	313	0 to 6			
23290	24	314	0 to 6			
23291	25	315	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/25 8am	Date/Time:
Received By:	Received By: Katelyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23223	29	0 - 6	8.1		0.21	Hi	1.8	4.5	8	21	248	6	11	7040	303	24	0.6	79	60	2.1	
23224	36	0 - 6	6.9		0.21	No	4.1	1.6	3	8	334	9	16	4684	793	88	1.5	111	60	1.8	
23225	41	0 - 6	6.8		0.18	No	4.2	3.2	6	5	322	9	16	4688	820	100	1.7	138	39	2.2	
23226	42	0 - 6	7.0		0.16	No	2.5	7.5	14	18	164	7	13	3909	593	62	1.2	129	41	1.6	
23227	46	0 - 6	6.6		0.10	No	2.7	1.1	<2	4	203	9	16	3227	911	88	0.6	122	26	1.4	
23228	2 CONVICT	0 - 6	8.1		0.33	Hi	2.0	10.3	19	13	358	7	13	8209	417	31	0.8	77	70	3.1	
23229	3 CONVICT	0 - 6	8.1		0.28	Hi	1.8	5.6	10	11	285	6	11	7826	491	34	0.6	72	53	2.3	
23230	4 CONVICT	0 - 6	7.3		0.14	Lo	2.7	<1.0	<2	5	180	4	7	5867	373	32	0.6	103	31	2.7	
23231	6 CONVICT	0 - 6	8.2		0.21	Hi	1.8	4.6	8	22	324	7	13	7513	478	38	0.8	91	84	2.7	
23232	7 CONVICT	0 - 6	7.7		0.18	Lo	1.7	5.8	10	28	260	6	11	5874	511	31	0.8	112	76	3.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23223	29	0 - 6	11/20/24																		
23224	36	0 - 6	11/20/24																		
23225	41	0 - 6	11/20/24																		
23226	42	0 - 6	11/20/24																		
23227	46	0 - 6	11/20/24																		
23228	2 CONVICT	0 - 6	11/19/24																		
23229	3 CONVICT	0 - 6	11/19/24																		
23230	4 CONVICT	0 - 6	11/19/24																		
23231	6 CONVICT	0 - 6	11/19/24																		
23232	7 CONVICT	0 - 6	11/19/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity CEC	%H	%K	%Ca	%Mg	%Na
23223	29																	28	0	2	88	9	0
23224	36																	31	0	3	75	21	1
23225	41																	32	0	3	74	22	1
23226	42																	25	0	2	78	20	1
23227	46																	25	0	2	66	31	2
23228	2 CONVICT																	30	0	3	85	12	0
23229	3 CONVICT																	30	0	2	83	14	0
23230	4 CONVICT																	29	0	2	87	11	0
23231	6 CONVICT																	30	0	3	83	13	1
23232	7 CONVICT																	30	0	2	83	14	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23223, 23224, 23225, 23226, 23227, 23228, 23229, 23230, 23231, 23232
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23223, 23228, 23229, 23231
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23223					
23224					
23225					
23226					
23227					
23228					
23229					
23230					
23231					
23232					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23253	143	0 - 6	6.6		0.17	No	2.0	3.8	7	12	249	8	14	4276	917	70	1.9	123	94	2.1	
23254	159	0 - 6	6.7		0.14	No	1.7	2.5	5	17	207	8	14	3566	830	82	1.4	158	89	2.4	
23255	160	0 - 6	7.3		0.17	No	1.6	3.7	7	8	191	9	16	3152	654	126	1.0	115	91	2.2	
23256	174	0 - 6	6.9		0.16	No	1.0	10.3	19	23	156	10	18	1759	394	53	0.7	288	22	1.7	
23257	175	0 - 6	7.2		0.11	No	0.8	2.3	4	18	109	9	16	1353	276	52	0.9	219	17	1.2	
23258	180	0 - 6	7.2		0.16	No	1.5	6.2	11	9	178	10	18	2735	481	53	0.9	151	70	1.9	
23259	181	0 - 6	7.0		0.10	No	1.3	4.3	8	7	147	6	11	3507	814	79	0.5	110	68	2.1	
23260	182	0 - 6	7.7		0.16	No	1.0	3.0	5	8	183	5	9	4517	857	75	0.4	90	41	1.7	
23261	184	0 - 6	7.3		0.13	No	1.0	4.2	8	5	139	6	11	3151	628	69	0.6	101	69	2.1	
23262	194	0 - 6	7.9		0.22	Lo	1.3	3.0	5	6	198	6	11	4841	716	76	1.0	101	92	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23253	143	0 - 6	11/20/24																		
23254	159	0 - 6	11/20/24																		
23255	160	0 - 6	11/20/24																		
23256	174	0 - 6	11/20/24																		
23257	175	0 - 6	11/20/24																		
23258	180	0 - 6	11/20/24																		
23259	181	0 - 6	11/20/24																		
23260	182	0 - 6	11/20/24																		
23261	184	0 - 6	11/20/24																		
23262	194	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
				6.0	6.5	7.0											
23253	143																
23254	159																
23255	160																
23256	174																
23257	175																
23258	180																
23259	181																
23260	182																
23261	184																
23262	194																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
30	0	2	71	26	1
26	0	2	70	27	1
22	0	2	71	24	2
13	0	3	69	26	2
10	0	3	71	24	2
18	0	2	74	22	1
25	0	2	70	27	1
31	0	2	74	23	1
22	0	2	73	24	1
31	0	2	78	19	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23253, 23254, 23255, 23256, 23257, 23258, 23259, 23260, 23261, 23262
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23253					
23254					
23255					
23256					
23257					
23258					
23259					
23260					
23261					
23262					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23263	196	0 - 6	7.9		0.20	No	1.5	2.3	4	9	273	6	11	5717	1095	111	0.7	108	85	2.3	
23264	199	0 - 6	7.5		0.18	No	1.7	2.4	4	8	235	7	13	5093	978	92	0.7	105	87	2.3	
23265	206	0 - 6	7.6		0.16	No	1.2	1.6	3	6	210	7	13	4763	875	96	0.8	104	75	2.3	
23266	218	0 - 6	7.2		0.15	No	1.4	2.5	5	6	207	7	13	4067	879	89	1.0	118	95	2.6	
23267	231	0 - 6	6.4		0.16	No	1.6	4.9	9	20	224	7	13	3751	1018	69	0.8	130	55	2.0	
23268	236	0 - 6	7.4		0.16	No	1.4	3.7	7	20	172	8	14	3348	689	57	1.7	113	104	2.3	
23269	246	0 - 6	6.9		0.14	No	1.2	2.7	5	6	118	8	14	2517	501	60	1.5	136	60	1.9	
23270	248	0 - 6	6.4		0.13	No	1.5	1.1	<2	25	186	6	11	3289	836	56	0.8	131	42	1.9	
23271	249	0 - 6	6.6		0.16	No	1.5	9.2	17	12	182	6	11	3642	659	46	1.1	95	73	2.0	
23272	254	0 - 6	6.3		0.13	No	2.1	2.0	4	5	121	9	16	1614	307	145	1.0	296	13	1.4	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23263	196	0 - 6	11/20/24																		
23264	199	0 - 6	11/20/24																		
23265	206	0 - 6	11/20/24																		
23266	218	0 - 6	11/20/24																		
23267	231	0 - 6	11/20/24																		
23268	236	0 - 6	11/20/24																		
23269	246	0 - 6	11/20/24																		
23270	248	0 - 6	11/20/24																		
23271	249	0 - 6	11/20/24																		
23272	254	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23263	196																	35	0	2	81	26	1
23264	199																	34	0	2	75	24	1
23265	206																	32	0	2	74	23	1
23266	218																	29	0	2	71	26	1
23267	231																	28	0	2	67	30	1
23268	236																	23	0	2	72	25	1
23269	246																	17	0	2	73	24	2
23270	248																	24	0	2	68	29	1
23271	249																	24	0	2	75	23	1
23272	254																	12	0	3	70	22	5

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23263, 23264, 23265, 23266, 23267, 23268, 23269, 23270, 23271, 23272
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23263					
23264					
23265					
23266					
23267					
23268					
23269					
23270					
23271					
23272					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23273	255	0 - 6	6.8		0.09	No	1.3	2.0	4	6	126	6	11	2238	453	49	1.5	147	57	1.7	
23274	262	0 - 6	7.2		0.14	No	1.4	7.0	13	9	170	7	13	3742	596	81	1.6	108	66	1.8	
23275	263	0 - 6	7.2		0.09	No	1.1	4.0	7	6	148	5	9	2910	558	76	0.9	129	54	2.1	
23276	269	0 - 6	7.4		0.19	Lo	1.6	4.1	7	21	274	10	18	4655	893	234	1.0	130	70	1.9	
23277	271	0 - 6	6.7		0.11	No	1.5	8.0	14	30	236	7	13	3740	865	53	0.9	155	58	2.0	
23278	273	0 - 6	6.8		0.15	No	1.4	8.7	16	11	190	7	13	3563	879	53	0.9	108	74	1.9	
23279	275	0 - 6	7.3		0.11	No	1.3	8.8	16	11	165	5	9	3786	633	55	0.9	114	69	2.0	
23280	276	0 - 6	6.6		0.09	No	1.5	3.4	6	18	224	7	13	3608	947	66	0.7	139	74	1.7	
23281	278	0 - 6	6.4		0.18	No	1.7	14.3	26	15	195	8	14	3558	863	53	0.8	119	67	2.1	
23282	283	0 - 6	7.3		0.10	No	1.2	4.0	7	6	145	5	9	3827	613	39	0.7	96	63	1.9	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23273	255	0 - 6	11/20/24																		
23274	262	0 - 6	11/20/24																		
23275	263	0 - 6	11/20/24																		
23276	269	0 - 6	11/20/24																		
23277	271	0 - 6	11/20/24																		
23278	273	0 - 6	11/20/24																		
23279	275	0 - 6	11/20/24																		
23280	276	0 - 6	11/20/24																		
23281	278	0 - 6	11/20/24																		
23282	283	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23273	255																	16	0	2	72	24	1
23274	262																	24	0	2	76	20	1
23275	263																	20	0	2	73	23	2
23276	269																	32	0	2	72	23	3
23277	271																	27	0	2	70	27	1
23278	273																	26	0	2	69	28	1
23279	275																	25	0	2	76	21	1
23280	276																	27	0	2	67	29	1
23281	278																	26	0	2	69	28	1
23282	283																	25	0	2	77	21	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23273, 23274, 23275, 23276, 23277, 23278, 23279, 23280, 23281, 23282
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23273					
23274					
23275					
23276					
23277					
23278					
23279					
23280					
23281					
23282					

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: Amy Meier, Data Review Coordinator

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.

ENVIRO-AG ENGINEERING, INC.
EAE
AMARILLO - STEPHENVILLE- ARTESIA

Corporate Office:
3404 Airway Blvd.
Amarillo TX 79118

Central Texas:
9855 FM 847
Dublin TX 76446

New Mexico:
110 East Mill Road
Artesia NM 88210

MEMORANDUM

February 28, 2025

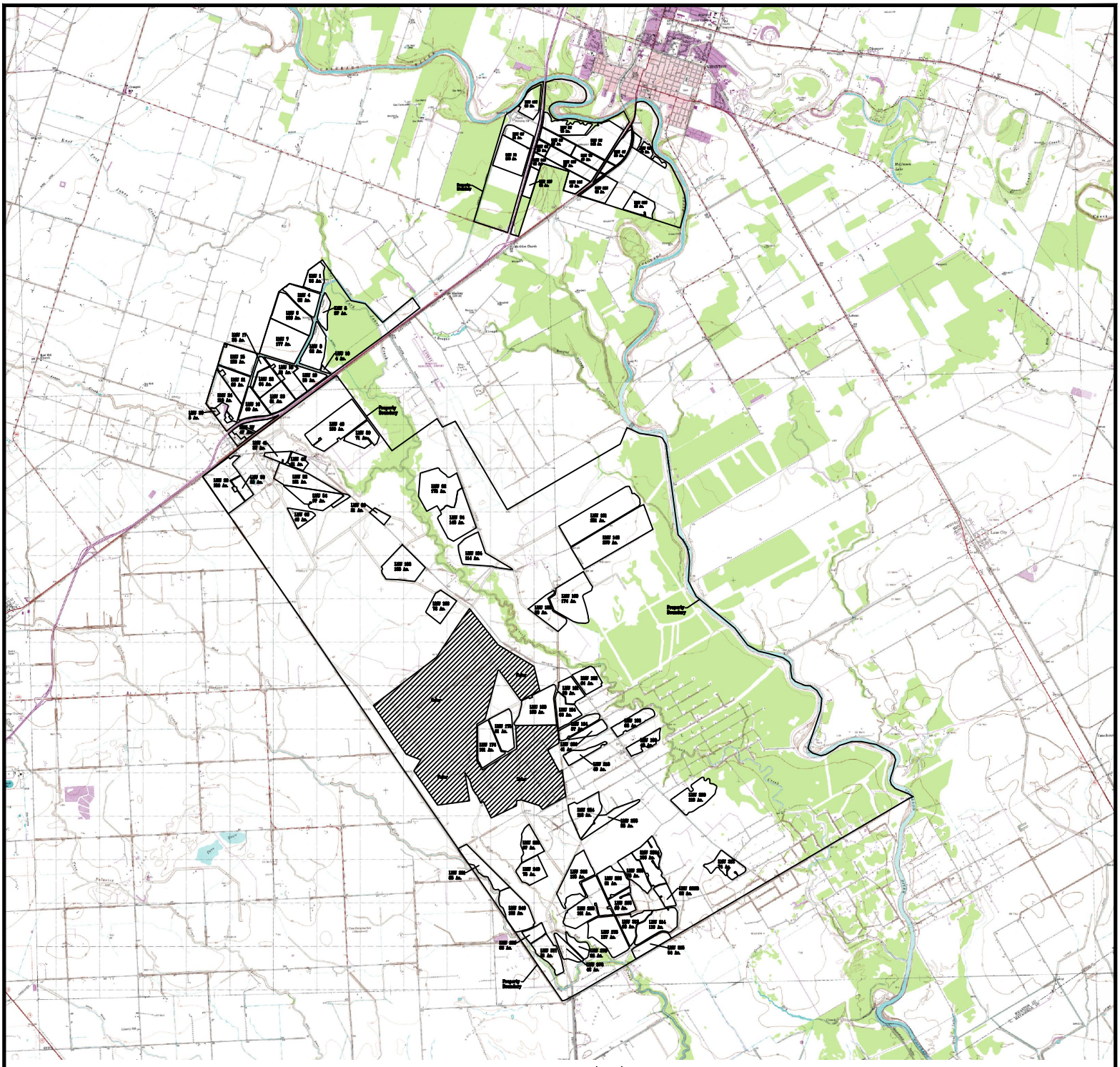
Via Email

To: Mr. Stephen Megina, Vanguard Renewables

From: Norman Mullin, P.E.

Subject: Pierce Ranch, Wharton County, Texas

Attached are the maps of the fields we sampled, the associated laboratory analysis, and the tabular summary of the nutrient budgets. There are approximately 250 fields depicted on the map provided by the Owner. The Owner identified specific fields he wanted sampled that included the two major soil textures (sandy clay and clay). We sampled those fields along with adjacent fields to ensure we captured the current nutrient loading in those areas for both cultivated and improved grass pastures. We sampled 89 fields comprising 7,373 gross acres which is a representation of the two major soil types and cropping schemes (corn, cotton, and grass) across the entire geographic area of the ranch. For permitting purposes, sampling the entirety of the fields would not be beneficial and cost prohibitive for permitting purposes. The laboratory data indicates very little residual levels of nitrogen and phosphorous in the top 6-inches. The nutrient budgets used county averages for yields and the TCEQ "S" tables for nutrient uptake. Since these fields have not been previously utilized for TCEQ regulated waste application, the results provided should remain similar for the following crop years with similar yields.



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Land Application Map Pg: 4	ENVIRONEER ENGINEERING CONSULTING

Effluent Characteristics

Effluent Storage

The effluent from the digestion tanks is pumped to an earthen storage lagoon and it is later removed from the lagoon are hauled off-site for proper disposal or beneficial use under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). If the facility chooses to apply effluent from digestate, then before the land application, the facility will implement an NMP per the Texas NRCS Practice Standard Code 590. The NMP will be updated annually to incorporate the most recent manure, wastewater, and soil analysis.

Effluent Quality

For the purposes of this plan, the Total Nitrogen content of the effluent to be land applied is 713 lb./ac-in TKN and Total Phosphorus is 328 lb./ac-in as P2O5, based on similar projects. Based on the geographical location of the facility and farm practices, the permittee estimates 80% of the total nitrogen is available after volatilization and mineralization.

Effluent Quantity

The average annual amount of effluent available for spreading is projected to be 20.5 million gallons (62.86 ac-ft/yr.).

Annual Cropping Plan

Crop Selection

It is the goal of Wharton AD1, LLC to grow any of the permitted crops listed in Attachment A. Table 2 illustrates the amount of effluent to be applied is based upon the most limiting nutrient, nitrogen. The total ac-in was derived based upon a crop rotation that depicts the acreages planted to various permitted crops. These crops will be rotated to ensure that nutrient/salts and the hydraulic requirements of the plant are managed properly.

The following formula will be utilized to determine the annual application rates based upon the most limiting nutrient content of effluent, nutrients in the soil, and crop requirements.

Total nutrient required by crop *((lb.lac)- Soil Test (lb.lac)) I ((lb.* per *Ac-in* of *Nut. in Effl* x *0.80)) = Annual Application* Rate *(Ac-in)*

In the event that the effluent from the digestate is land applied to an application field, the facility will deduct any applied nutrient from the solids and or fertilizer application against the planned effluent application rates.

Other Crop Inputs

Supplemental fertilizers may be needed to achieve yield goals, but determinations will be made annually on a field-by-field basis using soil test results. Based on the effluent pH, EC and sodium content, soil amendments such as elemental sulfur, gypsum or other inputs may be used to help manage soil pH and salinity.

Wharton AD1, LLC
Pierce Ranch
Attachment 1 - Nutrient Management Budget
Table 1 Generated 12/18/2024

			Columns													
			A	B	D	E	G		H	I	J	K	L	M		
Field ID w/Acreage	Planned Crop Rotation	Projected Yield bu/ac or tons/ac (1)	Crop N Requirement rate lb/Ac (1)	Crop P2O5 Requirement Rate lb/Ac (1)	0-6" Soil N Residual lb/Ac (2)	0-6" Soil P Residual ppm (2)	Remainder Crop N required lb/Ac (3)	Manure Source (4)	Wastewater N lb/Ac-in (4a)	Adjusted Plant Available N lb/ Ac-in (5)	Maximum Ac-In/Ac of Wastewater to apply	Wastewater P2O5 lb per Ac-in (4a)	Recommended Ac-In/Ac to apply	P205 Applied at N Rate lb/Ac (6)	Acre-Feet of Wastewater Applied	Gallons of Wastewater Applied
1 (56 acres)	Corn Grain	120 bu/ac	144	105	3	35	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	1.2	375,366.42
4 (82 acres)	Corn Grain	120 bu/ac	144	105	6	27	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.7	537,949.14
5 (37 acres)	Corn Grain	120 bu/ac	144	105	6	7	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	0.7	242,733.15
6 (126 acres)	Corn Grain	120 bu/ac	144	105	18	19	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	2.3	754,726.10
7 (177 acres)	Corn Grain	120 bu/ac	144	105	6	20	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	3.6	1,161,182.90
8 (92 acres)	Corn Grain	120 bu/ac	144	105	13	16	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.8	572,937.70
10 (4 acres)	Coastal Grazing	1 au/3ac	160	70	3	4	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.1	23,180.39
13 (123 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.4	783,534.62
15 (103 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	2.0	646,337.62
16 (69 acres)	Corn Grain	120 bu/ac	144	105	21	6	123	Digestate	714	571.20	0.22	328.00	0.22	70.63	1.2	403,461.86
17 (23acres)	Corn Grain	120 bu/ac	144	105	9	43	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.5	147,608.00
18 (81 acres)	Corn Grain	120 bu/ac	144	105	12	8	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.6	508,284.93
19 (55 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.1	345,131.74
21 (69 acres)	Corn Grain	120 bu/ac	144	105	13	10	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.3	429,703.28
22 (64 acres)	Corn Grain	120 bu/ac	144	105	13	24	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.2	398,565.36
23 (81 acres)	Coastal Grazing	1 au/3ac	160	70	8	5	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.4	469,402.82
24 (113 acres)	Corn Grain	120 bu/ac	144	105	8	14	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	2.2	730,576.39
25 (5 acres)	Corn Grain	120 bu/ac	144	105	11	13	133	Digestate	714	571.20	0.23	328.00	0.23	76.37	0.1	31,613.31
27 (47 acres)	Coastal Grazing	1 au/3ac	160	70	9	8	151	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.8	272,369.54
28 (68 acres)	Corn Grain	120 bu/ac	144	105	5	22	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.4	449,336.81
29 (156 acres)	Coastal Grazing	1 au/3ac	160	70	8	21	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.8	904,035.06
36 (33 acres)	Coastal Grazing	1 au/3ac	160	70	3	8	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	191,238.19
41 (27 acres)	Coastal Grazing	1 au/3ac	160	70	6	5	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.5	156,467.61
42 (31 acres)	Coastal Grazing	1 au/3ac	160	70	14	18	146	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	179,647.99
46 (190 acres)	Coastal Grazing	1 au/3ac	160	70	2	4	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	3.4	1,101,068.34
2C (78 acres)	Corn Grain	120 bu/ac	144	105	19	13	125	Digestate	714	571.20	0.22	328.00	0.22	71.78	1.4	463,503.37
3C (148 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.9	942,789.62
4C (69 acres)	Corn Grain	120 bu/ac	144	105	2	5	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.4	465,785.23
6C (55 acres)	Corn Grain	120 bu/ac	144	105	8	22	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	1.1	355,590.28
7C (49 acres)	Corn Grain	120 bu/ac	144	105	10	28	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	1.0	312,139.81
8C (51 acres)	Corn Grain	120 bu/ac	144	105	18	22	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	0.9	305,484.38
9C (20 acres)	Corn Grain	120 bu/ac	144	105	9	20	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.4	128,354.78
10C (87 acres)	Corn Grain	120 bu/ac	144	105	5	29	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.8	574,886.80
14C (32 acres)	Corn Grain	120 bu/ac	144	105	7	23	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	0.6	208,410.13
16C (46 acres)	Corn Grain	120 bu/ac	144	105	3	28	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	0.9	308,336.70
18C (35 acres)	Corn Grain	120 bu/ac	144	105	5	10	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	0.7	231,276.30
19C (62 acres)	Coastal Grazing	1 au/3ac	160	70	5	14	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.1	359,295.99
30C (65 acres)	Corn Grain	120 bu/ac	144	105	6	6	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.3	426,423.10
36C (40 acres)	Coastal Grazing	1 au/3ac	160	70	11	14	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.7	231,803.86
52 (121 acres)	Coastal Grazing	1 au/3ac	160	70	4	3	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.2	701,206.68
54 (97 acres)	Corn Grain	120 bu/ac	144	105	7	7	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	1.9	631,743.21
59 (71 acres)	Corn Grain	120 bu/ac	144	105	2	4	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.5	479,286.25
68 (40 acres)	Corn Grain	120 bu/ac	144	105	12	9	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	0.8	251,004.90

86 (21 acres)	Coastal Grazing	1 au/3ac	160	70	40	22	120	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.4	121,697.03
92 (175 acres)	Cotton	2 bales/ac	100	105	21	18	79	Digestate	714	571.20	0.14	328.00	0.14	45.36	2.0	657,224.01
94 (143 acres)	Coastal Grazing	1 au/3ac	160	70	7	12	153	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.5	828,698.81
103 (128 acres)	Coastal Grazing	1 au/3ac	160	70	2	5	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.3	741,772.36
104 (114 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.0	660,641.01
126 (72 acres)	Coastal Grazing	1 au/3ac	160	70	5	6	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	417,246.95
131 (251 acres)	Cotton	2 bales/ac	100	105	4	12	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	3.5	1,145,495.10
143 (279 acres)	Cotton	2 bales/ac	100	105	7	12	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	3.8	1,233,489.43
159 (80 acres)	Cotton	2 bales/ac	100	105	5	17	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	361,294.93
160 (174 acres)	Cotton	2 bales/ac	100	105	7	8	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.4	769,272.98
174 (101 acres)	Coastal Grazing	1 au/3ac	160	70	19	23	141	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.8	585,304.75
175 (91 acres)	Coastal Grazing	1 au/3ac	160	70	4	18	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.6	527,353.79
180 (153 acres)	Coastal Grazing	1 au/3ac	160	70	11	9	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.7	886,649.77
181 (58 acres)	Cotton	2 bales/ac	100	105	8	7	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.8	253,667.08
182 (64 acres)	Cotton	2 bales/ac	100	105	5	8	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.9	289,035.95
184 (66 acres)	Cotton	2 bales/ac	100	105	8	5	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.9	288,655.64
194 (57 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.8	257,422.64
196 (63 acres)	Cotton	2 bales/ac	100	105	4	9	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.9	287,514.71
199 (48 acres)	Cotton	2 bales/ac	100	105	4	8	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.7	219,058.82
206 (41 acres)	Cotton	2 bales/ac	100	105	3	6	97	Digestate	714	571.20	0.17	328.00	0.17	55.70	0.6	189,061.84
218 (40 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.6	180,647.47
231 (85 acres)	Cotton	2 bales/ac	100	105	9	10	91	Digestate	714	571.20	0.16	328.00	0.16	52.25	1.1	367,712.67
236 (67 acres)	Cotton	2 bales/ac	100	105	7	20	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	0.9	296,214.31
246 (128 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.8	578,071.90
249 (75 acres)	Cotton	2 bales/ac	100	105	17	12	83	Digestate	714	571.20	0.15	328.00	0.15	47.66	0.9	295,929.07
254 (112 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	1.6	511,137.25
255 (58 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.0	336,115.60
262 (125 acres)	Cotton	2 bales/ac	100	105	13	9	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.6	516,984.53
263 (161 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.2	711,798.56
271 (81 acres)	Cotton	2 bales/ac	100	105	14	30	86	Digestate	714	571.20	0.15	328.00	0.15	49.38	1.0	331,155.33
273 (42 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	0.5	167,716.91
275 (137 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	1.7	547,076.59
276 (36 acres)	Cotton	2 bales/ac	100	105	6	18	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	0.5	160,871.32
283 (81 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	1.1	358,109.83
285 (78 acres)	Cotton	2 bales/ac	100	105	5	10	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	352,262.56
286A (106 acres)	Cotton	2 bales/ac	100	105	5	9	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.5	478,715.79
286B (38 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.5	173,421.57
290 (116 acres)	Cotton	2 bales/ac	100	105	6	3	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	1.6	518,363.15
295 (69 acres)	Cotton	2 bales/ac	100	105	13	4	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	0.9	285,375.46
312 (74 acres)	Coastal Grazing	1 au/3ac	160	70	6	16	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	428,837.14
313 (68 acres)	Cotton	2 bales/ac	100	105	12	11	88	Digestate	714	571.20	0.15	328.00	0.15	50.53	0.9	284,472.22
314 (119 acres)	Cotton	2 bales/ac	100	105	13	5	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.5	492,169.27
315 (54 acres)	Cotton	2 bales/ac	100	105	11	5	89	Digestate	714	571.20	0.16	328.00	0.16	51.11	0.7	228,471.51
7,207															**118.20**	**38,539,149**

Notes:

(1) From NRCS 590-633 software alternative crops.
(2) Taken from annual soil test results from November 2024. It is assumed that residual N will be utilized with the first crop rotation. The facility will conduct soil sampling every year for verification, and the budgets will be updated to reflect the latest soil analysis.
(3) Column A- Column D = Remainder Crop N Required. Negative value indicates residual is higher than requirement. No wastewater application planned.
(4) The source shown is the primary for wastewater source, however, wastewater from any other lagoon structure can also be pumped to the field. The max rate as indicated by the Phophorous Index Rating shall no be exceeded by any sources.
(4a) Wastewater N and P from site specific analysis.
(5) Availability of N is estimated utilizing 80%.
(6) Illustrates P205 applied at the Nitrogen application rate.

Application Methods & Timing

Land Application Methods

The effluent from the digestate will be applied to the land using the spreading technique. This method ensures uniform distribution of nutrients across the application area, facilitating efficient nutrient absorption by the soil and crops. The spreading technique helps in optimizing the utilization of nitrogen, phosphorus, and potassium present in the effluent while minimizing nutrient runoff and environmental impact.

Soil Moisture Monitoring

Soil moisture monitoring is crucial for solid digestate land application, ensuring proper absorption and preventing runoff. The most important aspect of moisture management is accurately evaluating and maintaining optimal soil conditions. In application fields, soil moisture is assessed using the feel and appearance method, following USDA guidelines. This method provides a quick, practical evaluation of moisture levels before digestate spreading. Proper monitoring helps maintain soil health, nutrient efficiency, and environmental sustainability.

Operation and Maintenance

Procedures

The land application systems should be operated by the TLAP and with the following Best Management Practices (BMPs):

- Effluent application will not occur when the ground is frozen, saturated within 3 feet of the surface or during rainfall events unless necessary to prevent imminent overflow of the storage pond.
- Effluent application will not exceed maximum crop nutrient requirements.
- Effluent application will not occur to fallow lands except pre-watering as described in the previous section. Application to dormant perennial or winter crops shall be limited to the planned rate shown in the NMP.
- Records of the amount of effluent applied, the crops grown, the planting and harvest dates, and crop yields are maintained for each field.
- Personnel whose job responsibilities require the handling, or land application of digestate should be trained to ensure proper procedures are followed and appropriate records are kept.

Monitoring

Monitoring should occur before and after effluent spreading to ensure proper nutrient application and prevent over-application. No puddling, runoff, or soil erosion should occur. A visual inspection should be performed during and after spreading to detect any signs of surface accumulation or runoff. Corrective actions include, but are not limited to:

- Cease effluent spreading if soil becomes saturated.
- Adjust application rates and timing to match soil absorption capacity.

Monitoring of soil moisture, rainfall, and crop ET should occur at a minimum of weekly during the growing season.

As part of monitoring, annual soil tests will be reviewed. The following best management practices (BMPs) may be utilized to minimize nutrient leaching:

- Apply effluent before planting and after harvesting to enhance nutrient availability.
- Time applications to align with crop nutrient uptake during the growing season.
- Use conventional nitrogen fertilizers in conjunction with effluent application to optimize plant uptake.
- Retain crop residues to enhance soil organic matter and moisture retention.
- Adjust application schedules based on weather, soil moisture levels, and crop needs.
- Incorporate organic amendments to improve soil structure and prevent excessive nutrient leaching.
- Implement cover cropping or double cropping to enhance nutrient retention.
- Use nitrification inhibitors to minimize nitrogen losses, especially during high leaching periods.

Soil samples will be collected from each field before and after application, following TLAP guidelines. Effluent samples will also be collected as specified in TLAP to verify nutrient levels and ensure compliance with application limits.

System Maintenance

The effluent spreading system should be operated and maintained in accordance with manufacturer recommendations to ensure long-term reliability and efficiency. Proper operation and maintenance help prevent equipment failure, ensure uniform application, and minimize environmental risks. The spreading equipment, tanks, pipelines, and distribution components should be inspected regularly to maintain functionality.

All measuring devices, valves, spreaders, distribution nozzles, and mechanical components should be checked periodically, with worn or damaged parts repaired or replaced as needed. Nozzles and spreaders must be properly aligned, in good condition, and operated at the planned

application rate to ensure even distribution and prevent excessive accumulation in localized areas.

Maintain all pumps, piping, spreader attachments, and electrical or mechanical components as per manufacturer guidelines. Regularly clean screens and filters to avoid blockages that could affect application rates. Protect equipment from rodents, insects, heat, flooding, lightning, and power failures to avoid operational disruptions. Ensure all electrical connections are secure and replace worn-out wiring or fittings when first noticed. Periodically check for leaks and unintended discharge points. Display bilingual operating instructions and safety warnings as necessary. During non-operational periods, drain and secure pipelines, valves, and movable equipment to prevent damage.

Pollution hazards to groundwater and surface water can be minimized by following proper effluent spreading management. Runoff and deep percolation should be controlled by applying effluent only when soil moisture conditions allow for proper absorption. Avoid spills of agricultural chemicals, fuels, and lubricants near application sites to prevent contamination. Regularly review and adjust application schedules based on soil conditions, weather forecasts, and nutrient management plans to ensure safe and efficient effluent use.

8.0 **REFERENCES**

Information used to develop this plan was obtained, in part, from the following sources:

EPA 430-B-20-001 Project Development Handbook - A Handbook for Developing Anaerobic Digestion/Biogas Systems on Farms in the United States - 3rd Edition

Maas and Grattan. 1999. Agricultural drainage water management in arid and semi-arid areas. FAO Irrigation and Drainage Paper 61, Annex l. Crop salt tolerance data. Retrieved December 2022. http://www.fao.org/docrep/005/y4263e/y4263e0e.htm

Texas A&M Agrilife Extension. Retrieved 2023. Using Animal Manure and Wastewater for Crops and Pastures. https://agrilifeextension.tamu.edu/library/farming/

Texas Almanac. Retrieved May 2023. Texas Temperature, Freeze, Growing Season and Precipitation Records by County. https://texasalmanac.com/sites/default/tiles/images/olmanac-feature/countyweaf her A.pdt

USDA - NRCS Web Soil Survey, Wharton County, accessed May 2023.

USDA- NRCS (2012/2013 TLAP Permit List). Texas Waste Utilization and Nutrient Management 590- 633 Plan. Version 5, S Tables.

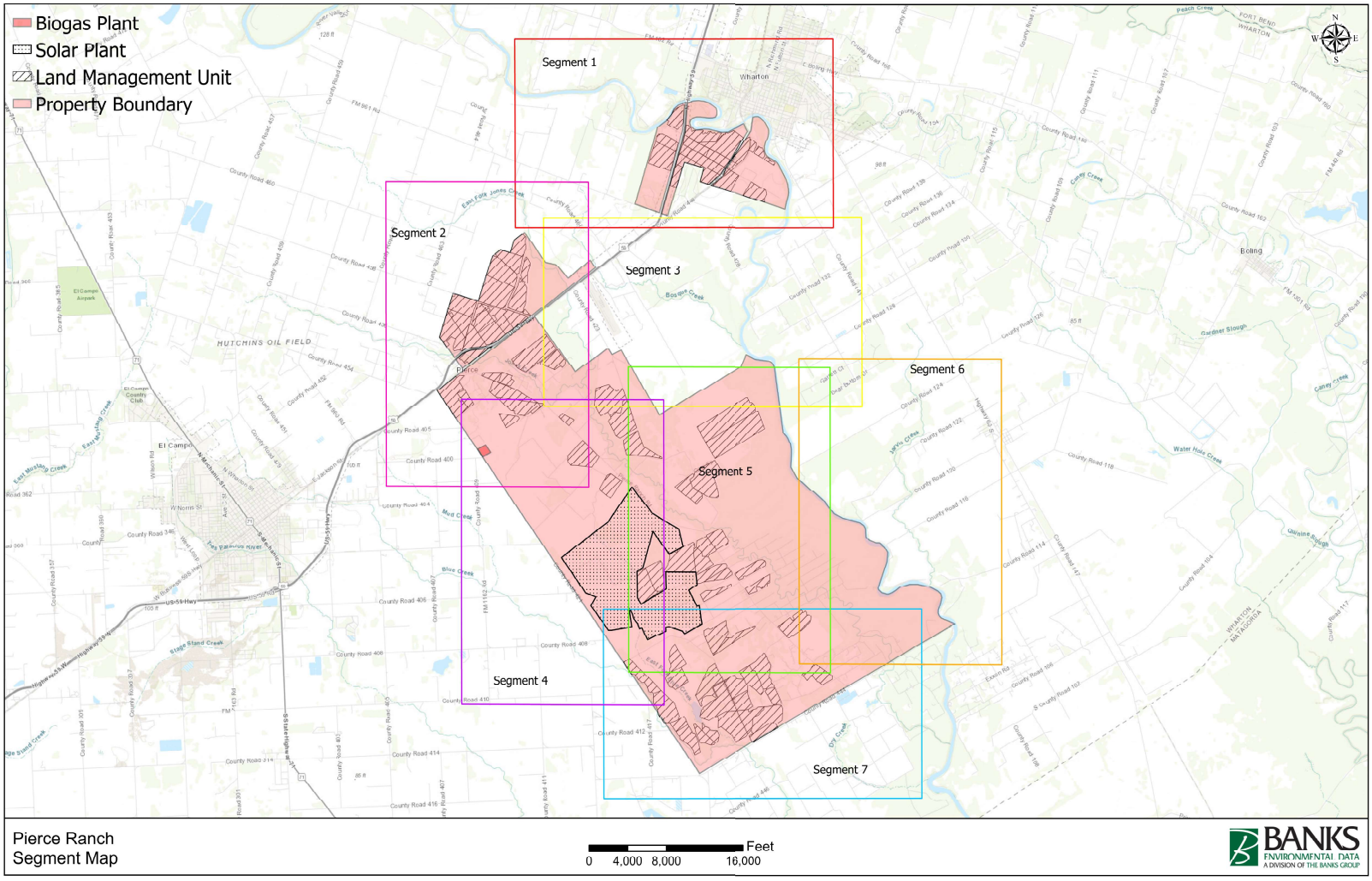
T.D.WATER WELL INFORMATION

Water Well Map

Figure 7, the Water Well Map, shows the locations of water wells within 1 mile of the property boundary. Water wells within the fields or adjacent to fields will be protected with 150-ft buffers.

Water Well Information

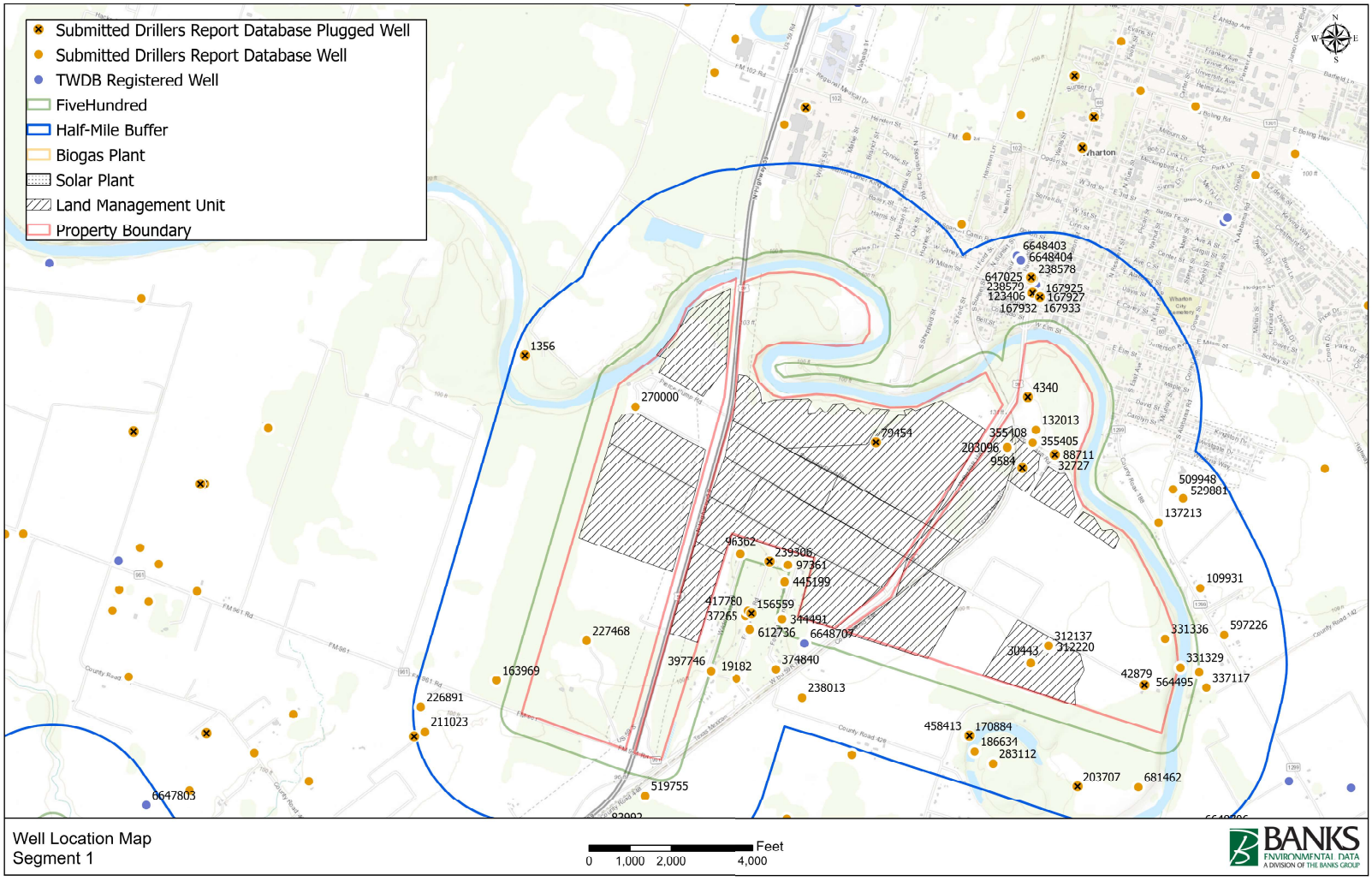
Water well data was obtained from a variety of sources, including on-site inspections, research, a database research firm in Toronto, ON-Canada, and the Texas Water Development Board (TWDB) WIID online database. The information provided by Environmental Risk Information Services (ERIS) was obtained from a variety of public sources. ERIS does not ensure and makes no warranty or representation as to the accuracy, reliability, quality, or errors occurring from data conversion or the interpretation of their report. The TWDB WIID database includes data from the TWDB Groundwater Database and Submitted Driller's Reports. ERIS and TWDB wells are shown on maps and in Table T.E. l if the location could be verified on-site or using the well log or district database information. Well information is provided in Worksheet 3-Section 4 of the Technical Report.

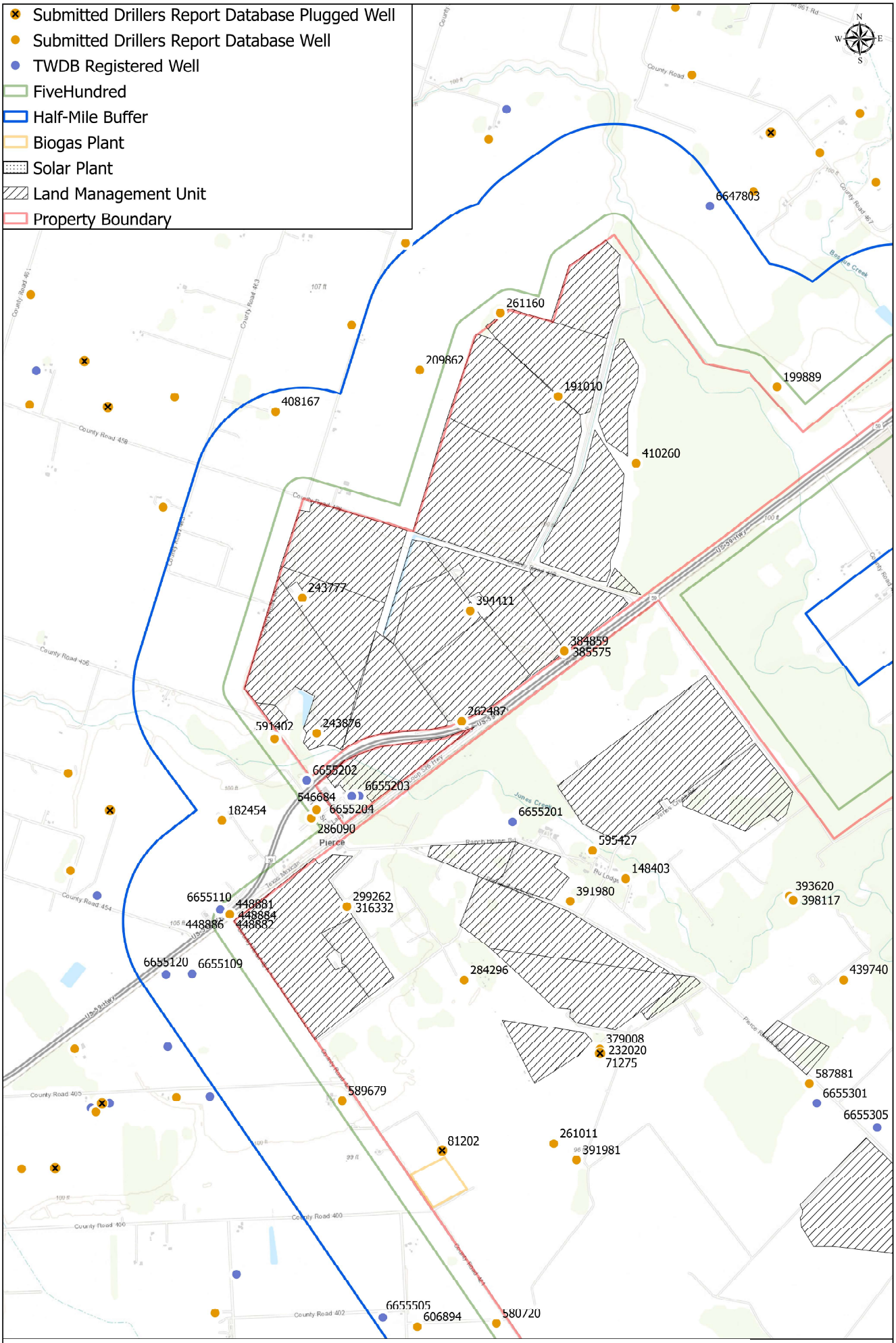


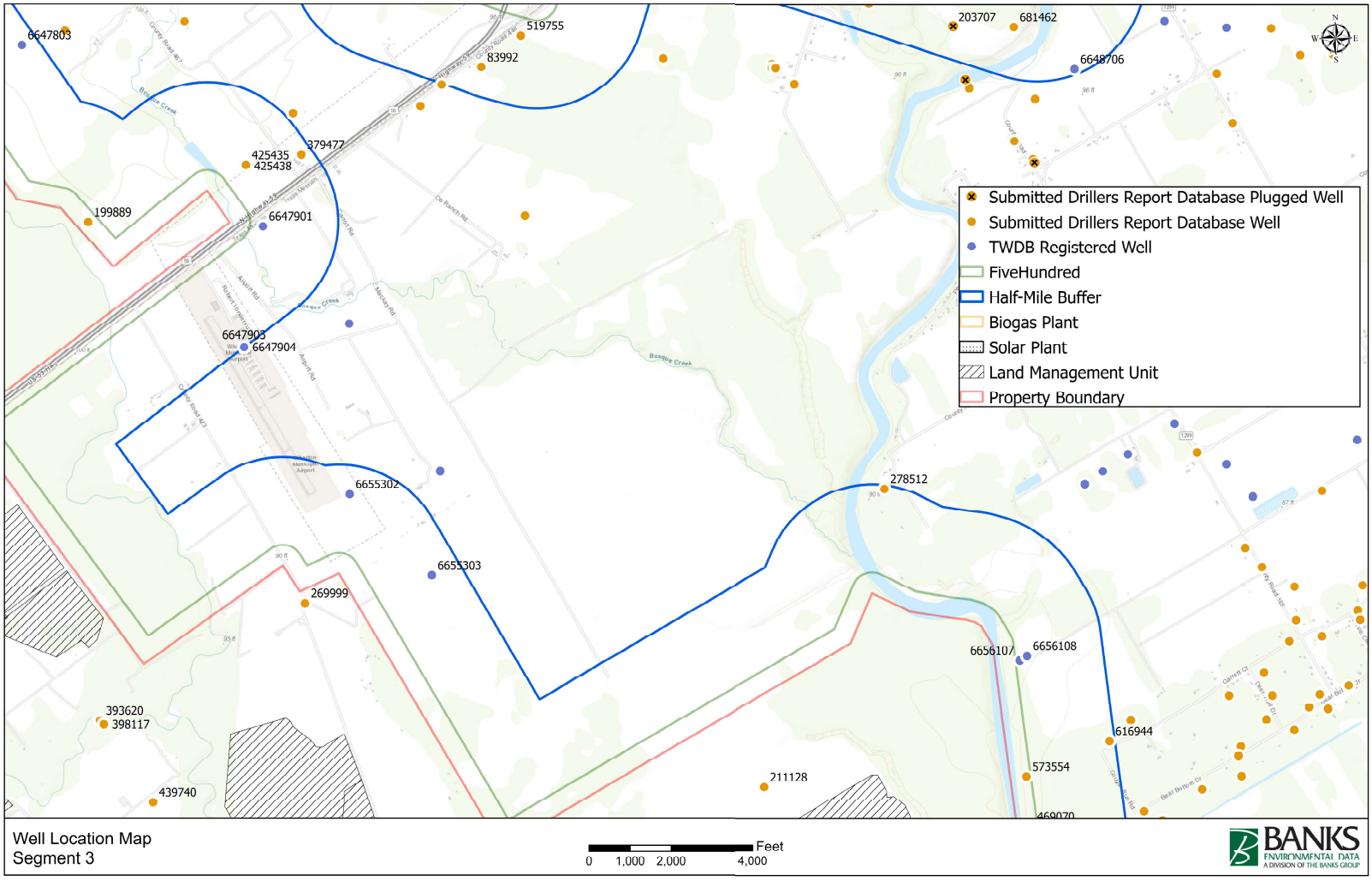
Pierce Ranch
Segment Map

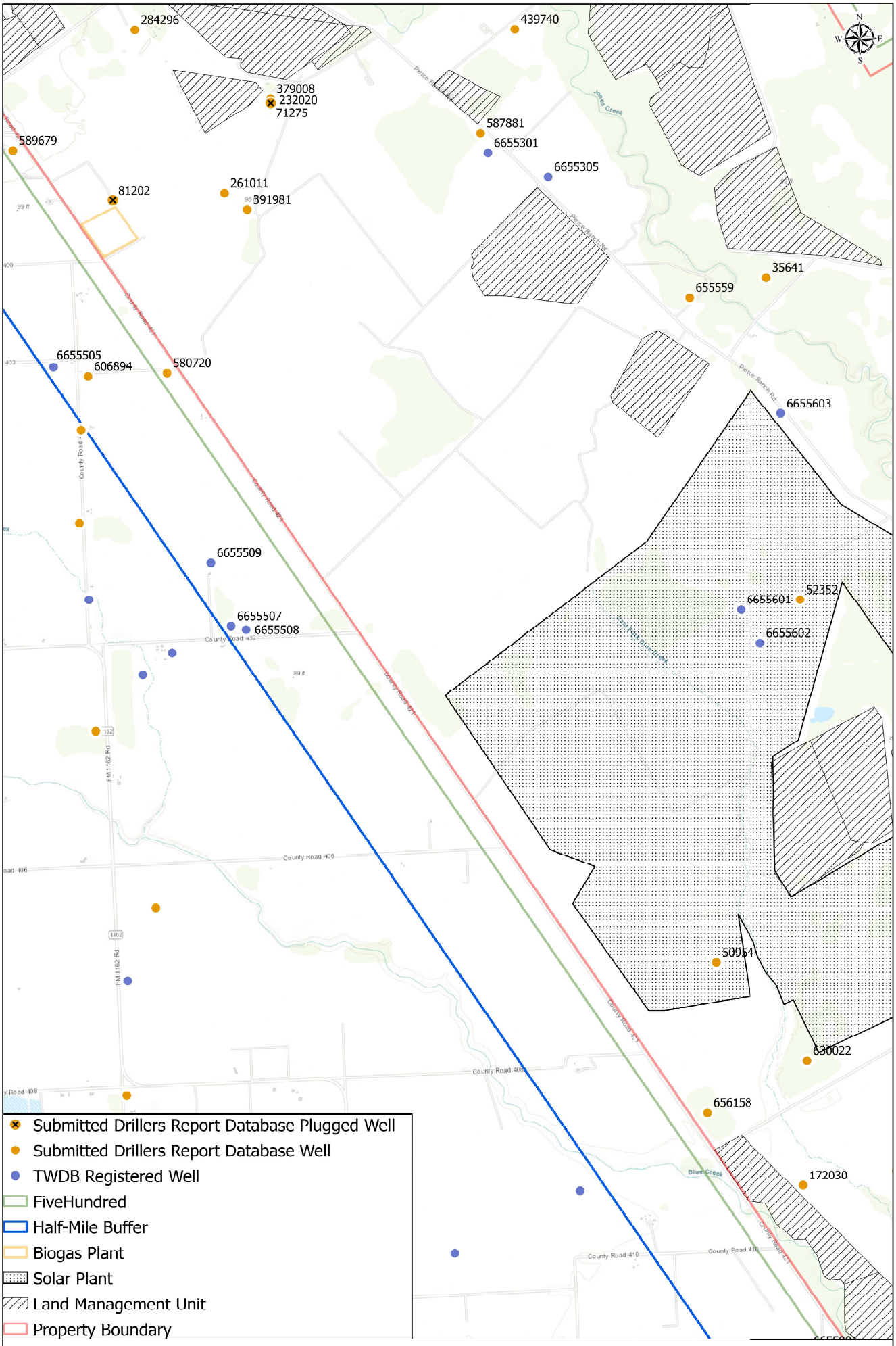
0 4,000 8,000 16,000 Feet

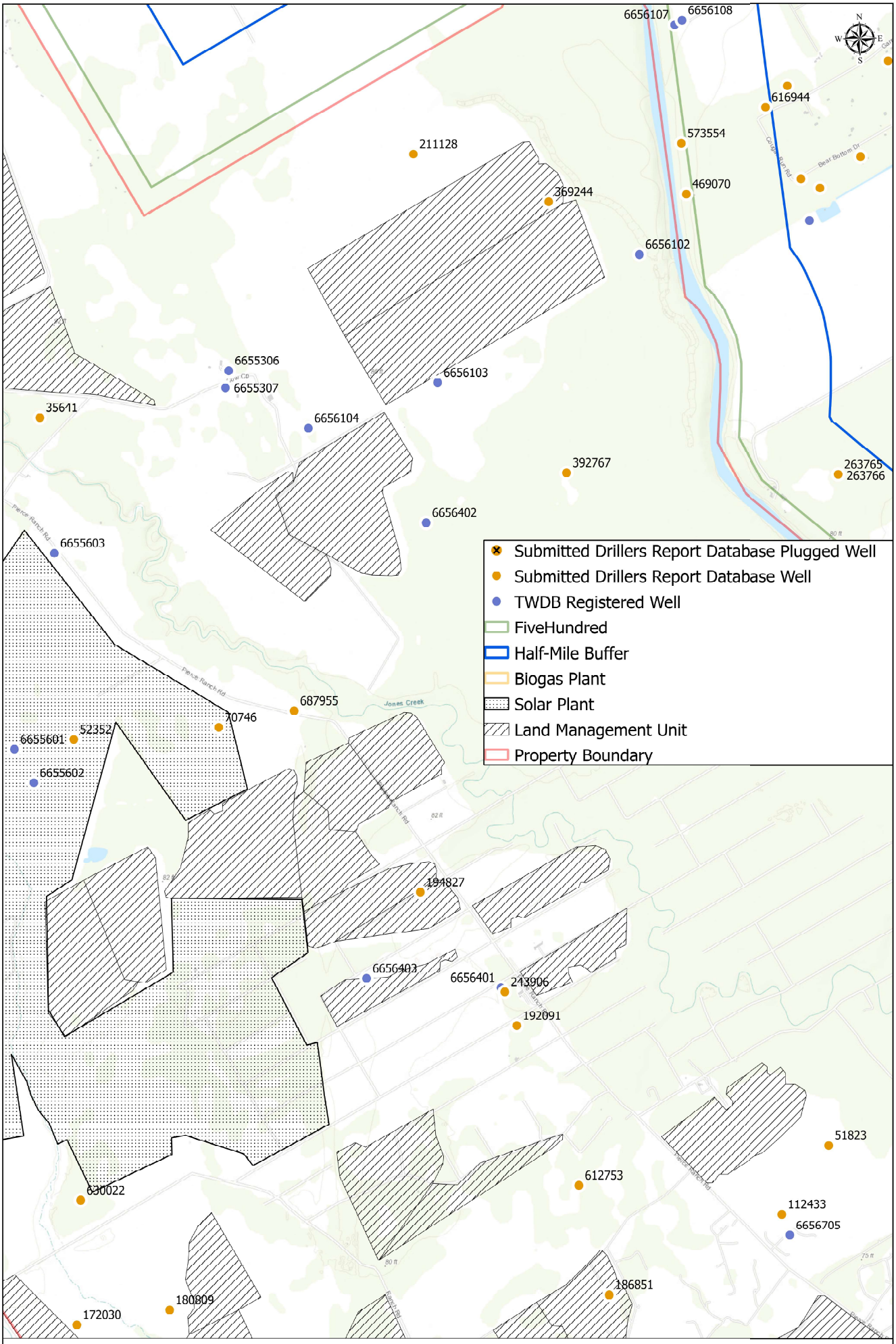
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
N
W
E
S
Wharton
6648403
6648404
238578
647025
238579
167925
123406
167927
167932
167933
1356
270000
4340
132013
79454
355408
355405
203096
88711
9584
32727
509948
529081
137213
96362
239306
97361
445199
109931
417780
156559
37265
344491
227468
612736
664870
312137
312220
30443
331336
597226
331329
42879
564495
337117
397746
19182
374840
163969
238013
226891
211023
458413
170884
186634
283112
203707
681462
6647803
519755
Well Location Map
Segment 1
Feet
0
1,000
2,000
4,000
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
6647803
261160
209862
199889
191010
408167
410260
243777
391111
384859
385575
262487
591402
243876
6655202
6655203
546684
6655204
182454
286090
Pierce
6655201
595427
148403
391980
393620
398117
6655110
448881
448884
448882
448886
299262
316332
6655120
6655109
284296
439740
379008
232020
71275
587881
6655301
6655305
589679
81202
261011
391981
6655505
606894
580720
County Road 458
County Road 436
County Road 454
County Road 405
County Road 400
County Road 402
US-59 Hwy
Jones Creek
Bu Lodge
Pierce Rd
Bayside Creek
Well Location Map
Segment 2
Feet
0
1,000
2,000
4,000
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


6647803
519755
83992
203707
681462
6648706
425435
425438
379477
199889
6647901
6647903
6647904
6655302
6655303
269999
278512
6656107
6656108
616944
573554
211128
393620
398117
439740
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 3
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

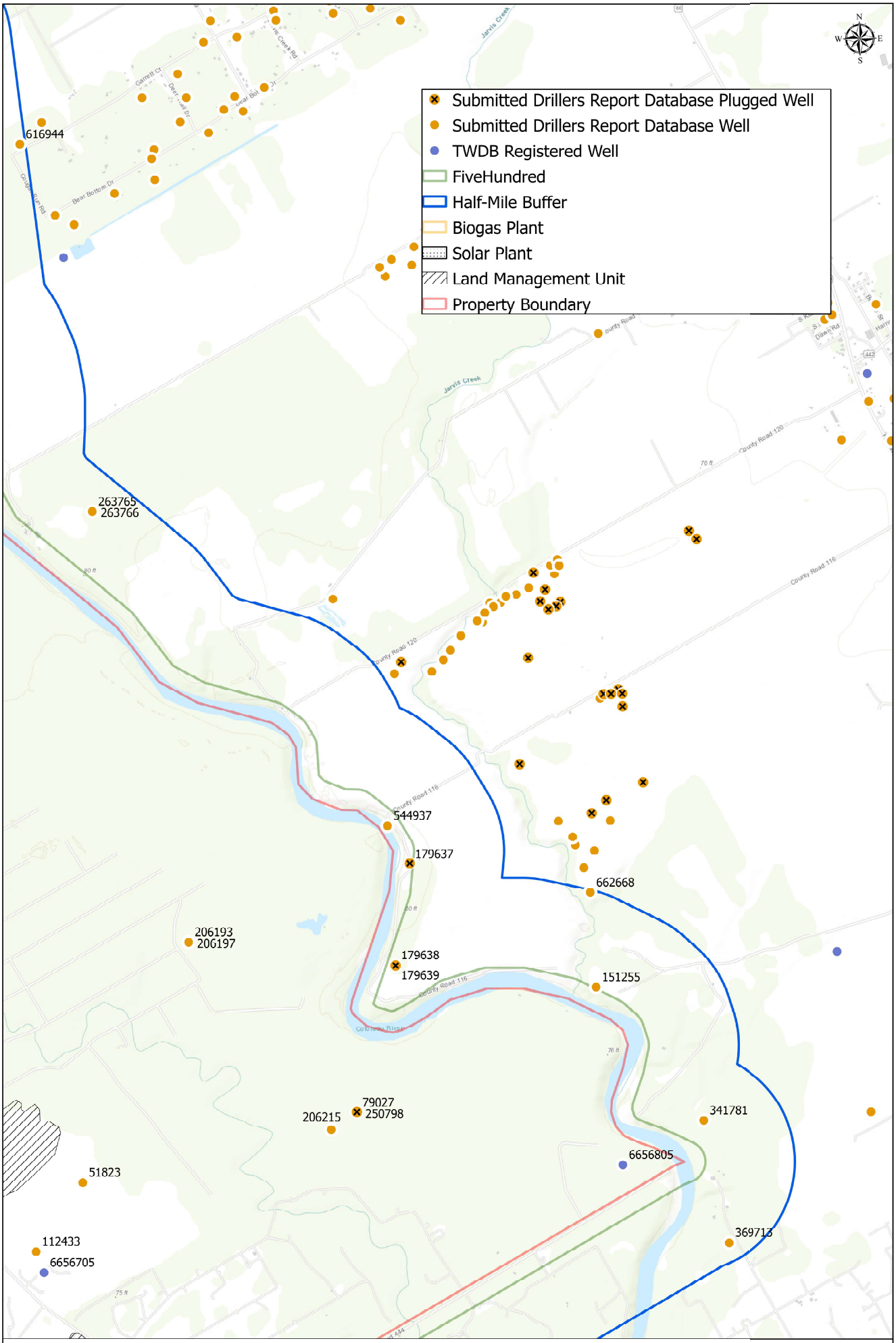

284296
439740
379008
232020
71275
587881
6655301
589679
6655305
81202
261011
391981
35641
655559
6655505
606894
580720
6655603
6655509
6655507
6655508
6655601
52352
6655602
50954
630022
656158
172030
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 4
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Well Location Map
Segment 5

0 1,000 2,000 4,000 Feet

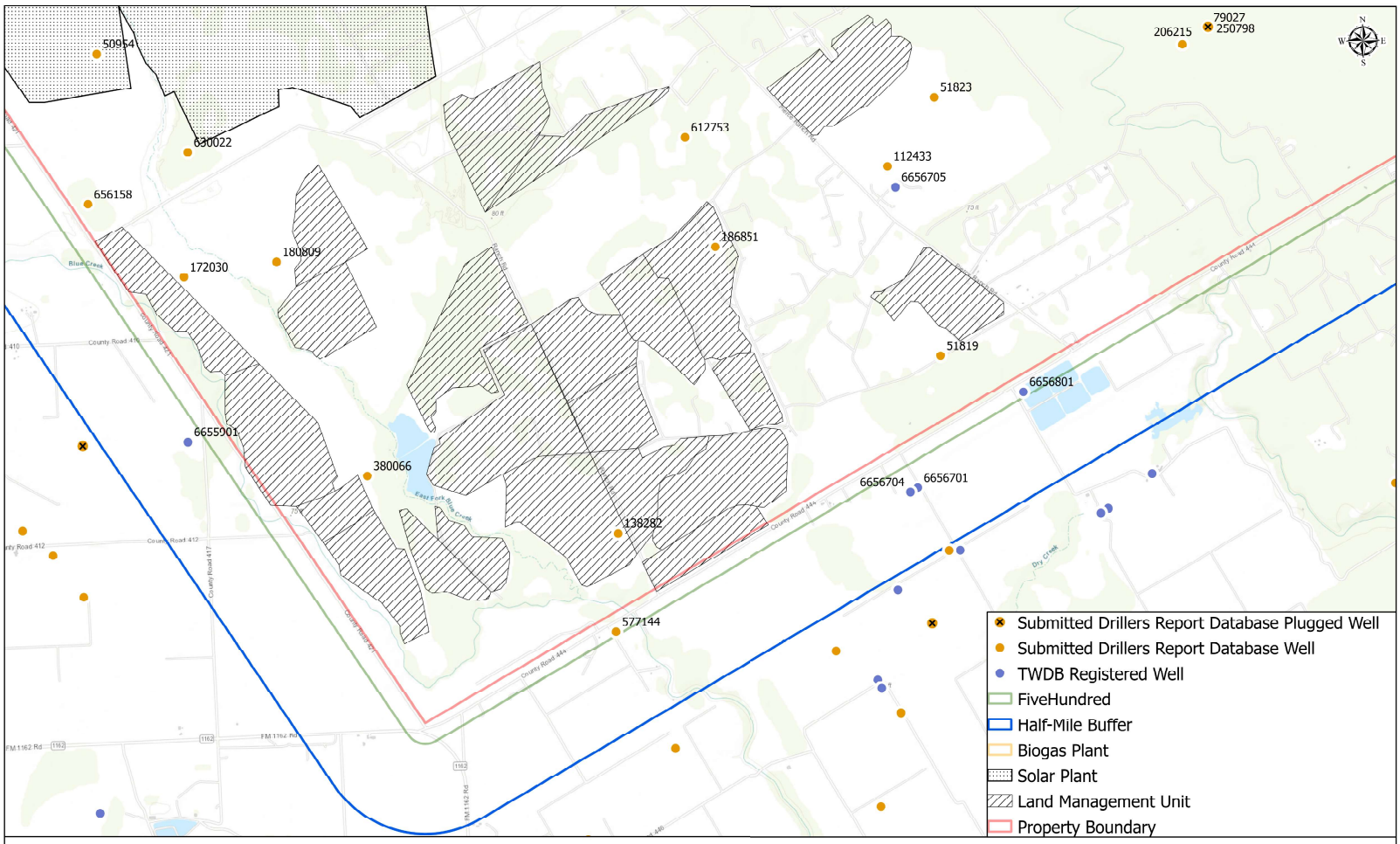
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Well Location Map
Segment 6

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


50954
630022
656158
172030
180809
617753
186851
51823
112433
6656705
206215
79027
250798
51819
6656801
6655901
380066
6656704
6656701
138282
577144
County Road 416
County Road 417
County Road 412
County Road 44a
FM 1162 Rd
Blue Creek
East Fork Big Creek
Dry Creek
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 7
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

T.E. GROUNDWATER TECHNICAL REPORT

Purpose

The purpose of this section is to provide information on the geologic features and groundwater resources at the Wharton AD1, LLC facility located near Pierce, Texas.

Geologic Atlas Map

Figure 8, Geologic Atlas Map, shows the geologic formations located at the property.

Geomorphologic/Geologic Features

The following information is from a report from the Texas Board of Water Engineers discussing soil and groundwater conditions in Wharton County.

Wharton County has around 30,000 acres of land irrigated in the early 20th century for the county's rice production. The wells used to irrigate the rice are mostly located in the western part of the county, ranging in depth from 150 to 500 feet. Periodic measurements show that the net water level in Wharton County has stayed relatively constant since 1934.

Aquifer Information

The Gulf Coast Aquifer includes several aquifers, such as the Jasper, Evangeline, and Chicot, composed of sand, silt, clay, and gravel layers. The total sand thickness of the aquifer ranges from 700 feet in the southern regions to 1,300 feet in the northern regions, with an average freshwater-saturated thickness of about 1,000 feet.

Water quality varies depending on depth and location. It tends to be good in the central and northeastern areas, where total dissolved solids are less than 500 milligrams per liter. However, it becomes more saline toward the south, with concentrations of total dissolved solids typically ranging from 1,000 to over 10,000 milligrams per liter. In these southern areas, aquifer productivity also decreases. Higher salinity levels along the central and eastern Gulf Coast are often linked to saltwater intrusion caused by groundwater pumping, brine migration due to oil field activities, or the natural flow of brine from salt domes into the aquifer.

The aquifer is used for municipal, industrial, and irrigation purposes. In counties such as Harris, Galveston, Fort Bend, Jasper, and Wharton, significant water level declines of up to 350 feet have resulted in land subsidence.

References

"Texas Water Development Board." Gulf Coast Aquifer | Texas Water Development Board, (TWDB)

www.twdb.texas.gov/groundwater/aquifer/majors/gulf-coast.asp. Accessed 17 Dec. 2024.

TEXAS WATER WELL REPORT

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167* *El Campo TX 77437*
Project No:	
Order No:	*25012900355*
Requested by:	*Environeer Engineering Consulting*
Date Completed:	*January 30, 2025*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Table of Contents.....2
Executive Summary.....3
Executive Summary: Report Summary.....4
Executive Summary: Site Report Summary - Project Property.....5
Executive Summary: Site Report Summary - Surrounding Properties.....6
Map.....7
Aerial.....10
Detail Report.....12
Appendix: Database Descriptions.....21
Definitions.....23

Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as database review of environmental records.

License for use of information in Report: No page of this report can be used without this cover page, this notice and the project property identifier. The information in Report(s) may not be modified or re-sold.

Your Liability for misuse: Using this Service and/or its reports in a manner contrary to this Notice or your agreement will be in breach of copyright and contract and ERIS may obtain damages for such mis-use, including damages caused to third parties, and gives ERIS the right to terminate your account, rescind your license to any previous reports and to bar you from future use of the Service.

No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by ERIS Information Inc. ("ERIS") using various sources of information, including information provided by Federal and State government departments. The report applies only to the address and up to the date specified on the cover of this report, and any alterations or deviation from this description will require a new report. This report and the data contained herein does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein and does not constitute a legal opinion nor medical advice. Although ERIS has endeavored to present you with information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

Trademark and Copyright: You may not use the ERIS trademarks or attribute any work to ERIS other than as outlined above. This Service and Report (s) are protected by copyright owned by ERIS Information Inc. Copyright in data used in the Service or Report(s) (the "Data") is owned by ERIS or its licensors. The Service, Report(s) and Data may not be copied or reproduced in whole or in any substantial part without prior written consent of ERIS.

Executive Summary

Property Information:

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167 El Campo TX 77437*
Project No:	
Coordinates:	
Latitude:	*29.215278*
Longitude:	*-96.194167*
UTM Northing:	*3,235,122.77*
UTM Easting:	*772,831.34*
UTM Zone:	*14R*
Target Property Geometry:	*POLYGON*
County/Parish Covered:	*Wharton (TX)*
Zipcode(s) Covered:	*El Campo TX: 77437*
State(s) Covered:	*TX*

Executive Summary: Report Summary

Database	Searched	Project Property	Within 0.50mi	Total
Federal				
FED USGS	Y	0	0	0
State				
TCEQ WELL LOGS	Y	0	**2**	**2**
SDRW WELLS	Y	0	**2**	**2**
GWDB	Y	0	**1**	**1**
WW FORT BEND	Y	0	0	0
WW HIGH PLAINS	Y	0	0	0
WW HARRIS GAL	Y	0	0	0
WUD	Y	0	0	0
Total:		0	**5**	**5**

**** PO – Property Only***

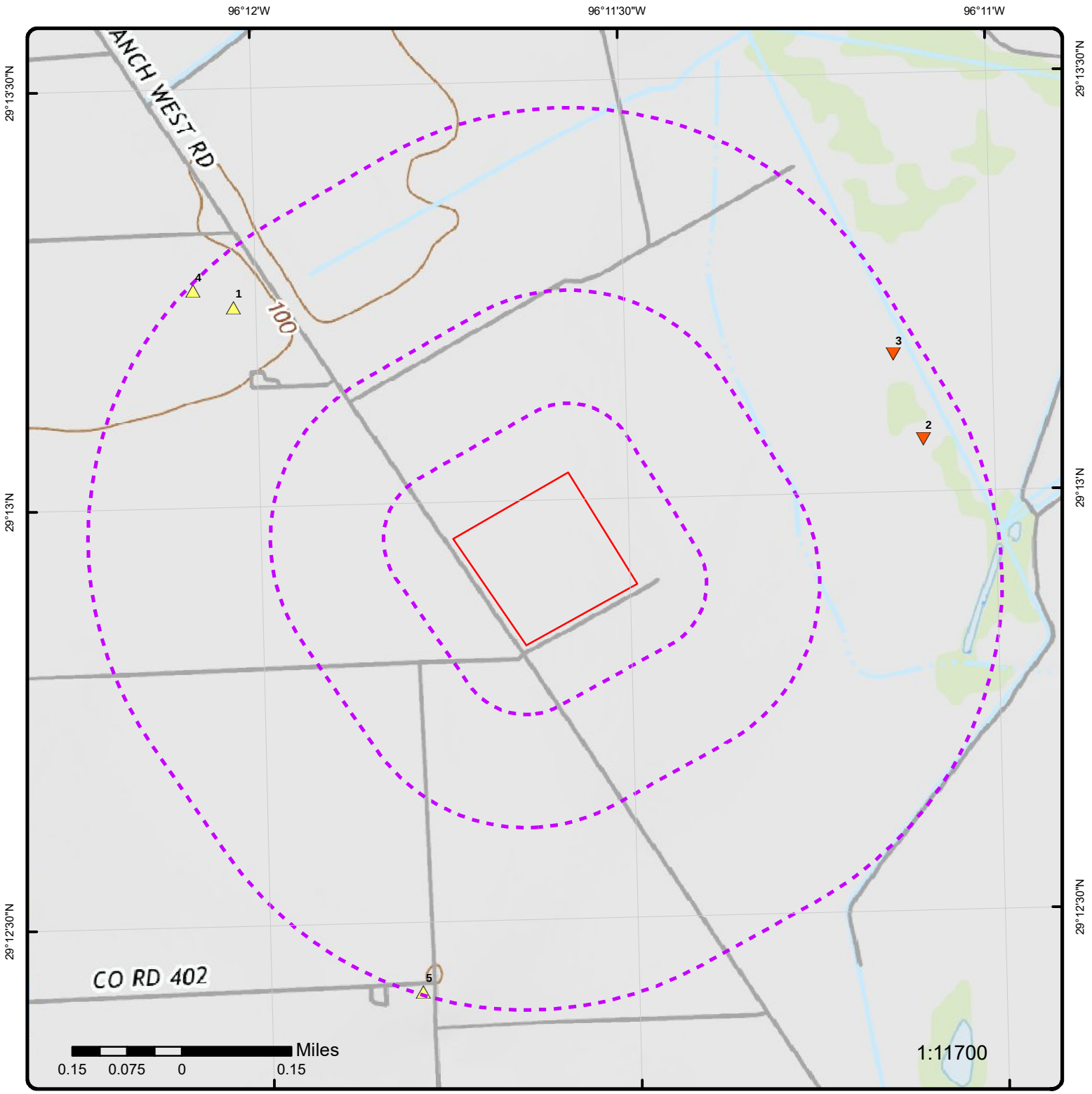
Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number
1	SDRW WELLS	Philip Kocurek	1104 Cr 421 El Camop TX 77437 ***Track NO:*** *589679*	NW	0.44 / 2,307.69	12
2	SDRW WELLS	Pierce Ranch	East of CR 421 and CR 400 Intersection Pierce TX 77467 ***Track NO:*** *261011*	ENE	0.44 / 2,322.58	13
3	TCEQ WELL LOGS	PIERCE RANCH	TX ***Grid No | Owners Name:*** *66-55-2E | PIERCE RANCH*	ENE	0.46 / 2,449.98	14
4	TCEQ WELL LOGS	FLOYD WATZ	TX ***Grid No | Owners Name:*** *66-55-2J | FLOYD WATZ*	NW	0.49 / 2,599.05	16
5	GWDB	John Boyd	TX ***State Well No | Owner Name:*** *6655505 | John Boyd*	SSW	0.50 / 2,616.31	18



Map: 0.5 Mile Radius
Order Number: 25012900355
Address: 29.215278, -96.194167, El Campo, TX

ERIS

Plotted Water Wells

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Eris Areas with Higher Elevation
- Eris Areas with Same Elevation
- Eris Areas with Lower Elevation
- Eris Areas with Unknown Elevation



Aerial **Year: 2022**

Order Number: 25012900355

Address: 29.215278, -96.194167, El Campo, TX

© ERIS Information Inc.

Source: ESRI World Imagery

Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
1	1 of 1	NW	0.44 / 2,307.69	Philip Kocurek 1104 Cr 421 El Camop TX 77437	SDRW WELLS

Track NO: 589679
Date Submitted: 2021-11-23
Owner Name: Philip Kocurek
Owner Address: 1104 Cr 421
Owner Address2:
Owner City: El Camop
Owner State: TX
Owner Zip: 77437
County: Wharton
Type of Work: New Well
Typ of Wrk Oth Descr:
Proposed Use: Domestic
Prop Use Oth Descr:
Latitude: 29.2209
Longitude: -96.2007
Drilling Date Started: 2021-09-09
Drilling Date Completed: 2021-09-11
Chemical Analysis: No
Company Name: Kight Water Well Service
Company Address: 1073 COUNTY ROAD 479
CompanyAddress2:
Company City: EL CAMPO
Company State: TX
Company Zip: 77437
Company Country:
Data Source: Full SDR Database; SDRDB Well Location (Map)
Report Link: https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=589679&Type=SDR-Well

Well Borehole Information

Top Depth: 0
Bottom Depth: 366

Top Depth:
Bottom Depth: 366.0

Well Levels

Measurement: 62
Measurement Date: 2021-09-12

Well Strata

Water Type:

Good

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
2	1 of 1	ENE	0.44 / 2,322.58	Pierce Ranch East of CR 421 and CR 400 Intersection Pierce TX 77467	SDRW WELLS

Track NO: 261011
Date Submitted: 2011-07-29
Owner Name: Pierce Ranch
Owner Address: P.O. Box 538
Owner Address2:
Owner City: Pierce
Owner State: TX
Owner Zip: 77467
County: Wharton
Type of Work: New Well
Typ of Wrk Oth Descr:
Proposed Use: Irrigation
Prop Use Oth Descr:
Latitude: 29.217778
Longitude: -96.185
Drilling Date Started: 2011-06-27
Drilling Date Completed: 2011-07-06
Chemical Analysis: No
Company Name: Weisinger Incorporated
Company Address: 2200 East Davis
CompanyAddress2:
Company City: Conroe
Company State: TX
Company Zip: 77301
Company Country:
Data Source: Full SDR Database; SDRDB Well Location (Map)
Report Link: https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=261011&Type=SDR-Well

Well Borehole Information

Top Depth: 0
Bottom Depth: 710

Top Depth: 0
Bottom Depth: 8

Top Depth:
Bottom Depth: 710.0

Well Levels

Measurement: 82
Measurement Date: 2011-07-20

Well Strata

Water Type:

Fresh

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
3	1 of 1	ENE	0.46 / 2,449.98	PIERCE RANCH TX	TCEQ WELL LOGS

Grid No:	66-55-2E
Date Drilled:	11/08/1972
Owners Name:	PIERCE RANCH
County:	WHARTON
Water Usage:	DOMESTIC
Static Level:	44
Depth Drilled:	196
Latitude:	
Longtiude:	

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-45-5
Located on map XSS
Received: 2-2-73
Jilda

1) OWNER:
Person having well drilled Pierce Ranch (Name) Address Pierce (Street or RFD) Tex (City) (State)
Landowner Same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Wharton 5 miles in NE (N.E., S.W., etc.) direction from El Campo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
See MAP ON 66-45-5B
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor League J. Talfener
Block 516 Survey
Abstract No. A-453
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check): New Well ✓ Deepening; Reconditioning; Plugging
4) PROPOSED USE (Check): Domestic ✓ Industrial; Municipal; Irrigation; Test Well; Other
5) TYPE OF WELL (Check): Rotary ✓ Driven; Dug; Cable; Jetted; Bored

6) WELL LOG:
Diameter of hole 7 in. Depth drilled 196 ft. Depth of completed well 196 ft. Date drilled 1-8-73
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Top Soil
5	28	Clay R
28	55	Sand
55	122	Clay R
122	138	Sand + G
138	146	Clay W
146	158	Sand
158	170	Clay R
170	196	Sand + G

(Use reverse side if necessary)

9) Casing: Type: Old; New ✓ Steel; Plastic ✓; Other
Cemented from ft. to ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4	0	194	SCH 40

10) SCREEN: Type PVC
Perforated; Slotted ✓

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
4	194	196	014

7) COMPLETION (Check): Straight wall; Gravel packed; Other; Under reamed; Open Hole

8) WATER LEVEL:
Static level 44 ft. below land surface Date
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc., ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No If yes, by whom?
Yield: gpm with ft. drawdown after hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? Yes No
Did any strata contain undesirable water? Yes No
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Praytor (Type or Print) Water Well Drillers Registration No. 407
ADDRESS P.O. Box 63 (Street or RFD) El Campo (City) Tex (State)
(Signed) W. C. Praytor (Water Well Driller) Praytor Drilling (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-6

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
4	1 of 1	NW	0.49 / 2,599.05	FLOYD WATZ TX	TCEQ WELL LOGS

Grid No:	66-55-2J
Date Drilled:	03/15/1977
Owners Name:	FLOYD WATZ
County:	WHARTON
Water Usage:	RENT
Static Level:	37
Depth Drilled:	75
Latitude:	
Longtiude:	

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-55-2J
Located on map 1 of 5
Received: 7-1-77
dlc

1) OWNER:
Person having well drilled: Floyd Watt (Name) — Address: Rt 1 (Street or RFD) — El Campo (City) — Tex (State)
Landowner: Same (Name) — Address: (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County: Wharton, 3½ miles in E (N.E., S.W., etc.) direction from El Campo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
map on 66-63-39
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor _____ League _____
Block _____ Survey _____
Abstract No. _____
(NW¼ NE¼ SW¼ SE¼) of Section _____

3) TYPE OF WORK (Check): New Well ✓ Deepening / Reconditioning / Plugging
4) PROPOSED USE (Check): Domestic / Industrial / Municipal / Irrigation / Test Well / Other Rent
5) TYPE OF WELL (Check): Rotary ✓ Driven / Dug / Cable / Jetted / Bored

6) WELL LOG:
Diameter of hole 4½ in. Depth drilled 75 ft. Depth of completed well 75 ft. Date drilled 3-15-77
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Topsoil
5	49	Clay R
49	75	Sand

9) Casing:
Type: Old / New / Steel / Plastic / Other
Cemented from _____ ft. to _____ ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
7	0	69	Sch 40

10) SCREEN:
Type PA
Perforated / Slotted ✓

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
2	69	75	.010

(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ✓ / Gravel packed / Other
Under reamed / Open Hole

8) WATER LEVEL:
Static level 37 ft. below land surface Date _____
Artesian pressure _____ lbs. per square inch Date _____
Depth to pump bowls, cylinder, jet, etc., _____ ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes / No If yes, by whom? _____
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.
Bailer test _____ gpm with _____ ft. drawdown after _____ hrs.
Artesian flow _____ gpm
Temperature of water _____

12) WATER QUALITY:
Was a chemical analysis made? Yes / No
Did any strata contain undesirable water? Yes / No
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Praytor (Type or Print) — Water Well Drillers Registration No. 407
ADDRESS P.O. Box (Street or RFD) — El Campo (City) — Tex (State)
(Signed) W. C. Praytor (Water Well Driller) — Praytor Drlg. Co. (Company Name)

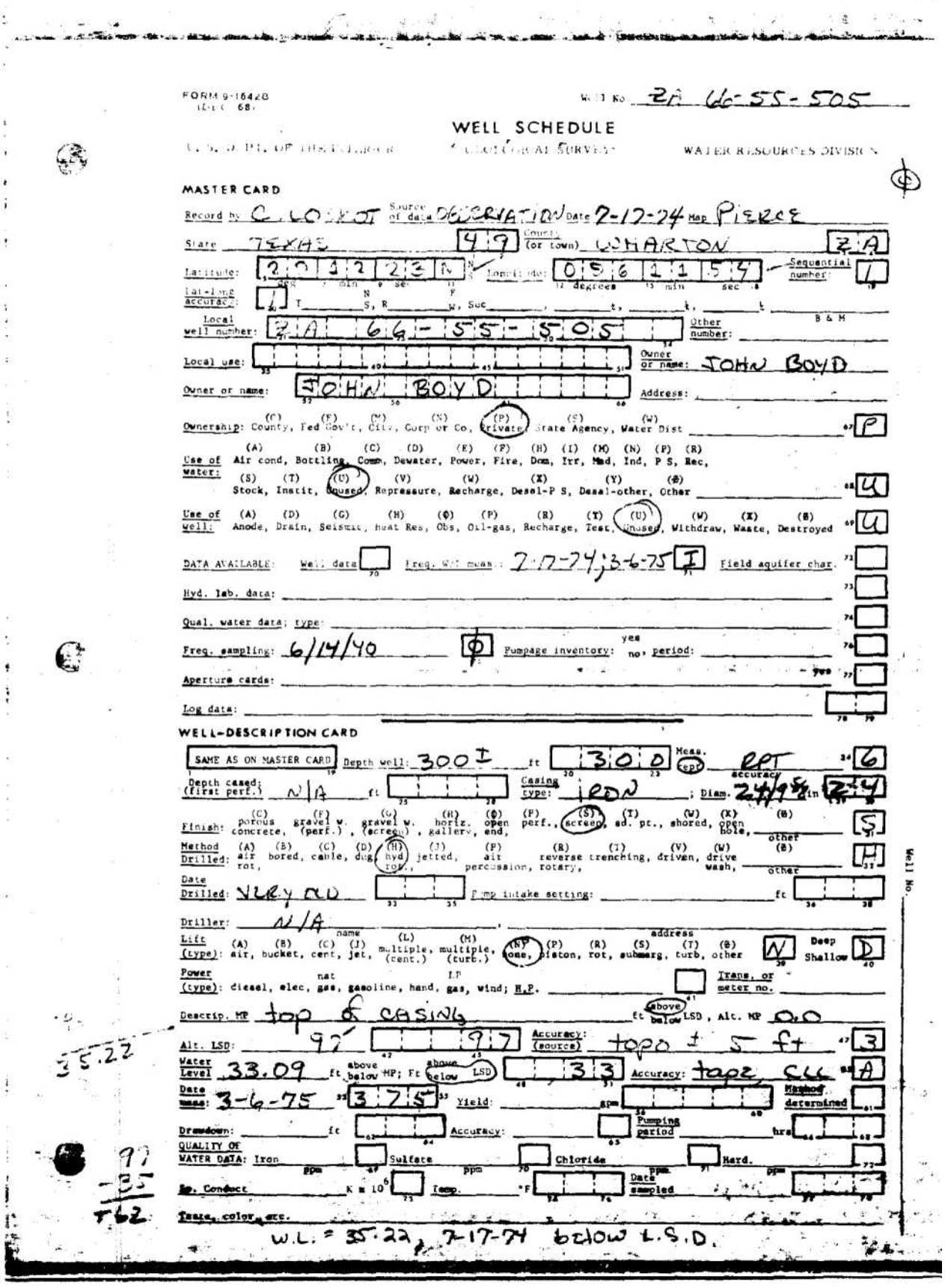
Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-8

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
5	1 of 1	SSW	0.50 / 2,616.31	John Boyd TX	GWDB

Well Rep Track No:	
State Well No:	6655505
Owner Name:	John Boyd
Drilling Start Dt:	
Drilling Month:	
Drilling Day:	
Drilling Year:	
Well Depth:	300
Well Usage:	Unused
Water Level Status:	
Latitude:	29.2066670
Longitude:	-96.1980560
Data Source:	Groundwater Database (GWDB) Reports; GIS shapefile of GWDB well locations
Well Info Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=6655505&Type=GWDB
Document Link:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetScannedImage.aspx?Num=6655505&Cnty=Wharton



FORM 9-1642B
(REV. 68)

Well No. 2A 66-55-505

WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

MASTER CARD

Record by C. LOVOI Source of data DESCRIPTION Date 7-17-74 Map PIERCE

State TEXAS 49 County (or town) WHARTON ZA

Latitude: 29 23 23 N Longitude: 096 11 54 Sequential number: 1

Lat-long accuracy: 1 T ____ S, R ____ W, Sec ____, ____, ____, ____

Local well number: ZA 66-55-505 Other number: ____ B & M

Local use: ____ Owner or name: JOHN BOYD

Owner or name: JOHN BOYD Address: ____

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist P

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Ind, (N) P S, (P) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Y) Desal-other, (@) Other U

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (@) Destroyed U

DATA AVAILABLE: Well data ____ Freq. WL meas.: 7-17-74; 3-6-75 I Field aquifer char. ____

Hyd. lab. data: ____

Qual. water data; type: ____

Freq. sampling: 6/14/40 Pumpage inventory: yes / no, period: ____

Aperture cards: ____

Log data: ____

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 300 I ft 310 Meas. rpt accuracy 6

Depth cased; (first perf.) N/A ft Casing type: RDW ; Diam. 24/9 5/8 in 2-4

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (Ø) open end, (P) perf., (S) screen, (T) sd. pt., (W) shored, (X) open hole, (@) other S

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (@) other H

Date Drilled: VERY OLD Pump intake setting: ____ ft

Driller: N/A name address

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple, (cent.), (M) multiple, (turb.), (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (@) other N Deep / Shallow D

Power (type): diesel, elec, gas, gasoline, hand, gas, wind; nat H.P. LP Trans. or meter no. ____

Descrip. MP top of CASING ft above / below LSD, Alt. MP 0.0

Alt. LSD: 97 917 Accuracy (source): topo ± 5 ft 3

Water Level 33.09 ft above / below MP; Ft above / below LSD 33 Accuracy: topo SLL A

Date meas: 3-6-75 375 Yield: ____ gpm Method determined ____

Drawdown: ____ ft Accuracy: ____ Pumping period ____ hrs

QUALITY OF WATER DATA: Iron ____ ppm Sulfate ____ ppm Chloride ____ ppm Hard. ____ ppm

Sp. Conduct ____ K x 10^6 Temp. ____ °F Date sampled ____

Tests, color, etc. W.L. = 35.22, 7-17-74 below L.S.D.

35.22

97
-35
T62

Well No.

Well No. 24 66-55-505

Latitude-longitude 29 d 12 m 23 s 96 d 11 m 54 s

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD | Physiographic Province: COASTAL PLAIN | 03 | Section:

F | Drainage Basin: | 521 | Subbasin:

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, (L) swamp, (O) offshore, (P) pediment, (S) hillside, (T) terrace, (U) undulating, (V) valley flat | F

MAJOR AQUIFER: ____ system, ____ series | J | ____ aquifer, formation, group | S

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

MINOR AQUIFER: ____ system, ____ series | ____ aquifer, formation, group

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

Intervals Screened:

Depth to consolidated rock: ft | Source of data:

Depth to basement: ft | Source of data:

Surficial material: | Infiltration characteristics:

Coefficient Trans: gpd/Ft | Coefficient Storage:

Coefficient Perm: gpd/ft^2; Spec cap: gpm/ft; Number of geologic cards:

40' - 24" CSG

MEASURED ~32" CSG - WELL MAY HAVE BEEN REWORKED

WELL NO.

GPO 865-801

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update.

Federal

Wells from NWIS: FED USGS

The U.S. Geological Survey's (USGS) National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This select NWIS Wells dataset contains specific Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well, Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern. Applicable NWIS database information is obtained through the Water Quality Data Portal (WQP). The WQP is a cooperative service sponsored by the USGS, the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC).

Government Publication Date: Mar 11, 2024

State

Well Log Reports from Plotted Water Wells: TCEQ WELL LOGS

Locations of TCEQ Water Wells as derived from well logs in the Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer, which includes unnumbered water wells and those plotted to 2.5 minute grid locations (2-3 miles). In this collection of Well Log Reports, locations have been manually verified.

Government Publication Date: Jul 26, 2022

Select Wells from SDR: SDRW WELLS

Locations of wells from the Submitted Drillers Report (SDR) Database with select proposed usage: Domestic, Fracking Supply, Industrial, Irrigation, Other, Public Supply, Rig Supply, Stock, Unknown. SDR is populated from the online Texas Well Report Submission and Retrieval System (TWRSRS), a cooperative Texas Department of Licensing and Regulation (TDLR) and Texas Water Development Board (TWDB) application requiring registered water-well drillers to submit reports. Excludes SDR records with the following proposed usage: Closed-Loop Geothermal, De-watering, Environmental Soil Boring, Extraction, Injection, Monitor, Test Well.

Government Publication Date: Sep 24, 2024

Groundwater Database: GWDB

The Texas Water Development Board (TWDB) Groundwater Database (GWDB) contains information on selected water wells, springs, oil/gas tests (that were originally intended to be or were converted to water wells), water levels and water quality.

Government Publication Date: Apr 12, 2024

Fort Bend Subsidence District Water Wells: WW FORT BEND

List of water wells in the Fort Bend Subsidence District, boundaries of which are defined as all the territory within Fort Bend County. The Fort Bend Subsidence District was created by the Texas Legislature in 1989 as a conservation and reclamation district to control land subsidence and manage groundwater resources through regulation, conservation, and coordination with suppliers of alternative water sources to assure an adequate quantity and quality of water for the future. The District's purpose is to provide for the regulation of the withdrawal of groundwater within the District to prevent subsidence that contributes to flooding, inundation or overflow of areas within the District, including rising waters resulting from storms or hurricanes.

Government Publication Date: Sep 23, 2024

High Plains Water Wells: WW HIGH PLAINS

Inventory of water wells in the High Plains Underground Water Conservation District No. 1 (HPUWCD), which was created in 1951. As a political subdivision of Texas, HPUWCD is charged with protecting, preserving and conserving aquifers within the District's 16-county service area.

Government Publication Date: Apr 14, 2024

Harris Galveston Subsidence District Water Wells: WW HARRIS GAL

List of water wells in the Harris-Galveston Subsidence District (HGSD). The HGSD was created by the 64th Texas Legislature as an underground water conservation district in 1975 to provide regulation of groundwater withdrawal to control subsidence.

Government Publication Date: Sep 23, 2024

Water Utility Database: WUD

The Water Utility Database is defined as a collection of data from Texas Water Districts, Public Drinking Water Systems and Water and Sewer Utilities who submit information to the TCEQ. This database is an integrated database designed and developed to replace over 160 stand alone legacy systems representing over 5 million records of the former Texas Water Commission and the Texas Department of Health.

Government Publication Date: Oct 1, 2020

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

T.F. SOILS INFORMATION

Soil Features

Soil mapping units included in this section for the production area and waste disposal areas were taken from the electronic Web Soil Survey for Wharton County. Soil descriptions are included in the supporting documentation and were taken from the most current version of the soil information database for Wharton County as obtained on February 7th, 2025.

T.G. ENGINEERING REPORT

Purpose

This report is prepared as part of the application for Wharton AD1, LLC. for a Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). Water balance models have been developed to illustrate the hydraulic and nutrient demands of the planned crops.

Background

Wharton AD1, LLC. is applying for a new Industrial Water Quality TLAP Permit No. WQ0000000000 to dispose of digestate (effluent) from two onsite anaerobic digesters. The entire process will generate an average of 75,000 gallons per day (GPO) of effluent for land application.

Water Balance Calculations

Figure 9, Water Balance Calculations, is designed to evaluate the maximum application rate (hydraulic loading rate) for the land application area, estimates the inflows and withdrawals from the direct rainfall, process-generated wastewater, evaporation, and irrigation withdrawal based on crop demand.

Storage Calculations

Figure 10, Storage Calculations, is designed to evaluate the storage capacity and surface area of the storage ponds.

Figure T.G.1

WATER BALANCE CALCULATIONS

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.:

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

(1) Month	(2) Avg Rain	(3) Avg Runoff	(4) Avg Infilt Rainfall	(5) Evapo-trans.	(6) Required Leach	(7) Total Water Needs	(8) Effluent Needed in Root Zone	(9a) Raw Net Evap. from Reservoir	(9b) Reservoir Net Evap. (as inches on plot acres)	(10) Effluent Needed Based on Irrigation Efficiency	(11) Reservoir Consumtion (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.41	1.95	0.81	0.00	0.81	0.00	-1.03	0.00	0.00	0.00
February	2.15	0.58	1.57	1.17	0.00	1.17	0.00	0.11	0.00	0.00	0.00
March	2.90	1.07	1.82	0.45	0.00	0.45	0.00	0.67	0.00	0.00	0.00
April	3.07	1.20	1.87	1.7	0.00	1.70	0.00	1.34	0.00	0.00	0.00
May	4.50	2.32	2.18	4.5	0.58	5.08	2.90	0.40	0.00	3.41	3.41
June	4.08	1.97	2.10	8.75	1.66	10.41	8.31	1.66	0.00	9.77	9.77
July	3.46	1.49	1.97	4.7	0.68	5.38	3.41	2.67	0.00	4.01	4.01
August	3.40	1.44	1.96	1.7	0.00	1.70	0.00	2.87	0.00	0.00	0.00
September	3.89	1.82	2.07	5.13	0.77	5.90	3.83	1.11	0.00	4.50	4.50
October	4.10	1.99	2.11	4.05	0.49	4.54	2.43	0.07	0.00	2.85	2.85
November	3.78	1.74	2.04	2.07	0.01	2.08	0.03	-0.82	0.00	0.04	0.04
December	2.71	0.95	1.77	0.99	0.00	0.99	0.00	-0.63	0.00	0.00	0.00
Totals	41.41	18.00	23.41	36.02	4.18	40.20	20.90	8.41	0.00	24.59	24.59

Crop is	Coastal	
CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	5.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate =	2.05	*ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate =		*ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis =	N/A	*ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit = 2.05 *ac-in/ac/month* **OR** *ac-ft/ac/year*

Limiting factor = Click this cell to choose from list.

Gross rate check (from flow, acres) = 0.00 **OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = ⟦(*average rainfall* – (0.2*((1000/*CN*) – 10)))⟧^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall – average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019
(6) Required leaching = ← Edit
If: *evapotranspiration – average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration – average infiltrated rainfall* > 0, *Ce* /(*Cl – Ce*)*(*evapotranspiration – avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration + required leaching*
(8) Effluent needed in root zone = *total water needs – average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface + effluent needed based on irrigation efficiency*

Figure T.G.2
STORAGE CALCULATIONS

STORAGE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: Wharton AD1, LLC
Permit No.: 0

The storage calculations are designed to evaluate the storage capacity and surface area of the applicant's storage pond (or multiple ponds). The pond must have enough surface area to evaporate all the flow to the pond under low-net evaporation and corresponding annual rainfall conditions. The pond is considered adequately sized when the adidtional storage required is equal to zero (or "none"). If the additional storage required is greater than zero, then:
(1) the pond's storage capacity must be increase, (2) the pond's surface area must be increased, (3) the effluent flow must be reduced, or (4) other approved measures must be taken to ensure that no accumulation occurs during low-net evaporation and corresponding annual rainfall conditions.

(12)	(13)	(14a)	(14b)	(15)	(16)	(17)	(18a)	(18b)	(19)	(20)
Month	Effluent Available (as inches on plot acres)	Average Rainfall Distrib. (%)	Rain Worst Year	Field Runoff Worst Year	Infiltrated Rain	Avail Water	Average Net Evap. Distrib. (%)	Low Net Evap. from Reservoir Surface	Effluent to Storage (as inches on plot acres)	Accum Storage (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	8.11%	5.04	2.77	2.27	2.27	-12.28%	0.00	0.00	-
February	0.00	5.19%	3.22	1.31	1.91	1.92	1.31%	0.00	0.00	-
March	0.00	6.99%	4.34	2.19	2.15	2.16	7.99%	0.00	0.00	0.01
April	0.00	7.41%	4.60	2.40	2.20	2.20	15.96%	0.00	0.00	0.01
May	0.00	10.88%	6.76	4.29	2.47	2.47	4.77%	0.00	-3.07	-
June	0.00	9.85%	6.12	3.72	2.40	2.41	19.77%	0.00	-9.42	-
July	0.00	8.37%	5.20	2.91	2.29	2.29	31.68%	0.00	-3.64	-
August	0.00	8.22%	5.10	2.83	2.27	2.28	34.09%	0.00	0.00	-
September	0.00	9.40%	5.84	3.47	2.37	2.37	13.18%	0.00	-4.14	-
October	0.00	9.91%	6.15	3.75	2.41	2.41	0.78%	0.00	-2.50	-
November	0.00	9.13%	5.67	3.32	2.35	2.35	-9.76%	0.00	0.00	-
December	0.00	6.55%	4.07	1.97	2.10	2.11	-7.50%	0.00	0.00	-
Totals	0.03	100%	62.12	34.93	27.19	27.23	100%	0.00	—	-

Worst (low) net evap. =	-18.96 inches	Storage required =	29.87 *ac-ft*
Corresponding rain =	62.12 inches	Actual storage =	*ac-ft*
Worst-case net year =	2004	Additional storage required =	29.87 *ac-ft*
		Storage days =	130 *days*

(13) Effluent available for irrigation (assumes design flow is applied to entire acerage unless different flow values are justified).
(14a) Average rainfall distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(14b) Rainfall worst year = (*rainfall distribution* as fraction or %/100*) *maximum annual rainfall*
(15) Field runoff worst year = ⟦(*rainfall worst year* – (0.2*((1000/*CN*) – 10)))⟧^2/((*rainfall worst year* + (0.8*((1000/*CN*) – 10))))
(16) Infiltrated rainfall = (rainfall worst year- field runoff worst year)
(17) Available water = (effluent available for land application + infiltrated rainfall check)
(18) (18a) Average net evaporation distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(18b) Net low evaporation from reservoir surface = [(|*low net evaporation*|)*(*net low evaporation avg. dist*)]* [(*pond area*)/(*irrigation area*)]
(19) Storage =
If: (*total water needs – infiltrated rainfall*) < 0, (*effluent available for land application – net low evaporation from reservoir surface*);
If: (*total water needs – infiltrated rainfall*) ≥ 0,
(effluent available for land application – net low evaporation from reservoir surface) * [(total water needs – infiltrated rainfall)/ (irrigation efficiency)]
(20) Accumulated storage =
If: *net low evaporation from reservoir surface + storage* ≤ 0, 0
If: *net low evaporation from reservoir surface + storage* > 0, enter value

T.H. OFF-SITE WASTES:

Volume and Type of Incoming Feedstock

Wharton AD1, LLC estimates a capacity to digest approximately 121,872 tons of feed stock per year; approximately 80,000 tons per year ("tpy") would originate from source separated organics, packaged waste, canned liquid and liquid organics and approximately 40,000 tpy would consist of dilution water (pressate, wash water and recovered). These wastes are to be acquired from multiple sources from Greater Houston Area. The total volume and percent of each source will fluctuate based on availability and needs of the digester. A summary of the proposed waste categories is as follows:

Category 1: Source-separated Organics (SSO)

Description: Source-Separated Organics (SSO) serve as a feedstock for biogas plants, providing high-energy organic material for anaerobic digestion (AD). The process breaks down food waste, yard waste, and soiled paper in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (nutrient-rich fertilizer).

Anticipated Quantity: 75 (tpd) (27,375 tpy)

Category 2: Packaged Waste

Description: Before material is brought on-site, the material must meet quality standards and haulers must provide a manifest for each truck. The waste undergoes depackaging to separate the organic fraction from non-biodegradable materials. The organic content is then fed into an anaerobic digestion (AD) system, where it decomposes in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (fertilizer).

Anticipated Quantity: 50 tpd (18,375 tpy)

Category 3: Canned liquid

Description: Canned liquid waste, like expired beverages and dairy, serves as a high-energy feedstock for biogas plants after depackaging. Rich in sugars, fats, and proteins, it enhances biogas production while reducing landfill waste. The process generates biogas for energy and digestate for fertilizer, promoting sustainability.

Anticipated Quantity: 25 tpd (9,000 tpy)

Category 4: Liquid Organics

Description: Liquid organics, such as food processing waste, dairy waste, and expired beverages, serve as an efficient feedstock for biogas plants. High in sugars, fats, and proteins, they accelerate anaerobic digestion, boosting biogas production and energy recovery.

Anticipated Quantity: 72 tpd (26,232 tpy)

Category 5: Other

Description: Dilution water, including pressate, wash water, and recovered water, enhances biogas production by optimizing feedstock consistency in anaerobic digestion. Pressate provides soluble organics, wash water adds biodegradable residues, and recovered water improves digestion efficiency. Their use increases methane yield, stabilizes the process, and supports resource recovery.

Anticipated Quantity: 112 tpd (40,890 tpy)

T.I. POLLUTANT ANALYSIS DATA

Pollutant analysis data is not available. Once the facility is in operation, samples will be collected and submitted to the TCEQ to meet the permit requirements.

Attachment - 2

PE LS
Texas Board of Professional Engineers and Land Surveyors

Number: **134253**
Status: **ACTIVE**
Expires: **3/31/2026**

XIAOYU ZHANG

TEXAS LICENSED PROFESSIONAL ENGINEER

Xiaoyu Michael Zhang
Signature

WHARTON CITY 120 E CANEY WHARTON TX 77488	BECKER ALVIE D ETUX LAURA J 174 GREENDALE RD WHARTON TX 77488	LEO ENTERPRISES INC 272 GREENDALE RD WHARTON TX 77488
LEO ENTERPRISES INC 272 GREENDALE RD WHARTON TX 77488	LEO ENTERPRISES INC 272 GREENDALE RD WHARTON TX 77488	DORNAK KEITH A 719 WILDERNESS TRL WHARTON TX 77488
PEREZ ANTHONY SR 223 SHIMEK EL CAMPO TX 77437	MCDOUGALL RUSSELL ETUX NANETTE 353 WILDERNESS TRL WHARTON TX 77488	KING LINDA 439 WILDERNESS TRL WHARTON TX 77488
SODERQUIST MICHELLE JANSKY 477 WILDERNESS TRAIL WHARTON TX 77488	CORTES ROLANDO & MARTINEZ ESMERALDA 614 MURPHY WHARTON TX 77488	DEITERICH FRANCES LIFE ESTATE 529 WILDERNESS TRL WHARTON TX 77488
DEITERICH FRANCES LIFE ESTATE 529 WILDERNESS TRL WHARTON TX 77488	ESCAMILLA CHRISSIE M 593 WILDERNESS TRL WHARTON TX 77488	NJOKU LASANDRA 950 BOROS DRIVE HOUSTON TX 77024
CASAREZ ANTONIO 1605 AMBER EL CAMPO TX 77437	SALEM ABDEL 10001 SIX PINES DR THE WOODLANDS TX 77380	ANZALDUA PAUL D 899 WILDERNESS TRAIL WHARTON TX 77488
OKEWUNMI JOHN & KIM PO BOX 118 ROSHARON TX 77583	BOYD CARL A III & KAILA N 586 FORREST LAWN WHARTON TX 77488	SMITH ANTHONY A 552 FORREST LAWN WHARTON TX 77488
PALACIOS RICHARD JR & YVONNA 522 FORREST LAWN WHARTON TX 77488	WHARTON COUNTY PO BOX 189 WHARTON TX 77488	WHARTON COUNTY 100 S FULTON ST STE 100 WHARTON TX 77488
WHARTON COUNTY 100 S FULTON ST STE 100 WHARTON TX 77488	TRUJILLO SONIA 1502 ENCLAVE PKWY APT 205 HOUSTON TX 77077	HOFFMANN PAUL LIFE EST 595 FORREST LAWN WHARTON TX 77488
PALACIOS GILBERT 594 FORREST LAWN RD WHARTON TX 77488	GUERRERO JESUS A ETUX ODETTE 304 OAK POND DR MANVEL TX 77578	WHARTON COUNTY 100 S FULTON ST STE 100 WHARTON TX 77488

LCRA PO BOX 220 AUSTIN TX 78767	LCRA PO BOX 220 AUSTIN TX 78767	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657
HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657
HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657
HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657	CAPLIN LLC 4017 MOUNTAIN SHADOW PLACE RAPID CITY TX 57702
KOCUREK JOSEPH JOHN 1098 CR 421 EL CAMPO TX 77437	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657
HANCOCK JOE BRUCE ETAL PO BOX 190 EL CAMPO TX 77437	LABELLE PROPERTIES LTD PO BOX 3111 BEAUMONT TX 77704	HANCOCK R H LANDS PO BOX 4125 HORSESHOE BAY TX 78657
WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488	CITY OF WHARTON 120 E. CANEY WHARTON TX 77488
CITY OF WHARTON 120 E. CANEY WHARTON TX 77488	GARCIA EVA RODRIGUEZ PO BOX 785 WHARTON TX 77488	WHARTON CITY OF PO BOX 311507 NEW BRAUNFELS TX 78131
WHARTON CITY 120 E CANEY WHARTON TX 77488	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467

PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	BAUER COLLEEN 5587 BRIGHT TIMBER LANDING DR SPRING TX 77386	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	GODSEY W R & WF 2127 SPUR TRL GRAPEVINE TX 76051	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE STATION ANTIQUES LLC PO BOX 501 PIERCE TX 77467	TEXAS STATE OF AUSTIN TX 78768
TEXAS STATE OF AUSTIN TX 78768	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	ACADEMY SQUARE (PIERCE) PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
MEHRENS NANCY KAINER & MEHRENS DAVID RAY 1316 FM 1299 WHARTON TX 77488	MEHRENS NANCY KAINER 1316 FM 1299 WHARTON TX 77488	MATHEWS DARREN R ETUX KIMBERLY D 1318 FM 1299 WHARTON TX 77488
BRUTON NELSON 1400 FM 1299 RD WHARTON TX 77488	ROSENBERG CARPET CENTER INC PO BOX 731 ROSENBERG TX 77471	ROSENBERG CARPET CENTER INC PO BOX 731 ROSENBERG TX 77471
ROSENBERG CARPET CENTER INC PO BOX 731 ROSENBERG TX 77471	JURASEK RUSSELL A ETUX JACQUELIN 1500 FM 1299 WHARTON TX 77488	MAYNARD RANDALL C 2100 FM 1299 RD WHARTON TX 77488

WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
VOULGARIS MICHAEL D 404 PRICE DR WHARTON TX 77488	BLUE CREEK REAL PROPERTIES LLC 1375 ENCLAVE PKWY HOUSTON TX 77077	HEIMANN GARY W 2172 CR 444 RD EL CAMPO TX 77437
BUCKEYE HAMILTON M3 MANAGEMENT LP 7 INWOOD CIR BAY CITY TX 77414	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
KOSCLSKSIE BARBARA B ETAL PO BOX 331 BROOKSHIRE TX 77423	HAWES BARBARA LOUISE TRUST DATED 8-17-81 PO BOX 686 WHARTON TX 77488	KOSCLSKIE BARBARA B ETAL PO BOX 331 BROOKSHIRE TX 77423
LCRA PO BOX 220 AUSTIN TX 78767	LCRA PO BOX 220 AUSTIN TX 78767	SCHMIDT RICHARD E PO BOX 784 EL CAMPO TX 77437
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	BEARD LONNIE F FAMILY TRUST 2106 NANCY LOU EL CAMPO TX 77437

KRESTA KEITH A & SARA 2394 FM 961 RD WHARTON TX 77488	MCMILLAN BARBARA A & MCMILLAN SHERRY L 2622 HAVERHILL DR HOUSTON TX 77008	MCELVEEN JOAN 3983 FM 1735 MT PLEASANT TX 75455
JOINES JON ETUX BLANCHE; JOINES CLINT J 1628 CR 235 WHARTON TX 77488	DUSEK DOUGLAS ETUX LORRAINE PO BOX 733 WHARTON TX 77488	WHARTON TURF GRASS INC PO BOX 1029 WHARTON TX 77488
WHARTON TURF GRASS INC PO BOX 1029 WHARTON TX 77488	BROWN DOUGLAS I 6570 COUGAR CROSSING WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
WHARTON CITY 120 E CANEY WHARTON TX 77488	CENTERPOINT ENERGY HOUSTON ELECTRIC PO BOX 1475 HOUSTON TX 77251	MAYNARD RANDALL 2100 FM 1299 RD WHARTON TX 77488
TEXAS STATE OF AUSTIN TX 78768	HOUSTON PIPE LINE CO PO BOX 660164 DALLAS TX 75266	DUSEK DOUGLAS ETUX LORRAINE PO BOX 733 WHARTON TX 77488
BOWERS N A EST 5426 CANDLE CREST HOUSTON TX 77091	BOWERS N A EST 5426 CANDLE CREST DR HOUSTON TX 77091	DAVIS CHARLES A JR PO BOX 1029 WHARTON TX 77488
WHARTON COUNTY EASEMENTS 309 E MILAM #600 WHARTON TX 77488	HORTON JM RANCH LLC 11744 SKENE WAY HOUSTON TX 77024	BOETTCHER & QUIREY PO BOX 384 EAST BERNARD TX 77435
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
BUCKEYE HAMILTON M3 MANAGEMENT LP 7 INWOOD CIR BAY CITY TX 77414	BUCKEYE HAMILTON M3 MANAGEMENT LP 7 INWOOD CIR BAY CITY TX 77414	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	SCHOENFIELD GARY & JEANETTE 3181 CR 405 RD EL CAMPO TX 77437	KNIPLING RICHARD F PO BOX 309 RICHMOND TX 77469

WILLIS BROTHERS PO BOX 271 EL CAMPO TX 77437	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	STAVINOHA ELSIE FAMILY TRUST PO BOX 1145 EL CAMPO TX 77437
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	ZALMAN JASON A ETUX TISHA M 191 WESTMOOR RD EL CAMPO TX 77437	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
SHAFER FAMILY FARMS LLC PO BOX 7602 HORSESHOE BAY TX 78657	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	COX PATSY R FAMILY LTD PTRNSHIP 1509 MICHAEL EL CAMPO TX 77437
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	KOCUREK JOSEPH JOHN 1098 CR 421 EL CAMPO TX 77437
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	HACKER WILLIAM 305 CR 409 RD EL CAMPO TX 77437	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP 191 WESTMOOR RD EL CAMPO TX 77437	ROD MARVIN J 118 DOGWOOD LAKE JACKSON TX 77566	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
THOMPSON KEVIN DALE & WF 623 CR 465 RD EL CAMPO TX 77437	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	BLUE CREEK REAL PROPERTIES LLC 1375 ENCLAVE PKWY HOUSTON TX 77077
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467

PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
WILBECK M P LLC 205 SILVER SADDLE DR ANGLETON TX 77515	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	Z & B PTNRSHIP 1306 AVE K EL CAMPO TX 77437
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	SWANSON LINDA S 15214 FALL PLACE DR SAN ANTONIO TX 78247
MAREK MELVIN E TRUST 9005 FM 1301 BOLING TX 77420	MAREK MELVIN E TRUST 9005 FM 1301 BOLING TX 77420	MAREK MELVIN E TRUST 9005 FM 1301 BOLING TX 77420
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	STAVINOHA ELSIE FAMILY TRUST PO BOX 1145 EL CAMPO TX 77437	GANGL JAMES ALLEN 4154 FM 1163 RD EL CAMPO TX 77437
GANGL JAMES ALLEN 4154 FM 1163 RD EL CAMPO TX 77437	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	SHAFER FAMILY FARMS LLC PO BOX 7602 HORSESHOE BAY TX 78657
KOPECKY ANNA J EST 8427 TAVENOR LN HOUSTON TX 77075	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	BEARD LONNIE F FAMILY TRUST 2106 NANCY LOU EL CAMPO TX 77437
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467

PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	BLUE CREEK REAL PROPERTIES LLC 1375 ENCLAVE PKWY HOUSTON TX 77077	BARTA WALTER 11726 MIGHTY REDWOOD DR HOUSTON TX 77059
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	BOEDEKER RONALD D ETUX SHARON H 120 CR 133 RD WHARTON TX 77488	KOEHN KENNETH & ALICE 559 WILDERNESS TRL WHARTON TX 77488
KOEHN KENNETH & ALICE 559 WILDERNESS TRL WHARTON TX 77488	DESIGN SUPERVISION ANALYSIS INC 5201 GARY RD COLLEGE STATION TX 77845	PRATKA MARK C ETUX KAY PO BOX 1596 EL CAMPO TX 77437
PRATKA MARK C ETUX KAY PO BOX 1596 EL CAMPO TX 77437	DEITERICH FRANCES M 529 WILDERNESS TRL WHARTON TX 77488	GARCIA HIGNIO ETAL 2800 CR 463 EL CAMPO TX 77437
WHARTON CITY 120 E CANEY WHARTON TX 77488	POPP CEDRIC E 4612 CR 410 RD EL CAMPO TX 77437	BARTOS VLASTA KOCUREK PO BOX 542 EL CAMPO TX 77437
KOCUREK JOSEPH JOHN 1098 CR 421 EL CAMPO TX 77437	KANSAS CITY SOUTHERN PO BOX 219335 KANSAS CITY TX 64121	KANSAS CITY SOUTHERN PO BOX 219335 KANSAS CITY TX 64121
KANSAS CITY SOUTHERN PO BOX 219335 KANSAS CITY TX 64121	KANSAS CITY SOUTHERN PO BOX 219335 KANSAS CITY TX 64121	ROD MARVIN J 118 DOGWOOD LAKE JACKSON TX 77566
HANSEN AUDREY A 7431 FM 1095 PALACIOS TX 77465	PENDRAY JANE K THORNBURG 1448 CR 428 RD WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP 415 FM 2817 RD WHARTON TX 77488	F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP 415 FM 2817 RD WHARTON TX 77488	JURASEK RUSSELL A ETUX JACQUELIN 1500 FM 1299 WHARTON TX 77488

WILBECK GARY L FAMILY TRUST 2902 WILLOW CREEK DR EL CAMPO TX 77437	WILBECK GARY L FAMILY TRUST 2902 WILLOW CREEK DR EL CAMPO TX 77437	WILBECK GARY L FAMILY TRUST 2902 WILLOW CREEK DR EL CAMPO TX 77437
WILBECK GARY L FAMILY TRUST 2902 WILLOW CREEK DR EL CAMPO TX 77437	D C V K LTD PRTNSHIP 580 MAXIM DR BOLING TX 77420	ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP 191 WESTMOOR RD EL CAMPO TX 77437
STUCKENSCHNEIDER TAMMY, HUNN EVELYN AND JETT ERVIN PO BOX 67 MARTINSBURG TX 65264	KAINER KATHRYN LIFE EST 411 AVE J EL CAMPO TX 77437	CJJ RETIREMENT LLC 1110 SUNSET ROAD ROSHARON TX 77583
JOINES JON ETUX BLANCHE 1628 CR 235 WHARTON TX 77488	HORTON JM RANCH LLC 11744 SKENE WAY HOUSTON TX 77024	MAREK TRAVIS L 821 CR 123 RD WHARTON TX 77488
MAREK TERENCE D 3079 W EMBERS CT BRYAN TX 77808	MAREK THOMAS E 283 DELLA EL CAMPO TX 77437	WHEELER DEBRA G 5 TORRINGTON CT AUSTIN TX 78738
SCHULZ THERESA & GOTTFRIED O 2299 LONE STAR DR APT 515 SUGAR LAND TX 77479	WHARTON CITY 120 E CANEY WHARTON TX 77488	WHARTON CITY 120 E CANEY WHARTON TX 77488
RUST LLOYD FAMILY LMT PRNSHP & RUST TM FAMILY LLC PO BOX 1027 WHARTON TX 77488	RACHUNEK KENNETH G 2123 FM 1299 RD WHARTON TX 77488	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	OTTO DIANNE 801 PECAN ST WHARTON TX 77488
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467

PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	MEZA RAFAEL & SUSANA 379 CR 456 EL CAMPO TX 77437
WHARTON CITY 120 E CANEY WHARTON TX 77488	RACHUNEK TIMOTHY J & LAURIANNE ETAL 710 CR 128 WHARTON TX 77488	ATTAWAY KIP RAY 24703 HARBOR TERRACE LN RICHMOND TX 77406
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
PIERCE RANCH GP PO BOX 538 PIERCE TX 77467	MATULA JULIUS & MARY FAMILY TRUST 674 CR 428 RD WHARTON TX 77488	HAWES HUGH R IV & CHRISTOPHER T TRUST PO BOX 538 PIERCE TX 77467
KAINER KATHRYN LIFE EST 411 AVE J EL CAMPO TX 77437	GAVRANOVIC F & D FARMS FLP 415 FM 2817 RD WHARTON TX 77488	BACCAM TOM N 19014 TEBROC CT HOUSTON TX 77094
J & D RIVER VIEW RANCH LLC 8003 ASH VALLEY DR SPRING TX 77379	BROWN DAVID OTIS & MARY JANE LIFE ESTATE 6420 COUGAR CROSSING WHARTON TX 77488	BROWN DAVID OTIS & MARY JANE LIFE ESTATE 6420 COUGAR CROSSING WHARTON TX 77488
JOHNSON CLINE III & CHRISTINE 854 COUNTY ROAD 402 EL CAMPO TX 77437	KOCUREK JOSEPH A & DANA 2440 CR 421 EL CAMPO TX 77437	Z & B PTNRSHIP 1306 AVE K EL CAMPO TX 77437
KOCUREK PHILIP ETUX BRAND LAURA 1104 COUNTY ROAD 421 EL CAMPO TX 77437	KOCUREK JOSEPH JOHN 1098 CR 421 EL CAMPO TX 77437	PIERCE RANCH GP PO BOX 538 PIERCE TX 77467
WHARTON CITY 120 E CANEY WHARTON TX 77488	AEP TEXAS INC PO BOX 16428 COLUMBUS TX 43216	STATE OF TEXAS 125 E 11TH ST AUSTIN TX 78701

CONFIDENTIAL OWNER 399 WILDERNESS TRL WHARTON TX 77488	BROWN DOUGLAS I 6570 COUGAR CROSSING WHARTON TX 77488	

ENGLISH VERSION OF THE PORTION OF NORI

APPLICATION. Wharton ADI, LLC (29°12'55"N 96°11'39"W), has applied to the Texas Commission on Environmental Quality (TCEQ) for a new Wastewater Disposal Permit No. WQ00_____ to authorize the distribution of digestate (effluent) from anaerobic digesters having an average daily flow rate of 75,000 gallons per day by the spreading method to approximately 28,955 acres of distribution area. The plant site is located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59. in Wharton County, Texas. This link to an electronic map of the general location of the site or facility is provided as a courtesy and is not part of the application or notice. For the exact location, see the application. [Insert web link from English notice]

This application was received by the TCEQ on _____ [date application received by TCEQ]. The permit application will be available for reading and copying at the Wharton County Library, 200 W Church St, El Campo, TX 77437 prior to the publication date of this notice in the newspaper.

Additional information may also be obtained from Wharton AD1, LLC at the address above or by calling Michael Zhang at 832-817-9116.

Comisión de Calidad Ambiental del Estado de Texas

AVISO DE RECEPCIÓN DE LA SOLICITUD Y LA INTENCIÓN DE OBTENER CALIDAD DEL AGUA PERMISO NUEVO

PERMISO NO. WQ00_____

SOLICITUD. Wharton ADI, LLC (29°12'55"N 96°11'39"W), ha solicitado a la Comisión de Calidad Ambiental de Texas (TCEQ) por un nuevo Permiso No.WQ00_____ de disposición de aguas residuales para autorizar Autorizar la distribución de digestato (efluente) de digestores anaeróbicos con un caudal promedio diario de 75,000 galones por día mediante el método de distribución a aproximadamente 28,955 acres de área de distribución. la disposición de digestato en un volumen que no sobrepasa un flujo promedio diario de 75,000 galones por día. galones por día por medio de método de extensión La planta y el sitio de disposición están ubicadas en El sitio está ubicado aproximadamente a 1,5 millas al sureste de la intersección de Pierce West Road y la autopista estadounidense 59. en el Condado de Wharton, Texas. Este enlace a un mapa electrónico de la ubicación general del sitio o de la instalación es proporcionado como una cortesía y no es parte de la solicitud o del aviso. Para la ubicación exacta, consulte la solicitud. [Insert web link from English notice]

La TCEQ recibió esta solicitud el día _____ *[date application received by TCEQ]*. La solicitud para el permiso estará disponible para leerla y copiarla en Wharton County Library, 200 W Church St, El Campo, TX 77437 antes de la fecha de publicación de este aviso en el periódico.

Include the following non-italicized sentence if the facility is located in the Coastal Management Program boundary and is an application for a major amendment which will increase the pollutant loads to coastal waters or would result in relocation of an outfall to a critical areas, or a renewal with such a major amendment. The Coastal Management Program boundary is the area along the Texas Coast of the Gulf of México as depicted on the map in 31 TAC §503.1 and includes part or all of the following counties: Cameron, Willacy, Kenedy, Kleberg, Nueces, San Patricio, Aransas, Refugio, Calhoun, Victoria, Jackson, Matagorda, Brazoria, Galveston, Harris, Chambers, Jefferson y Orange. If the application is for amendment that does not meet the above description, do not include the sentence: El Director Ejecutivo de la TCEQ ha revisado esta medida para ver si está de acuerdo con los objetivos y las regulaciones del Programa de Administración Costero de Texas (CMP) de acuerdo con

las regulaciones del Consejo Coordinador de la Costa (CCC) y ha determinado que la acción es conforme con las metas y regulaciones pertinentes del CMP.

AVISO ADICIONAL. El Director Ejecutivo de la TCEQ ha determinado que la solicitud es administrativamente completa y conducirá una revisión técnica de la solicitud. Después de completar la revisión técnica, el Director Ejecutivo puede preparar un borrador del permiso y emitirá una Decisión Preliminar sobre la solicitud. **El aviso de la solicitud y la decisión preliminar serán publicados y enviado a los que están en la lista de correo de las personas a lo largo del condado que desean recibir los avisos y los que están en la lista de correo que desean recibir avisos de esta solicitud. El aviso dará la fecha límite para someter comentarios públicos.**

COMENTARIO PUBLICO / REUNION PUBLICA. Usted puede presentar comentarios públicos o pedir una reunión pública sobre esta solicitud. El propósito de una reunión pública es dar la oportunidad de presentar comentarios o hacer preguntas acerca de la solicitud. La TCEQ realiza una reunión pública si el Director Ejecutivo determina que hay un grado de interés público suficiente en la solicitud o si un legislador local lo pide. Una reunión pública no es una audiencia administrativa de lo contencioso.

OPORTUNIDAD DE UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO. Después del plazo para presentar comentarios públicos, el Director Ejecutivo considerará todos los comentarios apropiados y preparará una respuesta a todo los comentarios públicos esenciales, pertinentes, o significativos. **A menos que la solicitud haya sido referida directamente a una audiencia administrativa de lo contencioso, la respuesta a los comentarios y la decisión del Director Ejecutivo sobre la solicitud serán enviados por correo a todos los que presentaron un comentario público y a las personas que están en la lista para recibir avisos sobre esta solicitud. Si se reciben comentarios, el aviso también proveerá instrucciones para pedir una reconsideración de la decisión del Director Ejecutivo y para pedir una audiencia administrativa de lo contencioso.** Una audiencia administrativa de lo contencioso es un procedimiento legal similar a un procedimiento legal civil en un tribunal de distrito del estado.

PARA SOLICITAR UNA AUDIENCIA DE CASO IMPUGNADO, USTED DEBE INCLUIR EN SU SOLICITUD LOS SIGUIENTES DATOS: su nombre, dirección, y número de teléfono; el nombre del solicitante y número del permiso; la ubicación y distancia de su propiedad/actividad con respecto a la instalación; una descripción específica de la forma cómo usted sería afectado adversamente por el sitio de una manera no común al público en general; una lista de todas las cuestiones de hecho en disputa que usted presente durante el período de comentarios; y la declaración "[Yo/nosotros] solicito/solicitamos una audiencia de caso impugnado". Si presenta la petición para una audiencia de caso impugnado de parte de un grupo o asociación, debe identificar una persona que representa al grupo

para recibir correspondencia en el futuro; identificar el nombre y la dirección de un miembro del grupo que sería afectado adversamente por la planta o la actividad propuesta; proveer la información indicada anteriormente con respecto a la ubicación del miembro afectado y su distancia de la planta o actividad propuesta; explicar cómo y porqué el miembro sería afectado; y explicar cómo los intereses que el grupo desea proteger son pertinentes al propósito del grupo.

Después del cierre de todos los períodos de comentarios y de petición que aplican, el Director Ejecutivo enviará la solicitud y cualquier petición para reconsideración o para una audiencia de caso impugnado a los Comisionados de la TCEQ para su consideración durante una reunión programada de la Comisión. La Comisión sólo puede conceder una solicitud de una audiencia de caso impugnado sobre los temas que el solicitante haya presentado en sus comentarios oportunos que no fueron retirados posteriormente. Si se concede una audiencia, el tema de la audiencia estará limitado a cuestiones de hecho en disputa o cuestiones mixtas de hecho y de derecho relacionadas a intereses pertinentes y materiales de calidad del agua que se hayan presentado durante el período de comentarios.

LISTA DE CORREO. Si somete comentarios públicos, un pedido para una audiencia administrativa de lo contencioso o una reconsideración de la decisión del Director Ejecutivo, la Oficina del Secretario Principal enviará por correo los avisos públicos en relación con la solicitud. Ademas, puede pedir que la TCEQ ponga su nombre en una or mas de las listas correos siguientes (1) la lista de correo permanente para recibir los avisos de el solicitante indicado por nombre y número del permiso específico y/o (2) la lista de correo de todas las solicitudes en un condado especifico. Si desea que se agrega su nombre en una de las listas designe cual lista(s) y envia por correo su pedido a la Oficina del Secretario Principal de la TCEQ.

CONTACTOS E INFORMACIÓN A LA AGENCIA. Todos los comentarios públicos y solicitudes deben ser presentadas electrónicamente vía http://www14.tceq.texas.gov/epic/eComment/ o por escrito dirigidos a la Comisión de Texas de Calidad Ambiental, Oficial de la Secretaría (Office of Chief Clerk), MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Tenga en cuenta que cualquier información personal que usted proporcione, incluyendo su nombre, número de teléfono, dirección de correo electrónico y dirección física pasarán a formar parte del registro público de la Agencia. Para obtener más información acerca de esta solicitud de permiso o el proceso de permisos, llame al programa de educación pública de la TCEQ, gratis, al 1-800-687-4040. Si desea información en Español, puede llamar al 1-800-687-4040.

También se puede obtener información adicional del Wharton AD1, LLC a la dirección indicada arriba o llamando a Michael Zhang al 832-817-9116.

Fecha de emisión _____ *[Date notice issued]*

TEXAS BOARD OF WATER ENGINEERS

Durwood Manford, Chairman
R. M. Dixon, Member
O. F. Dent, Member

BULLETIN 6019

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

November 1960

Reprinted July 1962

TEXAS BOARD OF WATER ENGINEERS

Durwood Manford, Chairman
R. M. Dixon, Member
O. F. Dent, Member

BULLETIN 6019

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

By

Louis L. McDaniels
Surface Water Division
Texas Board of Water Engineers

November 1960

Reprinted July 1962

First Printing, November 1960

Second Printing, September 1961

Third Printing, July 1962

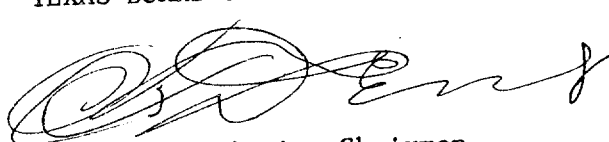
FOREWORD

Irrigation is practiced in different parts of Texas under various climatic conditions. In the far western portion of the State, irrigation supplies almost all of the water used by crops, while in the State's central region a significant part of crop water requirements is derived from rainfall. Rainfall on the eastern section of the State is sufficient for crop production most of the time, but crop yields are often assured through the use of "insurance" irrigation during infrequent critical dry periods of a few weeks duration.

This bulletin presents information on the water requirements of plants regardless of whether this water is supplied by precipitation directly, or by irrigation. The values given herein are not the amounts of water which are to be applied to the land, or pumped from a water supply source, to achieve agricultural production. Diversion amounts and field application volumes are dependent upon the soil characteristics, canal losses, deep percolation, and variations in times and amounts of rainfall. All these factors have to be considered in determining the amounts of water to be diverted from a supply for irrigation.

In order to determine the amount of irrigation water to be applied to the land, it is necessary to know the water requirements of plants. This bulletin presents the fundamental data of these water requirements of plants for use in water resources planning. Subsequent publications will describe studies of effective rainfall, irrigation efficiencies, and total diversion requirements.

TEXAS BOARD OF WATER ENGINEERS



O. F. Dent, Acting Chairman
November 23, 1960

TABLE OF CONTENTS

	Page
ABSTRACT	1
INTRODUCTION	3
ACKNOWLEDGEMENTS	3
PERSONNEL	4
DEFINITIONS	4
GENERAL DISCUSSION	5
Divisions of the State	5
Crops and Crop Groupings	5
Crop Seasons	6
Methods of Estimating Consumptive Use	7
TBWE METHOD	8
Procedure of Computation	8
BASIC DATA	10
Consumptive Use of Water by Crops	10
Climatic Index	12
USE COEFFICIENTS	12
TABULATIONS OF DATA	13
SELECTED BIBLIOGRAPHY	15

TABLE OF CONTENTS (Cont'd.)

APPENDICES

Page

Appendix A - Descriptive Figures ---------- A-1

Figure 1. Land resource divisions and irrigated areas ---------- A-3

2. Subdivision of irrigated areas ---------- A-4

3. Average-annual CLIMATIC-INDEX numbers for subdivisions of irrigated areas ---------- A-5

4. Average planting date and length of growing season of crops, by areas, in Texas ---------- A-6

Appendix B - Tables of Experiment Data and Basic Relations ---------- B-1

Table 1. Basic Data ---------- B-3

2. U. S. Weather Bureau First-Order Stations ---------- B-6

3. Climatic-Index Coefficients ---------- B-7

4. Climatic-Index Numbers ---------- B-8

Appendix C - Tables of Crop Consumptive Use ---------- C-1

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Table 5. Alfalfa ---------- C-3

6. Corn ---------- C-4

7. Cotton ---------- C-5

8. Grains, Small ---------- C-6

9. Orchards, Citrus ---------- C-7

10. Orchards, Deciduous Fruit ---------- C-7

11. Orchards, Pecan ---------- C-7

12. Peanuts ---------- C-8

13. Rice ---------- C-8

14. Sorghum, Grain ---------- C-9

15. Vegetables, Deep-Rooted ---------- C-10

16. Vegetables, Shallow-Rooted ---------- C-12

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

ABSTRACT

The study that resulted in the publication of this report was undertaken in order to obtain fundamental data of the average amounts of water used consumptively by agricultural crops, grown under favorable conditions including a full water supply, and thus to fulfill partly the need for information required for use in estimating the water requirements for irrigation.

The results published herein are estimates of average consumptive-use amounts for 12 major crops and crop groupings, and are tabulated by months for the respective length of growing season for each crop in each of 24 areas of major production in the State.

A method for estimating consumptive use of water by crops was developed by the Board of Water Engineers and used for the computation of the estimates tabulated. The TBWE (Texas Board of Water Engineers) Method is a procedure of relating experiment consumptive-use data to a composite relation of air temperature, dew point temperature, wind movement, and solar radiation, to obtain constant ratios or use coefficients for specific periods of time which vary with respect to length of periods and stage of development of vegetal growths.

The experiment data used were published consumptive-use amounts determined for crops grown in Texas, California, and Arizona. A composite relation of the aforementioned climatic data was used to compute average values for all areas of the state for the period 1946-55. These average values are called CLIMATIC-INDEX numbers. These numbers were used in conjunction with the use coefficients derived from the basic studies to compute estimates of monthly consumptive use by specific crops in each area of the State.

The estimated consumptive-use amounts for specific crops, as computed by this method, vary from place to place directly with the climatic-index number only.

These data provide a basis for estimating the monthly water requirements of plants on an average for production of agricultural crops in all areas of the State; and thus provide a basis for estimating amounts of water required from a source for irrigation when used with information describing amounts of rainfall effective in supplying the water requirements of crops, soil moisture available to crops, and losses involved with the distribution and application of water for crop use.

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

INTRODUCTION

The quantity of water required for the production of agricultural crops under irrigation must be known and inventoried in planning agricultural water-supply development.

This report presents estimates of average monthly depths of water used consumptively by major crops grown in Texas under conditions favorable to the production of agricultural crops, which includes a full water supply. Also included is a description of the TBWE (Texas Board of Water Engineers) method which has been developed for and used in the computation of these estimates of consumptive use. The values which are given for the water used consumptively by each crop are based on reliable data available at this time and are recommended for interim use until more extensive and precise data are obtained.

The estimates appearing in this report represent water requirements of plants only and not the gross amounts of water necessary for diversion from a surface or underground source to supply these plant requirements. Gross diversion requirements include consideration of many variable factors; such as canal losses, soil type, and method of water application, in addition to the water requirements of the plants. However, the water requirements of plants constitute the fundamental data used to develop estimates of quantities of water to be diverted for irrigation and are presented herein for this purpose.

ACKNOWLEDGEMENTS

All individuals and agencies, private and public, who have participated in the observation and collection of basic data related to the subject of this report are to be commended for their contributions. Particularly acknowledgement for assistance in the collection of basic data and in the interpretation of that data directly related to this report is given to:

The late Mr. Richard D. W. Blood, State Climatologist, U. S. Weather Bureau, Austin, Texas

Mr. Dean W. Bloodgood, Retired Irrigation Engineer, Board of Water Engineers, Austin, Texas and former Irrigation Engineer, U. S. Agricultural Research Service.

Dr. Morris E. Bloodworth, Professor of Soil Physics, Department of Agronomy, A. & M. College of Texas.

U. S. Study Commission-Texas, Irrigation Collaboration Group: Mr. Paul T. Gillett, Chairman; and members from the U. S. Bureau of Reclamation, the U. S. Soil Conservation Service, the State Soil Conservation Board, and the A. & M. College of Texas.

Mr. Tor J. Nordenson, Chief of Hydrologic Investigations Section, Hydrologic Services Division, U. S. Weather Bureau, Washington, D. C.

Mr. Robert V. Thurmond, Portland Cement Association, Austin, Texas. (Former Associate Planning Engineer, Texas Board of Water Engineers, and former Irrigation Engineer, Agricultural Extension Service, A. & M. College of Texas.)

PERSONNEL

Preliminary planning and inception of a report on consumptive use of water by, and irrigation requirements of, major crops grown under irrigation in Texas is credited to Robert V. Thurmond, working under the direction of McDonald D. Weinert, former Chief Engineer.

This report was prepared in Engineering Services, Board of Water Engineers, under the general supervision of John J. Vandertulip, Chief Engineer, and Seth D. Breeding, Chief Surface Water Engineer, by the Surface Water Division-Hydrologic Section for use by the Planning Division and is based on a method for consumptive-use determinations developed by Louis L. McDaniels, Acting Chief of the Hydrologic Section.

The Data Processing Division, directed by Ivan M. Stout, assisted Mr. McDaniels by performing extensive computations and preparing listings in tests of several accepted methods in preliminary studies prior to the development of the objective TBWE method for computing consumptive use of water by major crops grown under favorable conditions of available water.

DEFINITIONS

Terms used in this report to describe the method employed and to identify the relations and factors expressed are specifically defined, as follows:

CLIMATIC INDEX is a number expressing a composite relation of four climatic factors--air temperature, dew point temperature, wind movement, and solar radiation--as expressed by plate 2 in the USWB (U. S. Weather Bureau) Technical Paper 37 [1/] which in turn is based on Equation 14 in the USWB Research Paper 38 [2/].

[1/] Kohler, M. A., Nordenson, T. J., and Baker, D. R., 1959, Evaporation Maps for the United States: U. S. Weather Bureau Tech. Paper 37.

[2/] Kohler, M. A., Nordenson, T. J., and Fox, W. E., 1955, Evaporation from Pans and Lakes: U. S. Weather Bureau Research Paper 38.

Equation 14 was derived from evaporation research studies at Lake Hefner 3/ and at Lake Mead 4/.

CONSUMPTIVE USE is the depth of water, in inches, removed from a vegetated area by evaporation of moisture from soil surface, by evaporation of intercepted water from plant surfaces, by development of plant tissue, and by transpiration from vegetal growths. (Literature containing discussions of consumptive use of water by vegetation, evapotranspiration, and irrigation requirements of agricultural crops is quite voluminous. In lieu of many specific citations, a selected bibliography is presented at the end of this text.)

USE COEFFICIENT is a number expressing the ratio of a CONSUMPTIVE USE amount to a CLIMATIC INDEX.

The above terms are used in abbreviation, as follows: IC (CLIMATIC INDEX), UC (CONSUMPTIVE USE), AND KU (USE COEFFICIENT).

GENERAL DISCUSSION

Divisions of the State

The State was divided into eight areas (see figure 1, appendix A, page A-3) to form major land-resource divisions based on a complex characterized by similarities of vegetation, soil, climate, and water availability. These eight areas were further divided into 24 smaller areas (see figure 2, appendix A, page A-4) on a similar but more refined basis.

Crops and Crop Groupings

The following basic crops and crop groups are those for which consumptive-use amounts are presented:

Alfalfa
Corn
Cotton
Grains, Small
Orchards, Citrus
Orchards, Deciduous Fruit
Orchards, Pecan
Peanuts
Rice
Sorghum, Grain
Vegetables, Deep-Rooted
Vegetables, Shallow-Rooted

3/ U. S. Geological Survey, 1954, Water Loss Investigations: Vol. 1--Lake Hefner Studies: U. S. Geol. Survey Prof. Paper 269.

4/ U. S. Geological Survey, 1958, Water Loss Investigations: Lake Mead Studies: U. S. Geol. Survey Prof. Paper 298.

Included under deep-rooted vegetables, are the following:

Beans
Beets
Cantaloupe
Carrots
Chard
Cucumbers
Eggplant
Okra
Peas
Peppers
Pumpkin
Squash
Sweet Potatoes
Tomatoes
Turnips
Watermelons

Included under shallow-rooted vegetables, are the following:

Brussels Sprouts
Cabbage
Cauliflower
Celery
Lettuce
Onions
Radishes
Spinach
Sweet Corn

Consumptive-use amounts for five of the major crops (alfalfa, corn, cotton, small grains, and grain sorghum) are shown for all areas of the state for purposes of comparison and reference. For other crops, these amounts are given for areas of major production only.

Three of these crops were used as a basis for determining consumptive-use amounts for certain other crops. Consumptive use of water by perennial pasture was based on amounts shown for alfalfa; by leguminous fertilizers (used as soil conditioners) on amounts shown for small grains; and by silage sorghum and by forage sorghum on amounts shown for grain sorghum.

Crop Seasons

The variations in the climate and the habits and practices of farmers and agriculturists in Texas, from year to year and from area to area, necessitated the selection of uniform planting dates and length of growing season for crops in each area for use in this report. These selections, which use the first day or the sixteenth day of a month as starting dates for crops, were made on a practical basis from areal information to minimize the variations.

The average planting date in each of the 24 areas and the length of growing season for each crop in this report was based on field reports (except for shallow-rooted vegetables) from Agricultural Experiment Stations of the A. & M. College of Texas, and data revealing the physiology of plants which were collected and furnished by Dr. Morris E. Bloodworth. These dates and lengths of growing seasons are shown on figure 4 (appendix A, page A-6). For the shallow-rooted vegetable group, the one exception, one or more 3½-month growing seasons were indicated in the field reports. The lack of basic data on consumptive use, and the variations in planting dates and length of growing season for crops in this group were the reasons for the use of a 7-month season for shallow-rooted vegetables. This 7-month period generally spans the season characterized by staggered plantings and harvests of mixed combinations of vegetables in this group.

Methods of Estimating Consumptive Use

The need for knowledge of the consumptive use of water by major crops and native vegetation has been the incentive for extensive research and experiment. This need has been the stimulus for the development of methods for extrapolating the experiment data to other areas and different climatic regions. Recognizing that atmospheric phenomena, in addition to soil conditions, affected the growth of plants and their use of water, scientists have related research and experiment data to climatic data as a vehicle for use in estimating the consumptive use by crops in other areas. The sensitiveness and the objectiveness of these methods have been controlled by the type, the quantity, and the extent of the climatic data available. The number of atmospheric phenomena which comprise our climatic data recorded at meteorologic stations are few with respect to area of coverage and completeness of expression. The fewness of these data has been responsible generally for the development of methods which are adaptable to extensive areal usage, but which are lacking in sensitivity to changes in our geographic and climatic regions.

Several recognized methods for estimating consumptive use by agricultural crops and native vegetation have been used in the United States and in foreign countries. Some of the better-known methods are those discussed in "Methods of Computing Consumptive Use of Water" by Wayne D. Criddle, Paper 1507, IR-1, Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, January 1958, which include the following:

Lowry-Johnson Method
Thornthwaite Method
Blaney-Criddle Method
Hargreaves Method
Penman Method

The cited methods vary somewhat each from the other in the climatic data required and used to express relations in empirical or theoretical determinations of consumptive use during a part of, or throughout the life cycle of, specific vegetal growths at research and experiment sites.

Of these methods, the widely used Blaney-Criddle Method was seriously considered for use in estimating average-monthly consumptive-use amounts for the major crops grown in Texas under favorable conditions of available water. This method entails the use of: one variable which is mean air temperature, a constant for the site which is the percentage of daytime hours of a year at that latitude, and a use coefficient for each crop.

In the application of the Blaney-Criddle Method, the complexity of the use coefficient becomes apparent. This coefficient expresses an integration of the physiologic characteristics of a plant together with the effect of atmospheric phenomena other than (1) air temperature, and (2) the possible percentage of daytime hours of a year during each month. Heretofore, adjustment of this coefficient on the basis of relative humidity variations has been practiced in an effort to compensate for differences between geographic and climatic regions. Satisfactory results have been obtained in some areas by this procedure. The distribution of monthly and seasonal coefficients has been dependent on individual judgment.

Recognition of the subjectiveness of some of these methods previously adapted to widespread use reveals the acumen and adroitness of the cited authors and others whose work in this field is testimonial of their experience and judgment. However, the judgment procedures necessary to distribute the Blaney-Criddle use coefficients precluded the adoption of this method for use in estimating consumptive-use amounts for crops grown in Texas in this report, and provided the stimulus which led to the development of the method used.

TBWE METHOD

The TBWE Method developed for use in estimating consumptive-use amounts utilizes some of the basic research and experiment consumptive-use data presented by the cited authors. Similar data recently collected in Texas by the U. S. Agricultural Research Service and the Texas Agricultural Experiment Stations were used to develop constant-value USE COEFFICIENTS for a given crop.

The TBWE Method differs from other methods in the number of climatic variables utilized to express variations in consumptive-use amounts from place to place. Development of this method has been possible because of the availability of Equation 14, USWB Research Paper 38, and the related procedures presented in USWB Technical Paper 37, which provide the means of processing a greater and more varied amount of climatic data than heretofore practical.

The TBWE Method of estimating consumptive-use amounts for crops, is a procedure of relating a measured CONSUMPTIVE USE for a crop during a period of time, to a CLIMATIC INDEX at the site of measurement during the same period of time, to obtain a USE COEFFICIENT. This USE COEFFICIENT can then be applied to a CLIMATIC INDEX for the same length of time at any other site for which consumptive-use amounts are desired for that crop. This method and others are homogeneous in basic principles. However, this method employs constant USE COEFFICIENTS (KU) for specific crops in all geographic and climatic regions, and utilizes the variations in the composite relation of the four atmospheric phenomena to determine variations in consumptive-use (UC) amounts. Therefore, the amount of consumptive use estimated for a crop varies directly with the CLIMATIC INDEX (IC) only.

The only variation in a set of USE COEFFICIENTS for a crop is effected by the planting date and length of growing season; such as, the first of a month, the sixteenth of a month, or whatever date of a month is used. A set of USE COEFFICIENTS developed for a crop started on a specific planting date during any month and continuing throughout the length of the growing season for that crop from that date can be used without adjustment at sites other than the experiment site and beginning on the like planting date during any month. For example, USE COEFFICIENTS developed for cotton planted February 16 at Weslaco in Area 4A (see figure 4) can be used without change for cotton planted May 16 at Lubbock in Area 1B. The USE COEFFICIENTS developed were used in this manner for each specific crop in all areas having the same planting date of a month and the same length of growing season.

Procedure of Computation

The computation of USE COEFFICIENTS for each crop was accomplished in accordance with procedures described as follows:

A. Basic experiment data were related to CLIMATIC-INDEX numbers.

1. Measured CONSUMPTIVE-USE amounts were arranged by 15-day periods beginning with the planting date acknowledged in the experiment data used. These 15-day periods were arranged so that adjustments of the basic data could be made for use for crops started on the first or on the sixteenth day of a month.

2. CLIMATIC-INDEX numbers were computed for the same 15-day periods from climatic data for the experiment site or the nearest USWB first-order climatic station in accordance with the procedures described in the USWB Technical Paper 37. Paper 37 contains nomographs for the solution of Equation 14, USWB Research Paper 38. These numbers are called Evaporation from Lake Surfaces in the cited papers.

3. Each 15-day CONSUMPTIVE-USE amount was divided by the CLIMATIC INDEX for the corresponding 15-day period. The resulting ratios are 15-day USE COEFFICIENTS. (These 15-day ratios can be transferred to other sites and related to CLIMATIC-INDEX numbers for like periods to obtain estimates of CONSUMPTIVE USE by 15-day periods if desired.)

4. The 15-day amounts and numbers obtained in steps A1-3 were used to define growth-use curves which were plotted as histograms showing 15-day relations, and also plotted as mass curves showing total consumptive use for each crop during the period of experiment data available. These growth-use curves represent the consumptive use during various stages of vegetal growth.

B. The basic assumption of this method is that the growth of each crop and its corresponding water use is directly related to the four climatic factors described in the definition of CLIMATIC INDEX, and that this assumption is valid with the differing physiologic characteristics of various crops.

C. On the basis of the stated assumption under B, the growth-use curves described under A4 were used to adjust the experiment consumptive-use data to planting dates beginning on the first and sixteenth day of any month as desired.

1. CLIMATIC-INDEX numbers were computed for 15-day periods as needed for each experiment site in order to adjust experiment data for each crop to the selected planting dates used in the various areas.

2. The USE-COEFFICIENT numbers obtained by step A3 were used as constants for respective 15-day periods in sequence and were multiplied sequentially by the 15-day CLIMATIC-INDEX numbers obtained by step C1 to estimate CONSUMPTIVE-USE amounts at the experiment site as though a respective crop had been planted and grown at that site during the selected periods.

3. The CONSUMPTIVE-USE amounts and the CLIMATIC-INDEX numbers computed by steps C1 and C2 were combined into desired half-month and full-month arrangements to agree with the desired planting dates and the adopted length of growing season.

4. The half-month and full month values as combined in step C3 were then processed: UC/IC=KU--CONSUMPTIVE USE divided by CLIMATIC INDEX equals USE COEFFICIENT.

The KU numbers computed by the above-described procedure comprised sets of constant-value USE COEFFICIENTS which were employed in the computation of estimates of CONSUMPTIVE-USE amounts for respective crops in the areas of major production as desired.

BASIC DATA

Consumptive Use of Water by Crops

Amounts of water used consumptively by various crops, as determined at basic research and experiment sites, and presented in published and unpublished reports, were part of the basic data used to develop the relations and estimated consumptive-use amounts described and presented herein. These data were obtained at various sites in Arizona, California, and Texas. The sources of data for respective crops, are as follows:

Alfalfa consumptive-use amounts in San Fernando Valley, California, in 1940 5/

Corn based on consumptive-use amounts for grain sorghum at Bushland, Texas, 1956-58 5/,6/ and adjusted on the basis of growth-use relations for the two crops as indicated by figure 29 in Bulletin 937 7/

Cotton consumptive-use amounts at Weslaco, Texas, in 1958 8/

Small Grains consumptive use at Bushland, Texas, 1956-58 5/,6/

5/ Blaney, H. F., Haise, H. R., and Jensen, M. E., Monthly Consumptive Use by Irrigated Crops in Western United States: Supplement to U. S. Soil Conservation Service Tech. Paper 96.

6/ Jensen, M. E., and Sletten, W. H., 1959, Agricultural Reasearch Service Project Reports: ARS-SWC, Fort Collins, Colorado and Bushland, Texas.

7/ Bloodworth, M. E., 1959, Some Principles and Practices in the Irrigation of Texas Soils: Texas Agricultural Experiment Station Bull. 937, A. & M. College of Texas.

8/ Ross, P. E., and Boykin, J. W., Unpublished data for 1958 cotton crop at ARS-SWC station in Weslaco, Texas.

Citrus consumptive use is average of amounts for oranges and grapefruit in Salt River Valley, Arizona, 1931-54 9/ and the amounts for oranges in San Fernando Valley, California, in 1940 5/

Deciduous Fruit consumptive use in San Joaquin-Sacramento Delta, California, in 1928 9/

Pecans consumptive use based on amounts for walnuts in San Fernando Valley, California, in 1928 5/

Peanuts estimated average consumptive use in east Texas based on data in Bulletin 937 7/

Rice consumptive use and cultural flooding based on data from Rice-Pasture Experiment Station at Beaumont and Eagle Lake, Texas, in 1954

Grain sorghum consumptive use at Bushland, Texas, 1956-58 5/,6/

Deep-Rooted Vegetables consumptive use by tomatoes in Sacramento Valley, California, 1933-55 5/

Shallow-Rooted Vegetables consumptive use in San Joaquin Delta, California, in 1928 5/

The relations of the consumptive use of water by perennial pasture; by leguminous or other crops, used as fertilizers or soil conditioners; by silage sorghum and forage sorghum; to the consumptive use by the base crops described previously, were determined on the basis of sparse experiment data and recommendations by some of the agriculturists acknowledged.

The basic amounts of consumptive use at respective experiment sites by the above crops, as used to develop the USE COEFFICIENTS employed in the TBWE Method, are shown on table 1 (appendix B, page B-3). In some instances, the amounts shown as UC (CONSUMPTIVE USE) vary slightly from the amounts presented in the cited references. These variations result from the adjustment of the experiment data because of differences in planting dates.

5/ See footnote 5, page 10.

6/ See footnote 6, page 10.

7/ See footnote 7, page 10.

9/ Blaney, H. F., March 1959, Monthly Consumptive Use Requirements for Irrigated Crops: Am. Soc. Civil Engineers Proc. Paper 1963, Journal of the Irrigation and Drainage Division, Vol. 85, No. IR-1, Part I.

Climatic Index

The basic value of the average annual CLIMATIC INDEX determined for each of the 24 areas of the state described under GENERAL DISCUSSION, Divisions of the State, is shown by the large numerals on figure 3 (appendix A, page A-5). These values were obtained by replotting the respective isograms shown on plate 2, USWB Technical Paper 37, onto a map of Texas showing the 24 areas, and then determining an average from these isograms in each area. The resulting chart shows the variation in the average-annual value of the CLIMATIC INDEX for the 10-year period 1946-55 across the State.

As mentioned before, the values shown on plate 2, USWB Technical Paper 37, and entitled: "AVERAGE ANNUAL LAKE EVAPORATION IN INCHES, PERIOD 1946-55", are called CLIMATIC-INDEX numbers in this report.

Monthly values of the CLIMATIC-INDEX numbers for each of the 24 areas were determined by multiplying the average annual CLIMATIC-INDEX number for an area by the monthly distribution coefficients for that area as shown in table 3 (appendix B, page B-7). These distribution coefficients were determined from values of the average monthly CLIMATIC-INDEX number computed for 31 USWB first-order climatic stations--20 in Texas and 11 in adjacent states. These first-order stations are listed in table 2 (appendix B, page B-6). The distribution coefficients are the ratios obtained by dividing the average monthly CLIMATIC-INDEX number by the average annual CLIMATIC-INDEX number. If expressed as a percentage, these coefficients represent the percentage of the annual CLIMATIC-INDEX number occurring each month of a year on an average. The distribution coefficients were assigned to each of the 24 areas on the basis of the definition afforded by the numbers computed for each first-order climatic station--using such numbers direct when applicable, and interpolating between such numbers for adjacent areas when applicable. The resulting CLIMATIC-INDEX numbers are shown in table 3.

Monthly values of the CLIMATIC-INDEX number were computed for each experiment site, for each year or each average of years, as needed for relating to CONSUMPTIVE-USE amounts for crops comprising the basic agricultural data used herein. These numbers are shown as IC for the respective sites and crops in table 1.

USE COEFFICIENTS

Constant-value USE COEFFICIENTS for each crop at each experiment site were computed from the basic data as previously described under TBWE METHOD, Procedure of Computation. For practical application of the method, the USE COEFFICIENTS for half-month periods were recomputed and related to one-half of a monthly CLIMATIC-INDEX number. This procedure allows the use of monthly values of the CLIMATIC-INDEX number divided by two when computing estimates of consumptive use by crops planted on the sixteenth of a month or harvested by the fifteenth of a month. The USE COEFFICIENTS for each crop and each starting date and length of growing season are shown as KU in table 1.

The consumptive-use amounts computed and shown for each crop are estimates of the average depth of water, in inches, required for the growth and full development of that crop under conditions favorable to the production of

agricultural crops having a full water supply in each of the areas for the periods indicated. These amounts are constituted as defined and do not include estimates of losses of water from distribution, leaching, seepage, and other causes not inherently a part of the experiment consumptive-use data described and used.

TABULATIONS OF DATA

A set of tables, numbers 1 to 4 (appendix B) and numbers 5 to 16 (appendix C), are used to present the relations described and the results obtained by the procedures set forth. These tables contain the basic experiment CONSUMPTIVE-USE data adjusted to planting dates used herein, the CLIMATIC-INDEX numbers for the experiment sites, the TBWE USE COEFFICIENTS evolved, the distribution coefficients used to convert average-annual climatic-index numbers to monthly numbers in the 24 areas covering Texas, the average-monthly and average-annual climatic-index numbers computed for each of the 24 areas, and monthly and seasonal consumptive-use amounts by areas for the crops included and listed under GENERAL DISCUSSION, Crops and Crop Groupings.

The 24 areas were listed on the tables in a sequence chosen to attain reasonably smooth transition between the extremes in the general geographic and climatic areas of the State.

SELECTED BIBLIOGRAPHY

Abbe, Cleveland, 1905, A First Report of the Relations Between Climates and Crops: U. S. Weather Bureau Bull. 36.

Allen, S. W., 1955, Conserving Natural Resources, Principles and Practices in a Democracy: New York, McGraw-Hill Book Company.

Am. Geophys. Union, June 1934, Report of the Committee on Absorption and Transpiration, 1933-34: Am. Geophys. Union Trans., Washington, U. S. Govt. Printing Office.

Am. Soc. Civil Engineers, 1952, Consumptive Use of Water: Paper 2524 - a symposium, Am. Soc. Civil Engineers Trans., Vol. 117.

_____, 1930, Consumptive Use of Water in Irrigation: Progress Report of the Duty of Water Committee of the Irrigation, Am. Soc. Civil Engineers Trans., Vol. 94.

_____, 1949, Hydrology Handbook: Am. Soc. Civil Engineers Manuels of Engineering Practice, No. 28.

Beauchamp, K. H., September 1958, Potential Use of Water by Irrigation in the Humid Area: Am. Soc. Civil Engineers Proc. Paper 1750, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-3.

Biggar, J. W., Bloodworth, M. E., and Burleson, C. A., 1957, Effect of Irrigation Differentials and Planting Dates on the Growth, Yield, and Fiber Characteristics of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 1940, A. & M. College of Texas.

Blanney, H. F., 1952, Consumptive Use of Water: Am. Soc. Civil Engineers Trans., Vol. 117.

_____, October 1955, Evaporation and Evapotranspiration Investigations in the San Francisco Bay Area: Am. Geophys. Union Trans., Vol. 36, No. 5.

_____, 1938, Field Methods of Determining Consumptive Use of Water: Division of Irrigation, U. S. Dept. of Agriculture.

_____, March 1959, Monthly Consumptive Use Requirements for Irrigated Crops: Am. Soc. Civil Engineers Proc. Paper 1963, Journal of the Irrigation and Drainage Division, Vol. 85, No. IR-1, Part I.

_____, and Criddle, W. D., August 1950, Determining Water Requirements in Irrigated Areas from Climatological and Irrigation Data: U. S. Soil Conservation Service Tech. Paper 96.

_____, Ewing, P. A., Morin, K. V., and Criddle, W. D., June 1942, Consumptive Water Use and Requirements: Natl. Resources Planning Board, Pecos River Joint Investigation - Reports of the participating agencies, Washington, U. S. Govt. Printing Office.

Blaney, H. F., Ewing, P. A., Israelsen, O. W., Rohwer, Carl, and Scobey, F. C., February 1938, Water Utilization, Upper Rio Grande Basin: National Resources Committee, Part III.

_____, Haise, H. R., and Jensen, M. E., August 1950, Monthly Consumptive Use by Irrigated Crops in Western United States - a Provisional Supplement to SCS-TP-96, Determining Water Requirements in Irrigated Areas from Climatological and Irrigation Data: U. S. Soil Conservation Service Tech. Paper 96.

_____, and Harris, Karl, December 1951, Consumptive Use and Irrigation Requirements of Crops in Arizona: U. S. Soil Conservation Service.

_____, and Morin, K. V., 1942, Evaporation and Consumptive Use of Water Empirical Formulas: Am. Geophys. Union Trans., Vol. 23.

_____, and Stockwell, H. J., Jr., June 1941, Progress Report on Cooperative Research Studies on Water Utilization, San Fernando Valley, California, Irrigation Season of 1940: Division of Irrigation, U. S. Dept. of Agriculture.

_____, Taylor, C. A., Nickle, M. G., and Young, A. A., 1933, Water Losses Under Natural Conditions from Wet Areas in Southern California: Division of Water Resources Bull. 44, California State Dept. of Public Works, Pomona, California.

_____, Taylor, C. A., and Young, A. A., 1930, Rainfall Penetration and Consumptive Use of Water in Santa Ana River Valley and Coastal Plain: Division of Water Resources Bull. 33, California State Dept. of Public Works, Pomona, California.

Bloodgood, D. W., /no date/, Biennial Reports: Texas Board of Water Engineers, Austin, Texas.

_____, and Curry, A. S., 1925, Net Requirements of Crops for Irrigation Water in the Mesilla Valley, New Mexico: New Mexico Experiment Station Bull. 149.

Bloodworth, M. E., September 1959, Some Principles and Practices in the Irrigation of Texas Soils: Texas Agricultural Experiment Station Bull. 937, A. & M. College of Texas.

_____, Burleson, C. A., and Cowley, W. R., 1956, Effect of Irrigation Differentials and Planting Dates on the Growth, Yield, and Fiber Characteristics of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 1866, A. & M. College of Texas.

_____, Cowley, W. R., and Morris, J. S., 1950, Growth and Yield of Cotton on Willacy Loam as Affected by Different Irrigation Levels: Texas Agricultural Experiment Station Progress Report 1217, A. & M. College of Texas.

Bodman, G. B., and Colman, E. A., 1944, Moisture and Energy Conditions During Downward Entry of Water into Moist and Layered Soils: Am. Soil Science Society Proc., Vol. 8.

Bonnen, C. A., McArthur, W. C., Magee, A. C., and Hughes, W. F., 1952, Use of Irrigation Water on the High Plains: Texas Agricultural Experiment Station Bull. 756, A. & M. College of Texas.

Briggs, L. J., and Shantz, H. L., October 1916, Daily Transpiration During the Normal Growth Period and its Correlation with the Weather: Journal of Agricultural Research, Vol. 7.

_____, and Shantz, H. L., January 1916, Hourly Transpiration Rate on Clear Days as Determined by Cyclic Environmental Factors: Journal of Agricultural Research, Vol. 5.

Colman, E. A., and Bodman, G. B., 1945, Moisture and Energy Conditions During Downward Entry of Water into Moist and Layered Soils: Am. Soil Science Society Proc., Vol. 9.

Conkling, H., 1930, Consumptive Use of Water in Irrigation: Progress Report of the Duty of Water Committee of the Irrigation Division, Am. Soc. Civil Engineers Trans., Vol. 94.

Criddle, W. D., January 1958, Influence of Climate on Irrigation Agriculture: Am. Soc. Civil Engineers Proc. Paper 1504, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-1.

_____, January 1958, Methods of Computing Consumptive Use of Water: Am. Soc. Civil Engineers Proc. Paper 1507, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-1.

Davis, J. R., August 1956, Future of Irrigation in Humid Areas: Journal of the Am. Water Works Assoc., Vol. 48, No. 8.

_____, 1956, Water Demand Potential of Irrigation in Humid Areas: Report to Indiana Water Resources Study Committee, Purdue University, Lafayette, Indiana.

Draper, E. L. July 1947, Supporting Data, Middle Rio Grande Project Report Study of Valley Consumptive Use and Irrigation Demand at Otowi: U. S. Bureau of Reclamation, Albuquerque, New Mexico.

Fisher, C. E., and Burnett, E., 1953, Conservation and Utilization of Soil Moisture: Texas Agricultural Experiment Station Bull. 767, A. & M. College of Texas.

Fortier, Samuel, 1927, Orchard Irrigations: U. S. Dept. of Agriculture Farmers' Bull. 1518.

_____, and Young, A. A., June 1930, Irrigation Requirements of the Arid and Semiarid Lands of the Southwest: Division of Agricultural Engineering Tech. Bull. 185, Bureau of Public Roads, U. S. Dept. of Agriculture, Washington, U. S. Govt. Printing Office.

Gardner, W., and Widtsoe, J., 1921, The Movement of Soil Moisture: Soil Science, 11.

Garton, J. E. A., July 1951, Graphic Method of Finding the Depth of Irrigation Applied: Agricultural Engineering.

Gatewood, J. S., Robinson, T. W., Colby, B. R., Hem, J. D., and Halpenny, L. C., 1950, Use of Water by Bottom-Land Vegetation in Lower Safford Valley, Arizona: U. S. Geol. Survey Water-Supply Paper 1103.

Gerard, C. J., Bloodworth, M. E., Burleson, C. A., and Cowley, W. R., 1958, Cotton Irrigation in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Bull. 916, A. & M. College of Texas.

_____, Burleson, C. A., Biggar, J. W., and Cowley, W. R., 1958, Effect of Irrigation Differentials and Planting Dates on Yield of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 2016, A. & M. College of Texas.

Halkias, N. A., Veihmeyer, F. J., and Hendrickson, A. H., December 1955, Determining Water Needs for Crops from Climatic Data: Hilgardia, Vol. 24, No. 9, University of California.

Hall, W. A., April 1956, Estimating Irrigation Border Flow: Agricultural Engineering.

Hansen, V. E., February 2, 1955, Infiltration and Soil Water Movement During Irrigation: Soil Science, 79.

Hargreaves, G. H., November 1956, Irrigation Requirements Based on Climatic Data: Am. Soc. Civil Engineers Proc. Paper 1105, Journal of the Irrigation and Drainage Division, Vol. 82, No. IR-3.

Harris, Karl, Kinnison, A. F., and Albertt, O. W., 1936, Use of Water by Washinton Navel Oranges and Marsh Grapefruit Trees in Salt River Valley, Arizona: Arizona Agricultural Experiment Station Bull. 153.

Hildreth, R. J., 1956, Risk and Uncertainty Arising From Soil-Moisture Yield Relationships in the Great Plains: Paper for Southwestern Social Science Association Program, March 30, 1956, Dept. of Agricultural Economics and Sociology, A. & M. College of Texas.

Horton, R. E., 1923, Transpiration by Forest Trees: U. S. Weather Bureau Monthly Weather Review, Vol. 51.

Hughes, W. F., and Motheral, J. R., September 1950, Irrigated Agriculture in Texas: Texas Agricultural Experiment Station Misc. Pub. 59, A. & M. College of Texas.

Iowa State University, July 1959, Chances of Receiving Selected Amounts of Precipitation in the North Central Region of the U. S.: Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa.

_____, /no date/, Transpiration and Evapotranspiration as Related to Meteorological Factors (U. S. Weather Bureau Contract 9295): Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa.

Israelsen, O. W., September 1958, The Engineer and Worldwide Conservation of Soil and Water: Am. Soc. Civil Engineers Proc. Paper 1775, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-3.

_____, 1950, Irrigation Principles and Practices: New York, John Wiley and Sons, Inc.

Jensen, M. E., 1957, Research Shows When to Irrigate Winter Wheat: Soils and Water.

Kansas State College, 1956-57, The Evapotranspiration Problem First Contribution Report (U. S. Weather Bureau Contract 8806): Manhattan, Kansas.

Kohler, K. O., Jr., 1955, Trends in the Utilization of Water: Yearbook of Agriculture.

Kohler, M. A., 1957, Computation of Evaporation and Evapotranspiration from Meteorological Observations: Paper for presentation at Am. Meteorological Society Meeting in Chicago, March 19-21, 1957.

_____, Nordenson, T. J., and Baker, D. R., 1959, Evaporation Maps for the United States: U. S. Weather Bureau Tech. Paper 37.

_____, Nordenson, T. J., and Fox, W. E., 1955, Evaporation from Pans and Lakes: U. S. Weather Bureau Research Paper 38.

Linsley, R. K., /no date/, Techniques for Surveying Surface-Water Resources: World Meteorological Organization No. 82, Tech. Paper 32, Tech. Note 26.

Lowry, R. L., Jr., and Johnson, A. F., April 1941, Consumptive Use of Water for Irrigation: Am. Soc. Civil Engineers Proc., Vol. 67.

_____, and Johnson, A. F., 1942, Consumptive Use of Water for Agriculture: Am. Soc. Civil Engineers Trans., Vol. 107.

McCulloch, A. A., August 1957, The Economics of Sprinkler Irrigation Systems: Irrigation - Engineering and Maintenance.

Magee, A. C., Bonnen, C. A., McArthur, W. C., and Hughes, W. F., 1953, Production Practices for Irrigated Crops on the High Plains: Texas Agricultural Experiment Station Bull. 763, A. & M. College of Texas.

Maierhofer, C. R., January 1958, Drainage in Relation to a Permanent Irrigation Agriculture: Am. Soc. Civil Engineers Proc. Paper 1506, Journal of the Irrigation and Drainage Division, Vol. 84, No. 1R-1.

Mickey, K. B., 1945, Man and The Soil: International Harvester Company.

Muldrow, W. C., 1948, Forecasting Productivity of Irrigable Lands: Am. Soc. Civil Engineers Trans., Vol. 113.

Nettles, V. F., Jamison, F. S., and Jones, B. E., June 1952, Irrigation and Other Cultural Studies with Cabbage, Sweet Corn, Snap Beans, Onions, Tomatoes and Cucumbers: University of Florida Agricultural Experiment Station Bull. 495, Gainsville, Florida.

Osborn, Ben, /no date/, Water and the Land: U. S. Soil Conservation Service Tech. Paper 134.

Palmer, V. J., April 1946, Retardance Coefficients for Low Flow in Channels Lines with Vegetation: Am. Geophys. Union Trans. 27.

Palmer, W. C., April 1958, A Graphical Technique for Determining Evapotranspiration by the Thornwaite Method: U. S. Weather Bureau, Washington, U. S. Govt. Printing Office.

Parshall, R. L., 1937, Laboratory Measurement of Evapo-Transpiration Losses: Journal of Forestry, pp. 1033-1040.

Penman, H. L., February 1956, Estimating Evaporation: Am. Geophys. Union Trans., Vol. 37, No. 1.

_____, 1948, Natural Evaporation from Open Water, Bare Soil and Grass: Proceedings of the Royal Society, Series A-193, London, England.

_____, 1952, Water and Plant Growth: Agricultural Progress, Vol. 27, Part 2.

Pruitt, W. O., and Jensen, M. C., June 1955, Determining when to Irrigate: Agricultural Engineering.

Ree, W. O., 1939, Some Experiments on Shallow Flows Over a Grassed Slope: Am. Geophys. Union Trans., Part IV.

Reynolds, E. B., 1954, Research on Rice Production in Texas: Texas Agricultural Experiment Station Bull. 775, A. & M. College of Texas.

Robinson, A. R., Jr., and Rohwer, Carl, 1957, Measurement of Canal Seepage: Am. Soc. Civil Engineers Trans., Vol. 122.

Russell, E. J., 1950, Soil Conditions and Plant Growth: New York, Longmans, Green and Company.

Shaw, B. T. (Editor), 1952, Soil Physical Conditions and Plant Growth: New York, Academic Press.

South Dakota State College, February 1959, Seasonal Variations of Soil Moisture in South Dakota: South Dakota Agricultural Experiment Station, Economics Dept. Pamphlet 99, Brookings, South Dakota.

Staten, T. D., 1957, Alfalfa Production in Texas: Texas Agricultural Experiment Station Bull. 955, A. & M. College of Texas.

Swanson, N. P., and Thaxton, E. L., 1956, Irrigation Requirements for Grain Sorghum Production on the High Plains: Texas Agricultural Experiment Station Bull. 846, A. & M. College of Texas.

Texas Agricultural Experiment Station, June 1954, Summary of Soil and Water Conservation Research from the Blackland Experiment Station, Temple, Texas, 1942-53: Texas Agricultural Experiment Station Bull. 781, A. & M. College of Texas.

Texas Crop and Livestock Reporting Service, /no date/, Texas Vegetable Statistics, 1939-58: Agricultural Marketing Service, U. S. Dept. of Agriculture.

Thaxton, E. L., and Swanson, N. P., 1956, Guides in Cotton Irrigation on the High Plains: Texas Agricultural Experiment Station Bull. 838, A. & M. College of Texas.

Thornthwaite, C. W., 1948, An Approach toward a Rational Classification of Climate: Geographical Review 38.

Thornthwaite, C. W., and Mather, J. R., 1957, Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance: Drexel Institute of Technology Pub. in Climatology, Vol. X, No. 3, Centerton, New Jersey.

_____, and Mather, J. R., 1955, The Water Balance: Drexel institute of Technology Pub. in Climatology, Vol. VIII, No. 1, Centerton, New Jersey.

Thornton, J. D., and Templin, E. H., /no date/, The Soils of Texas: Texas Agricultural Extension Service Leaflet 74, A. & M. College of Texas.

Thurmond, R. V., /no date/, How to Estimate Soil Moisture by Feel: Texas Agricultural Extension Service Leaflet 355, A. & M. College of Texas.

_____, /no date/, Soil Moisture Storage: Texas Agricultural Extension Service Leaflet 357, A. & M. College of Texas.

_____, Box, J., and Elliott, F. C., Texas Guide for Growing Irrigated Cotton: Texas Agricultural Extension Service Bull. 896, A. & M. College of Texas.

Trew, E. M., and Hoveland, C. S., 1955, Irrigated Pastures for South Texas: Texas Agricultural Extension Service and Texas Agricultural Experiment Station Bull. 819, A. & M. College of Texas.

U. S. Geological Survey, 1954, Water-Loss Investigations: Vol. 1 - Lake Hefner Studies: U. S. Geol. Survey Prof. Paper 269.

_____, 1958, Water-Loss Investigations: Lake Mead Studies: U. S. Geol. Survey Prof. Paper 298.

Van Bavel, C. H. M., 1953, A Drought Criterion and Its Application in Evaluating Drought Incidence and Hazard: Agronomy Journal, Vol. 45.

_____, and Wilson, T. V., 1952, Evapotranspiration Estimates as Criteria for Determining Time of Irrigation: Agricultural Engineering, Vol. 33.

Veihmeyer, F. J., 1938, Evaporation from Soils and Transpiration: Am. Geophys. Union Trans., Vol. 19.

Young, A. A., 1945, Irrigation Requirements of California Crops: Division of Water Resources Bull. 51, California State Dept. of Public Works, Pomona, California.

_____, and Blaney, H. F., 1942, Use of Water by Native Vegetation: California State Division of Water Resources Bull. 50, Sacramento, California.

APPENDIX A

Descriptive Figures

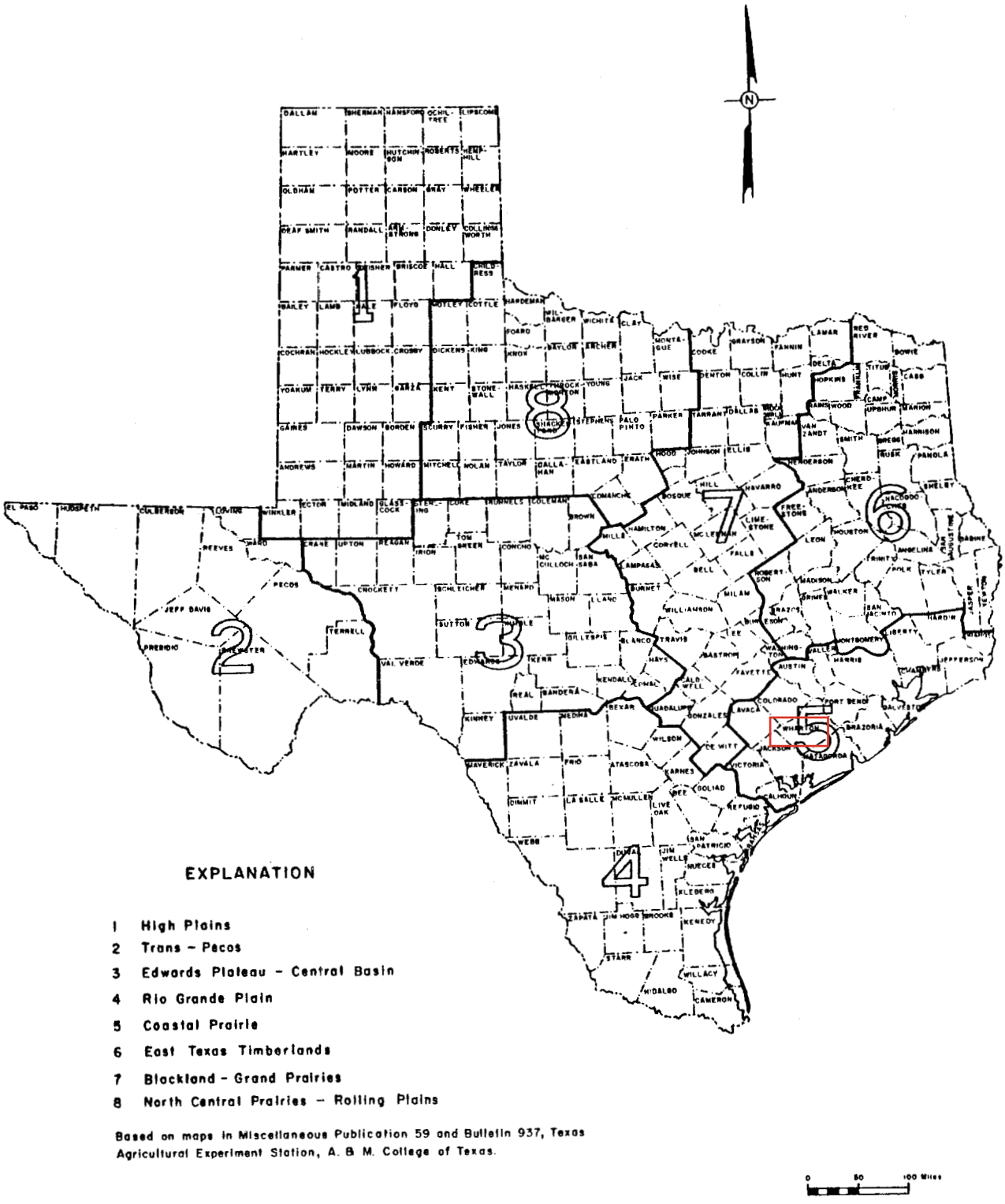


FIGURE 1. - Land resource divisions and irrigated areas.

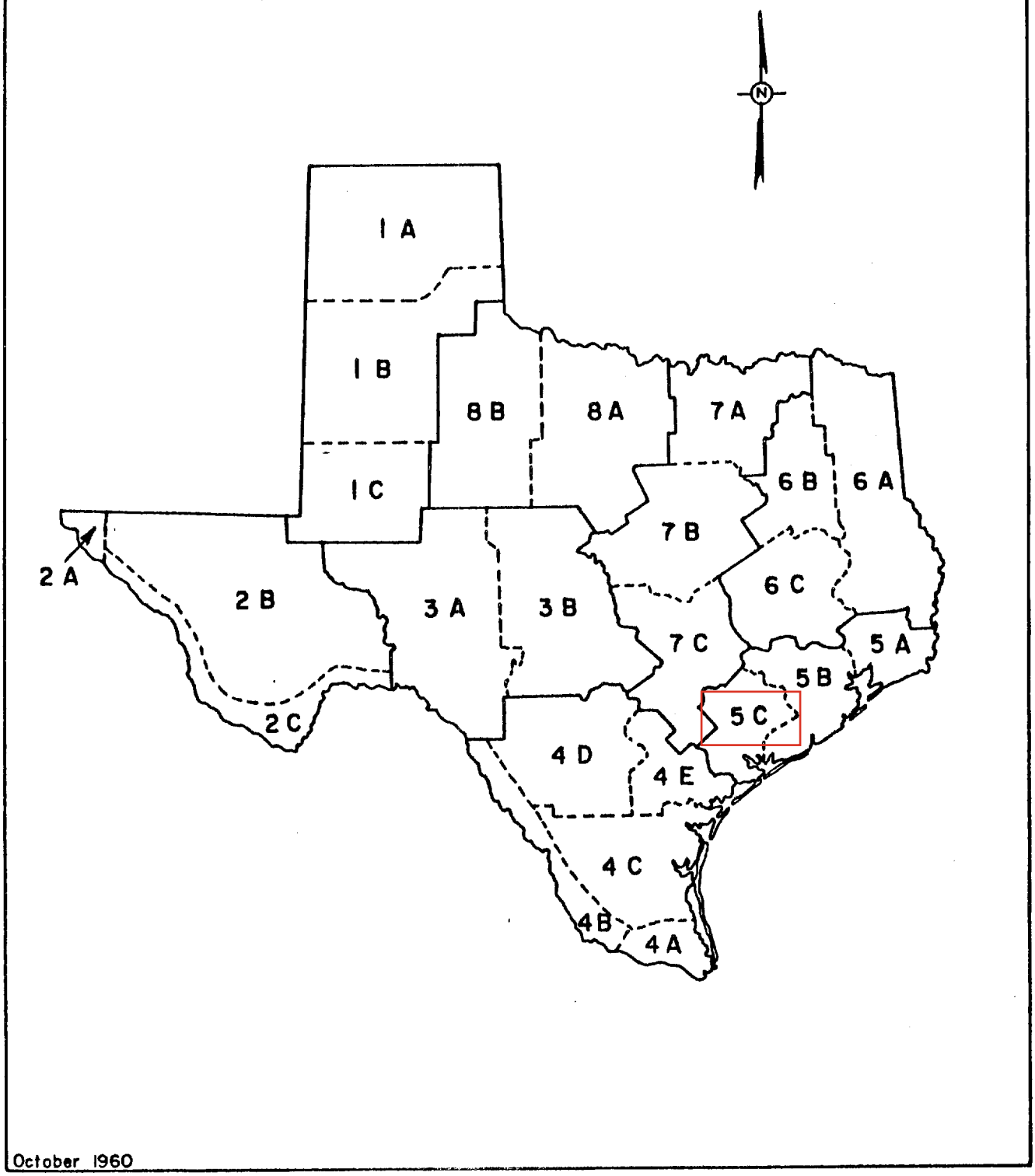


FIGURE 2.— Subdivisions of irrigated areas

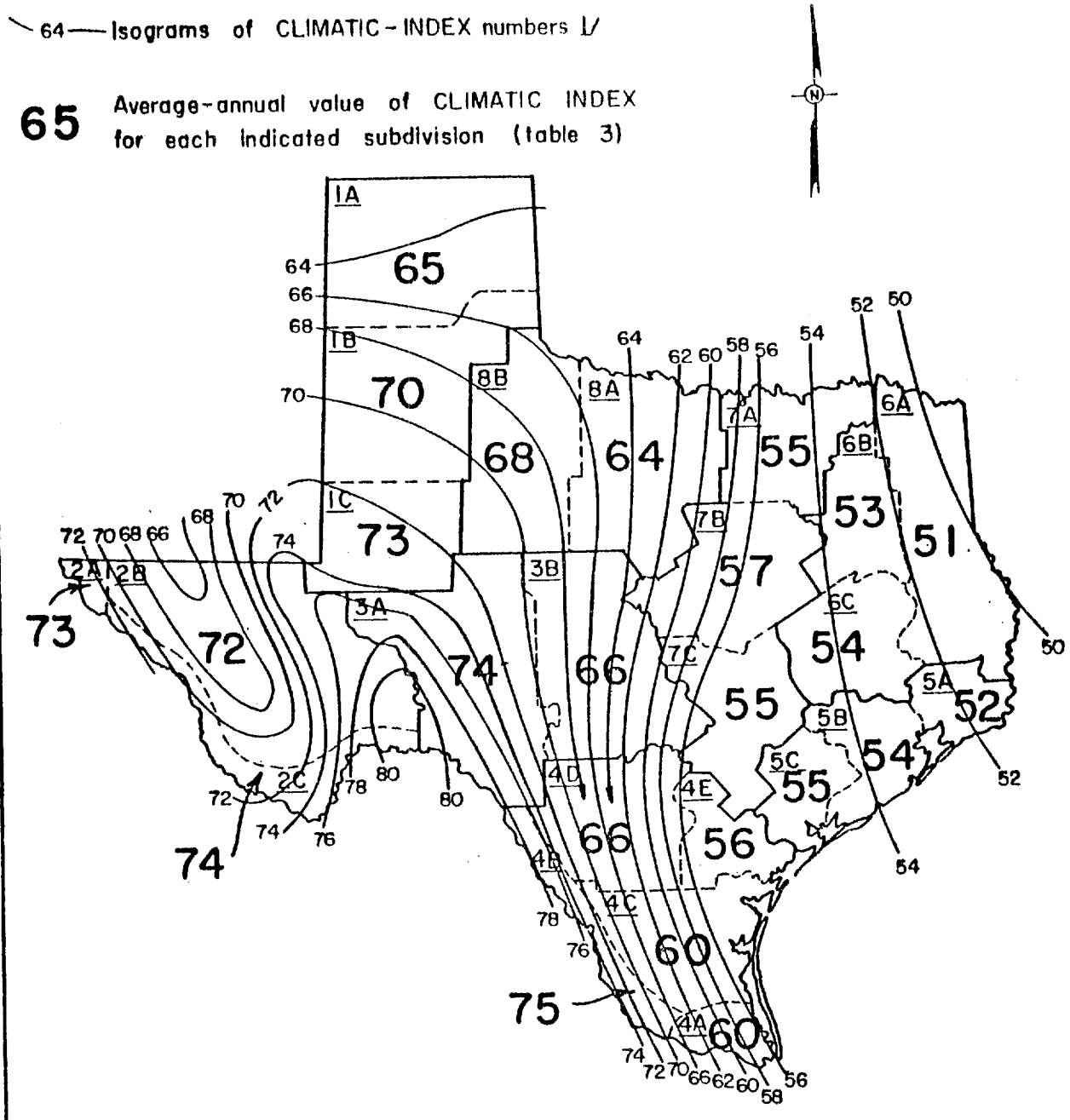


FIGURE 3.- Average-annual CLIMATIC-INDEX numbers for subdivisions of irrigated areas

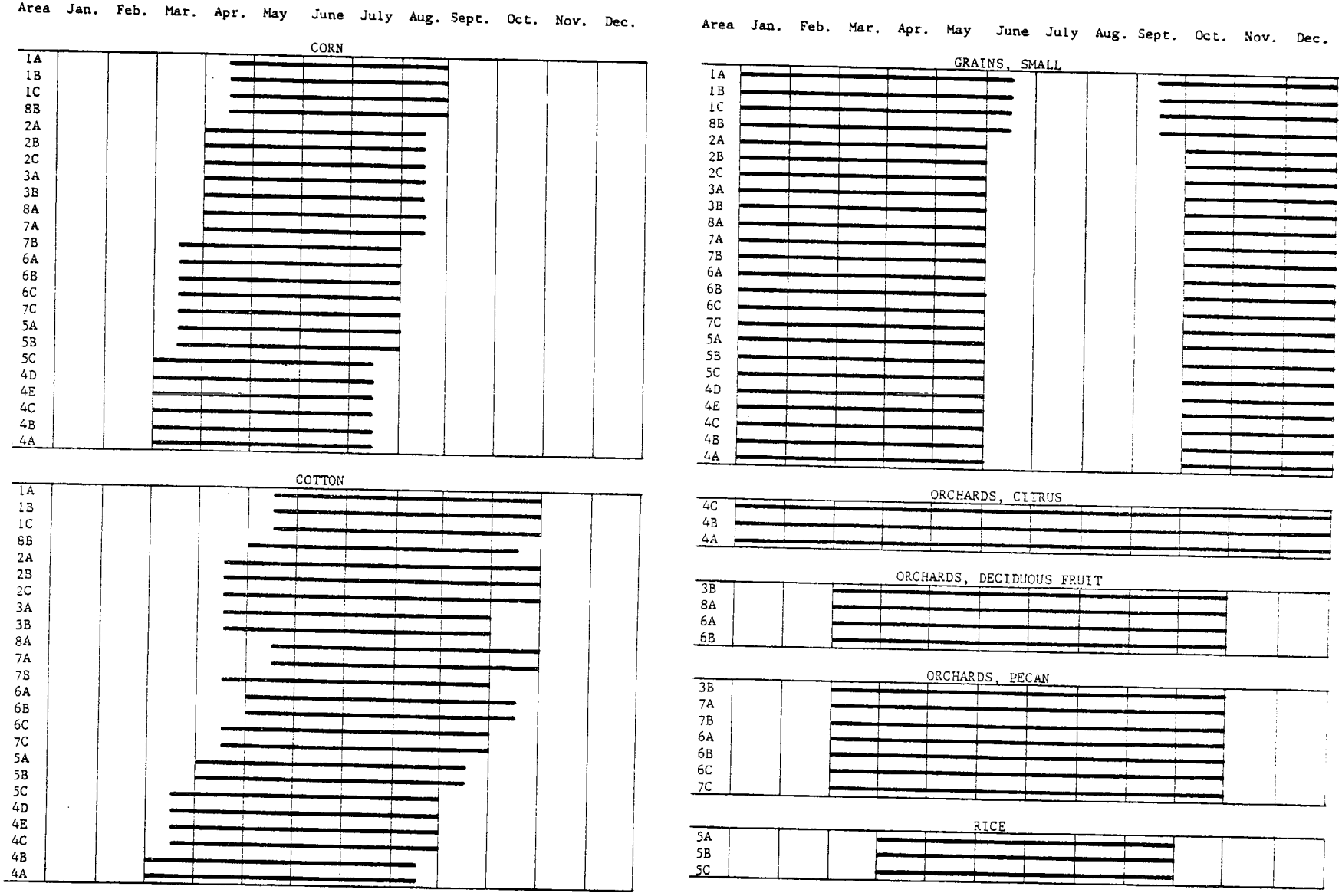
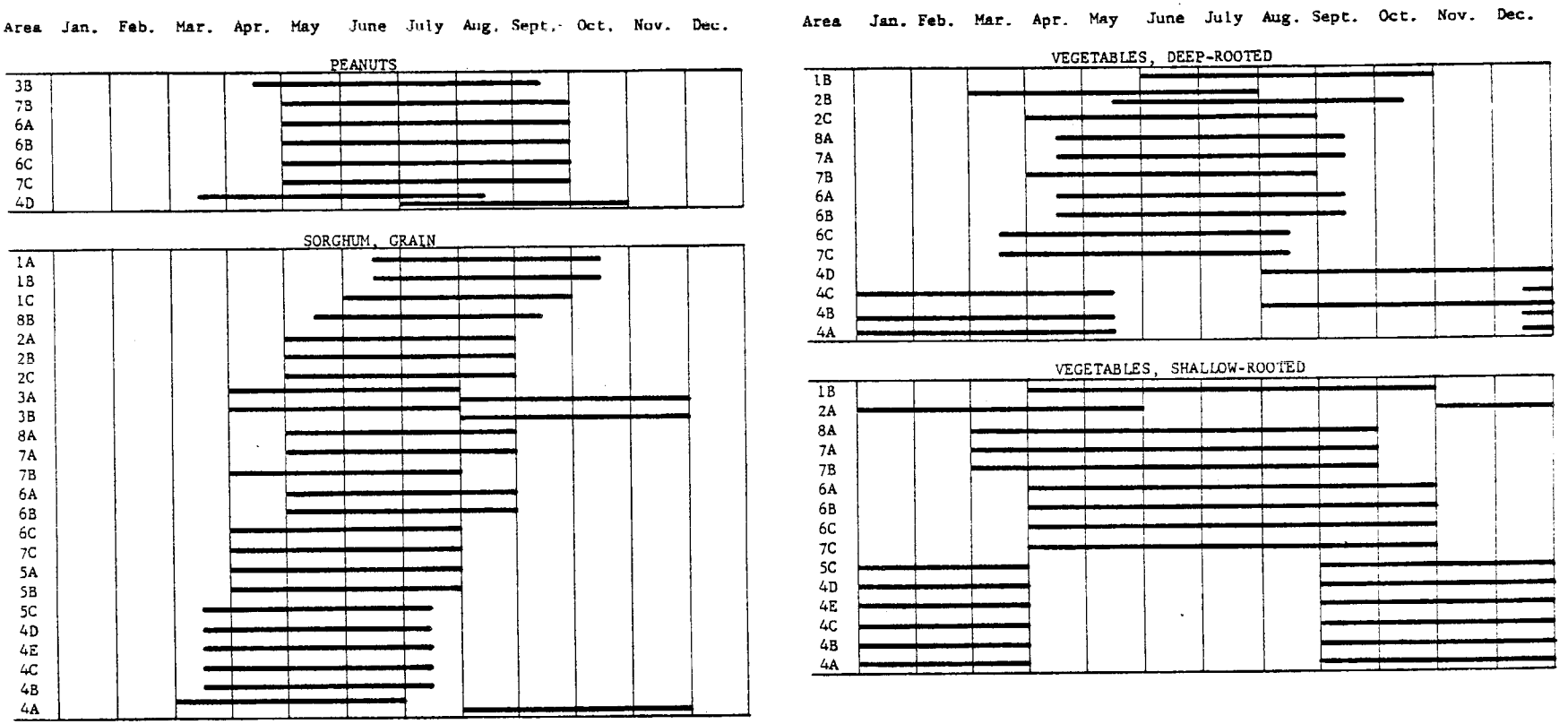


FIGURE 4.-Average planting date and length of growing season of crops, by areas, in Texas



Note.--Alfalfa, a perennial usually planted in September, is omitted from the above chart. The average planting date used for each crop is the first or middle of a month as indicated. In some areas for some crops, two bars indicate two crops yearly.

FIGURE 4. --Continued

APPENDIX B

Tables of Experiment Data and Basic Relations

Table 1

BASIC DATA

UC--CONSUMPTIVE USE; IC--CLIMATIC INDEX; KU--USE COEFFICIENT; values at experiment sites and times

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
ALFALFA: San Fernando Valley, California, 1940													
UC	1.3	1.6	3.1	3.3	6.7	5.4	7.8	4.2	5.6	4.4	3.1	1.3	47.8
IC	2.2	2.7	3.8	4.3	5.9	5.4	7.6	5.9	5.4	4.3	3.8	2.7	54.0
KU	0.59	0.59	0.82	0.77	1.14	1.00	1.03	0.71	1.04	1.02	0.82	0.48	0.89
CORN: Based on grain sorghum at Bushland, Texas, 1956-58, planted on 1st day of a month													
UC						1.3	4.0	6.5	8.4	*2.9			23.1
IC						8.4	8.8	8.0	6.2	5.7÷2			34.2
KU						0.15	0.45	0.81	1.35	1.00			0.68
CORN: Based on grain sorghum at Bushland, Texas, 1956-58, planted on 16th day of month													
UC						*0.4	2.8	4.6	7.3	6.7			21.6
IC						8.4÷2	8.8	8.0	6.2	5.7			32.9
KU						0.09	0.32	0.58	1.18	1.18			0.66
COTTON: Weslaco, Texas, 1958, planted on 1st day of a month, 5½-month season													
UC			0.7	1.2	6.1	5.5	4.5	*.04					18.4
IC			3.1	5.1	5.9	6.6	7.4	7.8÷2					32.0
KU			0.23	0.24	1.03	0.83	0.61	0.10					0.58
COTTON: Weslaco, Texas, 1958, planted on 16th day of a month, 5½-month season													
UC			*0.3	1.3	4.0	7.2	5.1	1.7					19.6
IC			3.1÷2	5.1	5.9	6.6	7.4	7.8					34.3
KU			0.18	0.25	0.68	1.09	0.69	0.22					0.57
COTTON: Weslaco, Texas, 1958, planted on 16th day of a month, 6½-month season													
UC			*0.3	1.3	3.6	6.0	6.4	5.5	3.5				26.6
IC			3.1÷2	5.1	5.9	6.6	7.4	7.8	4.5				38.3
KU			0.18	0.25	0.61	0.91	0.86	0.71	0.77				[illegible]

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
GRAINS, SMALL: Bushland, Texas, 1956-58, planted on 1st day of a month, 8-month season													
UC	1.6	2.4	5.4	7.5	6.4					1.6	1.6	1.5	28.0
IC	2.0	2.3	3.6	5.1	6.9					5.7	2.8	2.5	30.9
KU	0.80	1.04	1.50	1.47	0.93					0.28	0.57	0.60	0.91
GRAINS, SMALL: Bushland, Texas, 1956-58, planted on 16th day of a month, 9-month season													
UC	1.0	1.8	3.9	6.5	7.0	*3.1			*0.7	1.6	1.4	1.1	28.1
IC	2.0	2.3	3.6	5.1	6.9	8.4÷2			6.2÷2	5.7	2.8	2.5	38.2
KU	0.50	0.78	1.08	1.27	1.01	0.74			0.23	0.28	0.50	0.44	0.74
ORCHARDS, CITRUS: Average for oranges and grapefruit, Salt River Valley, Arizona, 1931-54													
UC	1.6	1.7	2.5	3.2	4.2	4.9	5.6	5.6	4.8	3.5	2.4	1.7	41.7
IC	2.3	3.3	5.0	7.1	8.9	9.9	9.2	8.1	5.2	5.0	3.0	2.2	69.2
KU	0.69	0.52	0.50	0.45	0.47	0.49	0.61	0.69	0.92	0.70	0.80	0.77	0.60
Oranges, San Fernando Valley, California, 1940													
UC	1.1	2.2	2.3	4.0	4.4	4.6	4.0	3.4	2.8	2.6	2.0	1.6	35.0
IC	2.2	2.7	3.8	4.3	5.9	5.4	7.6	5.9	5.4	4.3	3.8	2.7	54.0
KU	0.50	0.81	0.61	0.93	0.75	0.85	0.53	0.58	0.52	0.60	0.53	0.59	0.65
ORCHARDS, CITRUS: Average values													
KU	0.60	0.66	0.56	0.69	0.61	0.67	0.57	0.64	0.72	0.65	0.66	0.68	0.62
ORCHARDS, DECIDUOUS FRUIT: San Joaquin-Sacramento Delta, California, 1928													
UC			1.0	2.2	3.8	6.0	6.8	4.8	2.8	0.8			28.2
IC			2.4	4.8	4.3	5.8	7.2	6.7	6.2	3.4			40.8
KU			0.42	0.46	0.88	1.03	0.92	0.72	0.45	0.24			0.69
ORCHARDS, PECAN: San Fernando Valley, California, 1928													
UC			1.5	3.8	5.0	5.9	6.1	5.0	2.8	2.0			32.6
IC			2.6	5.1	4.6	6.1	7.6	7.1	6.6	3.6			43.3
KU			0.58	0.75	1.09	0.97	0.80	0.70	0.42	0.56			0.75

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
PEANUTS: Estimated UC, East Texas, planted on 1st day of a month, 4-month season													
UC					2.1	5.1	6.4	4.3					17.9
IC					5.6	6.6	7.1	6.6					25.9
KU					0.38	0.77	0.90	0.65					0.69
PEANUTS: Estimated UC, East Texas, planted on 1st day of a month, 5-month season													
UC					1.1	2.9	4.3	6.3	3.5				18.1
IC					5.6	6.6	7.1	6.6	5.1				31.0
KU					0.20	0.44	0.61	0.95	0.69				0.58
PEANUTS: Estimated UC, East Texas, planted on 16th day of a month, 5-month season													
UC				*0.4	2.0	3.4	5.5	5.3	*1.3				17.9
IC				4.6÷2	5.6	6.6	7.1	6.6	5.1÷2				30.8
KU				0.15	0.33	0.49	0.80	0.90	0.54				0.58
RICE: Based on data from Rice-Pasture Experiment Stations, Beaumont and Eagle Lake, Texas, 1954													
UC				7.6	6.8	15.0	10.2	6.8	9.6				56.0
IC				4.2	6.8	7.5	6.8	6.8	6.0				38.1
KU				1.80	1.00	2.00	1.50	1.00	1.60				1.47
SORGHUM, GRAIN: Bushland, Texas, 1956-58, planted on 1st day of a month													
UC						3.6	7.4	8.1	3.7				22.8
IC						8.4	8.8	8.0	6.2				31.4
KU						0.43	0.84	1.01	0.60				0.73
SORGHUM, GRAIN: Bushland, Texas, 1956-58, planted on 16th day of a month													
UC						*0.9	5.8	8.6	5.0	*1.1			21.5
IC						8.4÷2	8.8	8.0	6.2	5.7÷2			30.0
KU						0.21	0.66	1.08	0.81	0.38			0.72
VEGETABLES, DEEP-ROOTED: Tomatoes, Sacramento Valley, California, 1933-55, planted on 1st day of a month													
UC						3.0	4.2	7.0	5.1	2.1			21.4
IC						7.8	8.7	7.5	6.5	3.7			34.2
KU						0.38	0.48	0.93	0.78	0.57			0.63

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
VEGETABLES, DEEP-ROOTED: Tomatoes, Sacramento Valley, California, 1933-55, planted on 16th day of a month													
UC					*1.2	3.3	5.7	7.3	4.5	*0.8			22.8
IC					6.1÷2	7.8	8.7	7.5	6.5	3.7÷2			35.4
KU					0.38	0.42	0.66	0.97	0.69	0.43			0.66
VEGETABLES, SHALLOW-ROOTED: San Joaquin Delta, California, 1928, planted on 1st day of a month													
UC				1.2	3.0	6.0	5.4	5.4	3.6	1.8			26.4
IC				4.8	4.3	5.8	7.2	6.7	6.2	3.4			38.4
KU				0.25	0.70	1.03	0.75	0.81	0.58	0.53			0.69

*One-half month.

Table 2

U. S. WEATHER BUREAU First-Order Stations

Texas

Abilene	Dallas	Houston	San Angelo
Amarillo	Del Rio	Laredo	San Antonio
Austin	El Paso	Lubbock	Victoria
Brownsville	Fort Worth	Palestine	Waco
Corpus Christi	Galveston	Port Arthur	Wichita Falls

Arkansas	Louisiana	New Mexico	Oklahoma
Fort Smith	Baton Rouge	Albuquerque	Oklahoma City
Little Rock	Lake Charles	Clayton	Tulsa
Texarkana	Shreveport	Roswell	

Table 3

CLIMATIC-INDEX COEFFICIENTS

Coefficients for monthly distribution of average-annual climatic-index numbers, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	0.03	0.04	0.07	0.10	0.11	0.14	0.13	0.12	0.10	0.07	0.05	0.04	1.00
1B	.03	.05	.08	.10	.11	.14	.13	.13	.09	.07	.04	.03	1.00
1C	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
8B	.03	.04	.07	.09	.11	.14	.14	.13	.10	.07	.05	.03	1.00
2A	.03	.04	.07	.10	.13	.14	.13	.11	.10	.07	.05	.03	1.00
2B	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
2C	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
3A	.03	.04	.07	.09	.12	.13	.14	.12	.10	.08	.05	.03	1.00
3B	.04	.04	.07	.09	.11	.13	.13	.12	.10	.08	.05	.04	1.00
8A	.03	.04	.07	.09	.11	.14	.14	.13	.10	.08	.04	.03	1.00
7A	.03	.04	.07	.09	.11	.14	.14	.14	.10	.07	.04	.03	1.00
7B	.03	.04	.07	.09	.11	.13	.14	.14	.10	.08	.04	.03	1.00
6A	.03	.04	.07	.09	.11	.13	.14	.13	.10	.08	.04	.04	1.00
6B	.03	.04	.07	.09	.11	.13	.14	.14	.10	.07	.04	.04	1.00
6C	.03	.04	.07	.09	.11	.13	.14	.13	.10	.08	.04	.04	1.00
7C	.03	.04	.07	.09	.11	.13	.13	.13	.10	.08	.05	.04	1.00
5A	.03	.05	.07	.09	.12	.13	.12	.12	.10	.08	.05	.04	1.00
5B	.03	.04	.06	.09	.11	.14	.13	.13	.10	.08	.05	.04	1.00
5C	.03	.04	.07	.09	.11	.13	.13	.13	.10	.08	.05	.04	1.00
4D	.04	.05	.07	.08	.11	.12	.14	.13	.09	.08	.05	.04	1.00
4E	.04	.05	.07	.09	.11	.12	.13	.13	.09	.08	.05	.04	1.00
4C	.04	.05	.07	.09	.10	.12	.14	.13	.09	.08	.05	.04	1.00
4B	.04	.05	.06	.09	.11	.12	.14	.13	.09	.08	.05	.04	1.00
4A	.04	.05	.07	.09	.11	.12	.14	.12	.09	.08	.05	.04	1.00

Table 4

CLIMATIC-INDEX NUMBERS

Average monthly and annual climatic-index numbers, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	2.0	2.6	4.6	6.5	7.2	9.1	8.4	7.8	6.5	4.6	3.2	2.6	65
1B	2.1	3.5	5.6	7.0	7.7	9.8	9.1	9.1	6.3	4.9	2.8	2.1	70
1C	2.2	2.9	5.1	7.3	8.8	9.5	10.2	8.8	7.3	5.1	3.6	2.2	73
8B	2.0	2.7	4.8	6.1	7.5	9.5	9.5	8.8	6.8	4.8	3.4	2.0	68
2A	2.2	2.9	5.1	7.3	9.5	10.2	9.5	8.0	7.3	5.1	3.6	2.2	73
2B	2.2	2.9	5.0	7.2	8.6	9.4	10.1	8.6	7.2	5.0	3.6	2.2	72
2C	2.2	3.0	5.2	7.4	8.9	9.6	10.4	8.9	7.4	5.2	3.7	2.2	74
3A	2.2	3.0	5.2	6.7	8.9	9.6	10.4	8.9	7.4	5.9	3.7	2.2	74
3B	2.6	2.6	4.6	5.9	7.3	8.6	8.6	7.9	6.6	5.3	3.3	2.6	66
8A	1.9	2.6	4.5	5.8	7.0	9.0	9.0	8.3	6.4	5.1	2.6	1.9	64
7A	1.6	2.2	3.8	5.0	6.0	7.7	7.7	7.7	5.5	3.8	2.2	1.6	55
7B	1.7	2.3	4.0	5.1	6.3	7.4	8.0	8.0	5.7	4.6	2.3	1.7	57
6A	1.5	2.0	3.6	4.6	5.6	6.6	7.1	6.6	5.1	4.1	2.0	2.0	51
6B	1.6	2.1	3.7	4.8	5.8	6.9	7.4	7.4	5.3	3.7	2.1	2.1	53
6C	1.6	2.2	3.8	4.9	5.9	7.0	7.6	7.0	5.4	4.3	2.2	2.2	54
7C	1.6	2.2	3.8	5.0	6.0	7.2	7.2	7.2	5.5	4.4	2.8	2.2	55
5A	1.6	2.6	3.6	4.7	6.2	6.8	6.2	6.2	5.2	4.2	2.6	2.1	52
5B	1.6	2.2	3.2	4.9	5.9	7.6	7.0	7.0	5.4	4.3	2.7	2.2	54
5C	1.6	2.2	3.8	5.0	6.0	7.2	7.2	7.2	5.5	4.4	2.8	2.2	55
4D	2.6	3.3	4.6	5.3	7.3	7.9	9.2	8.6	5.9	5.3	3.3	2.6	66
4E	2.2	2.8	3.9	5.0	6.2	6.7	7.3	7.3	5.0	4.5	2.8	2.2	56
4C	2.4	3.0	4.2	5.4	6.0	7.2	8.4	7.8	5.4	4.8	3.0	2.4	60
4B	3.0	3.8	4.5	6.8	8.2	9.0	10.5	9.8	6.8	6.0	3.8	3.0	75
4A	2.4	3.0	4.2	5.4	6.6	7.2	8.4	7.2	5.4	4.8	3.0	2.4	60

APPENDIX C

Tables of Crop Consumptive Use

Average monthly and annual consumptive use,
depth in inches, by areas, 1946-55

Table 5

ALFALFA

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	1.2	1.5	3.8	5.0	8.2	9.1	8.7	5.5	6.8	4.7	2.6	1.2	58.3
1B	1.2	2.1	4.6	5.4	8.8	9.8	9.4	6.5	6.6	5.0	2.3	1.0	62.7
1C	1.3	1.7	4.2	5.6	10.0	9.5	10.5	6.2	7.6	5.2	3.0	1.1	65.9
8B	1.2	1.6	3.9	4.7	8.6	9.5	9.8	6.2	7.1	4.9	2.8	1.0	61.3
2A	1.3	1.7	4.2	5.6	10.8	10.2	9.8	5.7	7.6	5.2	3.0	1.1	66.2
2B	1.3	1.7	4.1	5.5	9.8	9.4	10.4	6.1	7.5	5.1	3.0	1.1	65.0
2C	1.3	1.8	4.3	5.7	10.1	9.6	10.7	6.3	7.7	5.3	3.0	1.1	66.9
3A	1.3	1.8	4.3	5.2	10.1	9.6	10.7	6.3	7.7	6.0	3.0	1.1	67.1
3B	1.5	1.5	3.8	4.5	8.3	8.6	8.9	5.6	6.9	5.4	2.7	1.2	58.9
8A	1.1	1.5	3.7	4.5	8.0	9.0	9.3	5.9	6.7	5.2	2.1	.9	57.9
7A	.9	1.3	3.1	3.8	6.8	7.7	7.9	5.5	5.7	3.9	1.8	.8	49.2
7B	1.0	1.4	3.3	3.9	7.2	7.4	8.2	5.7	5.9	4.7	1.9	.8	51.4
6A	.9	1.2	3.0	3.5	6.4	6.6	7.3	4.7	5.3	4.2	1.6	1.0	45.7
6B	.9	1.2	3.0	3.7	6.6	6.9	7.6	5.3	5.5	3.8	1.7	1.0	47.2
6C	.9	1.3	3.1	3.8	6.7	7.0	7.8	5.0	5.6	4.4	1.8	1.1	48.5
7C	.9	1.3	3.1	3.8	6.8	7.2	7.4	5.1	5.7	4.5	2.3	1.1	49.2
5A	.9	1.5	3.0	3.6	7.1	6.8	6.4	4.4	5.4	4.3	2.1	1.0	46.5
5B	.9	1.3	2.6	3.8	6.7	7.6	7.2	5.0	5.6	4.4	2.2	1.1	48.4
5C	.9	1.3	3.1	3.8	6.8	7.2	7.4	5.1	5.7	4.5	2.3	1.1	49.2
4D	1.5	1.9	3.8	4.1	8.3	7.9	9.5	6.1	6.1	5.4	2.7	1.2	58.5
4E	1.3	1.7	3.2	3.8	7.1	6.7	7.5	5.2	5.2	4.6	2.3	1.1	49.7
4C	1.4	1.8	3.4	4.2	6.8	7.2	8.7	5.5	5.6	4.9	2.5	1.2	53.2
4B	1.8	2.2	3.7	5.2	9.3	9.0	10.8	7.0	7.1	6.1	3.1	1.4	66.7
4A	1.4	1.8	3.4	4.2	7.5	7.2	8.7	5.1	5.6	4.9	2.5	1.2	53.5

Note.--PERENNIAL PASTURE: Use 90 percent of monthly amount shown for ALFALFA as estimate of consumptive use.

Table 6

CORN

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A				*0.3	2.3	5.3	9.9	9.2					27.0
1B				*.3	2.5	5.7	10.7	10.7					29.9
1C				*.3	2.8	5.5	12.0	10.4					31.0
8B				*.3	2.4	5.5	11.2	10.4					29.8
2A				1.1	4.3	8.3	12.8	*4.0					30.5
2B				1.1	3.9	7.6	13.6	*4.3					30.5
2C				1.1	4.0	7.8	14.0	*4.4					31.3
3A				1.0	4.0	7.8	14.0	*4.4					31.2
3B				.9	3.3	7.0	11.6	*4.0					26.8
8A				.9	3.2	7.3	12.2	*4.2					27.8
7A				.8	2.7	6.2	10.4	*3.8					23.9
7B			*0.2	1.6	3.7	8.7	9.4						23.6
6A			*.2	1.5	3.2	7.8	8.4						21.1
6B			*.2	1.5	3.4	8.1	8.7						21.9
6C			*.2	1.6	3.4	8.3	9.0						22.5
7C			*.2	1.6	3.5	8.5	8.5						22.3
5A			*.2	1.5	3.6	8.0	7.3						20.6
5B			*.1	1.6	3.4	9.0	8.3						22.4
5C			.6	2.2	4.9	9.7	*3.6						21.0
4D			.7	2.4	5.9	10.7	*4.6						24.3
4E			.6	2.2	5.0	9.0	*3.6						20.4
4C			.6	2.4	4.9	9.7	*4.2						21.8
4B			.7	3.1	6.6	12.2	*5.2						27.8
4A			.6	2.4	5.3	9.7	*4.2						22.2

* One-half month.

Table 7

COTTON

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A					*0.6	2.3	5.7	8.5	4.5	1.0			22.8
1B					*.7	2.4	6.2	9.9	4.3	1.1			24.6
1C					*.8	2.4	6.9	9.6	5.0	1.1			25.8
8B					1.7	2.3	9.8	7.3	4.1	*.2			25.4
2A				*0.7	2.4	6.2	8.6	6.9	5.2	3.9			33.9
2B				*.6	2.2	5.7	9.2	7.4	5.1	3.8			34.0
2C				*.7	2.2	5.9	9.5	7.7	5.3	4.0			35.3
3A				*.6	2.2	6.5	11.3	6.1	1.6				28.3
3B				*.5	1.8	5.8	9.4	5.5	1.5				24.5
8A					*.6	2.2	6.1	9.0	4.4	1.1			23.4
7A					*.5	1.9	5.2	8.4	3.8	.8			20.6
7B				*.5	1.6	5.0	8.7	5.5	1.3				22.6
6A					1.3	1.6	7.3	5.5	3.1	*.2			19.0
6B					1.3	1.7	7.6	6.1	3.2	*.2			20.1
6C				*.4	1.5	4.8	8.3	4.8	1.2				21.0
7C				*.4	1.5	4.9	7.8	5.0	1.2				20.8
5A				1.1	1.5	7.0	5.1	3.8	*.3				18.8
5B				1.1	1.4	7.8	5.8	4.3	*.3				20.7
5C			*0.3	1.2	4.1	7.8	5.0	1.6					20.0
4D			*.4	1.3	5.0	8.6	6.3	1.9					23.5
4E			*.4	1.2	4.2	7.3	5.0	1.6					19.7
4C			*.4	1.4	4.1	7.8	5.8	1.7					21.2
4B			1.0	1.6	8.4	7.5	6.4	*.5					25.4
4A			1.0	1.3	6.8	6.0	5.1	*.4					20.6

* One-half month

Table 8

GRAINS, SMALL

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A	1.0	2.0	5.0	8.3	7.3	*3.4			*0.7	1.3	1.6	1.1	31.7
1B	1.0	2.7	6.0	8.9	7.8	*3.6			*.7	1.4	1.4	.9	34.4
1C	1.1	2.3	5.5	9.3	8.9	*3.5			*.8	1.4	1.8	1.0	35.6
8B	1.0	2.1	5.2	7.7	7.6	*3.5			*.8	1.3	1.7	.9	31.8
2A	1.8	3.0	7.6	10.7	8.8					1.4	2.1	1.3	36.7
2B	1.8	3.0	7.5	10.6	8.0					1.4	2.1	1.3	35.7
2C	1.8	3.1	7.8	10.9	8.3					1.5	2.1	1.3	36.8
3A	1.8	3.1	7.8	9.8	8.3					1.7	2.1	1.3	35.9
3B	2.1	2.7	6.9	8.7	6.8					1.5	1.9	1.6	32.2
8A	1.5	2.7	6.8	8.5	6.5					1.4	1.5	1.1	30.0
7A	1.3	2.3	5.7	7.4	5.6					1.1	1.3	1.0	25.7
7B	1.4	2.4	6.0	7.5	5.9					1.3	1.3	1.0	26.8
6A	1.2	2.1	5.4	6.8	5.2					1.1	1.1	1.2	24.1
6B	1.3	2.2	5.6	7.1	5.4					1.0	1.2	1.3	25.1
6C	1.3	2.3	5.7	7.2	5.5					1.2	1.3	1.3	25.8
7C	1.3	2.3	5.7	7.4	5.6					1.2	1.6	1.3	26.4
5A	1.3	2.7	5.4	6.9	5.8					1.2	1.5	1.3	26.1
5B	1.3	2.3	4.8	7.2	5.5					1.2	1.5	1.3	25.1
5C	1.3	2.3	5.7	7.4	5.6					1.2	1.6	1.3	26.4
4D	2.1	3.4	6.9	7.8	6.8					1.5	1.9	1.6	32.0
4E	1.8	2.9	5.8	7.4	5.8					1.3	1.6	1.3	27.9
4C	1.9	3.1	6.3	7.9	5.6					1.3	1.7	1.4	29.2
4B	2.4	4.0	6.8	10.0	7.6					1.7	2.2	1.8	36.5
4A	1.9	3.1	6.3	7.9	6.1					1.3	1.7	1.4	29.7

* One-half month

Note.--LEGUMINOUS FERTILIZERS: Use monthly amount shown for SMALL GRAINS for respective periods of growth.

Table 9

ORCHARDS, CITRUS

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
4C	1.4	2.0	2.4	3.7	3.7	4.8	4.8	5.0	3.9	3.1	2.0	1.6	38.4
4B	1.8	2.5	2.5	4.7	5.0	6.0	6.0	6.3	4.9	3.9	2.5	2.0	48.1
4A	1.4	2.0	2.4	3.7	4.0	4.8	4.8	4.6	3.9	3.1	2.0	1.6	38.3

Table 10

ORCHARDS, DECIDUOUS FRUIT

3B	1.9	2.7	6.4	8.9	7.9	5.7	3.0	1.3	37.8
8A	1.9	2.7	6.2	9.3	8.3	6.0	2.9	1.2	38.5
6A	1.5	2.1	4.9	6.8	6.5	4.8	2.3	1.0	29.9
6B	1.6	2.2	5.1	7.1	6.8	5.3	2.4	0.9	31.4

Table 11

ORCHARDS, PECAN

3B	2.7	4.4	8.0	8.3	6.9	5.5	2.8	3.0	41.6
7A	2.2	3.8	6.5	7.5	6.2	5.4	2.3	2.1	36.0
7B	2.3	3.8	6.9	7.2	6.4	5.6	2.4	2.6	37.2
6A	2.1	3.4	6.1	6.4	5.7	4.6	2.1	2.3	32.7
6B	2.1	3.6	6.3	6.7	5.9	5.2	2.2	2.1	34.1
6C	2.2	3.7	6.4	6.8	6.1	4.9	2.3	2.4	34.8
7C	2.2	3.8	6.5	7.0	5.8	5.0	2.3	2.5	35.1

Table 12

PEANUTS

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
3B				*0.4	2.4	4.2	6.9	7.1	*1.8				
7B					1.3	3.3	4.9	7.6	3.9				22.8
6A					1.1	2.9	4.3	6.3	3.5				21.0
6B					1.2	3.0	4.5	7.0	3.7				18.1
6C													19.4
7C					1.2	3.1	4.6	6.6	3.7				
≠4D					1.2	3.2	4.4	6.8	3.8				19.2
≠4D			*0.3	1.7	3.6	6.3	8.3	*2.3					19.4
							3.5	6.6	5.3	3.4			22.5
													18.8

Table 13

RICE

5A				8.5	6.2	13.6	9.3	6.2	8.3				52.1
5B				8.8	5.9	15.2	10.5	7.0	8.6				56.0
5C				9.0	6.0	14.4	10.8	7.2	8.8				56.2

* One-half month.
≠ Two crops yearly.

Table 14

SORGHUM, GRAIN

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A						*1.0	5.5	8.4	5.3	*0.9			21.1
1B						*1.0	6.0	9.8	5.1	*.9			22.8
1C						4.1	8.6	8.9	4.4				26.0
8B					*0.8	6.3	10.3	7.1	*1.3				25.8
2A					4.1	8.6	9.6	4.8					27.1
2B					3.7	7.9	10.2	5.2					27.0
2C					3.8	8.1	10.5	5.3					27.7
≠3A				2.9	7.5	9.7	6.2						26.3
≠3B				2.5	6.1	8.7	5.2						22.5
8A					3.0	7.6	9.1	5.0					24.7
7A					2.6	6.5	7.8	4.6					21.5
7B				2.2	5.3	7.5	4.8						19.8
6A					2.4	5.5	7.2	4.0					19.1
6B					2.5	5.8	7.5	4.4					20.2
6C				2.1	5.0	7.1	4.6						18.8
7C				2.2	5.0	7.3	4.3						18.8
5A				2.0	5.2	6.9	3.7						17.8
5B				2.1	5.0	7.7	4.2						19.0
5C			*0.4	3.3	6.5	5.8	*1.4						17.4
4D			*.5	3.5	7.9	6.4	*1.7						20.0
4E			*.4	3.3	6.7	5.4	*1.4						17.2
4C			*.4	3.6	6.5	5.8	*1.6						17.9
4B			*.5	4.5	8.9	7.3	*2.0						23.2
≠4A			1.8	4.5	6.7	4.3							17.3

* One-half month.
≠ Two crops yearly.

Table 14--Continued

SORGHUM, GRAIN

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
≠4A								3.1	4.5	4.8	1.8		14.2
≠3A								3.8	6.2	6.0	2.2		18.2
≠3B								3.4	5.5	5.4	2.0		16.3

≠ Two crops yearly.
Note.--SORGHUM, SILAGE AND FORAGE: Use monthly amount shown for GRAIN SORGHUM for respective periods of growth.

Table 15

VEGETABLES, DEEP-ROOTED

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1B						3.7	4.4	8.5	4.9	2.8			24.3
≠2B			1.9	3.5	8.0	7.3	5.8						26.5
≠2B					*1.6	3.9	6.7	8.3	5.0	*1.1			26.6
2C				2.8	4.3	8.9	8.1	5.1					29.2
8A				*1.1	2.9	5.9	8.7	5.7	*1.4				25.7
7A				*1.0	2.5	5.1	7.5	5.3	*1.2				22.6
7B				1.9	3.0	6.9	6.2	4.6					22.6
6A				*.9	2.4	4.4	6.9	4.6	*1.1				20.3
6B				*.9	2.4	4.6	7.2	5.1	*1.1				21.3
6C			*.7	2.1	3.9	6.8	5.2	*1.5					20.2
7C			*.7	2.1	4.0	7.0	5.0	*1.5					20.3
4D								3.3	2.8	4.9	2.6	1.5	15.1

* One-half month.
≠ Two crops yearly.

Table 15--Continued

VEGETABLES, DEEP-ROOTED

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
4C	1.0	2.0	4.1	3.7	*1.3							*0.5	12.6
≠4B								3.7	3.3	5.6	3.0	1.7	17.3
≠4B	1.3	2.5	4.4	4.7	*1.8							*.6	15.3
4A	1.0	2.0	4.1	3.7	*1.4							*.5	12.7

Crops Included

Beans	Chard	Okra	Pumpkin	Tomatoes
Beets	Cucumbers	Peas	Squash	Turnips
Cantaloupe	Eggplant	Peppers	Sweet potatoes	Watermelons
Carrots				

* One-half month.
≠ Two crops yearly.

Table 16

VEGETABLES, SHALLOW-ROOTED

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1B				1.8	5.4	10.1	6.8	7.4	3.7	2.6			37.8
2A	2.3	2.2	4.1	4.2	5.0						0.9	1.5	20.2
8A			1.1	4.1	7.2	6.8	7.3	4.8	3.4				34.7
7A			1.0	3.5	6.2	5.8	6.2	4.5	2.9				30.1
7B			1.0	3.6	6.5	5.6	6.5	4.6	3.0				30.8
6A				1.2	3.9	6.8	5.3	5.3	3.0	2.2			27.7
6B				1.2	4.1	7.1	5.6	6.0	3.1	2.0			29.1
6C				1.2	4.1	7.2	5.7	5.7	3.1	2.3			29.3
7C				1.2	4.2	7.4	5.4	5.8	3.2	2.3			29.5
5C	1.3	1.3	2.0						1.4	3.1	2.9	1.6	13.6
4D	2.1	1.9	2.4						1.5	3.7	3.4	2.0	17.0
4E	1.8	1.6	2.1						1.2	3.2	2.9	1.6	14.4
4C	1.9	1.7	2.2						1.4	3.4	3.1	1.8	15.5
4B	2.4	2.2	2.4						1.7	4.2	3.9	2.2	19.0
4A	1.9	1.7	2.2						1.4	3.4	3.1	1.8	15.5

Crops Included

Brussels sprouts
Cabbage
Cauliflower
Celery
Lettuce
Onions
Radishes
Spinach
Sweet Corn

Soil	HSG	Crop	Treatment	% Area	CN	Total CN component
BcA	D	Grass		4.50%	80	3.6
BeA	D	Grass		3.10%	80	2.48
Cn	C	Grass		0.30%	74	0.222
Cr	C	Grass		3.20%	74	2.368
EdA	D	Grass		20%	80	15.92
Eh	D	Grass		2.30%	80	1.84
EtA	D	Grass		0.10%	80	0.08
LcA	D	Grass		57.30%	80	45.84
Md	D	Grass		<0.1	N/A	N/A
Me	D	Grass		4.10%	80	3.28
MidB	C	Grass		0.50%	74	0.37
NoA	B	Grass		3.60%	61	2.196
Nr	B	Grass		0.20%	61	0.122
W	D	Water		0.80%	N/A	N/A
				99.90%		78.318

Dacosta - 90%

Area type for Wharton County - 5C

Consumptive use				
	Corn	Cotton	Alfa-alfa	Average
January			0.81	0.81
February			1.17	1.17
March	0.6	0.3		0.45
April	2.2	1.2		1.7
May	4.9	4.1		4.5
June	9.7	7.8		8.75
July	3.6	5.8		4.7
August		1.7		1.7
September			5.13	5.13
October			4.05	4.05
November			2.07	2.07
December			0.99	0.99

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.:

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

(1) Month	(2) Avg Rain	(3) Avg Runoff	(4) Avg Infilt Rainfall	(5) Evapo-trans.	(6) Required Leach	(7) Total Water Needs	(8) Effluent Needed in Root Zone	(9a) Raw Net Evap. from Reservoir	(9b) Reservoir Net Evap. (as inches on plot acres)	(10) Effluent Needed Based on Irrigation Efficiency	(11) Reservoir Consumtion (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.41	1.95	0.81	0.00	0.81	0.00	-1.03	0.00	0.00	0.00
February	2.15	0.58	1.57	1.17	0.00	1.17	0.00	0.11	0.00	0.00	0.00
March	2.90	1.07	1.82	0.45	0.00	0.45	0.00	0.67	0.00	0.00	0.00
April	3.07	1.20	1.87	1.7	0.00	1.70	0.00	1.34	0.00	0.00	0.00
May	4.50	2.32	2.18	4.5	0.58	5.08	2.90	0.40	0.00	3.41	3.41
June	4.08	1.97	2.10	8.75	1.66	10.41	8.31	1.66	0.00	9.77	9.77
July	3.46	1.49	1.97	4.7	0.68	5.38	3.41	2.67	0.00	4.01	4.01
August	3.40	1.44	1.96	1.7	0.00	1.70	0.00	2.87	0.00	0.00	0.00
September	3.89	1.82	2.07	5.13	0.77	5.90	3.83	1.11	0.00	4.50	4.50
October	4.10	1.99	2.11	4.05	0.49	4.54	2.43	0.07	0.00	2.85	2.85
November	3.78	1.74	2.04	2.07	0.01	2.08	0.03	-0.82	0.00	0.04	0.04
December	2.71	0.95	1.77	0.99	0.00	0.99	0.00	-0.63	0.00	0.00	0.00
Totals	41.41	18.00	23.41	36.02	4.18	40.20	20.90	8.41	0.00	24.59	24.59

Crop is	Coastal	
CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	5.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate =	2.05	*ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate =		*ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis =	N/A	*ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit = 2.05 *ac-in/ac/month* **OR** *ac-ft/ac/year*

Limiting factor = Click this cell to choose from list.

Gross rate check (from flow, acres) = 0.00 **OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = ⟦(*average rainfall* – (0.2*((1000/*CN*) – 10)))⟧^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall* – *average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019
(6) Required leaching = ← Edit
If: *evapotranspiration* – *average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration* – *average infiltrated rainfall* > 0, *Ce* /(*Cl* – *Ce*)*(*evapotranspiration* – *avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration* + *required leaching*
(8) Effluent needed in root zone = *total water needs* – *average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface* + *effluent needed based on irrigation efficiency*

STORAGE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: Wharton AD1, LLC

Permit No.: 0

The storage calculations are designed to evaluate the storage capacity and surface area of the applicant's storage pond (or multiple ponds). The pond must have enough surface area to evaporate all the flow to the pond under low-net evaporation and corresponding annual rainfall conditions. The pond is considered adequately sized when the adidtional storage required is equal to zero (or "none"). If the additional storage required is greater than zero, then:
(1) the pond's storage capacity must be increase, (2) the pond's surface area must be increased, (3) the effluent flow must be reduced, or (4) other approved measures must be taken to ensure that no accumulation occurs during low-net evaporation and corresponding annual rainfall conditions.

(12) Month	(13) Effluent Available (as inches on plot acres)	(14a) Average Rainfall Distrib. (%)	(14b) Rain Worst Year	(15) Field Runoff Worst Year	(16) Infiltrated Rain	(17) Avail Water	(18a) Average Net Evap. Distrib. (%)	(18b) Low Net Evap. from Reservoir Surface	(19) Effluent to Storage (as inches on plot acres)	(20) Accum Storage (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	8.11%	5.04	2.77	2.27	2.27	-12.28%	0.00	0.00	-
February	0.00	5.19%	3.22	1.31	1.91	1.92	1.31%	0.00	0.00	-
March	0.00	6.99%	4.34	2.19	2.15	2.16	7.99%	0.00	0.00	0.01
April	0.00	7.41%	4.60	2.40	2.20	2.20	15.96%	0.00	0.00	0.01
May	0.00	10.88%	6.76	4.29	2.47	2.47	4.77%	0.00	-3.07	-
June	0.00	9.85%	6.12	3.72	2.40	2.41	19.77%	0.00	-9.42	-
July	0.00	8.37%	5.20	2.91	2.29	2.29	31.68%	0.00	-3.64	-
August	0.00	8.22%	5.10	2.83	2.27	2.28	34.09%	0.00	0.00	-
September	0.00	9.40%	5.84	3.47	2.37	2.37	13.18%	0.00	-4.14	-
October	0.00	9.91%	6.15	3.75	2.41	2.41	0.78%	0.00	-2.50	-
November	0.00	9.13%	5.67	3.32	2.35	2.35	-9.76%	0.00	0.00	-
December	0.00	6.55%	4.07	1.97	2.10	2.11	-7.50%	0.00	0.00	-
Totals	0.03	100%	62.12	34.93	27.19	27.23	100%	0.00	—	-

Worst (low) net evap. =	-18.96 inches	Storage required =	29.87 *ac-ft*
Corresponding rain =	62.12 inches	Actual storage =	*ac-ft*
Worst-case net year =	2004	Additional storage required =	29.87 *ac-ft*
		Storage days =	130 *days*

← You must manually enter a starting value for accumulated storage. **Click the link for instructions.**
Instructions for setting the accumulated storage start value'

FALSE ← Special case (all positive storage values)

(13) Effluent available for irrigation (assumes design flow is applied to entire acerage unless different flow values are justified).
(14a) Average rainfall distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(14b) Rainfall worst year = (*rainfall distribution* as fraction or %/100)**maximum annual rainfall*
(15) Field runoff worst year = ⟦(*rainfall worst year* – (0.2*((1000/*CN*) – 10)))⟧^2/((*rainfall worst year* + (0.8*((1000/*CN*) – 10))))
(16) Infiltrated rainfall = (rainfall worst year- field runoff worst year)
(17) Available water = (effluent available for land application + infiltrated rainfall check)
(18a) Average net evaporation distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(18b) Net low evaporation from reservoir surface = [(|*low net evaporation*|)*(*net low evaporation avg. dist*)]*[(*pond area*)/(*irrigation area*)]
(19) Storage =
If: (*total water needs – infiltrated rainfall*) < 0, (*effluent available for land application – net low evaporation from reservoir surface*);
If: (*total water needs – infiltrated rainfall*) ≥ 0,
(effluent available for land application – net low evaporation from reservoir surface) * [(total water needs – infiltrated rainfall)/(irrigation efficiency)]
(20) Accumulated storage =
If: *net low evaporation from reservoir surface + storage* ≤ 0, 0
If: *net low evaporation from reservoir surface + storage* > 0, enter value

From: Sowmiya Kannappan
To: Sara Holmes
Cc: Hannah Zellner; James Miertschin; Stephen Megnia; Michael Zhang | Environeer Engineering Consulting
Subject: Re: WQ0005487000 - Wharton AD 1,LLC NOD
Date: Tuesday, June 10, 2025 10:32:46 PM
Attachments: Outlook-A picture .png
Outlook-Graphical .png

Hi Sara,

I have attached the updated pages of the application for your review in the following drive link:

https://drive.google.com/drive/folders/1G4saB7P_cTcZG2t31lPdNGGgnaTkyXPU?usp=sharing

Please let me know if you have any questions.

Sowmiya Kannappan
Environmental Consultant
Office: (281)-845-9889 | Mobile: (346)-441-9582
Address: University of Houston Technology Bridge
5000 Gulf Freeway, Bldg 4, Houston, TX, 77023
www.environeerconsulting.com

ENVIRONEER
ENGINEERING CONSULTING

Goldman Sachs 10,000 small businesses
ALUMNI

From: Sara Holmes <Sara.Holmes@tceq.texas.gov>
Sent: Wednesday, May 21, 2025 2:39 PM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>; Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>
Cc: Hannah Zellner <Hannah.Zellner@Tceq.Texas.Gov>; James Miertschin <jm@jmaenv.com>
Subject: WQ0005487000 - Wharton AD 1,LLC NOD

Good afternoon,

We have received the application for WQ0005487000 Wharton AD 1, LLC, and it is missing information necessary to complete our review. Please provide the updated information listed above in the attachment of this email within **14 days** or by June 4, 2025.

Please send revisions electronically to Hannah and me. Regarding any attachments sent in response, please only send all revised pages of the application, not the entire application. We would not consider an application re-submitted in its entirety to be part of the record and would have to ask you again to submit just any pages with changes. If you have any questions, please feel free to contact either Hannah Zellner or me.

Thank you,

Sara Holmes
Natural Resource Specialist III
Water Quality Assessment Team
12100 Park 35 Circle
Austin, TX 78753
512-239-4534

WHARTON AD1, LLC
PERMIT NO. WQ005487000
APPLICATION FOR A NEW PERMIT
Technical Completeness Review

Please address the following items:

GEOLOGY & GROUNDWATER

1. Domestic Worksheet 3.0, Item 4. Well and Map Information: Several surface waters are shown on the submitted site maps including the Colorado River, Jones Creek, East Fork Blue Creek, Pierce Canal, various canal ditches, roadside ditches and levees, etc. Please provide a 100-ft buffer from all surface waters to the land application areas to protect waters in the state. Please indicate these buffers on the USGS map. - **Done**

   Please identify the proposed location of the storage lagoon on the USGS map.
   The lat/long of the lagoon is:
   Latitude: 29°12'54.60"N
   Longitude: 96°11'40.81"W

   Proposed South Digestate Lagoon Design
   - Total Depth = 20.5ft
   - Freeboard Depth = 2ft
   - Side Slopes = 3:1
   - Top Elevation = TBD
   - Bottom Elevation = TBD
   - Max Operating Elevation = TBD
   - Berm Width = 10ft
   - Storage Period = 195 days
   - Max Operating Capacity = 11,134,044 gallons

   Please complete the well table with information for water wells within 500 ft of the land application areas and include a proposed BMP (plugging, buffers, or no action required).

2. Technical Report 1.0, Item 3. Impoundments: Please complete as much of the table as possible. **Completed**

SOILS & AGRONOMY

1. Domestic Worksheet 3.0, Item 3. Annual Cropping Plan – I don't see the following included in the cropping plan. Please address these items within the cropping plan:
   - Crop growing seasons – **Between March and June**
   - Breakdown of acreage and percent of total acreage for each crop (Please note that in Attachment 1 – Nutrient Management Budget, all the crops and LMUs listed only makes up approximately 26% of the 28,955 total land application acres) – **Total land application area of 28,955 acres is higher than the cultivation area (7,207 acres) on the nutrient management budget to spread effluent on the pasture land in the future.**
   - Min/max harvest heights (for grass) – **6 feet**
   - Supplemental watering – No additional watering since rainfall is 37 inches per year
   - Crop salt tolerances

SALT TOLERANCES
The proposed crops for the land application are corn and cotton grain. Cotton is classified as moderately salt tolerant crop with a salinity threshold level of 7.7 mmhos/cm[i] and corn is

relatively non-tolerant crop for salt and the threshold for potential limited growth in corn lower at is 1.1 mmhos/cm[ii].

2. Domestic Worksheet 3.1, Item 2. Surface Spray/Irrigation – Please provide additional information on the following items in this worksheet:
    - Please propose an application rate given in acre-feet/acre/year. – **0.023 ac-ft/acre/year**
    - Please also provide more information on how the spreading technique and how often it will occur. How does this operate? Note that Worksheet 3.1 indicated the frequency as 24 hours a day for 7 days a week. How will the effluent be applied during the growing seasons of corn and cotton?

Effluent application will be carried out using the dragline method, which allows for efficient and uniform distribution across the designated land application area. The application events are planned to occur twice annually, strategically scheduled between crop harvest and the planting of the next crop to maximize nutrient uptake and minimize potential runoff. A calibrated flow meter will be used to monitor and record the application rate. The total proposed duration for land application activities is estimated at 400 hours per year.

- How will the applicant determine that the application rate is evenly distributed over the entire land application area?

Effluent applications will be carried out using the dragline method, which allows for efficient and uniform distribution across the designated land application area

- How will flow be measured to the land application areas? And how will the application rate be calculated when applying to application areas?

A calibrated flow meter will be used to monitor and record the application rate.

3. Domestic Worksheet 3.1, Water Balance – Please include details of how the Column 5 values were determined. Was it based on Corn and Bermudagrass rates? Can you also provide additional information on how the Ce was determined? You can provide these items in the engineering report.
   Column 5 is included based on data from Bulletin6019 for corn grain, cotton and alfa-alfa. Ce is provided based on the assumption value discussed with TCEQ on call (Sara Holmes).

Please feel free to call Hannah Zellner, P.G. for geology/groundwater questions at (512) 239-2908 or via email (preferred) at Hannah.Zellner@tceq.texas.gov. For soils/agronomy questions, please feel free to call Sara Holmes at (512) 239-4534 or via email (preferred) at Sara.Holmes@tceq.texas.gov.

---

[i] **Salinity stress in cotton: effects, mechanism of tolerance and its management strategies**
Iram Sharif[1], Saba Aleem[2], Jehanzeb Farooq[1], Muhammad Rizwan[1], Abia Younas[1], Ghulam Sarwar[1], Shahid Munir Chohan[1]

[ii] TAM-AAMM Texas A&M—AgriLife Agronomic Monday Memo Plant Tolerances to Salinity in Irrigation Waters and Soils

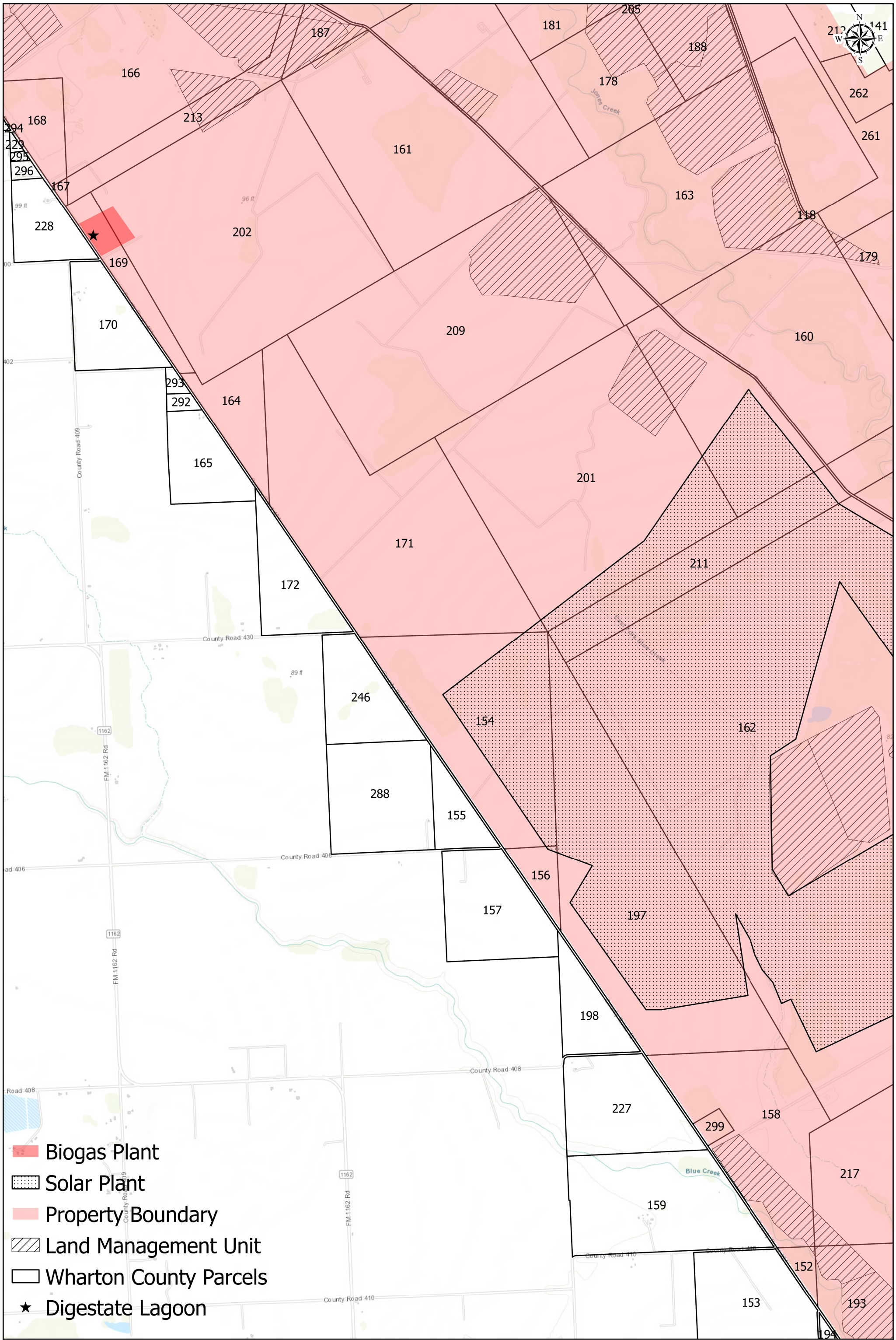
Texas Parks & Wildlife, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

- Biogas Plant
- Solar Plant
- Property Boundary
- Land Management Unit
- Wharton County Parcels
- ★ Digestate Lagoon

Affected Landowners Map
Segment 2

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


205
181
187
212
141
188
166
178
262
168
213
294
229
295
296
161
261
167
163
228
202
118
169
179
170
209
160
293
292
164
165
201
171
211
172
246
154
162
288
155
156
157
197
198
227
158
299
217
159
152
153
193
194
Jones Creek
Blue Creek
County Road 409
County Road 430
County Road 406
County Road 408
County Road 410
FM 1162 Rd
1162
99 ft
96 ft
89 ft
N
S
E
W
Biogas Plant
Solar Plant
Property Boundary
Land Management Unit
Wharton County Parcels
Digestate Lagoon
Affected Landowners Map
Segment 4
0
1,000
2,000
4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

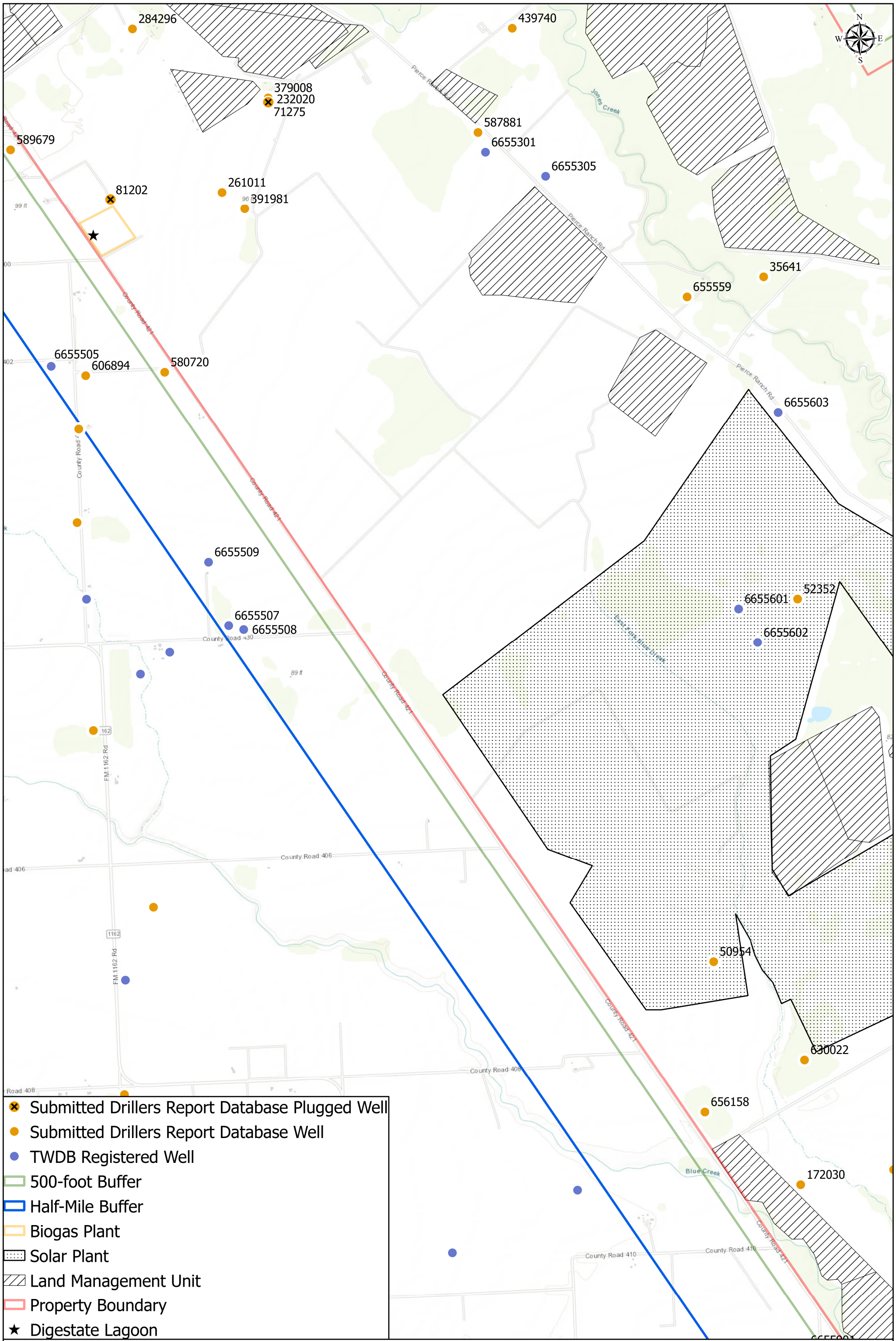
- Submitted Drillers Report Database Plugged Well
- Submitted Drillers Report Database Well
- TWDB Registered Well
- 500-foot Buffer
- Half-Mile Buffer
- Biogas Plant
- Solar Plant
- Land Management Unit
- Property Boundary
- Digestate Lagoon

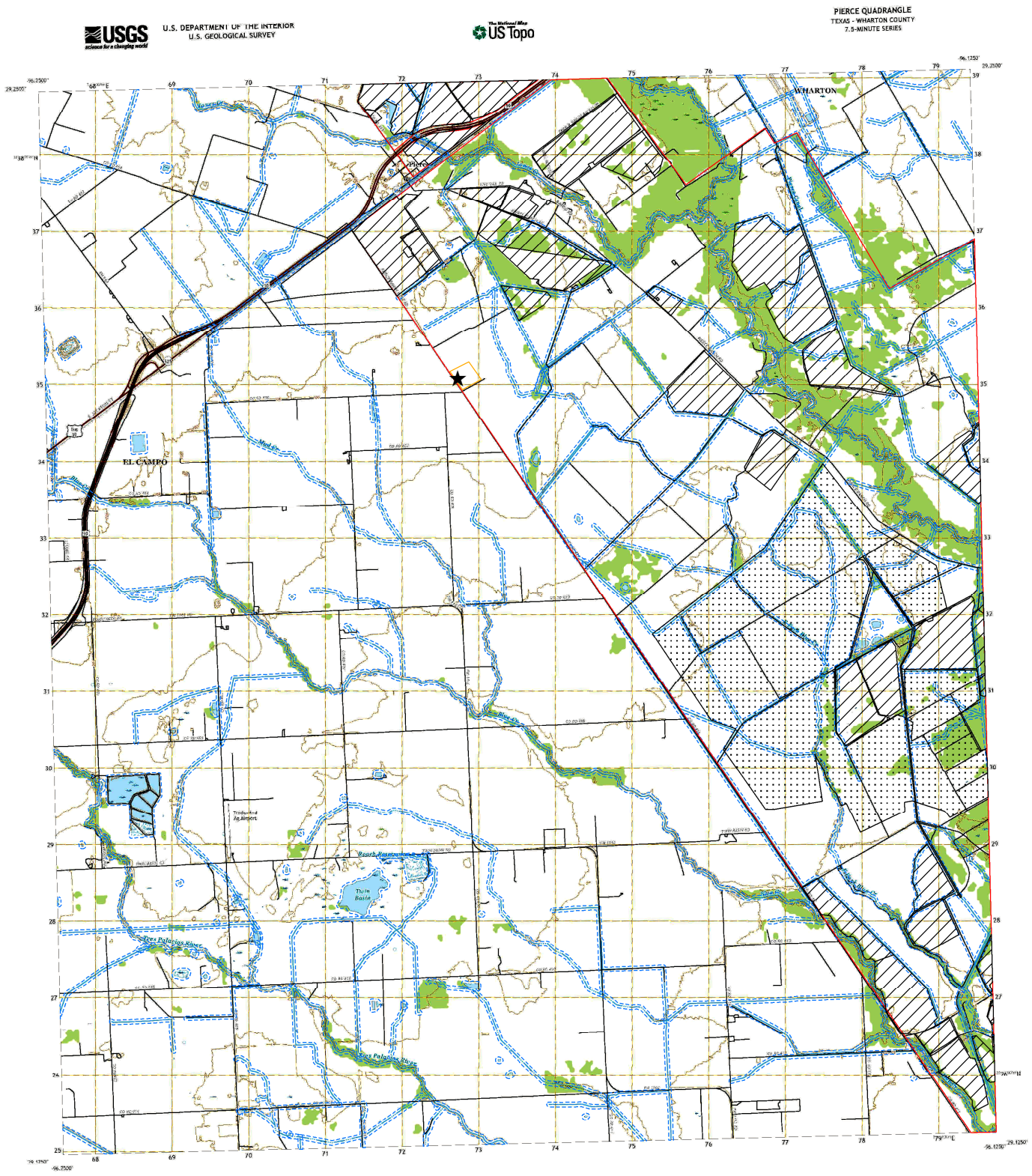
6647803
261160
209862
191010
199889
408167
410260
243777
394411
384859
385575
262487
591402
243876
6655202
6655203
546684
6655204
182454
286090
6655201
595427
148403
391980
393620
398117
6655110
448881
448884
448886
448882
299262
316332
6655120
6655109
284296
439740
379008
232020
71275
587881
6655301
6655305
589679
81202
261011
391981
6655505
606894
580720

Well Location Map
Segment 2

Feet
0 1,000 2,000 4,000

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


284296
439740
379008
232020
71275
589679
587881
6655301
6655305
81202
261011
391981
35641
655559
6655505
606894
580720
6655603
6655509
6655507
6655508
52352
6655601
6655602
50954
630022
656158
172030
County Road 421
County Road 430
County Road 406
County Road 408
County Road 410
FM 1162 Rd
Pierce Ranch Rd
Jones Creek
Blue Creek
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
500-foot Buffer
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Digestate Lagoon
Well Location Map
Segment 4
0
1,000
2,000
4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



★ Digestate Lagoon

Biogas Plant

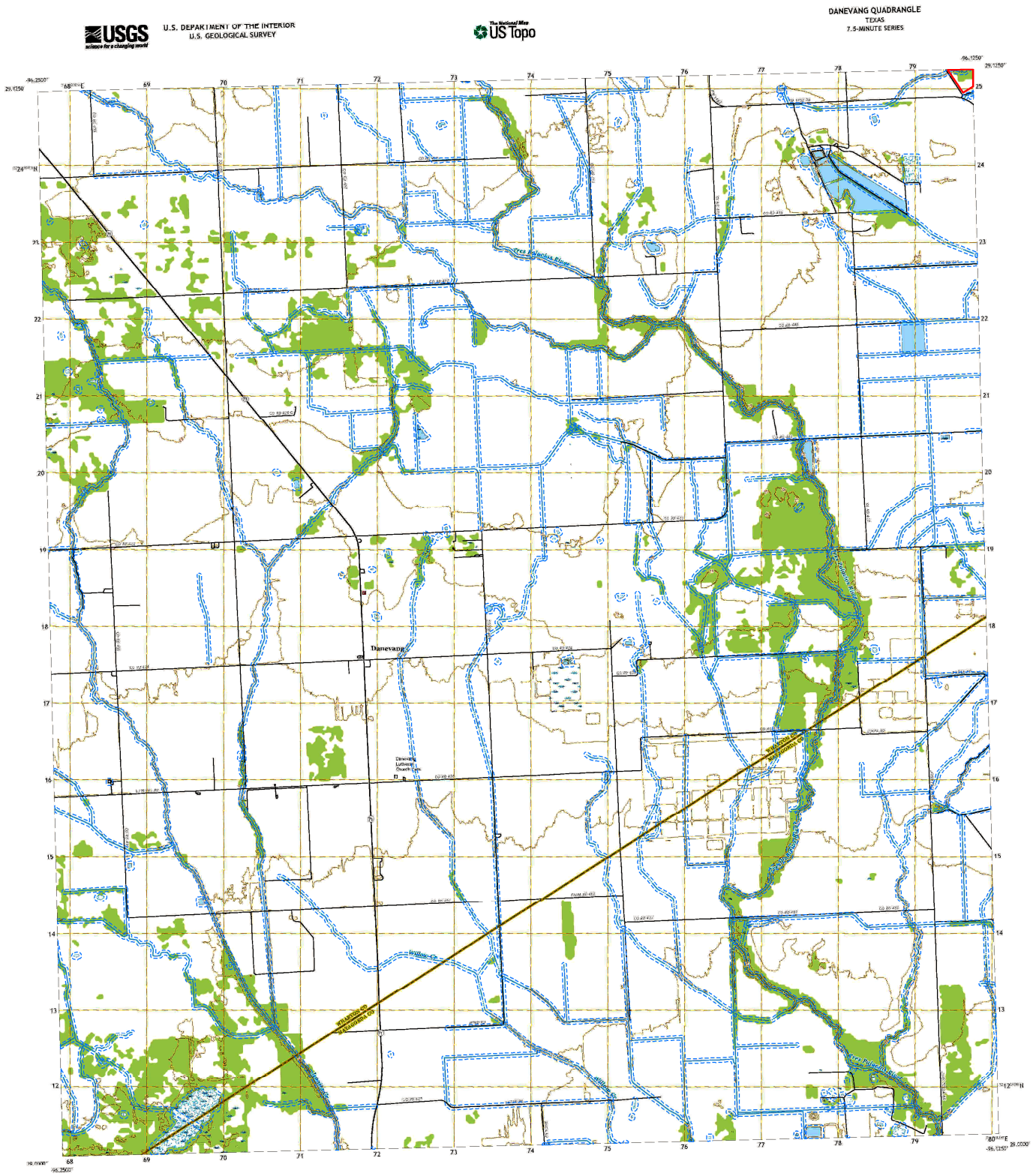
Solar Plant

Land Management Unit

Property Boundary

Surface Water 100-ft Buffer

Source: USGS



Biogas Plant

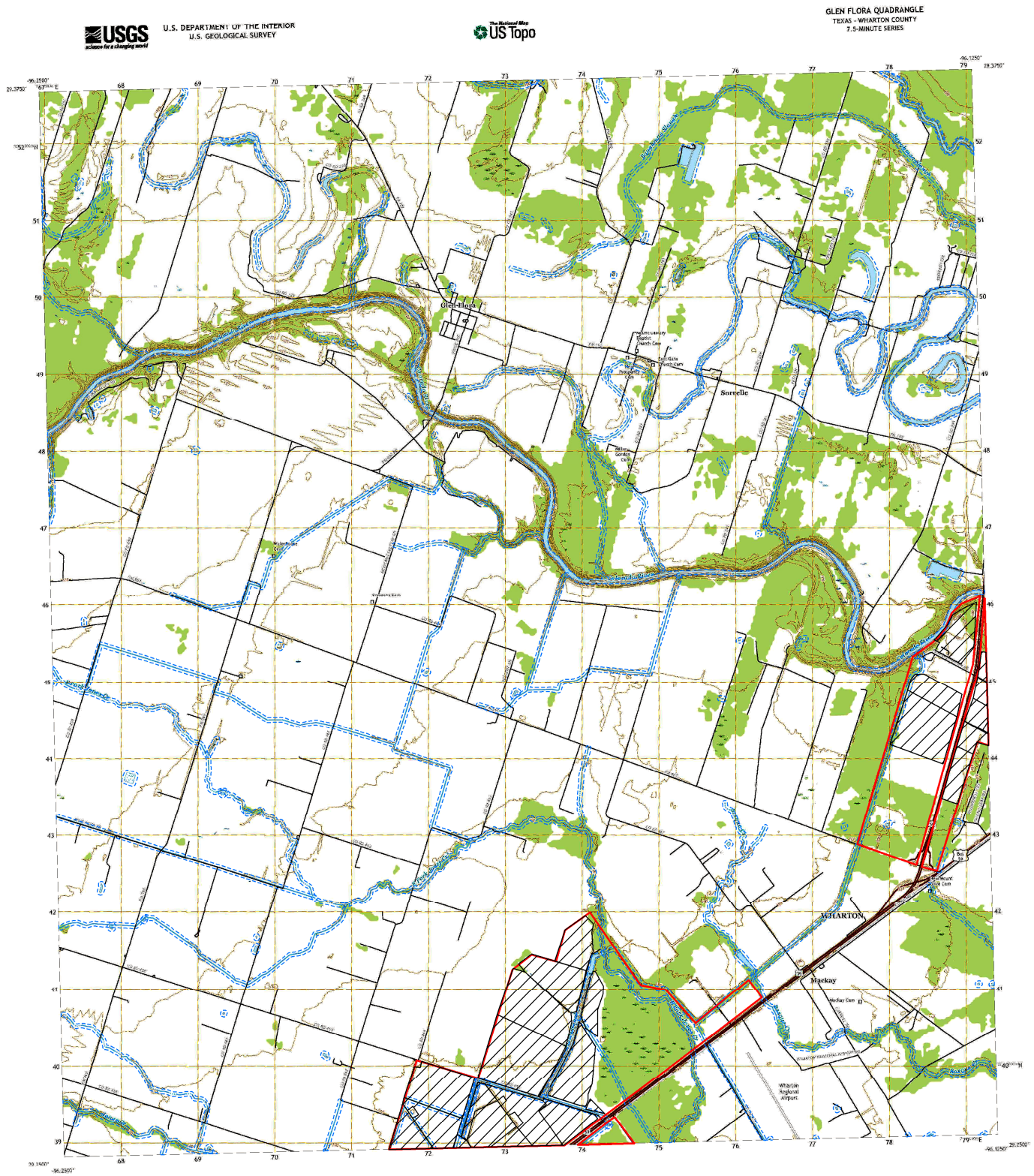
Solar Plant

Land Management Unit

Property Boundary

Surface Water 100-ft Buffer

Source: USGS



Biogas Plant

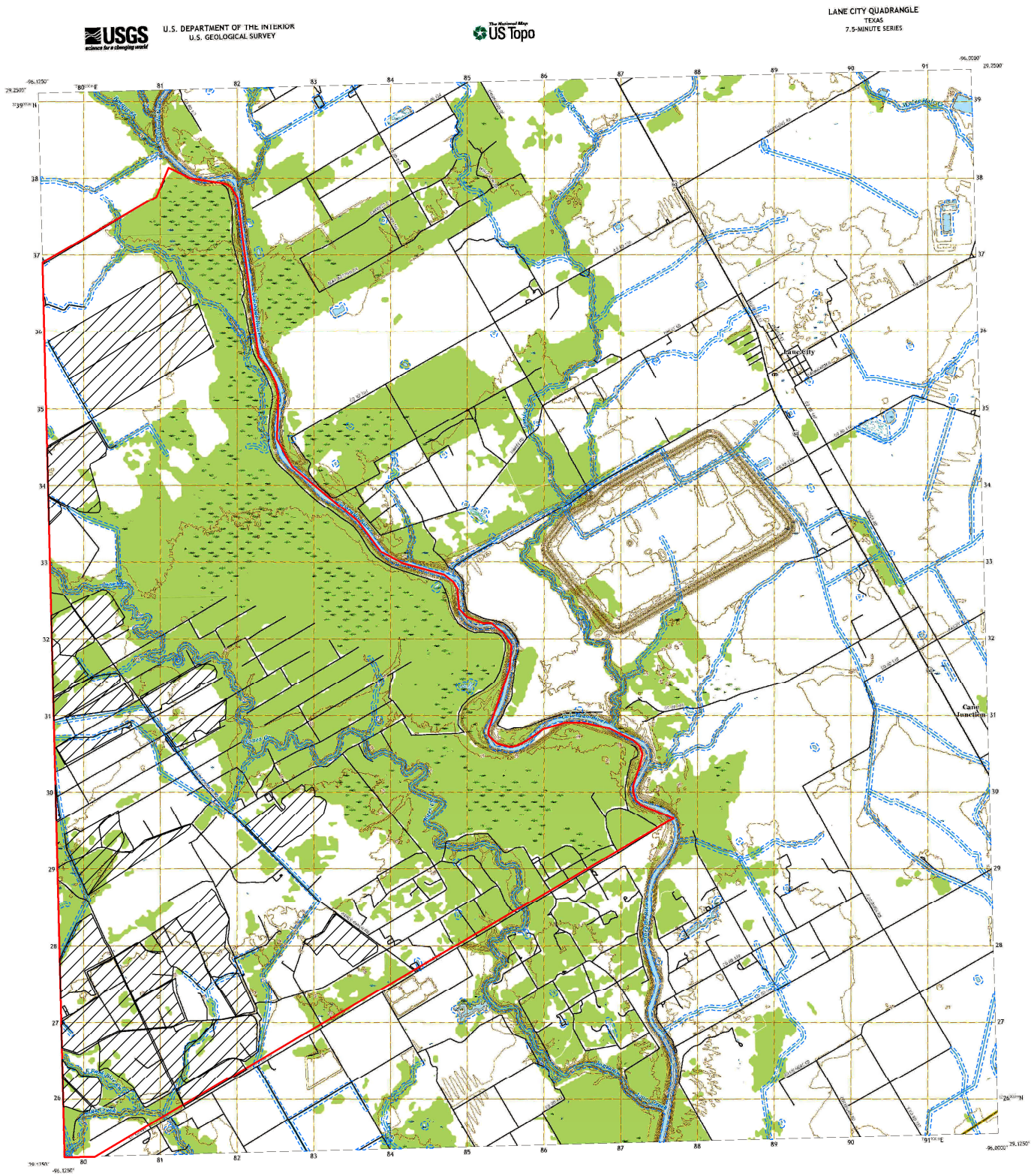
Solar Plant

Land Management Unit

Property Boundary

Surface Water 100-ft Buffer

Source: USGS



Biogas Plant

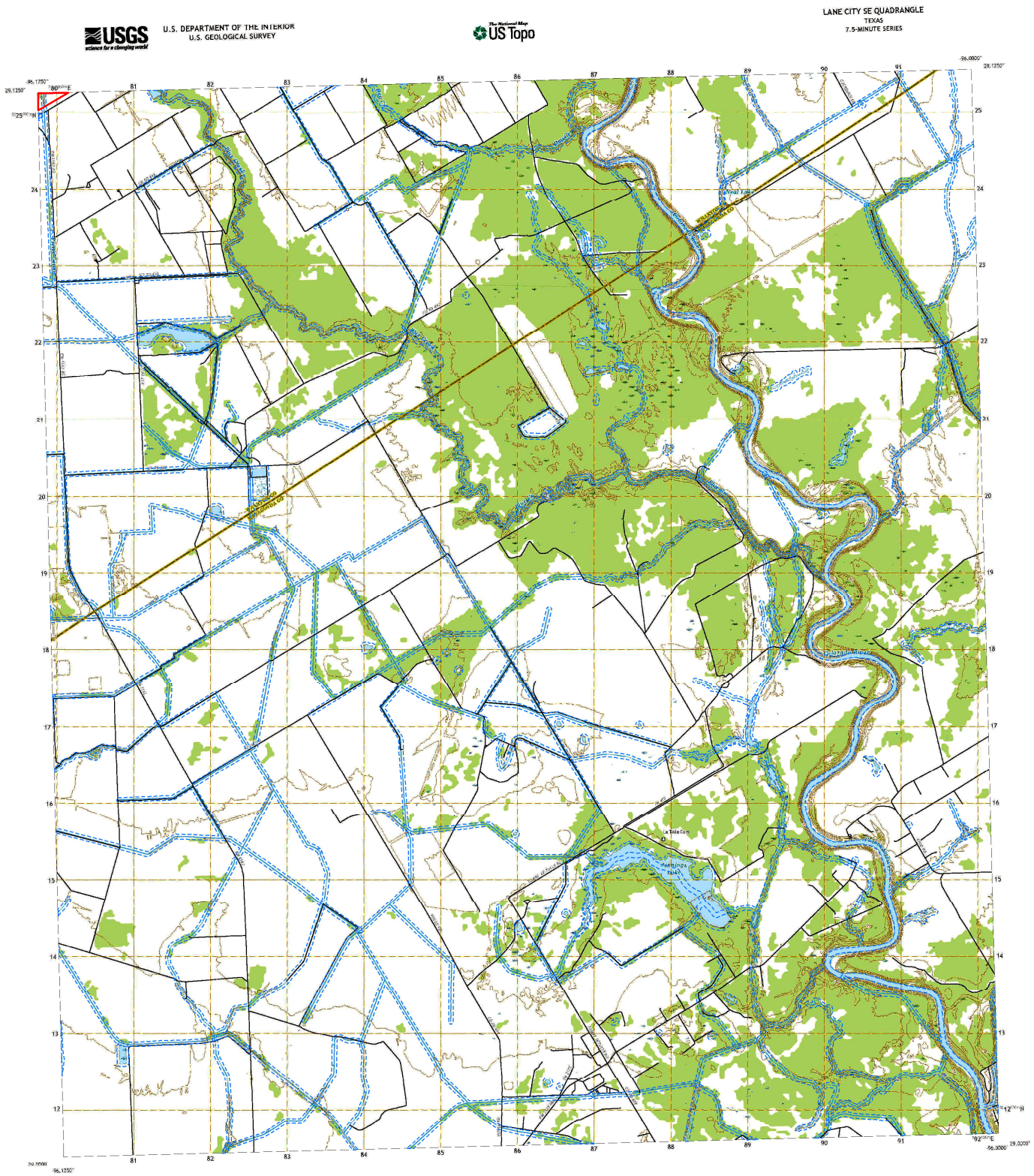
Solar Plant

Land Mangement Unit

Property Boundary

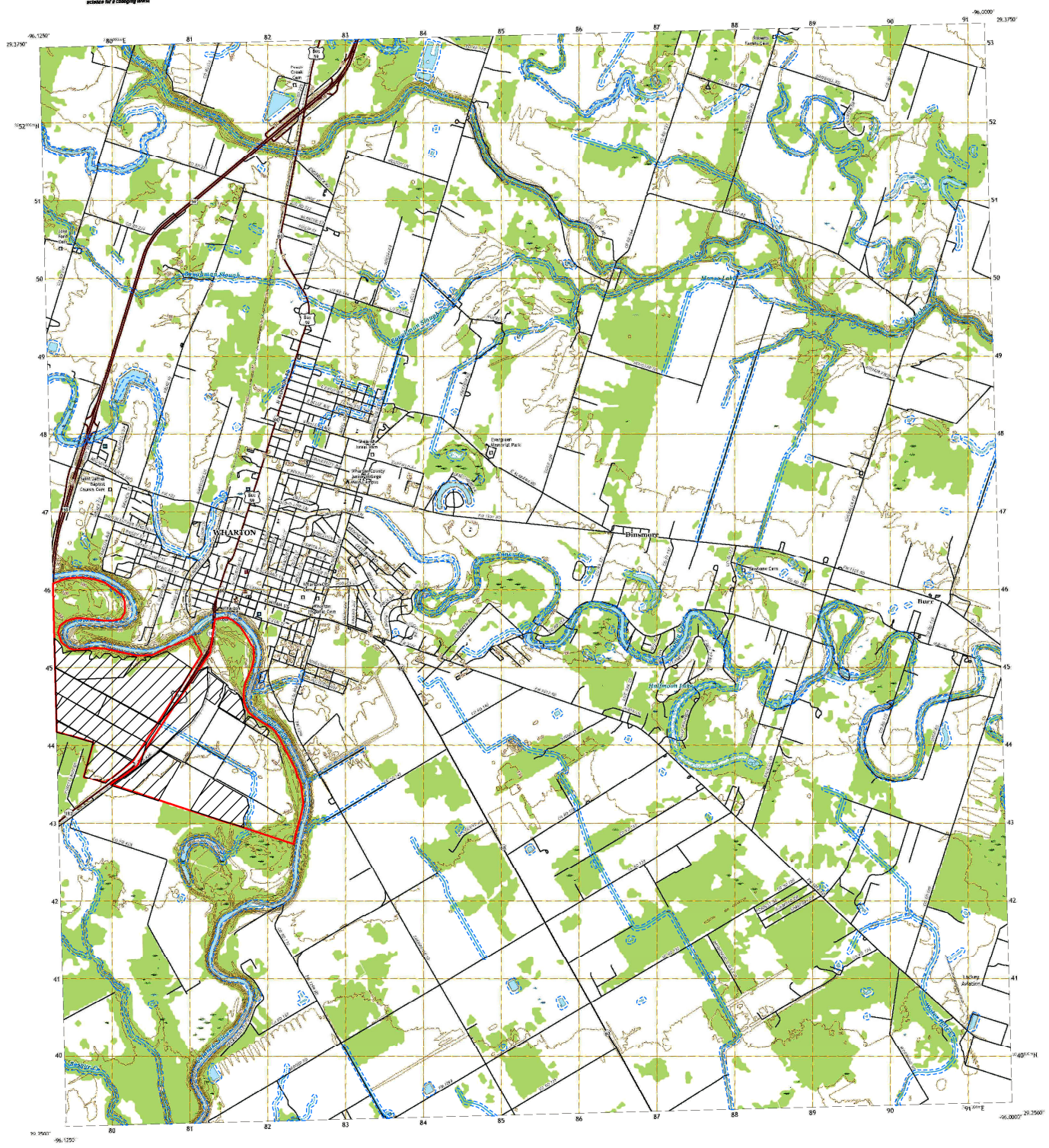
Surface Water 100-ft Buffer

Source: USGS



- Biogas Plant
- Solar Plant
- Land Management Unit
- Property Boundary
- Surface Water 100-ft Buffer

Source: USGS



Biogas Plant

Solar Plant

Land Management Unit

Property Boundary

Surface Water 100-ft Buffer

Source: USGS

StateWell No.	Source	Well use	Latitude	Longitude	Well Depth	Plugged?	Proposed Best Management Practice
6655110	TWDB	Domestic	29.233611	-96.209445	315	No	meets the 500 ft buffer
6655201	TWDB	Domestic	29.238889	-96.1875	1272	No	meets the 500 ft buffer
6655202	TWDB	Stock	29.241945	-96.202778	180	No	meets the 500 ft buffer
6655203	TWDB	Public Supply	29.240834	-96.198889	1130	No	meets the 500 ft buffer
6655204	TWDB	Domestic	29.240834	-96.199445	310	No	meets the 500 ft buffer
6655301	TWDB	Stock	29.22	-96.165278	29	No	meets the 500 ft buffer
6655305	TWDB	Stock	29.218333	-96.160834	82	No	meets the 500 ft buffer
6655306	TWDB	Domestic	29.214167	-96.130555	90	No	meets the 500 ft buffer
6655307	TWDB	Domestic	29.213056	-96.130833	355	No	meets the 500 ft buffer
6655601	TWDB	Stock	29.189722	-96.147222	30	No	meets the 500 ft buffer
6655602	TWDB	Unused	29.1875	-96.145834	7152	No	meets the 500 ft buffer
6655603	TWDB		29.202501	-96.143889	100	No	meets the 500 ft buffer
6656102	TWDB	Stock	29.221111	-96.099722	63	No	meets the 500 ft buffer
6656103	TWDB	Stock	29.213056	-96.115001	107	No	meets the 500 ft buffer
6656104	TWDB	Stock	29.210278	-96.124722	41	No	meets the 500 ft buffer
6656401	TWDB	Domestic	29.173333	-96.111389	229	No	meets the 500 ft buffer
6656402	TWDB	Unused	29.203889	-96.116112	6012	No	meets the 500 ft buffer
6656403	TWDB		29.174167	-96.121389	275	No	meets the 500 ft buffer
6656705	TWDB	Industrial	29.156667	-96.090278	160	No	meets the 500 ft buffer
6656801	TWDB	Irrigation	29.143056	-96.081111	882	No	meets the 500 ft buffer
6656805	TWDB	Recreation	29.162778	-96.046945	180	No	meets the 500 ft buffer
30443	SDRDB	Industrial	29.286945	-96.103889	300	No	meets the 500 ft buffer
35641	SDRDB	Domestic	29.211389	-96.144722	240	No	meets the 500 ft buffer
50954	SDRDB	Rig Supply	29.166667	-96.149722	240	No	meets the 500 ft buffer
51819	SDRDB	Industrial	29.145556	-96.087222	140	No	meets the 500 ft buffer
51823	SDRDB	Industrial	29.162501	-96.087222	160	No	meets the 500 ft buffer
52352	SDRDB	Rig Supply	29.190278	-96.142778	260	No	meets the 500 ft buffer
70746	SDRDB	Industrial	29.190834	-96.131944	150	No	meets the 500 ft buffer
88711	SDRDB	Irrigation	29.300834	-96.101667	350	No	meets the 500 ft buffer
96362	SDRDB	Domestic	29.294722	-96.125833	80	No	meets the 500 ft buffer
97361	SDRDB	Domestic	29.293889	-96.122222	140	No	meets the 500 ft buffer
112433	SDRDB	Domestic	29.158056	-96.090834	170	No	meets the 500 ft buffer
132013	SDRDB	Rig Supply	29.302501	-96.103056	160	No	meets the 500 ft buffer
138282	SDRDB	Industrial	29.134445	-96.111667	290	No	meets the 500 ft buffer
148403	SDRDB	Domestic	29.235	-96.179167	360	No	meets the 500 ft buffer
172030	SDRDB	Irrigation	29.151945	-96.143611	300	No	meets the 500 ft buffer
180809	SDRDB	Industrial	29.152778	-96.136667	160	No	meets the 500 ft buffer
186851	SDRDB	Industrial	29.153056	-96.103889	280	No	meets the 500 ft buffer
191010	SDRDB	Rig Supply	29.266667	-96.183334	220	No	meets the 500 ft buffer
192091	SDRDB	Rig Supply	29.170833	-96.110278	140	No	meets the 500 ft buffer
194827	SDRDB	Industrial	29.179722	-96.117222	260	No	meets the 500 ft buffer
199889	SDRDB	Rig Supply	29.266944	-96.166944	200	No	meets the 500 ft buffer
203096	SDRDB	Stock	29.301389	-96.105278	105	No	meets the 500 ft buffer
206193	SDRDB	Stock	29.178055	-96.078889	90	No	meets the 500 ft buffer
206197	SDRDB	Domestic	29.178055	-96.078889	96	No	meets the 500 ft buffer
206215	SDRDB	Stock	29.165556	-96.068611	177	No	meets the 500 ft buffer
211128	SDRDB	Industrial	29.228055	-96.116389	150	No	meets the 500 ft buffer
227468	SDRDB	Industrial	29.289167	-96.137778	230	No	meets the 500 ft buffer
232020	SDRDB	Industrial	29.223611	-96.181389	270	No	meets the 500 ft buffer
243777	SDRDB	Rig Supply	29.253889	-96.202778	200	No	meets the 500 ft buffer
243876	SDRDB	Industrial	29.245	-96.201945	460	No	meets the 500 ft buffer

StateWell No.	Source	Well use	Latitude	Longitude	Well Depth	Plugged?	Proposed Best Management Practice
243906	SDRDB	Industrial	29.173055	-96.111112	290	No	meets the 500 ft buffer
250798	SDRDB	Rig Supply	29.166667	-96.066667	160	No	meets the 500 ft buffer
261011	SDRDB	Irrigation	29.217778	-96.185	710	No	meets the 500 ft buffer
261160	SDRDB	Irrigation	29.272222	-96.1875	652	No	meets the 500 ft buffer
262487	SDRDB	Irrigation	29.245556	-96.191111	680	No	meets the 500 ft buffer
269838	SDRDB	Domestic	29.290278	-96.122778	205	No	meets the 500 ft buffer
269999	SDRDB	Irrigation	29.241111	-96.151112	702	No	meets the 500 ft buffer
270000	SDRDB	Irrigation	29.304723	-96.133611	710	No	meets the 500 ft buffer
284296	SDRDB	Rig Supply	29.228611	-96.191389	250	No	meets the 500 ft buffer
299262	SDRDB	Rig Supply	29.233611	-96.200001	200	No	meets the 500 ft buffer
312137	SDRDB	Closed-Loop Geothermal	29.288056	-96.102501	105	No	meets the 500 ft buffer
312220	SDRDB	Domestic	29.288056	-96.102501	365	No	meets the 500 ft buffer
316332	SDRDB	Rig Supply	29.233611	-96.200001	240	No	meets the 500 ft buffer
331329	SDRDB	Domestic	29.286389	-96.0925	124	No	meets the 500 ft buffer
331336	SDRDB	Domestic	29.288334	-96.093611	126	No	meets the 500 ft buffer
344491	SDRDB	Domestic	29.290278	-96.122778	85	No	meets the 500 ft buffer
355405	SDRDB	Closed-Loop Geothermal	29.301667	-96.103334	105	No	meets the 500 ft buffer
355408	SDRDB	Domestic	29.301667	-96.103334	335	No	meets the 500 ft buffer
369244	SDRDB	Domestic	29.224722	-96.106389	63	No	meets the 500 ft buffer
379008	SDRDB	Rig Supply	29.223889	-96.181389	130	No	meets the 500 ft buffer
380066	SDRDB	Rig Supply	29.138611	-96.130278	330	No	meets the 500 ft buffer
384859	SDRDB	Domestic	29.250001	-96.183334	120	No	meets the 500 ft buffer
385575	SDRDB	Rig Supply	29.250001	-96.183334	220	No	meets the 500 ft buffer
391980	SDRDB	Rig Supply	29.233611	-96.183334	340	No	meets the 500 ft buffer
391981	SDRDB	Rig Supply	29.216667	-96.183334	220	No	meets the 500 ft buffer
392767	SDRDB	Domestic	29.206945	-96.105556	330	No	meets the 500 ft buffer
393620	SDRDB	Rig Supply	29.233611	-96.166944	240	No	meets the 500 ft buffer
394411	SDRDB	Rig Supply	29.252778	-96.190278	120	No	meets the 500 ft buffer
398117	SDRDB	Rig Supply	29.233334	-96.166667	220	No	meets the 500 ft buffer
410260	SDRDB	Rig Supply	29.262167	-96.177639	205	No	meets the 500 ft buffer
439740	SDRDB	Rig Supply	29.228056	-96.163056	240	No	meets the 500 ft buffer
448881	SDRDB	Monitor	29.233291	-96.208752	45	No	meets the 500 ft buffer
448886	SDRDB	Monitor	29.233291	-96.208752	40	No	meets the 500 ft buffer
448882	SDRDB	Monitor	29.233291	-96.208752	48	No	meets the 500 ft buffer
448884	SDRDB	Monitor	29.233291	-96.208752	45	No	meets the 500 ft buffer
469070	SDRDB	Domestic	29.225	-96.096111	69	No	meets the 500 ft buffer
544937	SDRDB	Industrial	29.185348	-96.063857	114	No	meets the 500 ft buffer
546684	SDRDB	Domestic	29.24	-96.2021	203	No	meets the 500 ft buffer
573554	SDRDB	Domestic	29.228333	-96.096389	70	No	meets the 500 ft buffer
577144	SDRDB	Domestic	29.128	-96.112	130	No	meets the 500 ft buffer
580720	SDRDB	Domestic	29.2061	-96.1896	382	No	meets the 500 ft buffer
587881	SDRDB	Stock	29.2213	-96.1658	100	No	meets the 500 ft buffer
589679	SDRDB	Domestic	29.2209	-96.2007	366	No	meets the 500 ft buffer
591402	SDRDB	Domestic	29.2447	-96.2051	118	No	meets the 500 ft buffer
595427	SDRDB	Domestic	29.236903	-96.181584	380	No	meets the 500 ft buffer
612753	SDRDB	Domestic	29.160278	-96.105944	210	No	meets the 500 ft buffer
630022	SDRDB	Industrial	29.1601	-96.1431	271	No	meets the 500 ft buffer
655559	SDRDB	Stock	29.2102	-96.1505	243	No	meets the 500 ft buffer
656158	SDRDB	Industrial	29.156839	-96.150647	305	No	meets the 500 ft buffer
687955	SDRDB	Stock	29.1918	-96.1263	113	No	meets the 500 ft buffer
9584	SDRDB	Monitor	29.300001	-96.104167	0	Yes	meets the 500 ft buffer

StateWell No.	Source	Well use	Latitude	Longitude	Well Depth	Plugged?	Proposed Best Management Practice
81202	SDRDB	Withdrawal of Water	29.2175	-96.193334	250	Yes	meets the 500 ft buffer
71275	SDRDB	Withdrawal of Water	29.223611	-96.181389	270	Yes	meets the 500 ft buffer
79027	SDRDB	Withdrawal of Water	29.166667	-96.066667	160	Yes	meets the 500 ft buffer
42879	SDRDB	Withdrawal of Water	29.285278	-96.095278	124	Yes	meets the 500 ft buffer
32727	SDRDB	Withdrawal of Water	29.300834	-96.101667	360	Yes	meets the 500 ft buffer
79454	SDRDB	Withdrawal of Water	29.301945	-96.115278	75	Yes	meets the 500 ft buffer
4340	SDRDB	Monitor	29.304723	-96.103612	40	Yes	meets the 500 ft buffer
179637	SDRDB	Domestic	29.18285	-96.062263	0	Yes	meets the 500 ft buffer
239306	SDRDB	Domestic	29.294167	-96.123611	0	Yes	meets the 500 ft buffer

AGRONOMIC MANAGEMENT PLAN

Purpose

This document is in support of the Wharton AD1, LLC land application of wastes as prescribed by the Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). It is the purpose of this Agronomic Management Plan (AMP) to illustrate the beneficial use of the effluent from the proposed facility. All effluent application is managed in a manner that ensures environmental stability and maximum crop production.

This plan is updated on an annual basis to address current soil and waste analysis, climatic data, previous water demands, and proposed crop water usage for the next plan year. Application rate calculations will be developed and maintained on-site for use by the operator to determine application timing and rates.

Background

Wharton AD1, LLC is applying for a TLAP authorization through the TCEQ to beneficially irrigate effluent from the renewable energy facility located near Pierce, Wharton County, Texas. The facility generates approximately 0.075 million gallons per day (MGD) of treated effluent, which is stored in a pond and then applied to 28,955 acres of irrigated farmland. Currently, only 7,207 acres are under active cultivation as listed in the Nutrient Management Budget (Attachment 1), accounting for roughly 26% of the total land application area. The remaining acreage is designated for future pastureland application. The primary crop growing season runs from March through June, supporting crops such as corn and cotton across the designated Land Management Units (LMUs).

The region receives an average annual rainfall of 37 inches, providing sufficient natural moisture for crop growth and eliminating the need for supplemental irrigation. Grasses cultivated in the area are typically harvested at a height of around 6 feet. From a salinity management perspective, cotton is classified as a moderately salt-tolerant crop with a threshold of 7.7 mmhos/cm, making it well-suited for effluent application. In contrast, corn is relatively sensitive to salt, with a lower tolerance threshold of 1.1 mmhos/cm, which may restrict its growth under saline conditions. These considerations help guide crop selection and land management practices to optimize both agricultural productivity and environmental protection.

Overview

The digestate is transferred to the storage lagoon at an average of 0.075 MGD. It is then distributed to high-production farmland that has been typically planted with corn grain and cotton. These crops are intensively managed for maximum production. The stated crop yield goals will be provided by data from the NRCS or from historical data obtained from the farmer.

Management practices are in place and used by the landowner to ensure maximized crop production. High residue crops are utilized, and deep tillage is necessary to maximize the ability of the soils to store and retain water, allowing for maximum root penetration.

All solids produced from this facility will be recycled/disposed of under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). Land application of solid wastes will occur at agronomic rates.

Site Features

The renewable energy facility, associated infrastructure, and irrigation tracts are located in Wharton County, Texas, immediately south of Pierce, Texas. This area is located in south Texas, roughly 65 miles southwest of Houston down the US Highway 59-South.

The regional climate is classified as subtropical humid, with warm summers and mild winters. The growing season averages 268 days. The average annual rainfall is 37 inches and generally occurs during the warm season months of May, June, July, and August.

The optimum yields can only be achieved through supplemental irrigation of the crops due to low rainfall and high evaporative rates. Most cropping systems will require preseason irrigation with growing season application depending upon stored water to produce the maximum yield goals. These are standard operational production practices in this area. To achieve optimum production, the permittee requests preseason irrigation up to 30 days before crop planting. This will allow the facility to manage application events to build up a moisture and nutrient profile in the soil prior to planting. This management tool would reduce the need to use groundwater for pre-water and the costs associated with pre-plant starter fertilizers.

Soils

According to information in the Wharton Soil Survey, soils of the property tract and the surrounding area consist of Dacosta sandy clay loam, Bernard-Edna complex, Edna loam, Lake Charles clay and Bernard loam series. The physical and hydrological properties of these soils are illustrated in Table l below. More soil information can be found in supporting documentation.

General Objectives of AMP

- Present information about the effluent, soils, and crops.
- Present information about crop rotations and yield goals to illustrate the appropriateness of the selected crops for use with this project.
- A description of effluent usage for land application. This will include information pertaining to actual application rates of effluent to meet the crop hydraulic/nutrient demands and maximize crop yield goals.
- An estimation of the annual loading of nutrients supplied by the effluent.
- An overview of wastewater/nutrient storage needed in the soil profile and a pre-plant scenario to serve as a starter fertilizer.
- Monitoring soil profiles to ensure no saturated soils are present within 3 feet of the surface.

T.G. ENGINEERING REPORT

Purpose

This report is prepared as part of the application for Wharton AD1, LLC. for a Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). Water balance models have been developed to illustrate the hydraulic and nutrient demands of the planned crops.

Background

Wharton AD1, LLC. is applying for a new Industrial Water Quality TLAP Permit No. WQ0000000000 to dispose of digestate (effluent) from two onsite anaerobic digesters. The entire process will generate an average of 75,000 gallons per day (GPO) of effluent for land application.

Water Balance Calculations

Figure 9, Water Balance Calculations, is designed to evaluate the maximum application rate (hydraulic loading rate) for the land application area, estimates the inflows and withdrawals from the direct rainfall, process-generated wastewater, evaporation, and irrigation withdrawal based on crop demand.

Storage Calculations

Figure 10, Storage Calculations, is designed to evaluate the storage capacity and surface area of the storage ponds.

The proposed effluent application rate is 0.023 acre-feet per acre per year, designed to align with agronomic needs while protecting environmental quality. Effluent will be applied using the dragline method, which enables efficient and uniform distribution across the designated land application areas. Application events are planned to occur twice annually, typically scheduled between the harvest of one crop and the planting of the next. This timing supports optimal nutrient uptake by crops such as corn and cotton and helps minimize the risk of nutrient runoff. The total duration of effluent application activities is estimated at approximately 400 hours per year, based on crop schedules and field conditions.

To ensure accurate and even application, a calibrated flow meter will be used to monitor and record flow volumes during each application event. The application rate will be calculated by dividing the total volume of effluent applied by the acreage treated. The dragline system provides controlled and consistent coverage, and periodic field checks will be conducted to verify uniform distribution across the land application areas.

Figure T.G.1

WATER BALANCE CALCULATIONS

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.:

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

(1) Month	(2) Avg Rain	(3) Avg Runoff	(4) Avg Infilt Rainfall	(5) Evapo-trans.	(6) Required Leach	(7) Total Water Needs	(8) Effluent Needed in Root Zone	(9a) Raw Net Evap. from Reservoir	(9b) Reservoir Net Evap. (as inches on plot acres)	(10) Effluent Needed Based on Irrigation Efficiency	(11) Reservoir Consumtion (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.41	1.95	0.81	0.00	0.81	0.00	-1.03	0.00	0.00	0.00
February	2.15	0.58	1.57	1.17	0.00	1.17	0.00	0.11	0.00	0.00	0.00
March	2.90	1.07	1.82	0.45	0.00	0.45	0.00	0.67	0.00	0.00	0.00
April	3.07	1.20	1.87	1.7	0.00	1.70	0.00	1.34	0.00	0.00	0.00
May	4.50	2.32	2.18	4.5	0.58	5.08	2.90	0.40	0.00	3.41	3.41
June	4.08	1.97	2.10	8.75	1.66	10.41	8.31	1.66	0.00	9.77	9.77
July	3.46	1.49	1.97	4.7	0.68	5.38	3.41	2.67	0.00	4.01	4.01
August	3.40	1.44	1.96	1.7	0.00	1.70	0.00	2.87	0.00	0.00	0.00
September	3.89	1.82	2.07	5.13	0.77	5.90	3.83	1.11	0.00	4.50	4.50
October	4.10	1.99	2.11	4.05	0.49	4.54	2.43	0.07	0.00	2.85	2.85
November	3.78	1.74	2.04	2.07	0.01	2.08	0.03	-0.82	0.00	0.04	0.04
December	2.71	0.95	1.77	0.99	0.00	0.99	0.00	-0.63	0.00	0.00	0.00
Totals	41.41	18.00	23.41	36.02	4.18	40.20	20.90	8.41	0.00	24.59	24.59

Crop is	Coastal	
CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	5.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate =	2.05	*ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate =		*ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis =	N/A	*ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit = 2.05 *ac-in/ac/month* **OR** *ac-ft/ac/year*

Limiting factor = Click this cell to choose from list.

Gross rate check (from flow, acres) = 0.00 **OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = ⟦(*average rainfall* – (0.2*((1000/*CN*) – 10)))⟧^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall* – *average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019 - Based on data for cotton, corn grain and alfa-alfa
(6) Required leaching = ← Edit
If: *evapotranspiration* – *average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration* – *average infiltrated rainfall* > 0, *Ce* /(*Cl* – *Ce*)*(*evapotranspiration* – *avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration* + *required leaching*
(8) Effluent needed in root zone = *total water needs* – *average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface* + *effluent needed based on irrigation efficiency*

From: Sara Holmes
To: Sowmiya Kannappan; Michael Zhang | Environeer Engineering Consulting
Cc: Hannah Zellner
Subject: RE: Pretech comments - WQ0005487000
Date: Thursday, March 27, 2025 3:01:48 PM

Hi Sowmiya,

Thank you for taking my call. As we discussed, we can move forward with the application process with the soil sampling analyses that you submitted, so please disregard the first sentence of agronomy comment #2. I do still need the soil map, but the rest of the analyses can be done at a later time. I will be recommending a special provision be put into the permit stating that the permittee must submit those additional soil samples prior to land application.

Thank you
Sara Holmes

From: Sara Holmes
Sent: Monday, March 17, 2025 1:24 PM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>; Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>
Cc: Hannah Zellner <Hannah.Zellner@tceq.texas.gov>
Subject: Pretech comments - WQ0005487000

Good afternoon,

The Water Quality Assessment (WQA) Team of the Texas Commission on Environmental Quality has completed a preliminary review of the permit application information and identified deficiencies (attached) that must be addressed before the WQA Team can continue with the technical review. The deficient item(s) will require your response in a timely, complete, and accurate manner.

An accurate and complete revised permit application is essential for making recommendations to the commission regarding whether this permit should be issued. Based on the information provided in the application, the executive director does not have sufficient information to make a recommendation. Therefore, you must send updated technically complete and accurate information within **14 days** (March 31, 2025) of the date of this email.

Any revisions can be sent electronically to this email. If you have any questions, please feel free to contact either me or Hannah.

Thank you,

Sara Holmes
Natural Resource Specialist II
Water Quality Assessment Team
12100 Park 35 Circle
Austin, TX 78753
512-239-4534

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION CHECKLIST

Complete and submit this checklist with the industrial wastewater permit application.

APPLICANT NAME: Wharton AD1, LLC

PERMIT NUMBER (If new, leave blank): WQ00 Click to enter text.

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

	Y	N		Y	N
Administrative Report 1.0	☒	☐	Worksheet 8.0	☐	☐
Administrative Report 1.1	☒	☐	Worksheet 9.0	☐	☐
SPIF	☐	☐	Worksheet 10.0	☐	☐
Core Data Form	☒	☐	Worksheet 11.0	☐	☐
Public Involvement Plan Form	☒	☐	Worksheet 11.1	☐	☐
Plain Language Summary	☒	☐	Worksheet 11.2	☐	☐
Technical Report 1.0	☒	☐	Worksheet 11.3	☐	☐
Worksheet 1.0	☐	☐	Original USGS Map	☒	☐
Worksheet 2.0	☐	☐	Affected Landowners Map	☒	☐
Worksheet 3.0	☒	☐	Landowner Disk or Labels	☐	☐
Worksheet 3.1	☐	☐	Flow Diagram	☒	☐
Worksheet 3.2	☐	☐	Site Drawing	☒	☐
Worksheet 3.3	☐	☐	Original Photographs	☐	☐
Worksheet 4.0	☐	☐	Design Calculations	☐	☐
Worksheet 4.1	☐	☐	Solids Management Plan	☐	☐
Worksheet 5.0	☐	☐	Water Balance	☒	☐
Worksheet 6.0	☐	☐			
Worksheet 7.0	☐	☐			

For TCEQ Use Only

Segment Number _____County _____
Expiration Date _____Region _____
Permit Number _____

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.0

This report is required for all applications for TPDES permits and TLAPs, except applications for oil and gas extraction operations subject to 40 CFR Part 435. Contact the Applications Review and Processing Team at 512-239-4671 with any questions about completing this report.

Applications for oil and gas extraction operations subject to 40 CFR Part 435 must use the Oil and Gas Exploration and Production Administrative Report (TCEQ Form-20893 and 20893-inst[1]).

Item 1. Application Information and Fees (Instructions, Page 26)

a. Complete each field with the requested information, if applicable.

Applicant Name: Wharton AD1, LLC

Permit No.: WQ000Click to enter text.

EPA ID No.: TX0Click to enter text.

Expiration Date: Click to enter text.

b. Check the box next to the appropriate authorization type.

☒ Industrial Wastewater (wastewater and stormwater)

☐ Industrial Stormwater (stormwater only)

c. Check the box next to the appropriate facility status.

☐ Active ☒ Inactive

d. Check the box next to the appropriate permit type.

☐ TPDES Permit ☒ TLAP ☐ TPDES with TLAP component

e. Check the box next to the appropriate application type.

☒ New

☐ Renewal with changes ☐ Renewal without changes

☐ Major amendment with renewal ☐ Major amendment without renewal

☐ Minor amendment without renewal

☐ Minor modification without renewal

f. If applying for an amendment or modification, describe the request: Click to enter text.

For TCEQ Use Only

Segment Number _____County _____

[1] https://www.tceq.texas.gov/publications/search_forms.html

g. Application Fee

EPA Classification	New	Major Amend. (with or without renewal)	Renewal (with or without changes)	Minor Amend. / Minor Mod. (without renewal)
Minor facility not subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☒ $350	☐ $350	☐ $315	☐ $150
Minor facility subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☐ $1,250	☐ $1,250	☐ $1,215	☐ $150
Major facility	N/A [2]	☐ $2,050	☐ $2,015	☐ $450

h. Payment Information

Mailed

Check or money order No.: Click to enter text.

Check or money order amt.: Click to enter text.

Named printed on check or money order: Click to enter text.

Epay

Voucher number: Click to enter text.

Copy of voucher attachment: Click to enter text.

Item 2. Applicant Information (Instructions, Pages 26)

a. Customer Number, if applicant is an existing customer: CN000000000

Note: Locate the customer number using the TCEQ's Central Registry Customer Search[3].

b. Legal name of the entity (applicant) applying for this permit: Wharton AD1, LLC

Note: The owner of the facility must apply for the permit. The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Mr. Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

d. Will the applicant have overall financial responsibility for the facility?

☒ Yes ☐ No

[2] All facilities are designated as minors until formally classified as a major by EPA.

[3] https://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 3. Co–applicant Information (Instructions, Page 27)

☒ Check this box if there is no co-applicant.; otherwise, complete the below questions.

a. Legal name of the entity (co-applicant) applying for this permit: Click to enter text.

Note: The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

b. Customer Number (if applicant is an existing customer): CNClick to enter text.

Note: Locate the customer number using the TCEQ's Central Registry Customer Search.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

Title: Click to enter text. Credential: Click to enter text.

d. Will the co-applicant have overall financial responsibility for the facility?

☐ Yes ☐ No

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 4. Core Data Form (Instructions, Pages 27)

a. Complete one Core Data Form (TCEQ Form 10400) for each customer (applicant and co-applicant(s)) and include as an attachment. If the customer type selected on the Core Data Form is Individual, complete Attachment 1 of the Administrative Report. Attachment: Click to enter text.

Item 5. Application Contact Information (Instructions, Page 27)

Provide names of two individuals who can be contact for additional information about this application. Indicate if the individual can be contact about administrative or technical information, or both.

a. ☒ Administrative Contact . ☒ Technical Contact

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. ☒ Administrative Contact ☒ Technical Contact

Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Managing Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 6. Permit Contact Information (Instructions, Page 28)

Provide two names of individuals that can be contacted throughout the permit term.

a. Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 7. Billing Contact Information (Instructions, Page 28)

The permittee is responsible for paying the annual fee. The annual fee will be assessed for permits **in effect on September 1 of each year**. The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (form TCEQ-20029).

Provide the complete mailing address where the annual fee invoice should be mailed and the name and phone number of the permittee's representative responsible for payment of the invoice.

Prefix: Mr Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

Organization Name: Wharton AD1, LLC

Mailing Address: 133 Boston Post Rd City/State/Zip: Weston, MA, 02493

Phone No: 508.360.2095 Email: smegnia@vanguardrenewable.com

Item 8. DMR/MER Contact Information (Instructions, Page 28)

Provide the name and mailing address of the person delegated to receive and submit DMRs or MERs. **Note:** DMR data must be submitted through the NetDMR system. An electronic reporting account can be established once the facility has obtained the permit number.

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: Sowmiya.kannappan@environeerconsulting.com

Item 9. Notice Information (Instructions, Pages 28)

a. Individual Publishing the Notices

Prefix: Ms Full Name (Last/First Name): Sowmiya Kannappan

Title: Environment Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy, Bldg 4 City/State/Zip: Houston, TX 77054

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package (only for NORI, NAPD will be sent via regular mail)

☒ E-mail: sowmiya.kannappan@environeerconsulting.com

☐ Fax: Click to enter text.

☐ Regular Mail (USPS)

Mailing Address: Click to enter text.

City/State/Zip Code: Click to enter text.

c. Contact in the Notice

Prefix: Ms Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

d. Public Viewing Location Information

Note: If the facility or outfall is located in more than one county, provide a public viewing place for each county.

Public building name: Wharton County Library Location within the building: Click to enter text.

Physical Address of Building: 200 W Church St, El Campo, TX 77437

City: El Campo County: Wharton

e. Bilingual Notice Requirements

This information is required for new, major amendment, minor amendment or minor modification, and renewal applications.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine if an alternative language notice(s) is required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

☒ Yes ☐ No

If no, publication of an alternative language notice is not required; skip to Item 8 (Regulated Entity and Permitted Site Information.)

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

   ☒ Yes ☐ No

3. Do the students at these schools attend a bilingual education program at another location?

   ☐ Yes ☒ No

4. Would the school be required to provide a bilingual education program, but the school has waived out of this requirement under 19 TAC §89.1205(g)?

   ☐ Yes ☐ No ☒ N/A

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? Spanish

f. Plain Language Summary Template – Complete the Plain Language Summary (TCEQ Form 20972) and include as an attachment. Attachment: A.C

g. Complete one Public Involvement Plan (PIP) Form (TCEQ Form 20960) for each application for a new permit or major amendment and include as an attachment. Attachment: A.D

Item 10. Regulated Entity and Permitted Site Information (Instructions Page 29)

a. TCEQ issued Regulated Entity Number (RN), if available: RNClick to enter text.

Note: If your business site is part of a larger business site, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search the TCEQ's Central Registry to determine the RN or to see if the larger site may already be registered as a Regulated Entity. If the site is found, provide the assigned RN.

b. Name of project or site (the name known by the community where located): Wharton AD1, LLC

c. Is the location address of the facility in the existing permit the same?

☐ Yes ☐ No ☒ N/A (new permit)

Note: If the facility is located in Bexar, Comal, Hays, Kinney, Medina, Travis, Uvalde, or Williamson County, additional information concerning protection of the Edwards Aquifer may be required.

d. Owner of treatment facility:

Prefix:Mr. Full Name (Last/First Name): Laurance Armour

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: 832-741-7411 Email: lharmour3@gmail.com

e. Ownership of facility: ☐ Public ☒ Private ☐ Both ☐ Federal

f. Owner of land where treatment facility is or will be: Click to enter text.

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years (In some cases, a lease may not suffice - see instructions). Attachment: Click to enter text.

g. Owner of effluent TLAP disposal site (if applicable): Click to enter text.

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

h. Owner of sewage sludge disposal site (if applicable):

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

Item 11. TDPES Discharge/TLAP Disposal Information (Instructions, Page 31)

a. Is the facility located on or does the treated effluent cross Native American Land?

☐ Yes ☒ No

b. Attach an original full size USGS Topographic Map (or an 8.5"×11" reproduced portion for renewal or amendment applications) with all required information. Check the box next to each item below to confirm it has been included on the map.

☐ One-mile radius

☒ Applicant's property boundaries

☐ Labeled point(s) of discharge

☐ Effluent disposal site boundaries

☐ Sewage sludge disposal site

☐ Three-miles downstream information

☐ Treatment facility boundaries

☐ Highlighted discharge route(s)

☐ All wastewater ponds

☐ New and future construction

Attachment: Click to enter text.

c. Is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: Click to enter text.

d. Are the point(s) of discharge in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: The effluent from the biogas plant is applied directly on the land without any treatment.

e. Are the discharge route(s) in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new permit, provide an accurate description of the discharge route: The effluent from the biogas plant is applied directly on the land without any treatment.

f. City nearest the outfall(s): N/A

g. County in which the outfalls(s) is/are located: N/A

h. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If yes, indicate by a check mark if: ☐ Authorization granted ☐ Authorization pending

For new and amendment applications, attach copies of letters that show proof of contact and provide the approval letter upon receipt. Attachment: Click to enter text.

For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge: Click to enter text.

i. For TLAPs, is the location of the effluent disposal site in the existing permit accurate?

☐ Yes No or New Permit ☒ New Permit

If no, or a new application, provide an accurate location description: Site is located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59

j. City nearest the disposal site: Pierce

k. County in which the disposal site is located: Wharton

l. For TLAPs, describe how effluent is/will be routed from the treatment facility to the disposal site: Effluent from the biogas plant is directly applied on the land and no treatment facility is included

m. For TLAPs, identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained: Colorado River

Item 12. Miscellaneous Information (Instructions, Page 33)

a. Did any person formerly employed by the TCEQ represent your company and get paid for service regarding this application?

☐ Yes ☒ No

If yes, list each person: Click to enter text.

b. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Account no.: Click to enter text.

Total amount due: Click to enter text.

c. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Enforcement order no.: Click to enter text.

Amount due: Click to enter text.

Item 13. Signature Page (Instructions, Page 33)

Permit No: WQ000Click to enter text.

Applicant Name: Wharton AD1, LLC

Certification: I, Kim Martin, 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 (typed or printed): Kim Martin

Signatory title: VP of Development

Signature: _____ Date: 3/17/25
(Use blue ink)

Subscribed and Sworn to before me by the said Kim Martin

on this 17th day of March, 2025.

My commission expires on the 4th day of September, 2031.

Noelle P. Fairney
Notary Public

[SEAL]

NOELLE P. FAIRNENY
Notary Public
Commonwealth of Massachusetts
My Commission Expires
September 4, 2031

Middlesex
County, Massachusetts

Note: *If co-applicants are necessary, each entity must submit an original, separate signature page.*

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.1

The following information is required for new and amendment applications.

Item 1. Affected Landowner Information (Instructions, Page 35)

a. Attach a landowner map or drawing, with scale, as applicable. Check the box next to each item to confirm it has been provided.

☒ The applicant's property boundaries.

☒ The facility site boundaries within the applicant's property boundaries.

☒ The distance the buffer zone falls into adjacent properties and the property boundaries of the landowners located within the buffer zone.

☒ The property boundaries of all landowners surrounding the applicant's property. (Note: if the application is a major amendment for a lignite mine, the map must include the property boundaries of all landowners adjacent to the new facility (ponds).)

☐ The point(s) of discharge and highlighted discharge route(s) clearly shown for one mile downstream.

☐ The property boundaries of the landowners located on both sides of the discharge route for one full stream mile downstream of the point of discharge.

☐ The property boundaries of the landowners along the watercourse for a one-half mile radius from the point of discharge if the point of discharge is into a lake, bay, estuary, or affected by tides.

☐ The boundaries of the effluent disposal site (e.g., irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property.

☐ The property boundaries of all landowners surrounding the applicant's property boundaries where the effluent disposal site is located.

☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners within one-quarter mile of the applicant's property boundaries where the sewage sludge land application site is located.

☐ The property boundaries of landowners within one-half mile in all directions from the applicant's property boundaries where the sewage sludge disposal site (e.g., sludge surface disposal site or sludge monofil) is located.

Attachment: Click to enter text.

b. Check the box next to the format of the landowners list:

☐ Readable/Writeable CD ☐ Four sets of labels

Attachment: Click to enter text.

d. Provide the source of the landowners' names and mailing addresses: Wharton County Central Appraisal District (WCAD)

e. As required by Texas Water Code § 5.115, is any permanent school fund land affected by this application?

☐ Yes ☒ No

If yes, provide the location and foreseeable impacts and effects this application has on the land(s): Click to enter text.

Item 2. Original Photographs (Instructions, Page 37)

Provide original ground level photographs. Check the box next to each of the following items to indicate it is included.

☐ At least one original photograph of the new or expanded treatment unit location.

☐ At least two photographs of the existing/proposed point of discharge and as much area downstream (photo 1) and upstream (photo 2) as can be captured. If the discharge is to an open water body (e.g., lake, bay), the point of discharge should be in the right or left edge of each photograph showing the open water and with as much area on each respective side of the discharge as can be captured.

☐ At least one photograph of the existing/proposed effluent disposal site.

☒ A plot plan or map showing the location and direction of each photograph.

Attachment: Click to enter text.

INDUSTRIAL WASTEWATER PERMIT APPLICATION

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

This form applies to TPDES permit applications only. Complete and attach the Supplemental Permit information Form (SPIF) (TCEQ Form 20971).

Attachment: Click to enter text.

WATER QUALITY PERMIT

PAYMENT SUBMITTAL FORM

Use this form to submit the Application Fee, if mailing the payment. (Instructions, Page 36–37)

- Complete items 1 through 5 below.
- Staple the check or money order in the space provided at the bottom of this document.
- Do not mail this form with the application form.
- Do not mail this form to the same address as the application.
- Do not submit a copy of the application with this form as it could cause duplicate permit entries.

Mail this form and the check or money order to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, Texas 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, Texas 78753

Fee Code: WQP **Permit No:** WQ000Click to enter text.

1. Check or Money Order Number: Click to enter text.
2. Check or Money Order Amount: Click to enter text.
3. Date of Check or Money Order: Click to enter text.
4. Name on Check or Money Order: Click to enter text.
5. APPLICATION INFORMATION

   Name of Project or Site: Click to enter text.

   Physical Address of Project or Site: Click to enter text.

   If the check is for more than one application, attach a list which includes the name of each Project or Site (RE) and Physical Address, exactly as provided on the application.
   Attachment: Click to enter text.

Staple Check or Money Order in This Space

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION TECHNICAL REPORT 1.0

The following information **is required** for all applications for a TLAP or an individual TPDES discharge permit.

For **additional information** or clarification on the requested information, please refer to the Instructions for Completing the Industrial Wastewater Permit Application[1] available on the TCEQ website. Please contact the Industrial Permits Team at 512-239-4671 with any questions about this form.

If more than one outfall is included in the application, provide applicable information for each individual outfall. **If an item does not apply to the facility, enter N/A** to indicate that the item has been considered. Include separate reports or additional sheets as **clearly cross–referenced attachments** and provide the attachment number in the space provided for the item the attachment addresses.

NOTE: This application is for an industrial wastewater permit only. Additional authorizations from the TCEQ Waste Permits Division or the TCEQ Air Permits Division may be needed.

Item 1. Facility/Site Information (Instructions, Page 39)

a. Describe the general nature of the business and type(s) of industrial and commercial activities. Include all applicable SIC codes (up to 4).

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. Primary SIC Code = 4924, Primary NAICS Code = 221210

b. Describe all wastewater-generating processes at the facility.

Anaerobic digestion breaks down organic materials like cow manure and food waste in an enclosed environment to produce biogas. Combining manure with food waste enhances biogas production, making the system more efficient. Feedstock from hydrolysis and manure tanks is regularly transferred to digester tanks, where it is mixed, heated, and broken down by microbes in an oxygen-free environment. This process generates biogas, primarily methane, carbon dioxide, hydrogen, and water vapor. The collected biogas undergoes conditioning to produce pipeline-quality natural gas. As new material enters the digester, processed digestate is removed and stored in a lagoon for land application by spreading method.

[1] https://www.tceq.texas.gov/permitting/wastewater/industrial/TPDES_industrial_wastewater_steps.html

c. Provide a list of raw materials, major intermediates, and final products handled at the facility.

Materials List

Raw Materials	Intermediate Products	Final Products
Source-separated Organics	Digestate	Renewable Natural Gas
Packaged waste	Biogas	Liquid fertilizer
Canned liquid		
Liquid organics		
Dilution water		

Attachment: Click to enter text.

d. Attach a facility map (drawn to scale) with the following information:

- Production areas, maintenance areas, materials-handling areas, waste-disposal areas, and water intake structures.
- The location of each unit of the WWTP including the location of wastewater collection sumps, impoundments, outfalls, and sampling points, if significantly different from outfall locations.

Attachment: T.A

e. Is this a new permit application for an existing facility?

☐ Yes ☒ No

If **yes**, provide background discussion: Click to enter text.

f. Is/will the treatment facility/disposal site be located above the 100-year frequency flood level.

☐ Yes ☒ No

List source(s) used to determine 100-year frequency flood plain: Click to enter text.

If **no**, provide the elevation of the 100-year frequency flood plain and describe what protective measures are used/proposed to prevent flooding (including tail water and rainfall run-on controls) of the treatment facility and disposal area: Click to enter text.

Attachment: T.B

g. For **new** or **major amendment** permit applications, will any construction operations result in a discharge of fill material into a water in the state?

☐ Yes ☒ No ☐ N/A (renewal only)

h. If **yes** to Item 1.g, has the applicant applied for a USACE CWA Chapter 404 Dredge and Fill permit?

☐ Yes ☒ No

If **yes**, provide the permit number: Click to enter text.

If **no**, provide an approximate date of application submittal to the USACE: Click to enter text.

Item 2. Treatment System (Instructions, Page 40)

a. List any physical, chemical, or biological treatment process(es) used/proposed to treat wastewater at this facility. Include a description of each treatment process, starting with initial treatment and finishing with the outfall/point of disposal.

The digestate (effluent) produced in anaerobic digesters is distributed using the spreading method without undergoing any additional treatment. The feedstock is processed within the biogas plant, and the resulting digestate is directly applied to agricultural land via spreading, with no intermediate treatment steps.

b. Attach a flow schematic **with a water balance** showing all sources of water and wastewater flow into the facility, wastewater flow into and from each treatment unit, and wastewater flow to each outfall/point of disposal.

Attachment: T.A.1

Item 3. Impoundments (Instructions, Page 40)

Does the facility use or plan to use any wastewater impoundments (e.g., lagoons or ponds?)

☒ Yes ☐ No

If **no**, proceed to Item 4. If **yes**, complete **Item 3.a** for **existing** impoundments and **Items 3.a – 3.e** for **new or proposed** impoundments. **NOTE:** See instructions, Pages 40-42, for additional information on the attachments required by Items 3.a – 3.e.

a. Complete the table with the following information for each existing, new, or proposed impoundment. Attach additional copies of the Impoundment Information table, if needed.

Use Designation: Indicate the use designation for each impoundment as Treatment (**T**), Disposal (**D**), Containment (**C**), or Evaporation (**E**).

Associated Outfall Number: Provide an outfall number if a discharge occurs or will occur.

Liner Type: Indicate the liner type as Compacted clay liner (**C**), In-situ clay liner (**I**), Synthetic/plastic/rubber liner (**S**), or Alternate liner (**A**). **NOTE:** See instructions for further detail on liner specifications. If an alternate liner (A) is selected, include an attachment that provides a description of the alternate liner and any additional technical information necessary for an evaluation.

Leak Detection System: If any leak detection systems are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no.

Groundwater Monitoring Wells and Data: If groundwater monitoring wells are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no. Attach any existing groundwater monitoring data.

Dimensions: Provide the dimensions, freeboard, surface area, storage capacity of the impoundments, and the maximum depth (not including freeboard). For impoundments with irregular shapes, submit surface area instead of length and width.

Compliance with 40 CFR Part 257, Subpart D: If the impoundment is required to be in compliance with 40 CFR Part 257, Subpart D, enter **Y** for yes. Otherwise, enter **N** for no.

Date of Construction: Enter the date construction of the impoundment commenced (mm/dd/yy).

Impoundment Information

Parameter	**Pond #**	**Pond #**	**Pond #**	**Pond #**
Use Designation: (T) (D) (C) or (E)	N/A			
Associated Outfall Number	N/A			
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), Not Including Freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction	TBD			

Attachment: Click to enter text.

The following information (**Items 3.b – 3.e**) is required only for **new or proposed** impoundments.

b. For new or proposed impoundments, attach any available information on the following items. If attached, check **yes** in the appropriate box. Otherwise, check **no** or **not yet designed**.

1. Liner data

☐ Yes ☐ No ☐ Not yet designed

2. Leak detection system or groundwater monitoring data

☐ Yes ☐ No ☐ Not yet designed

3. Groundwater impacts

☐ Yes ☐ No ☐ Not yet designed

NOTE: Item b.3 is required if the bottom of the pond is not above the seasonal high-water table in the shallowest water-bearing zone.

Attachment: Click to enter text.

For TLAP applications: Items 3.c – 3.e are **not required**, continue to Item 4.

c. Attach a USGS map or a color copy of original quality and scale which accurately locates and identifies all known water supply wells and monitor wells within ½-mile of the impoundments.

Attachment: Click to enter text.

d. Attach copies of State Water Well Reports (e.g., driller's logs, completion data, etc.), and data on depths to groundwater for all known water supply wells including a description of how the depths to groundwater were obtained.

Attachment: Click to enter text.

e. Attach information pertaining to the groundwater, soils, geology, pond liner, etc. used to assess the potential for migration of wastes from the impoundments or the potential for contamination of groundwater or surface water.

Attachment: Click to enter text.

Item 4. Outfall/Disposal Method Information (Instructions, Page 42)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge, and for each point of disposal for TLAP operations.

If there are more outfalls/points of disposal at the facility than the spaces provided, copies of pages 6 and/0r numbered accordingly (i.e., page 6a, 6b, etc.) may be used to provide information on the additional outfalls.

For TLAP applications: Indicate the disposal method and each individual irrigation area **I**, evaporation pond **E**, or subsurface drainage system **S** by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for **Outfall** number (e.g. **E1** for evaporation pond 1, **I2** for irrigation area No. 2, etc.).

Outfall Longitude and Latitude

Outfall No.	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
N/A	N/A	N/A

Outfall Location Description

Outfall No.	Location Description
	The distribution of digestate (effluent) from anaerobic digesters is by the spreading method and do not have any outfalls.

Description of Sampling Point(s) (if different from Outfall location)

Outfall No.	Description of sampling point
N/A	N/A

Outfall Flow Information – Permitted and Proposed

Outfall No.	Permitted Daily Avg Flow (MGD)	Permitted Daily Max Flow (MGD)	Proposed Daily Avg Flow (MGD)	Proposed Daily Max Flow (MGD)	Anticipated Discharge Date (mm/dd/yy)
N/A					

Outfall Discharge – Method and Measurement

Outfall No.	Pumped Discharge? Y/N	Gravity Discharge? Y/N	Type of Flow Measurement Device Used
N/A			

Outfall Discharge – Flow Characteristics

Outfall No.	Intermittent Discharge? Y/N	Continuous Discharge? Y/N	Seasonal Discharge? Y/N	Discharge Duration (hrs/day)	Discharge Duration (days/mo)	Discharge Duration (mo/yr)
N/A						

Outfall Wastestream Contributions

Outfall No. T-1

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow
N/A	N/A	N/A

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow
N/A	N/A	N/A

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow
N/A	N/A	N/A

Attachment: Click to enter text.

Item 5. Blowdown and Once–Through Cooling Water Discharges (Instructions, Page 43)

a. Indicate if the facility currently or proposes to:

☐ Yes ☒ No Use cooling towers that discharge blowdown or other wastestreams

☐ Yes ☒ No Use boilers that discharge blowdown or other wastestreams

☐ Yes ☒ No Discharge once-through cooling water

NOTE: If the facility uses or plans to use cooling towers or once-through cooling water, Item 12 **is required**.

b. If **yes** to any of the above, attach an SDS with the following information for each chemical additive.

- Manufacturers Product Identification Number
- Product use (e.g., biocide, fungicide, corrosion inhibitor, etc.)
- Chemical composition including CASRN for each ingredient
- Classify product as non-persistent, persistent, or bioaccumulative
- Product or active ingredient half-life
- Frequency of product use (e.g., 2 hours/day once every two weeks)
- Product toxicity data specific to fish and aquatic invertebrate organisms
- Concentration of whole product or active ingredient, as appropriate, in wastestream.

In addition to each SDS, attach a summary of the above information for each specific wastestream and the associated chemical additives. Specify which outfalls are affected.

Attachment: Click to enter text.

c. Cooling Towers and Boilers

If the facility currently or proposes to use cooling towers or boilers that discharge blowdown or other wastestreams to the outfall(s), complete the following table.

Cooling Towers and Boilers

Type of Unit	Number of Units	Daily Avg Blowdown (gallons/day)	Daily Max Blowdown (gallons/day)
Cooling Towers			
Boilers			

Item 6. Stormwater Management (Instructions, Page 44)

Will any existing/proposed outfalls discharge stormwater associated with industrial activities, as defined at *40 CFR § 122.26(b)(14)*, commingled with any other wastestream?

☐ Yes ☒ No

If **yes**, briefly describe the industrial processes and activities that occur outdoors or in a manner which may result in exposure of the activities or materials to stormwater: Click to enter text.

Item 7. Domestic Sewage, Sewage Sludge, and Septage Management and Disposal (Instructions, Page 44)

Domestic Sewage - Waste and wastewater from humans or household operations that is discharged to a wastewater collection system or otherwise enters a treatment works.

a. Check the box next to the appropriate method of domestic sewage and domestic sewage sludge treatment or disposal. Complete Worksheet 5.0 or Item 7.b if directed to do so.

☐ Domestic sewage is routed (i.e., connected to or transported to) to a WWTP permitted to receive domestic sewage for treatment, disposal, or both. Complete Item 7.b.

☐ Domestic sewage disposed of by an on-site septic tank and drainfield system. Complete Item 7.b.

☐ Domestic and industrial treatment sludge ARE commingled prior to use or disposal.

☐ Industrial wastewater and domestic sewage are treated separately, and the respective sludge IS NOT commingled prior to sludge use or disposal. Complete Worksheet 5.0.

☐ Facility is a POTW. Complete Worksheet 5.0.

☐ Domestic sewage is not generated on-site.

☐ Other (e.g., portable toilets), specify and Complete Item 7.b: Click to enter text.

b. Provide the name and TCEQ, NPDES, or TPDES Permit No. of the waste-disposal facility which receives the domestic sewage/septage. If hauled by motorized vehicle, provide the name and TCEQ Registration No. of the hauler.

Domestic Sewage Plant/Hauler Name

Plant/Hauler Name	Permit/Registration No.

Item 8. Improvements or Compliance/Enforcement Requirements (Instructions, Page 45)

a. Is the permittee currently required to meet any implementation schedule for compliance or enforcement?

☐ Yes ☒ No

b. Has the permittee completed or planned for any improvements or construction projects?

☐ Yes ☒ No

c. If **yes** to either 8.a **or** 8.b, provide a brief summary of the requirements and a status update: Click to enter text.

Item 9. Toxicity Testing (Instructions, Page 45)

Have any biological tests for acute or chronic toxicity been made on any of the discharges or on a receiving water in relation to the discharge within the last three years?

☐ Yes ☒ No

If **yes**, identify the tests and describe their purposes: Click to enter text.

Additionally, attach a copy of all tests performed which **have not** been submitted to the TCEQ or EPA. **Attachment:** Click to enter text.

Item 10. Off–Site/Third Party Wastes (Instructions, Page 45)

a. Does or will the facility receive wastes from off-site sources for treatment at the facility, disposal on-site via land application, or discharge via a permitted outfall?

☒ Yes ☐ No

If **yes**, provide responses to Items 10.b through 10.d below.

If **no**, proceed to Item 11.

b. Attach the following information to the application:

- List of wastes received (including volumes, characterization, and capability with on-site wastes).
- Identify the sources of wastes received (including the legal name and addresses of the generators).
- Description of the relationship of waste source(s) with the facility's activities.

Attachment: T.H

c. Is or will wastewater from another TCEQ, NPDES, or TPDES permitted facility commingled with this facility's wastewater after final treatment and prior to discharge via the final outfall/point of disposal?

☐ Yes ☒ No

If **yes**, provide the name, address, and TCEQ, NPDES, or TPDES permit number of the contributing facility and a copy of any agreements or contracts relating to this activity.

Attachment: Click to enter text.

d. Is this facility a POTW that accepts/will accept process wastewater from any SIU and has/is required to have an approved pretreatment program under the NPDES/TPDES program?

☐ Yes ☒ No

If **yes**, **Worksheet 6.0** of this application **is required**.

Item 11. Radioactive Materials (Instructions, Page 46)

a. Are/will radioactive materials be mined, used, stored, or processed at this facility?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L.

Radioactive Materials Mined, Used, Stored, or Processed

Radioactive Material Name	Concentration (pCi/L)

b. Does the applicant or anyone at the facility have any knowledge or reason to believe that radioactive materials may be present in the discharge, including naturally occurring radioactive materials in the source waters or on the facility property?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L. Do not include information provided in response to Item 11.a.

Radioactive Materials Present in the Discharge

Radioactive Material Name	Concentration (pCi/L)

Item 12. Cooling Water (Instructions, Page 46)

a. Does the facility use or propose to use water for cooling purposes?

☐ Yes ☒ No

If **no**, stop here. If **yes**, complete Items 12.b thru 12.f.

b. Cooling water is/will be obtained from a groundwater source (e.g., on-site well).

☐ Yes ☐ No

If **yes**, stop here. If **no**, continue.

c. Cooling Water Supplier

1. Provide the name of the owner(s) and operator(s) for the CWIS that supplies or will supply water for cooling purposes to the facility.

Cooling Water Intake Structure(s) Owner(s) and Operator(s)

CWIS ID				
Owner				
Operator				

2. Cooling water is/will be obtained from a Public Water Supplier (PWS)

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the PWS Registration No. and stop here: PWS No. Click to enter text.

3. Cooling water is/will be obtained from a reclaimed water source?

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the Reuse Authorization No. and stop here: Click to enter text.

4. Cooling water is/will be obtained from an Independent Supplier

   ☐ Yes ☐ No

   If **no**, proceed to Item 12.d. If **yes**, provide the actual intake flow of the Independent Supplier's CWIS that is/will be used to provide water for cooling purposes and proceed: Click to enter text.

d. 316(b) General Criteria

1. The CWIS(s) used to provide water for cooling purposes to the facility has or will have a cumulative design intake flow of 2 MGD or greater.

   ☐ Yes ☐ No

2. At least 25% of the total water withdrawn by the CWIS is/will be used at the facility exclusively for cooling purposes on an annual average basis.

   ☐ Yes ☐ No

3. The CWIS(s) withdraw(s)/propose(s) to withdraw water for cooling purposes from surface waters that meet the definition of Waters of the United States in *40 CFR § 122.2*.

   ☐ Yes ☐ No

   If **no**, provide an explanation of how the waterbody does not meet the definition of Waters of the United States in *40 CFR § 122.2*: Click to enter text.

If **yes** to all three questions in Item 12.d, the facility **meets** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA. Proceed to **Item 12.f**.

If **no** to any of the questions in Item 12.d, the facility **does not meet** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA; however, a determination is required based upon BPJ. Proceed to **Item 12.e**.

e. The facility does not meet the minimum requirements to be subject to the fill requirements of Section 316(b) **and uses**/proposes **to use cooling towers**.

   ☐ Yes ☐ No

   If **yes**, stop here. If **no**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ.

f. Oil and Gas Exploration and Production

1. The facility is subject to requirements at 40 CFR Part 435, Subparts A or D.

☐ Yes ☐ No

If **yes**, continue. If **no**, skip to Item 12.g.

2. The facility is an existing facility as defined at 40 CFR § 125.92(k) or a new unit at an existing facility as defined at 40 CFR § 125.92(u).

☐ Yes ☐ No

If **yes**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ. If **no**, skip to Item 12.g.3.

g. Compliance Phase and Track Selection

1. Phase I – New facility subject to 40 CFR Part 125, Subpart I

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection, attach the requested information, and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – AIF greater than 2 MGD, but less than 10 MGD

- Attach information required by *40 CFR §§ 125.86(b)(2)–(4)*.

☐ Track I – AIF greater than 10 MGD

- Attach information required by *40 CFR § 125.86(b)*.

☐ Track II

- Attach information required by *40 CFR § 125.86(c)*.

Attachment: Click to enter text.

2. Phase II – Existing facility subject to 40 CFR Part 125, Subpart J

☐ Yes ☐ No

If **yes**, complete Worksheets 11.0 through 11.3, as applicable.

3. Phase III – New facility subject to 40 CFR Part 125, Subpart N

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection and provide the requested information.

☐ Track I – Fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – Not a fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Item 2 (except CWIS latitude/longitude under Item 2.a).

☐ Track II – Fixed facility

- Attach information required by 40 CFR § 125.136(c) and complete Worksheet 11.0, Items 2 and 3.

Attachment: Click to enter text.

Item 13. Permit Change Requests (Instructions, Page 48)

This item is only applicable to existing permitted facilities.

a. Is the facility requesting a **major amendment** of an existing permit?

☐ Yes ☒ No

If **yes**, list each request individually and provide the following information: 1) detailed information regarding the scope of each request and 2) a justification for each request. Attach any supplemental information or additional data to support each request.

Click to enter text.

b. Is the facility requesting any **minor amendments** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

c. Is the facility requesting any **minor modifications** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

Item 14. Laboratory Accreditation (Instructions, Page 49)

All laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification*, which includes the following general exemptions from National Environmental Laboratory Accreditation Program (NELAP) certification requirements:

- The laboratory is an in-house laboratory and is:
  - periodically inspected by the TCEQ; or
  - located in another state and is accredited or inspected by that state; or
  - performing work for another company with a unit located in the same site; or
  - performing pro bono work for a governmental agency or charitable organization.
- The laboratory is accredited under federal law.
- The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.
- The laboratory supplies data for which the TCEQ does not offer accreditation.

The applicant should review *30 TAC Chapter 25* for specific requirements.

The following certification statement shall be signed and submitted with every application. See the *Signature Page* section in the Instructions, for a list of designated representatives who may sign the certification.

CERTIFICATION:

I certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification.*

Printed Name: Click to enter text.

Title: Click to enter text.

Signature: _____

Date: _____

INDUSTRIAL WASTEWATER PERMIT APPLICATION WORKSHEET 3.0: LAND APPLICATION OF EFFLUENT

This worksheet **is required** for all applications for a permit to disposal of wastewater by land application (i.e., TLAP)).

Item 1. Type of Disposal System (Instructions, Page 69)

Check the box next to the type of land disposal requested by this application:

- ☐ Irrigation
- ☐ Evaporation
- ☐ Evapotranspiration beds
- ☐ Drip irrigation system
- ☐ Subsurface application
- ☐ Subsurface soils absorption
- ☒ Surface application
- ☐ Other, specify: Click to enter text.

Item 2. Land Application Area (Instructions, Page 69)

Land Application Area Information

Effluent Application (gallons/day)	Irrigation Acreage (acres)	Describe land use & indicate type(s) of crop(s)	Public Access? (Y/N)
75,000	28,955	Agricultural land and Coastal grazing – Cotton and Corn grain	N

Item 3. Annual Cropping Plan (Instructions, Page 69)

Attach the required cropping plan that includes each of the following:

- Cool and warm season plant species
- Breakdown of acreage and percent of total acreage for each crop
- Crop growing season
- Harvesting method/number of harvests
- Minimum/maximum harvest height
- Crop yield goals
- Soils map
- Nitrogen requirements per crop
- Additional fertilizer requirements
- Supplemental watering requirements
- Crop salt tolerances
- Justification for not removing existing vegetation to be irrigated

Attachment: T.C

Item 4. Well and Map Information (Instructions, Page 70)

a. Check each box to confirm the required information is shown and labeled on the attached USGS map:

☒ The exact boundaries of the land application area

☒ On-site buildings

☐ Waste-disposal or treatment facilities

☐ Effluent storage and tailwater control facilities

☐ Buffer zones

☒ All surface waters in the state onsite and within 500 feet of the property boundaries

☒ All water wells within ½-mile of the disposal site, wastewater ponds, or property boundaries

☐ All springs and seeps onsite and within 500 feet of the property boundaries

Attachment: T.D

b. List and cross reference all water wells located on or within 500 feet of the disposal site, wastewater ponds, or property boundaries in the following table. Attach additional pages as necessary to include all of the wells.

Well and Map Information Table

Well ID	Well Use	Producing? Y/N/U	Open, cased, capped, or plugged?	Proposed Best Management Practice
589679				
261011				
391981				

Attachment: T.D

c. Groundwater monitoring wells or lysimeters are/will be installed around the land application site or wastewater ponds.

☐ Yes ☒ No

If **yes**, provide the existing/proposed location of the monitoring wells or lysimeters on the site map attached for Item 4.a. Additionally, attach information on the depth of the wells or lysimeters, sampling schedule, and monitoring parameters for TCEQ review, possible modification, and approval.

Attachment: Click to enter text.

d. Attach a short groundwater technical report using *30 TAC § 309.20(a)(4)* as guidance.
Attachment:

Item 5. Soil Map and Soil Information (Instructions, Page 71)

Check each box to confirm that the following information is attached:

a. ☒ USDA NRCS Soil Survey Map depicting the area to be used for land application with the locations identified by fields and crops.

b. ☒ Breakdown of acreage and percent of total acreage for each soil type.

c. ☒ Copies of laboratory soil analyses. **Attachment:** T.C

Item 6. Effluent Monitoring Data (Instructions, Page 72)

a. Completion of Table 14 **is required** for all **renewal** and **major amendment** applications. Complete the table with monitoring data for the previous two years for all parameters regulated in the current permit. An additional table has been provided with blank headers for parameters regulated in the current permit which are not listed in Table 14.

Table 14 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre–feet/month)

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre–feet/month)

b. Use this table to provide effluent analysis for parameters regulated in the current permit which are not listed in Table 14.

Additional Parameter Effluent Analysis

Date (mo/yr)							

c. Attach an explanation of all persistent excursions to permitted parameters and corrective actions taken. **Attachment:** Click to enter text.

Item 7. Pollutant Analysis (Instructions, Page 72)

a. Provide the date range of all sampling events conducted to obtain the analytical data submitted with this application (e.g., 05/01/2018-05/30/2018): Click to enter text.

b. ☐ Check the box to confirm all samples were collected no more than 12 months prior to the date of application submittal.

c. Complete Tables 15 and 16.

Table 15 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)
BOD (5-day)				
CBOD (5-day)				
Chemical oxygen demand				
Total organic carbon				
Dissolved oxygen				
Ammonia nitrogen				
Total suspended solids				
Nitrate nitrogen				
Total organic nitrogen				
Total phosphorus				
Oil and grease				
Total residual chlorine				
Total dissolved solids				
Sulfate				
Chloride				
Fluoride				
Total alkalinity (mg/L as CaCO3)				
Temperature (°F)				
pH (standard units)				

Table 16 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Aluminum, total					2.5
Antimony, total					5

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Arsenic, total					0.5
Barium, total					3
Beryllium, total					0.5
Cadmium, total					1
Chromium, total					3
Chromium, hexavalent					3
Chromium, trivalent					N/A
Copper, total					2
Cyanide, available					2/10
Lead, total					0.5
Mercury, total					0.005/0.0005
Nickel, total					2
Selenium, total					5
Silver, total					0.5
Thallium, total					0.5
Zinc, total					5.0

Texas Land Application Permit (TLAP)
Admin Package

Report Date: November 18th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

List of Figures..... i
List of Tables..... i
A.A: TCEQ APPLICATION FEE..... 1
A.B: CORE DATA FORMS & LEASE AGREEMENT..... 2
A.C: PLAIN LANGUAGE SUMMARY..... 3
A.D: PUBLIC INVOLVEMENT PLAN..... 4
A.E: 7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE..... 4
A.E.1 7.5-Minute USGS Topographic Quadrangle Map..... 6
A.F: AFFECTED LANDOWNER INFORMATION..... 7
A.F.1 Adjacent Landowners Map..... 7
A.F.2 Landowners List..... 7
A.G: PHOTOGRAPHS..... 8
A.G.1 Photograph Location Map..... 9

List of Figures

Figure A.E.1: 7.5-Minute USGS Topographic Quadrangle Map..... 6
Figure A.F.1: Adjacent Landowners Map..... 7
Figure A.G.1: Photograph Location Map..... 9

List of Tables

Table A.F.1. Adjacent Landowners..... 7

A.A: TCEQ APPLICATION FEE

A.B: CORE DATA FORMS & LEASE AGREEMENT

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions on completing 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.*)

☒ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ 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)*
		RN

SECTION II: Customer Information

4. General Customer Information | **5. Effective Date for Customer Information Updates** (mm/dd/yyyy) 11/20/2024

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

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:*

Wharton AD1, LLC

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID**	**10. DUNS Number** *(if applicable)*
805930283		33-3670329	

11. Type of Customer: ☒ Corporation ☐ Individual Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees
☐ 0-20 ☒ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?
☐ **Yes** ☐ **No**

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*

☒ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ VCP/BSA Applicant ☐ Other:

15. Mailing Address:

133 Boston Post Road, Building 15, 2nd Floor

City	Weston	**State**	MA	**ZIP**	02493	**ZIP + 4**	

16. Country Mailing Information *(if outside USA)*	**17. E-Mail Address** *(if applicable)*
	development@vanguardrenewables.com

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(248) 259-4031		(781) 232-7491

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected, a new permit application is also required.)*

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core 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.)*

Pierce Ranch

23. Street Address of the Regulated Entity: ***(No PO Boxes)***								
	City	Pierce	**State**	TX	**ZIP**	77437	**ZIP + 4**	
24. County	Wharton							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:	Site is located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59

26. Nearest City	State	Nearest ZIP Code
Pierce	TX	77437

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	29.2165071		28. Longitude (W) In Decimal:	-96.19356185	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	12	55	96	11	39

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)
4924		221210	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Renewable Energy Production

34. Mailing Address:	**133 Boston Post Road, Building 15, 2nd Floor**							
	City	**Weston**	**State**	**MA**	**ZIP**	**02493**	**ZIP + 4**	
35. E-Mail Address:	**development@vanguardrenewables.com**							

36. Telephone Number	37. Extension or Code	38. Fax Number *(if applicable)*
(248) 259-4031		**(781) 232-7491**

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.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:
				TLAP

SECTION IV: Preparer Information

40. Name:	Michael Zhang		**41. Title:**	Managing Consultant
42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**	
(832) -817-9116		( ) -	michael.zhang@environeerconsulting.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:	Wharton AD1, LLC	**Job Title:**	VP of Development
Name *(In Print):*	Kim Martin	**Phone:**	(508-)560–6882
Signature:	Kim Martin (Mar 17, 2025 12:46 EDT)	**Date:**	3/17/2025

ASSIGNMENT AND ASSUMPTION AGREEMENT

This ASSIGNMENT AND ASSUMPTION AGREEMENT (this "Agreement") is entered into as of March 27th, 2025 by VR Development Services LLC ("Assignor") and Wharton AD 1, LLC, a Delaware limited liability company ("Assignee"). The Assignor and Assignee are sometimes referred to herein each as a "Party" and, collectively, as the "Parties."

WHEREAS, the Assignor desires to assign and convey to Assignee, and Assignee desires to assume from Assignor, the Assigned Contracts (each, as defined below), and Assignor has agreed to delegate to Assignee, and Assignee has agreed to assume all of Assignor's rights in and obligations under the Assigned Contracts from the Assignor, as applicable; and

NOW, THEREFORE, in consideration for the mutual covenants and promises herein contained, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. Assignment of Contracts. Assignor hereby grants, bargains, sell, transfers, conveys, assigns, and delivers to Assignee, and Assignee hereby accepts the assignment of all of Assignor's right, title and interest in, to, and under those certain assigned contracts set forth on Schedule A hereto (the "Assigned Contracts").

2. Assumption. Assignee hereby accepts the Assigned Contracts and assumes all of Assignor's right, title and interest in and obligations and liabilities under, and Assignee hereby assumes and agree to perform and discharge the Assignor's obligations under, the Assigned Contracts, as applicable, as of the date hereof, in accordance with the terms set forth herein.

3. Governing Law. THIS AGREEMENT AND THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER AND THE TRANSACTIONS CONTEMPLATED HEREBY SHALL BE GOVERNED BY, ENFORCED AND INTERPRETED IN ACCORDANCE WITH THE LAWS OF THE STATE OF DELAWARE WITHOUT REGARD TO THE LAWS OF THE STATE OF DELAWARE OR ANY OTHER JURISDICTION THAT WOULD CALL FOR THE APPLICATION OF THE SUBSTANTIVE OR PROCEDURAL LAWS OF ANY JURISDICTION OTHER THAN DELAWARE.

4. Further Assurances. Each of the Parties hereby covenants that it will execute, acknowledge and deliver any and all such other and further acts, deeds, assignments, transfers, conveyances, confirmations, powers of attorney and any instruments of further assurance, approvals and consents as may be reasonably required in order to complete, insure and perfect the transfer, conveyance and assignment to Assignee of all the right, title and interest of Assignor in and to the Assigned Contracts hereby granted, bargained, sold, transferred, conveyed or assigned, or intended so to be.

5. Counterparts. This Agreement and any amendment hereto may be executed in any number of counterparts (including facsimile counterparts), all of which together shall constitute a single instrument. Any counterpart or other signature delivered by facsimile or by electronic mail shall be deemed for all purposes as being a good and valid execution and delivery of this Agreement or any amendment hereto by that Party. This Agreement and any amendment hereto may be signed or transmitted by e-mail or a .pdf document or using electronic signature technology (e.g., via DocuSign, AdobeSign or other electronic signature technology), and that such signed electronic record shall be valid and as effective to bind the Party so signing as a paper copy bearing such Party's handwritten signature. The Parties further consent and agree that (a) to the extent a party signs this Agreement or any amendment hereto using electronic signature technology, by clicking "SIGN", such Party is signing this Agreement electronically; and (b) the electronic signatures appearing on this Agreement or any amendment hereto shall be treated, for purposes of validity, enforceability and admissibility, the same as handwritten signatures.

6. Entire Agreement. This Agreement, including all schedules and exhibits hereto and thereto, supersede all prior agreements between the Parties with respect to the subject matter hereof and thereof, and contain the sole and entire agreement between the Parties hereto with respect to the subject matter hereof and thereof.

7. No Assignment; Binding Effect. No Party may transfer or assign all or any part of its rights or obligations under this Agreement without the prior written consent of the other Parties (including by operation of law). Any purported assignment or other disposition by a Party, except as permitted herein, shall be null and void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the respective successors and permitted assigns of each Party.

(Signatures appear on following page)

IN WITNESS WHEREOF, each of Assignee and each Assignor have caused this Assignment and Assumption Agreement to be executed by its respective duly authorized representative on the date first set forth above.

ASSIGNOR:

VR Development Services LLC

By: _____
Kevin Chase (Mar 27, 2025 13:16 MDT)
Name: Kevin Chase
Title: Chief Development Officer

ASSIGNEE:

Wharton AD 1, LLC

By: Victoria Lepore
Name: Victoria Lepore
Title: Authorized Person

SCHEDULE A

ASSIGNED CONTRACTS

1. Ground Lease, by and between VR Development Services LLC and Pierce Ranch GP, dated January 13, 2025.

2. Digester Products Agreement, by and between VR Development Services LLC and Pierce Ranch GP, dated January 13, 2025.

Assignment Agreement_Pierce

Final Audit Report 2025-03-27

Created:	2025-03-27
By:	Stephen Megnia (smegnia@vanguardrenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAA2zDCrnihd272le673JBLX2HKNe7_vicC

"Assignment Agreement_Pierce" History

Document created by Stephen Megnia (smegnia@vanguardrenewables.com)
2025-03-27 - 6:12:31 PM GMT

Document emailed to Kevin Chase (kchase@vanguardrenewables.com) for signature
2025-03-27 - 6:13:02 PM GMT

Email viewed by Kevin Chase (kchase@vanguardrenewables.com)
2025-03-27 - 7:14:07 PM GMT

Document e-signed by Kevin Chase (kchase@vanguardrenewables.com)
Signature Date: 2025-03-27 - 7:16:54 PM GMT - Time Source: server

Document emailed to Victoria Lepore (vlepore@vanguardrenewables.com) for signature
2025-03-27 - 7:16:55 PM GMT

Email viewed by Victoria Lepore (vlepore@vanguardrenewables.com)
2025-03-27 - 7:59:24 PM GMT

Document e-signed by Victoria Lepore (vlepore@vanguardrenewables.com)
Signature Date: 2025-03-27 - 7:59:45 PM GMT - Time Source: server

Agreement completed.
2025-03-27 - 7:59:45 PM GMT

MEMORANDUM OF LEASE

This is a Memorandum of Lease ("Memorandum") made and entered into as of this 24th day of February, 2025, by and between **Pierce Ranch GP** ("Lessor"), located at Post Office Box 538, Pierce, Texas, 77467; and **VR Development Services LLC**, a Massachusetts limited liability company ("Lessee"), located at 133 Boston Post Rd, Building 15, 2nd Floor, Weston, MA 02493, upon the following terms:

1. Lease. The provisions set forth in a written lease between the parties hereto dated January 13th, 2025 (the "Lease") are hereby incorporated by reference into this Memorandum.

2. Leased Area. The Leased Area which is the subject of the Lease is located on a portion of Lessor's Property more particularly described on the attached Exhibit A.

3. Commencement Date of Lease. The Lease commenced January 13th, 2025, as set forth in the Lease.

4. Term. The Term of the Lease is twenty-five (25) years from the Operations Date as defined in the Lease, with three (3) additional automatic renewal periods of five (5) years each unless either party exercises the non-renewal options provided in the Lease.

5. Duplicate Copies. Copies of the originals of the Lease are in the possession of Lessor and Lessee, and reference should be made thereto for a more detailed description thereof.

6. Purpose. It is expressly understood and agreed by all parties that the sole purpose of this Memorandum of Lease is to give record notice of the Lease; it being distinctly understood and agreed that said Lease constitutes the entire lease and agreement between the parties with respect to the Leased Area and is hereby incorporated by reference. The Lease contains and sets forth additional rights, terms, conditions, duties, and obligations not enumerated within this instrument which govern the Lease. This Memorandum is for information purposes only and nothing contained herein may be deemed in any way to modify or vary any of the terms or conditions of the Lease. In the event of any inconsistency between the terms of the Lease and this instrument, the terms of the Lease shall control. The rights and obligations set forth herein shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, representatives, successors, and assigns.

[signature pages follow]

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of Lease pursuant to due authorization on the dates herein acknowledged.

LESSOR:

Pierce Ranch GP

By: _____

Name: Laurance H. Armour, III

Title: General Manager

ACKNOWLEDGMENT

STATE OF Texas)
) SS
COUNTY OF Wharton)

On this 26th day of February, 2025, before me appeared Laurance H. Armour, III to me personally known, who, being by me duly sworn did say that he or she is the person of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in Pierce, TX, the day and year last above written.

_____
Notary Public Signature

My Commission expires 05-05-2025

VELDA VONDERAU
NOTARY PUBLIC
STATE OF TEXAS
ID # 761496-8
My Comm. Expires 05-05-2025

LESSEE:

VR Development Services LLC

By: Kevin Chase
Name: _____ Feb 28, 2025
Title: Chief Development Officer

ACKNOWLEDGMENT

STATE OF _____)
) SS
COUNTY OF _____)

On this ___ day of _____, 20___, before me appeared _____ to me personally known, who, being by me duly sworn did say that he or she is the _____ of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in _____, the day and year last above written.

_____
Notary Public Signature

My Commission expires _____

Pierce Ranch Lease Memo

Final Audit Report 2025-02-28

Created:	2025-02-28
By:	Stephen Megnia (smegnia@vanguardrenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAcrt8WX5POxI_PZtyZmcR6SqUQdY7Mhss

"Pierce Ranch Lease Memo" History

Document created by Stephen Megnia (smegnia@vanguardrenewables.com)
2025-02-28 - 6:36:36 PM GMT

Document emailed to Kevin Chase (kchase@vanguardrenewables.com) for signature
2025-02-28 - 6:37:09 PM GMT

Email viewed by Kevin Chase (kchase@vanguardrenewables.com)
2025-02-28 - 6:39:53 PM GMT

Document e-signed by Kevin Chase (kchase@vanguardrenewables.com)
Signature Date: 2025-02-28 - 6:40:14 PM GMT - Time Source: server

Agreement completed.
2025-02-28 - 6:40:14 PM GMT

EXHIBIT A

Leased Area



EXHIBIT "A"

The SURFACE rights in those certain tracts or parcels of land and premises lying and situated in Wharton County, Texas, and being a portion of the property commonly known as the "Pierce Ranch" and including those areas of the "Pierce Ranch" known as the "Convict Farm" and part of the "B U Ranch", more specifically described as follows:

TRACT A:

Survey	Sur. No.	Abst. No.	Acres
Convict Farm:			
Edw. Gallagher 1/4 League		23	1,040.27
Robt. Kuykendall League as described in Deed from Louise K. Hutchins to Lacy W. Armour, et al., dated February 10, 1956, recorded in Volume 287, Page 234, Wharton County Deed Records LESS AND EXCEPT 115.964 acres conveyed to the State of Texas in Deed recorded in Volume 350, Page 53, Wharton County Deed Records for highway purposes		39	944.136

TRACT B:

A portion of those lands commonly known and referred to as "the B.U. Ranch" of Pierce Estate or Pierce Ranch, located in Wharton County, Texas, (including a tract of 97.5 acres out of the Henry Griffith Survey, conveyed by J.W. Kubela, et al, to Lacy W. Armour, et al, by deed dated January 20, 1949, recorded in Vol. 218, Page 323 of the Deed Records of Wharton County, Texas), and which Ranch includes the following surveys, or the parts thereof described below:

B.U. Ranch Land North of Railroad:			
Henry Griffith League		25	1,080.00
W.C.R.R. Co. (incl. out lots)	73	368	310.95
W.C.R.R. Co.	71	389	35.62
I. & G.N.R.R. Co. (incl. out lots)	39	405	138.00
F.L. Jones & G.R. Lyons	70	448	11.12
J.S. MacNamara (W.C.R.R. Co.)	72	451	320.00
J. Telfner (H&T.C.R.R.Co.) (incl. out lots)	2	453	3.00
Day Land & Cattle Co.	1	675	126.92
Day Land & Cattle Co.	2	678	3.60
B.U. Ranch Land South of Railroad:			
John Caldwell League		10	2,746.00
Henry Griffith League		25	279.50
Wm. Pettus League		51	2,820.00
Thomas Westall League		65	4,428.40
E.T.R.R. Co.	109	108	263.75
E.T.R.R. Co.	43	115	18.50
E.T.R.R. Co.	1	138	341.50
E.T.R.R. Co.	19	147	26.50
E.T.R.R. Co.	21	148	272.00
G.& B.N. Co.	2	157	640.00
G.& B.N. Co.	4	158	640.00
Chas. Howard League		181	4,428.00

H.T. & B.R.R. Co.	1	194	640.00
I. & G.N.R.R. Co.	33	218	72.00
I. & G.N.R.R. Co.	38	221	640.00
I. & G.N.R.R. Co.	37	222	32.95
I. & G.N.R.R. Co.	35	224	193.00
I. & G.N.R.R. Co.	34	230	556.50
W.F. York		397	65.20
I. & G.N.R.R. Co. (incl. out lots)	39	405	433.43
Abram Kincheloe		412	160.00
H.E.& W.T.R.R.Co.	1	418	320.00
H.E.& W.T.R.R.Co.	7	441	534.00
I.R.R. Co.	11	447	320.00
J. Telefener	2	453	28.20
J. Telefener	12	454	320.00
John McMaster	2	468	320.00
L.P. Ogden	108	537	.50
L.P. Ogden	110	538	569.50
Mark Weiss	20	558	573.50
Joseph Hyland	2	626	410.00
A.H. Pierce	1	640	640.00
A.H. Pierce	3	641	640.00
A.H. Pierce	8	642	640.00
Day Land & Cattle Co.	1	675	21.00
Day Land & Cattle Co.	2	678	356.80
Day Land & Cattle Co.	3	679	318.00
J.M. Swisher	1	693	166.80
K.R. Ferris		856	640.00
A.P. Borden	15	877	129.88
A.P. Borden	14	878	240.11
A.P. Borden	19	894	382.50
A.P. Borden	18	895	93.44
A.P. Borden		921	85.98
W.W. King		948	193.60
Joshua Parker League		49	24.00
Joshua Parker League		49	386.00

Canals:

Henry Griffith League		25	35.55
R. Kuykendall League		39	5.00
Henry Griffith League		25	12.50

LESS AND EXCEPT 84.81 acres (described as First Tract through Sixth Tract), any interest in 3 acres, lands, canals, easements, etc. (described as Seventh Tract) and 187.4 acres [described as Ninth Tract, parcel (b)] conveyed by Laurance H. Armour, Jr., Trustee, et. al. to Blue Creek Ranch Company, recorded in Volume 696, Page 612, Wharton County Deed Records.

TRACT C:

Pumping Plant tract and pumping plant, together with canal tracts and easements connecting to and used in connection with the B.U. Ranch in Wharton County, Texas, above described, said pumping plant tract and canal and easements consisting of:

PARCEL 1 - 52 acre tract:

52 acres of land, more or less, in the Robt. Kuykendall League, Abstract 39, Wharton County, Texas, being a strip of land 300 feet in width off the West side of that certain tract of 1,060.1 acres, more or less, in the Robt. Kuykendall League which 1,060.1 acre tract is part of what is referred to as the "Convict Farm" tract of the Pierce Ranch or Pierce Estate, said 52 acres being described by metes and bounds as follows:

BEGINNING at the Southwest corner of the aforesaid "Convict Farm", which is also the Southwest corner of the said 1,060.1 acre tract, being in the intersection of the West line of said tract with the North right-of-way line of the road known as the "Rancho Grande Road";

THENCE North 20 deg. East with the West line of said "Convict Farm" tract, 7,500 feet to the Northwest corner of the 52 acre tract herein described, and being the Southwest corner of a 36 acre tract hereinafter described next below;

THENCE South 70 deg. East, crossing the Pierce Ranch Main Canal, 300 feet to the Northeast corner of this tract, being the lower Southeast corner of said 36 acre tract described below;

THENCE 20 deg. West parallel to and 300 feet from the above mentioned West line of said "Convict Farm" tract, 7,500 feet to the intersection with the North line of the above mentioned Rancho Grande Road;

THENCE North 70 deg. West with the North line of said Rancho Grande Road 300 feet to the place of beginning, containing 52 acres of land, more or less.

PARCEL 2 - Pumping Plant Tract:

36 acres of land, more or less, in the Robt. Kuykendall League, Abstract 39, Wharton County, Texas, and being a part of the above referred to 1,060.1 acre tract, and also part of what is referred to as the "Convict Farm", said 36 acres being described by metes and bounds as follows:

BEGINNING at the Northwest corner of the above described 52 acre tract, being the 300 foot wide Main Canal tract, such beginning point being in the West line of said "Convict Farm" tract;

THENCE South 70 deg. East crossing the Pierce Ranch Main Canal 300 feet to corner, being the Northeast corner of said 52 acre Main Canal tract described above;

THENCE North 48 deg. 06 min. East crossing a lateral canal 688 feet to a point for corner, said corner being 15 feet out at right angles from the center of the Northwest borrow ditch of said lateral canal;

THENCE North 86 deg. 18 min. East parallel to and 15 feet from the center of said Northwest borrow ditch of said lateral canal, 810 feet to point for corner, said point being in a projection of the East yard fence line of the farthest South house of a row of houses on this 36 acre tract;

THENCE North 30 deg. 06 min. East at 491 feet pass the Southeast corner of said East yard fence, and continuing with the said East yard fence in all 639 feet (with the total distance of this call being 639 feet) to fence post for corner, being the Northeast corner of said yard fence and also the Northeast corner of this 36 acre tract;

THENCE North 58 deg. 46 min. West with the fence forming the back yard enclosures of said row of houses at 938 feet pass the top bluff bank of the Colorado River, and continuing on said call to said River;

THENCE Southwesterly up said Colorado River, following the meanders, to its intersection with the first above mentioned West line of said "Convict Farm" tract, same being the Northwest corner of the aforesaid 1,060.01 acre tract;

THENCE South 20 deg. West with the West line of said 1,060.1 acre tract, and also with the West line of the above referred to "Convict Farm" to the place of beginning, containing 36 acres of land, more or less.

PARCEL 3 - Canal:

5 acre tract off the West side of Tract 1 of the subdivision of the Robt. Kuykendall League, Abstract 39, in Wharton County, Texas, which 5 acres was reserved in deed dated December 16, 1927, executed by J.F. Hutchins, et al Executors, to N.A. Bowers, recorded in Vol. 79, Page 427 of the Deed Records of Wharton County, Texas.

PARCEL 4 - Canal:

Two tracts of land containing 17.16 acres and 18.39 acres, respectively, out of the Henry Griffith League, Wharton County, Texas, conveyed by J.B. Ferguson to Pierce Estates, Incorporated, by deed dated February 5, 1943, recorded in Vol. 163, Page 285 of the Deed Records of Wharton County, Texas.

PARCEL 5 - Canal:

Canal easement located in the Henry Griffith League, Wharton County, Texas, reserved in deed dated November 23, 1905, executed by A.P. Borden, et al, to Valentine Heil, recorded in Vol. 14, Page 177 of the Deed Records of Wharton County, Texas, and which easement is located in the Henry Griffith League, Wharton County, Texas.

PARCEL 6 - Canal:

Canal Easement conveyed by Blue Creek Ranch Company to J.F. Hutchins by deed dated December 15, 1936, filed for record in the office of the County Clerk of Wharton County, Texas, on January 27, 1956, which deed covers 7.5 acres out of the F.C. McReynolds Survey No. 6, Wharton County, Texas.

TRACT D: (Canal)

A 200' strip of land being 100' on either side of the center line of that portion of an existing canal that runs approximately parallel to U.S. Highway 59 and a 100' strip of land being 50' on either side of the center line of that portion of an existing canal that runs approximately perpendicular to U.S. Highway 59. This TRACT D canal is located between the Southwest end of the 17.16 acre canal described as TRACT C Parcel (4) above and the northwest end of the 18.39 acre canal described as TRACT C Parcel (4) above and connects the 17.16 acre canal to the 18.39 acre canal. This TRACT D canal is shown on the Plat attached hereto as Exhibit "B", Page 1. It is in the Henry Griffith League on the B.U. Ranch North of the Railroad.

TRACT E: (Canal)

A 100' strip of land being 50' on either side of the center line of an existing canal located on that portion of B.U. Ranch lying South of the railroad and northwesterly of a line (herein called "DIVISION LINE") described as follows:

A line across the Pierce Ranch from the Southwest corner of the O.B. Ranch Co. 675.134 acre tract, in the Joshua Parker 1/2 League, Abstract No. 49 Wharton County, Texas (Volume 755, Page 281, Wharton County Deed Records) to the northeast line of the Pierce West Line Road, same being the southwest line of the Pierce Ranch and being more particularly described by metes and bounds as follows:

BEGINNING at an iron rod set at the southwest corner of the aforementioned O.B. Ranch Co. 675.134 acre tract;

THENCE S 61 deg. 24' 03" W 2575.21 feet to an iron rod set for an angle point;

THENCE S 61 deg. 24' 21" W 2550.91 feet to an iron rod set for a corner;

THENCE S 30 deg. 33' 42" E 570.81 feet to an iron rod set for a corner;

THENCE S 61 deg. 11' 31" W 2268.25 feet to an iron rod set for an angle point;

THENCE S 40 deg. 32' 26" W 1520.34 feet to an iron rod set for an angle point;

THENCE S 39 deg. 57' 12" W 2607.83 feet to an iron rod set for an angle point;

THENCE S 47 deg. 39' 40" W 6241.35 feet to an iron rod set in the east line of Pierce West Line Road, same being the west line of the Lacy W. Armour Estate.

The canal is located between the southeast end of the 18.39 acre canal tract described under TRACT C Parcel (4) above and the "DIVISION LINE" and connects the 18.39 acre canal to the canal system on TRACT B southeast of the "DIVISION LINE". The herein described canal tract is shown on the Plat attached hereto as Exhibit "B", Page 1, and is designated thereon as TRACT E.

TRACT F: (Road Easement)

A 60' strip of land being 30' on either side of the center line of an existing gravel road designated and known as the Pierce Ranch Main Ranch Road (a/k/a Texaco Road) beginning at the point where said road enters the Pierce Ranch Southeast of the Town of Pierce at the Southeast line of the Southern Pacific Railroad which parallels old U.S. Highway 59, in I & G N RR Co. Survey No. 39, Abstract 405, said point being N. 55 deg. 30' E. a distance of 3,185.22' from an iron rod set in the southeast line of Pierce West Line Road (County Road 421) at its intersection with the Southern Pacific Railroad; thence, in a Southeasterly direction across said survey, and, thence, across I & G N RR Survey No. 38, Abstract 221; A. P. Borden Survey, Abstract 895; J. Telfner Survey, Abstract 454, Galv. & Braz. Nav. Co. Survey No. 4, Abstract 158, to a point in the H.T. & B. R.R. Survey No. 1, Abstract 194 where said road intersects with the "Division Line" described above, which point is located approximately S. 61 deg. 24' 03', 7394.37' from the beginning point of the "Division Line", as more particularly shown on plat attached hereto as Exhibit "B".

TRACT G:

The following lots in the town of Pierce City, Wharton County, Texas, according to the map or plat thereof, which is recorded in Vol. P, Page 289, of the Deed Records of Wharton County, Texas:

Classification - City or Town Lots:

Block	Lots
1 (All)	1 to 16 inclusive
2	1 to 4 inclusive and 9 to 12 inclusive
3 (All)	1 to 16 inclusive
5 (All)	1 to 16 inclusive
6 (All)	1 to 16 inclusive
7	4 through 16, inclusive

8 (All)	1 to 16 inclusive
9 (All)	1 to 16 inclusive
10 (All)	1 to 16 inclusive
11 (All)	1 to 16 inclusive
12	2 to 8 inclusive and 11 to 16 inclusive
13	1 to 8 inclusive and 10 to 16 inclusive
14	1 to 8 inclusive and 10 to 16 inclusive
15 (All)	1 to 16 inclusive
16 (All)	1 to 16 inclusive
17 (All)	1 to 12 inclusive
18 (All)	1 to 12 inclusive
19 (All)	1 to 12 inclusive
22	3 to 6 inclusive and 10 to 12 inclusive
23 (All)	1 to 12 inclusive
24 (All)	1 to 12 inclusive
25 (All)	1 to 12 inclusive
26 (All)	1 to 12 inclusive
27 (All)	1 to 12 inclusive
28	1 to 5 inclusive and 8 to 10 inclusive
29 (All)	1 to 10 inclusive
30 (All)	1 to 12 inclusive
31 (All)	1 to 12 inclusive
32 (All)	1 to 12 inclusive
33 (All)	1 to 12 inclusive
34 (All)	1 to 12 inclusive
35 (All)	1 to 10 inclusive
36 (All)	1 to 12 inclusive
37 (All)	1 to 12 inclusive
38 (All)	1 to 10 inclusive
39 (All)	1 to 12 inclusive
40 (All)	1 to 12 inclusive
41 (All)	1 to 12 inclusive
42 (All)	1 to 12 inclusive
44 (All)	1 to 12 inclusive
45 (All)	1 to 12 inclusive
47 (All)	1 to 12 inclusive
48 (All)	1 to 12 inclusive
49 (All)	1 to 12 inclusive
50 (All)	1 to 12 inclusive
51 (All)	1 to 10 inclusive
52 (All)	1 to 12 inclusive
53 (All)	1 to 12 inclusive
54	4 to 10 inclusive
55 (All)	1 to 12 inclusive
56 (All)	1 to 12 inclusive
58 (All)	1 to 12 inclusive
59 (All)	1 to 12 inclusive
60 (All)	1 to 12 inclusive
61 (All)	1 to 12 inclusive
62 (All)	1 to 12 inclusive
63 (All)	1 to 12 inclusive
64 (All)	1 to 12 inclusive

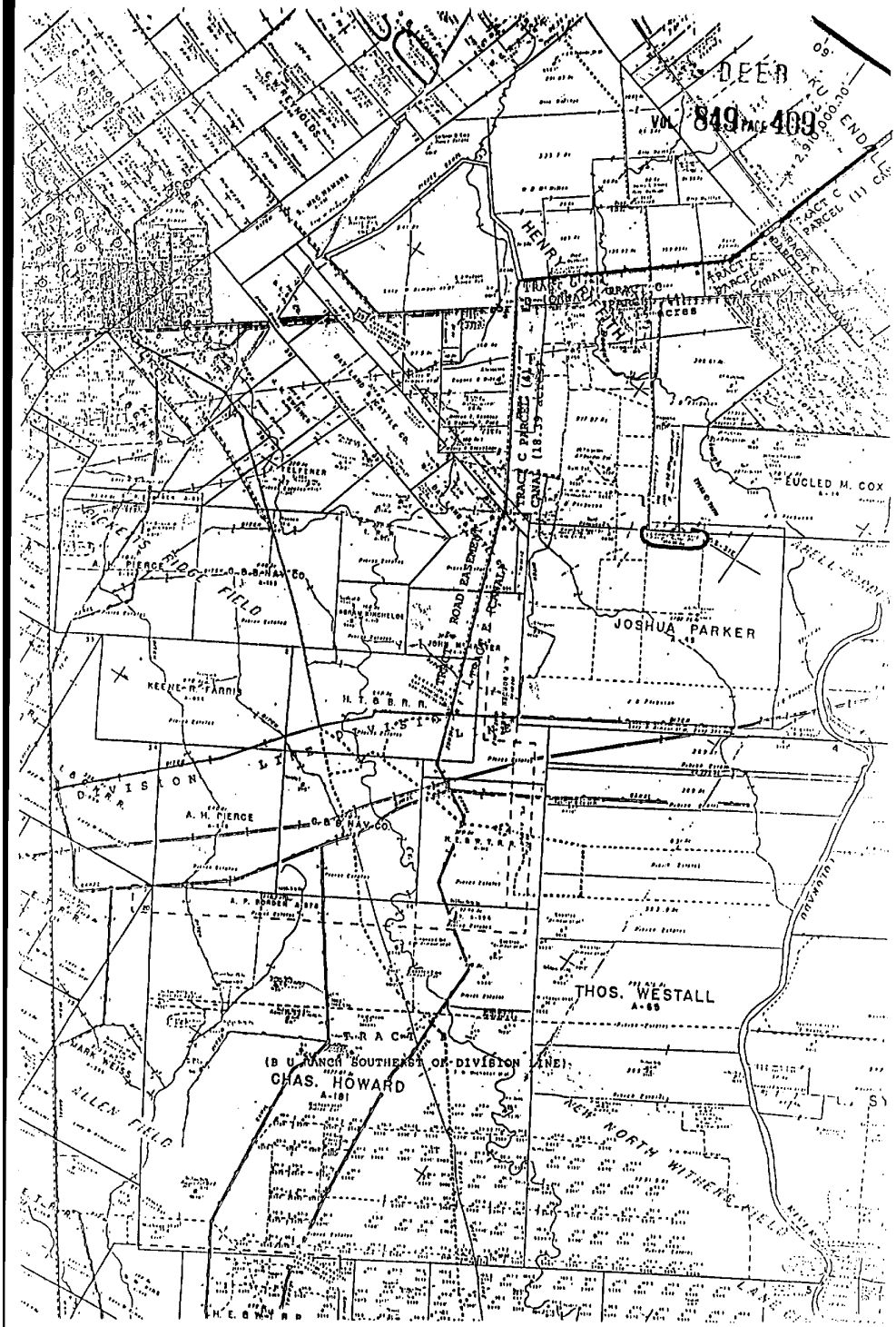


EXHIBIT B
PAGE 1

RECORDER'S MEMORANDUM
AT THE TIME OF RECORDATION, THIS INSTRUMENT WAS FOUND TO BE INADEQUATE FOR THE BEST PHOTOGRAPHIC REPRODUCTION BECAUSE OF ILLEGIBILITY, CARBON OR PHOTO COPY, DISCOLORED PAPER, ETC.

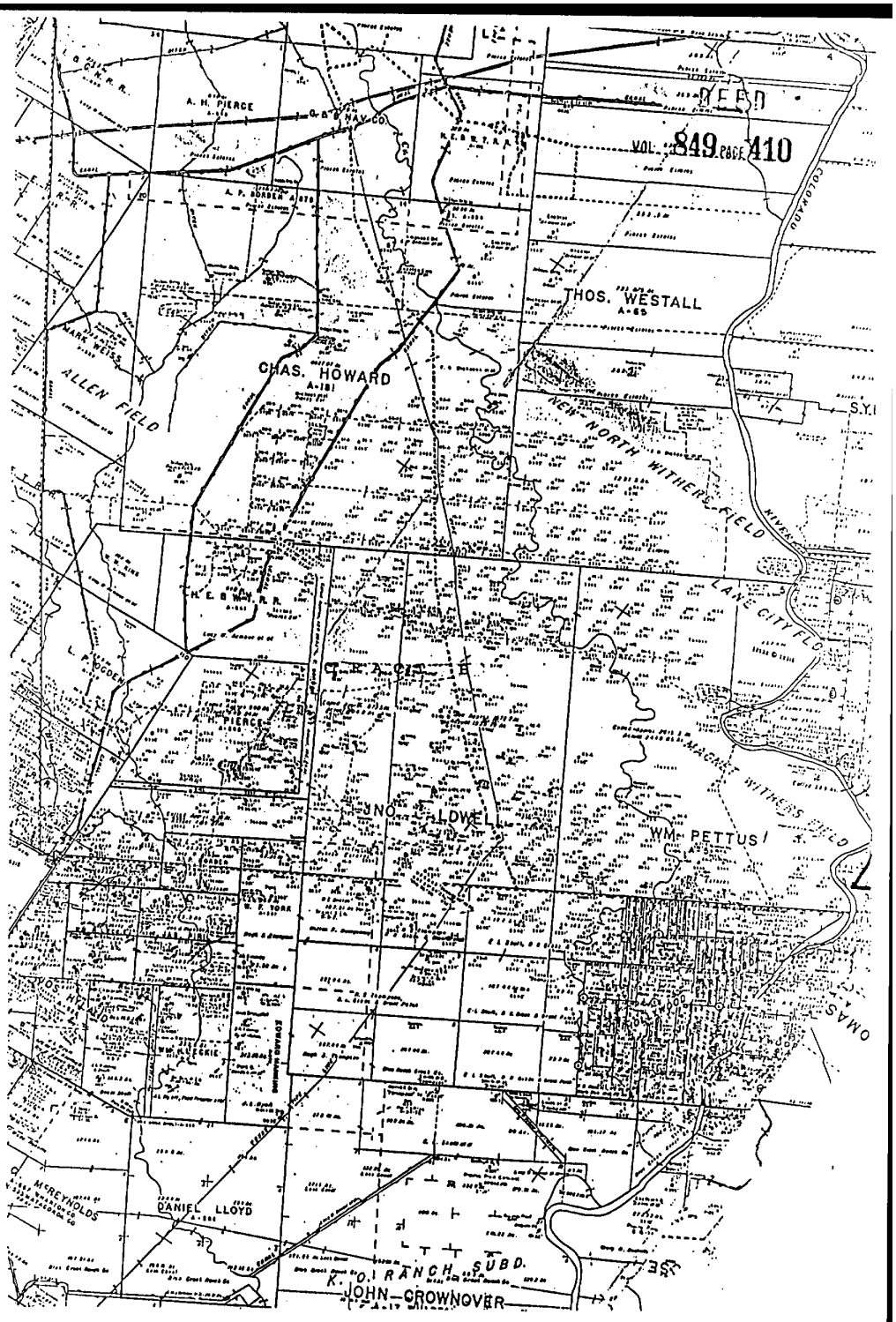


EXHIBIT B
PAGE 2

RECORDER'S MEMORANDUM

AT THE TIME OF RECORDATION, THIS INSTRUMENT WAS FOUND TO BE INADEQUATE FOR THE BEST PHOTOGRAPHIC REPRODUCTION BECAUSE OF ILLEGIBILITY, CARBON OR PHOTO COPY, DISCOLORED PAPER, ETC.

DEED

VOL 849 PAGE 411

STATE OF TEXAS COUNTY OF WHARTON

I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the volume and page of the named records of Wharton County, Texas as stamped hereon by me on

JAN 25 1991

COUNTY CLERK, Wharton County, Texas

BY _____ Deputy

FILED FOR RECORD
at 9:00 o'clock A M

JAN 24 1991

DELFIN MAREK
COUNTY CLERK, WHARTON CO., TEXAS
By Bernice Lucas

Od $31.00
Hutcheson & Grundy
Attn: Harriet H. Learnell
3300 Citicorp Center
1200 Smith St.
Houston, Tx.
77002-4579

122429

A.C: PLAIN LANGUAGE SUMMARY

TLAP Application

The following summary is *provided for this pending water quality permit application being reviewed by the Texas Commission on Environmental Quality as required by 30 Texas Administrative Code Chapter 39. The information provided in this summary may change during the technical review of the application and are not federal enforceable representations of the permit application.*

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. The facility will be located at the coordinates (29.2165071, -96.19356185), near the City of Pierce, Wharton County, Texas, 77437.

Anaerobic digestion is a process in which organic materials, such as cow manure and food waste, are broken down by microorganisms in an oxygen-free environment to produce biogas. By combining food waste with manure, a smaller volume of manure can generate sufficient biogas to make the system efficient. The digester tanks regularly receive material from both the hydrolysis and manure tanks. The material transferred from the hydrolysis tanks will contain a mix of feedstock. Once in the digester, the mixture is homogenized using mixers. Inside the digester, the blend of manure and food waste is heated and remains in the tank for several days. During this time, microbes break down the organic material in an anaerobic environment, producing biogas, which consists of methane, carbon dioxide, hydrogen, and water vapor. The biogas collected in the digester's headspace is then routed through a gas conditioning and upgrading system to remove impurities, resulting in pipeline-quality natural gas. The effluent from the digesters, known as digestate, must be regularly removed as the digester tanks have limited capacity. As more organic waste is added, the processed material is extracted throughout the day to maintain tank volume. This digestate is a nutrient-rich liquid that is stored in an on-site earthen lagoon for future land application by spreading.

Spanish Translation

El siguiente resumen se proporciona para esta solicitud de permiso de calidad del agua pendiente que está siendo revisada por la Comisión de Calidad Ambiental de Texas, según lo exige el Capítulo 39 del Título 30 del Código Administrativo de Texas. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no son representaciones federales exigibles de la solicitud de permiso.

Wharton AD1, LLC desarrolla, construye, posee y opera digestores anaeróbicos en granjas lecheras para producir energía renovable y otros subproductos agrícolas como fertilizantes líquidos y enmiendas del suelo. La instalación estará ubicada en las coordenadas (29.2165071, -96.19356185), cerca de la ciudad de Pierce, condado de Wharton, Texas, 77437.

La digestión anaeróbica es un proceso en el que los microorganismos descomponen materiales orgánicos, como el estiércol de vaca y los desechos de alimentos, en un ambiente libre de oxígeno para producir biogás. Al combinar los desechos de alimentos con estiércol, un volumen menor de estiércol puede generar suficiente biogás para que el sistema sea eficiente. Los tanques digestores reciben regularmente material tanto de los tanques de hidrólisis como de estiércol. El material transferido desde los tanques de hidrólisis contendrá una mezcla de materia prima. Una vez en el digestor, la mezcla se homogeneiza mediante mezcladores. Dentro del digestor, la mezcla de estiércol y restos de comida se calienta y permanece en el tanque durante varios días. Durante este tiempo, los microbios descomponen el material orgánico en un ambiente anaeróbico, produciendo biogás, que consiste en metano, dióxido de carbono, hidrógeno y vapor de agua. Luego, el biogás recolectado en el espacio de cabeza del digestor se conduce a través de un sistema de acondicionamiento y mejora de gas para eliminar las impurezas, lo que da como resultado gas natural con calidad de tubería. El efluente de los digestores, conocido como digestato, debe eliminarse periódicamente ya que los tanques de los digestores tienen una capacidad limitada. A medida que se agregan más desechos orgánicos, el material procesado se extrae durante el día para mantener el volumen del tanque. Este digestato puede procesarse aún más en un sistema de manejo de nutrientes, lo que da como resultado un líquido rico en nutrientes que se almacena en una laguna de tierra en el sitio para su futura aplicación en la tierra mediante esparcimiento.

PUBLIC INVOLVEMENT PLAN

Texas Commission on Environmental Quality

Public Involvement Plan Form for Permit and Registration Applications

The Public Involvement Plan is intended to provide applicants and the agency with information about how public outreach will be accomplished for certain types of applications in certain geographical areas of the state. It is intended to apply to new activities; major changes at existing plants, facilities, and processes; and to activities which are likely to have significant interest from the public. This preliminary screening is designed to identify applications that will benefit from an initial assessment of the need for enhanced public outreach.

All applicable sections of this form should be completed and submitted with the permit or registration application. For instructions on how to complete this form, see TCEQ-20960-inst.

Section 1. Preliminary Screening

☒ New Permit or Registration Application

☐ New Activity – modification, registration, amendment, facility, etc. (see instructions)

If neither of the above boxes are checked, completion of the form is not required and does not need to be submitted.

Section 2. Secondary Screening

☒ Requires public notice,

☐ Considered to have significant public interest, **and**

☐ Located within any of the following geographical locations:

- Austin
- Dallas
- Fort Worth
- Houston
- San Antonio
- West Texas
- Texas Panhandle
- Along the Texas/Mexico Border
- Other geographical locations should be decided on a case-by-case basis

If all the above boxes are not checked, a Public Involvement Plan is not necessary. Stop after Section 2 and submit the form.

☐ Public Involvement Plan not applicable to this application. Provide **brief** explanation.

Section 3. Application Information

Type of Application (check all that apply):

Air ☐ Initial ☐ Federal ☐ Amendment ☐ Standard Permit ☐ Title V

Waste ☐ Municipal Solid Waste ☐ Industrial and Hazardous Waste ☐ Scrap Tire
☐ Radioactive Material Licensing ☐ Underground Injection Control

Water Quality

☐ Texas Pollutant Discharge Elimination System (TPDES)

☒ Texas Land Application Permit (TLAP)

☐ State Only Concentrated Animal Feeding Operation (CAFO)

☐ Water Treatment Plant Residuals Disposal Permit

☐ Class B Biosolids Land Application Permit

☐ Domestic Septage Land Application Registration

Water Rights New Permit

☐ New Appropriation of Water

☐ New or existing reservoir

Amendment to an Existing Water Right

☐ Add a New Appropriation of Water

☐ Add a New or Existing Reservoir

☐ Major Amendment that could affect other water rights or the environment

Section 4. Plain Language Summary

Provide a brief description of planned activities.

Wharton AD1, LLC develops and operates anaerobic digesters to convert cow manure and food waste into renewable energy and agricultural by-products. The facility near Pierce, Texas, will use anaerobic digestion to break down organic materials in an oxygen-free environment, producing biogas. This biogas, primarily methane, is purified into pipeline-quality natural gas. The remaining digestate is processed into nutrient-rich liquid fertilizer and soil amendments. The liquid by-product is stored in a lagoon for future land application on farms.

Section 5. Community and Demographic Information

Community information can be found using EPA's EJ Screen, U.S. Census Bureau information, or generally available demographic tools.

Information gathered in this section can assist with the determination of whether alternative language notice is necessary. Please provide the following information.

Pierce

(City)

Wharton

(County)

(Census Tract)

Please indicate which of these three is the level used for gathering the following information.

☒ City ☐ County ☒ Census Tract

(a) Percent of people over 25 years of age who at least graduated from high school

60.0%

(b) Per capita income for population near the specified location

$35,139 (Household Income)

(c) Percent of minority population and percent of population by race within the specified location

27.9%

(d) Percent of Linguistically Isolated Households by language within the specified location

N/A

(e) Languages commonly spoken in area by percentage

N/A

(f) Community and/or Stakeholder Groups

N/A

(g) Historic public interest or involvement

N/A

Section 6. Planned Public Outreach Activities

(a) Is this application subject to the public participation requirements of Title 30 Texas Administrative Code (30 TAC) Chapter 39?

☐ Yes ☐ No

(b) If yes, do you intend at this time to provide public outreach other than what is required by rule?

☐ Yes ☐ No

If Yes, please describe.

Wharton AD1, LLC plans to host a series of community conversations to both engag

If you answered "yes" that this application is subject to 30 TAC Chapter 39, answering the remaining questions in Section 6 is not required.

(c) Will you provide notice of this application in alternative languages?

☐ Yes ☐ No

Please refer to Section 5. If more than 5% of the population potentially affected by your application is Limited English Proficient, then you are required to provide notice in the alternative language.

If yes, how will you provide notice in alternative languages?

☐ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

(d) Is there an opportunity for some type of public meeting, including after notice?

☐ Yes ☐ No

(e) If a public meeting is held, will a translator be provided if requested?

☐ Yes ☐ No

(f) Hard copies of the application will be available at the following (check all that apply):

☐ TCEQ Regional Office ☐ TCEQ Central Office
☐ Public Place (specify)

Section 7. Voluntary Submittal

For applicants voluntarily providing this Public Involvement Plan, who are not subject to formal public participation requirements.

Will you provide notice of this application, including notice in alternative languages?

☐ Yes ☐ No

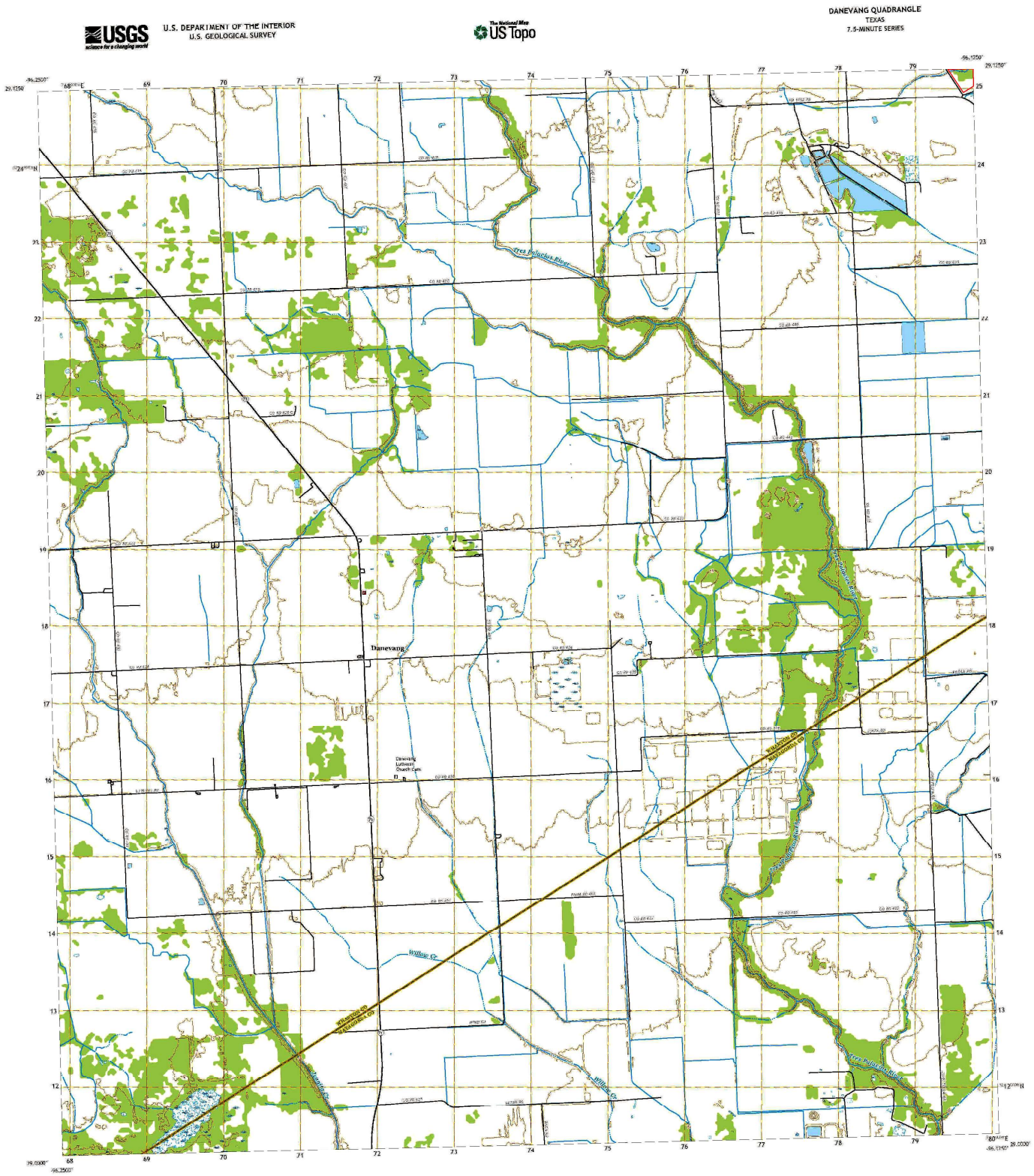
What types of notice will be provided?

☒ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE MAP

7.5-Minute USGS Topographic Quadrangle Map

Figure A.E.l, 7.5-Minute USGS Topographic Quadrangle Map, is an original 7.5-Minute USGS Topographic Map of the Pierce, Texas Quadrangle. This map shows the major highways, county roads, water bodies, and elevation lines near the property.

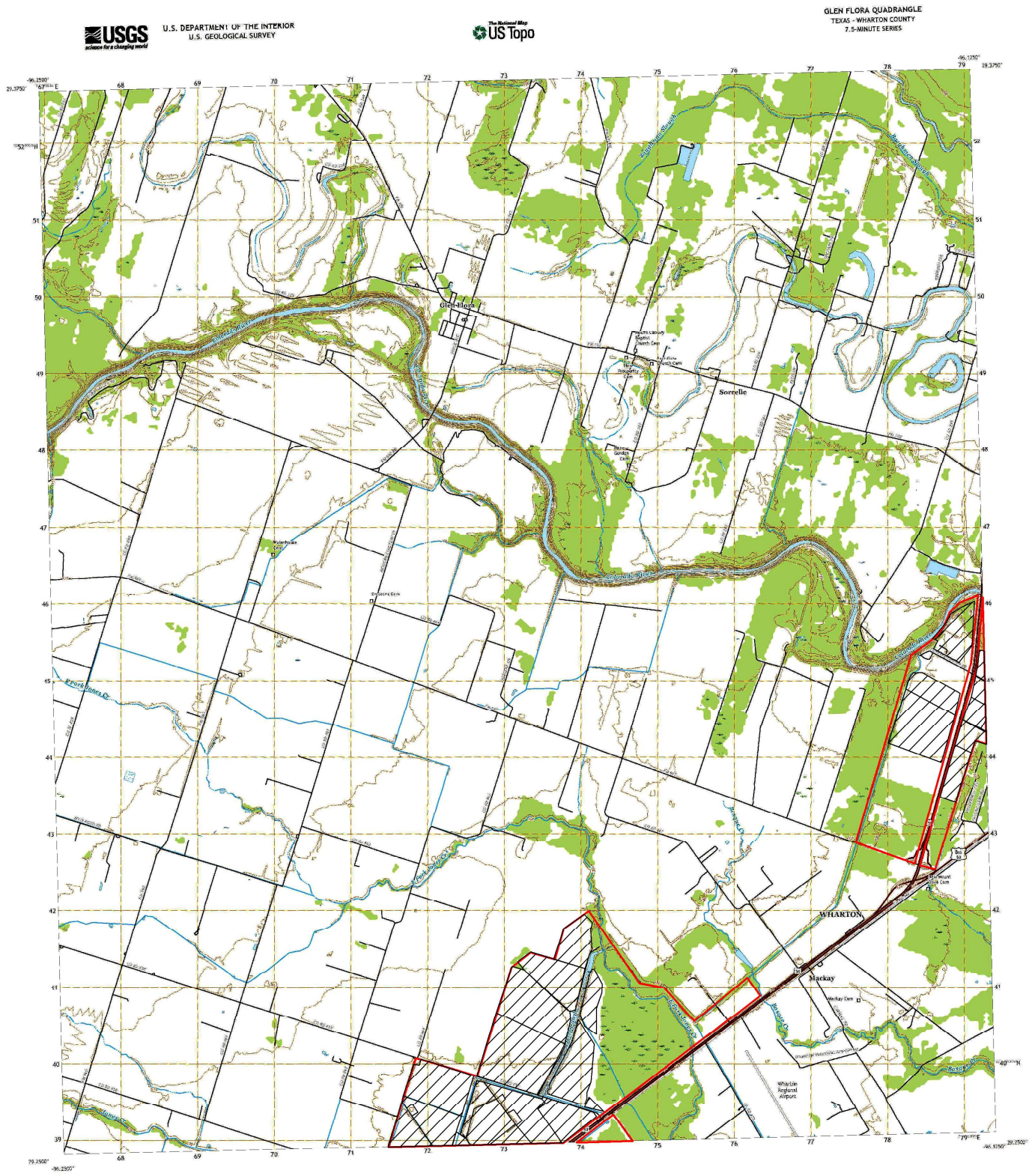


Biogas Plant

Solar Plant

Land Management Unit

Property Boundary

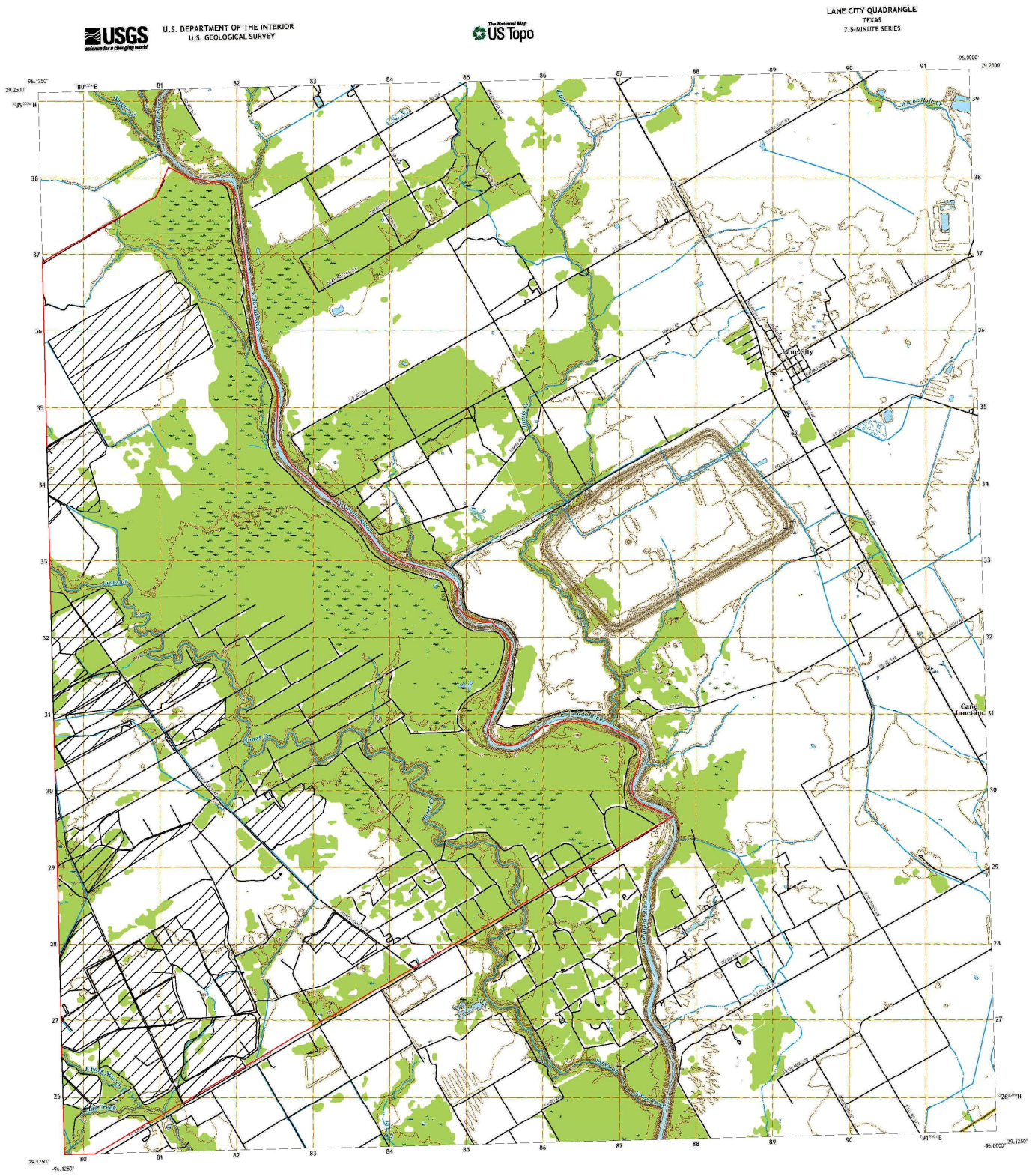


Biogas Plant

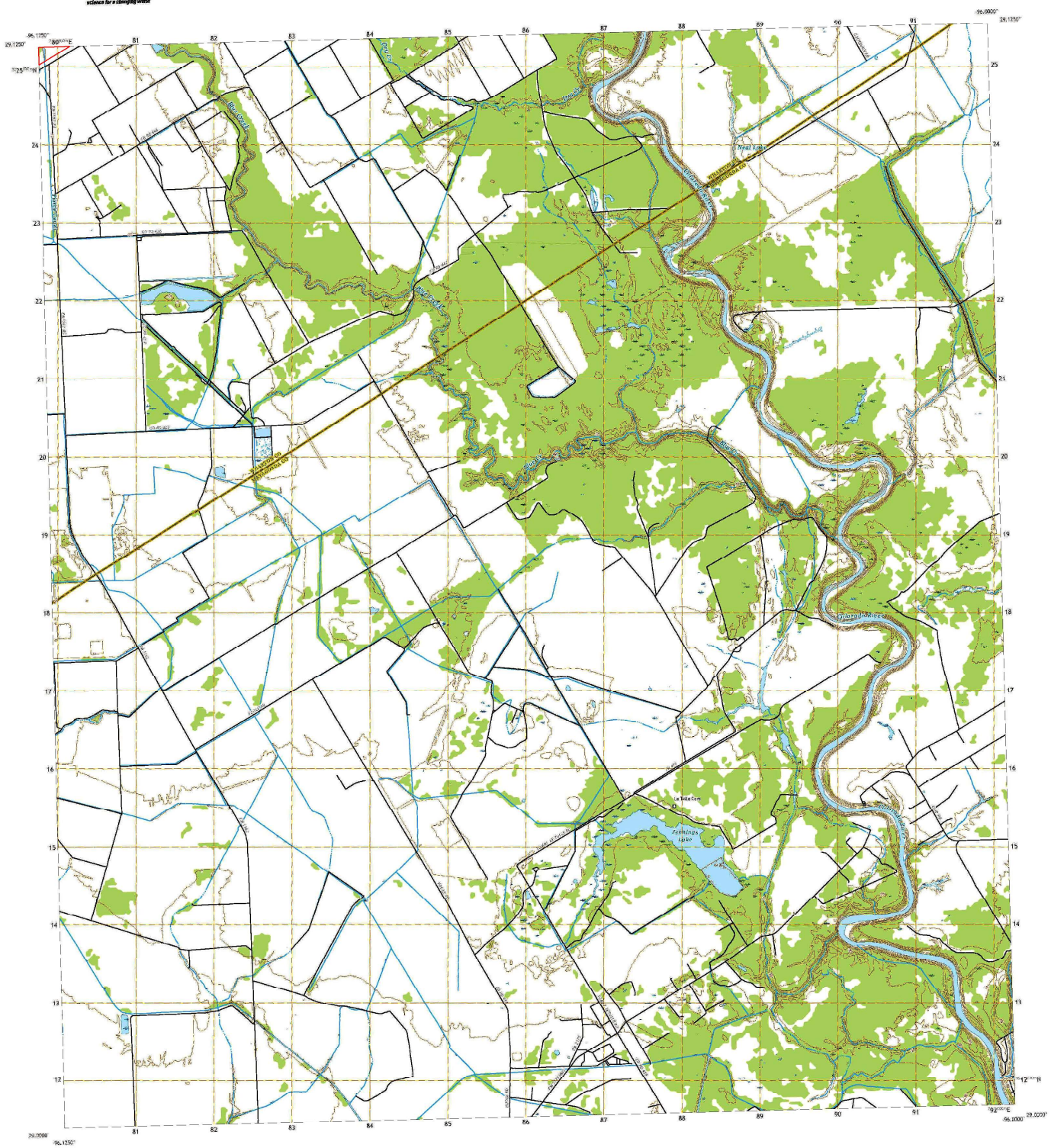
Solar Plant

Land Management Unit

Property Boundary



- Biogas Plant
- Solar Plant
- Land Management Unit
- Property Boundary

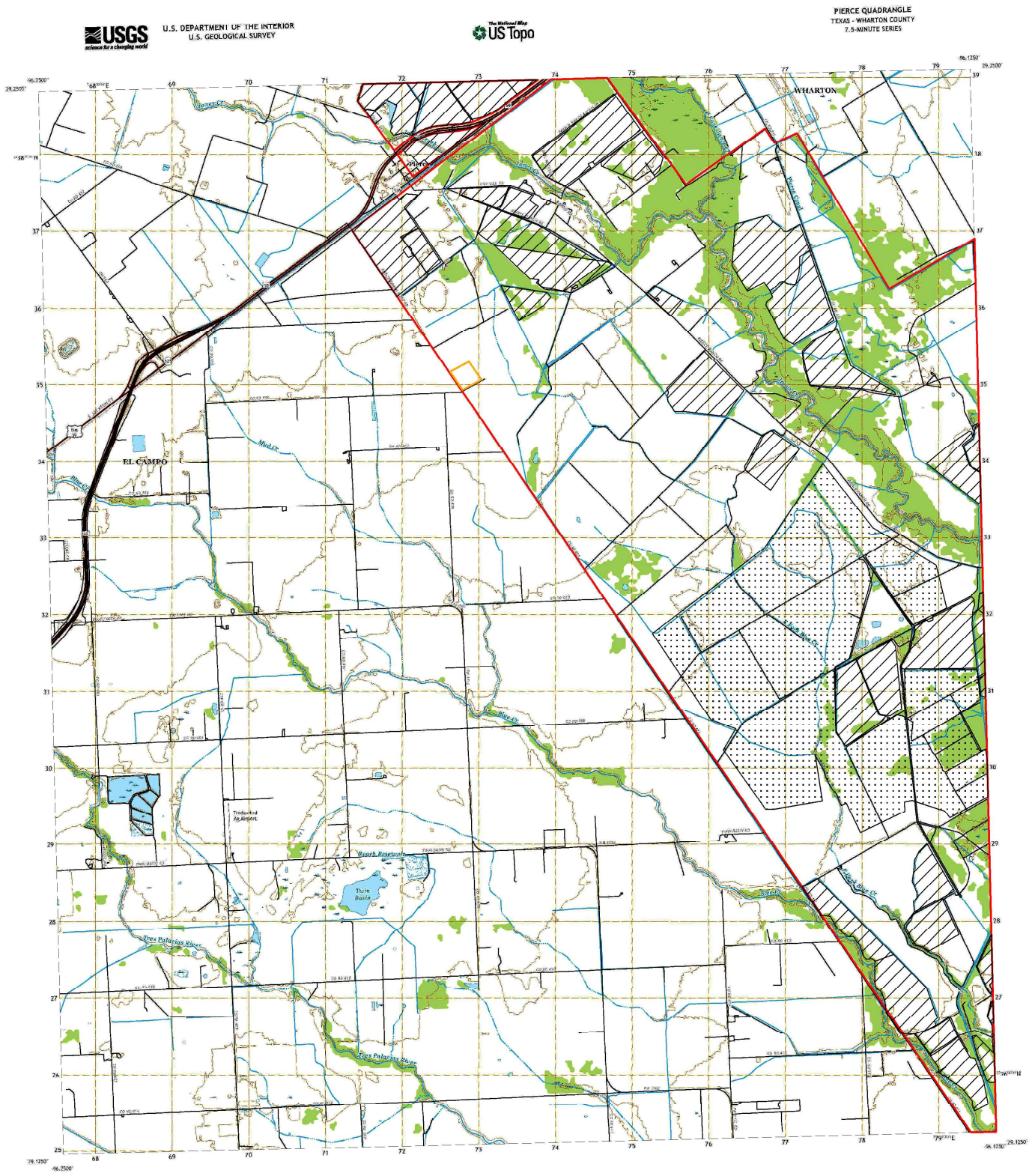


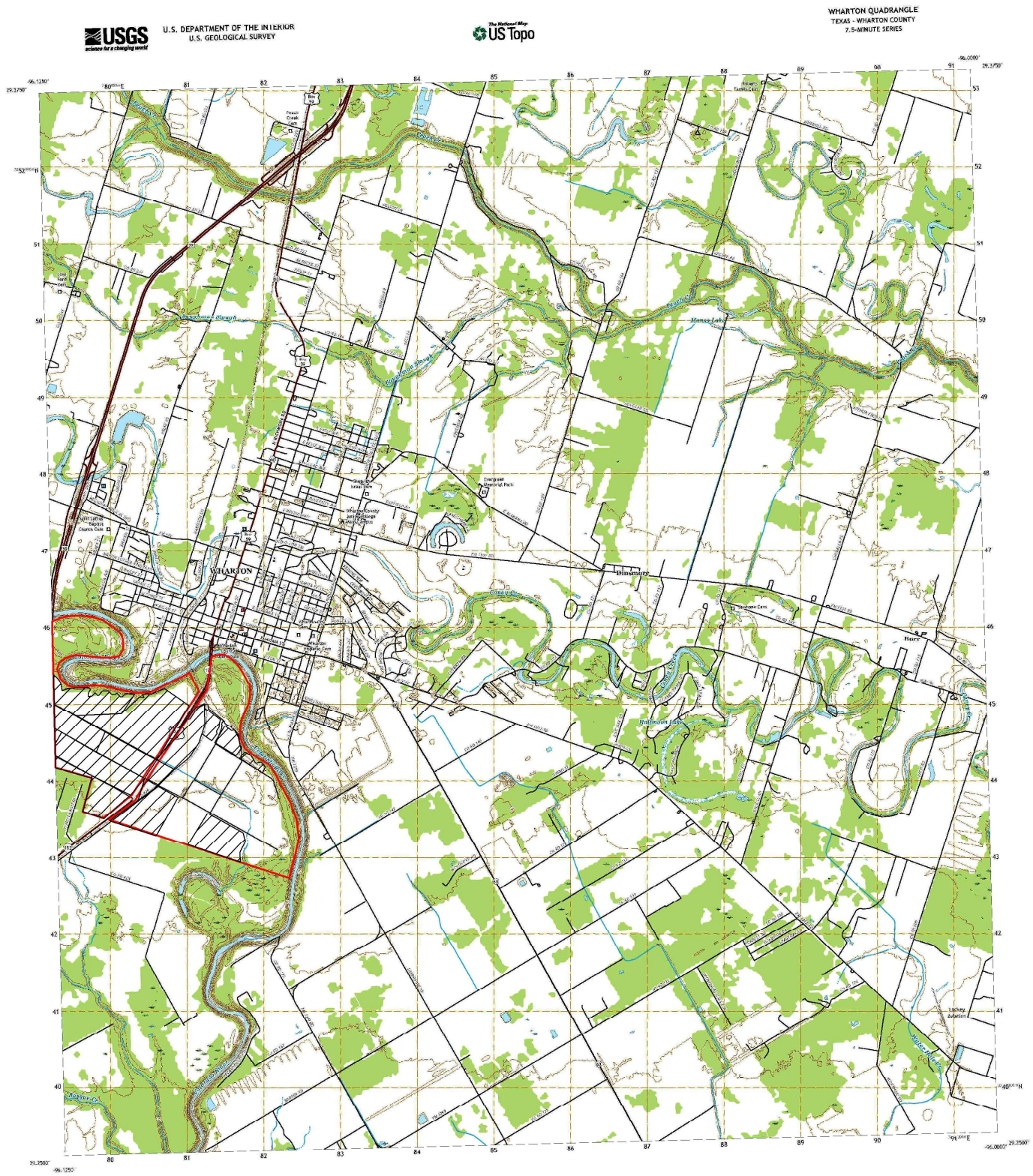
Biogas Plant

Solar Plant

Land Management Unit

Property Boundary


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
The National Map
US Topo
PIERCE QUADRANGLE
TEXAS - WHARTON COUNTY
7.5-MINUTE SERIES
WHARTON
EL CAMPO
Mud Cr
Blue Cr
Trib
Trib
Trib



Biogas Plant

Solar Plant

Land Management Unit

Property Boundary

A.F: AFFECTED LANDOWNER INFORMATION

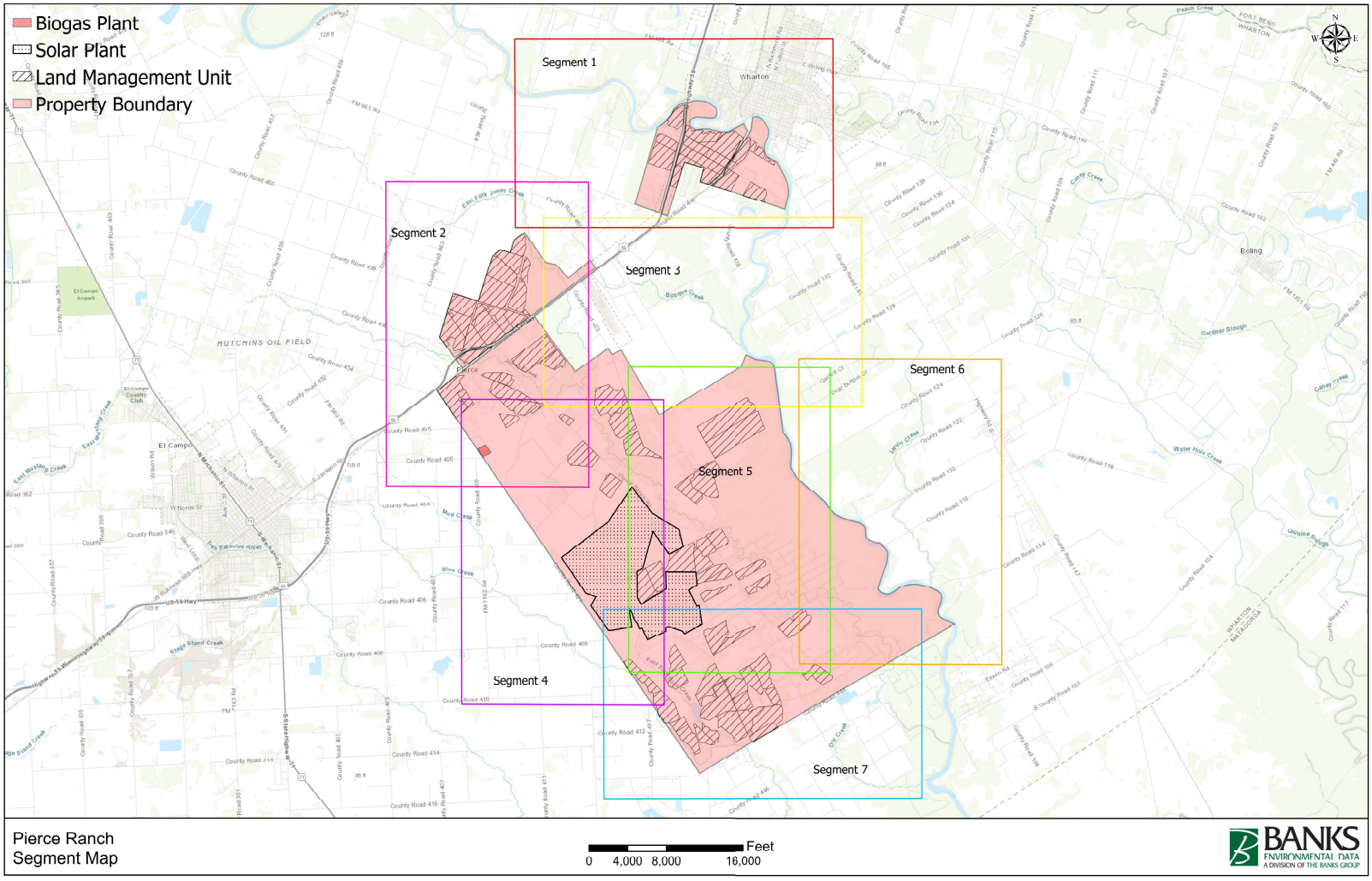
A.F.1 Adjacent Landowners Map

Figure A.F.1 shows the information required in item 1.a. of the Industrial Administrative Report 1.1. Property boundaries were obtained from the Wharton County Appraisal District Interactive Map as of November 2024. The tracts identified on the map correspond to Table A.F. l, below.

A.F.2 Landowners List

The landowner names and addresses in Table A.F.1 were obtained from the Wharton Appraisal District Property Search web databases, retrieved 11/2024.

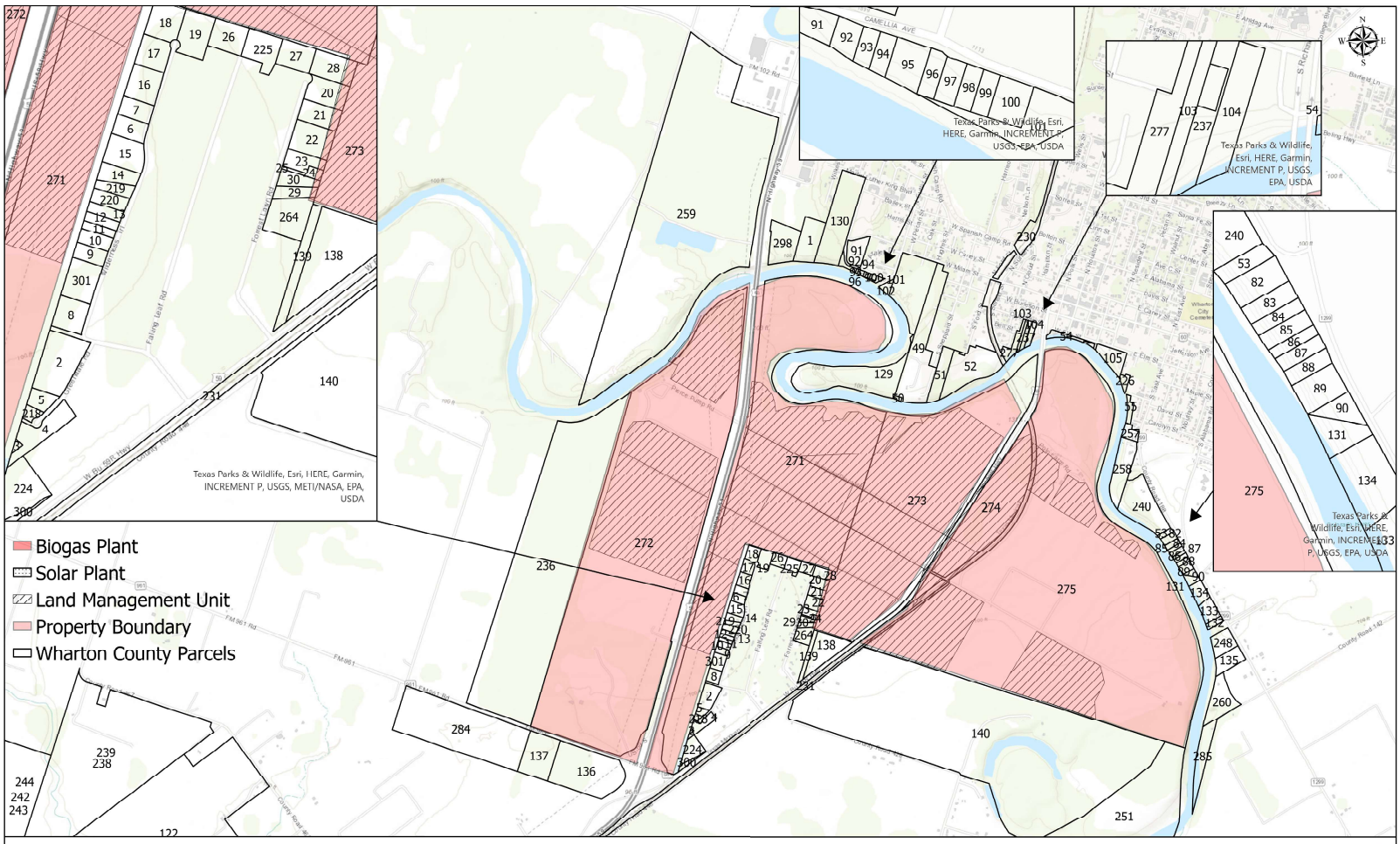
Table 1. Adjacent Landowners



Pierce Ranch
Segment Map

0 4,000 8,000 16,000 Feet

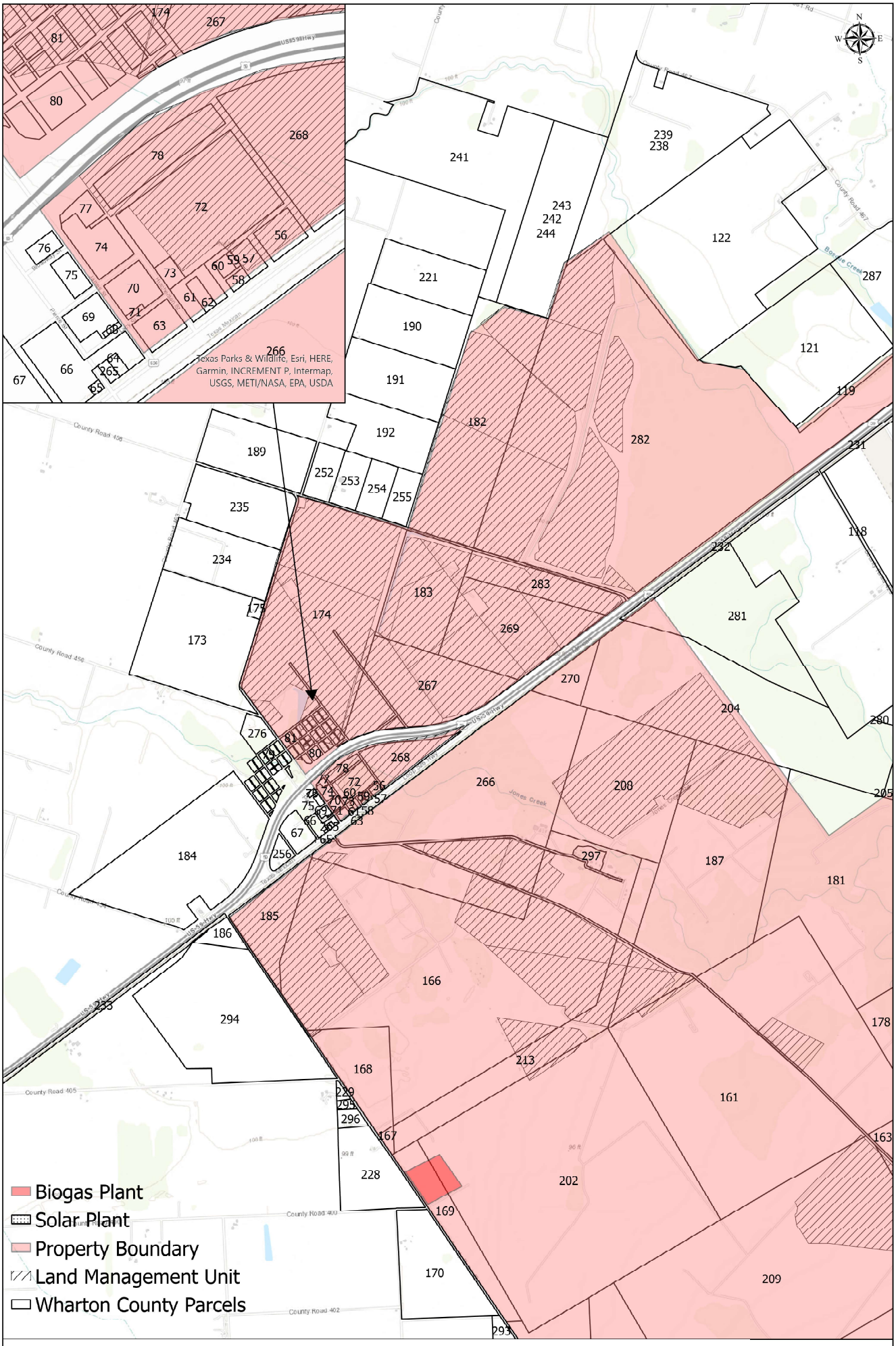
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 1

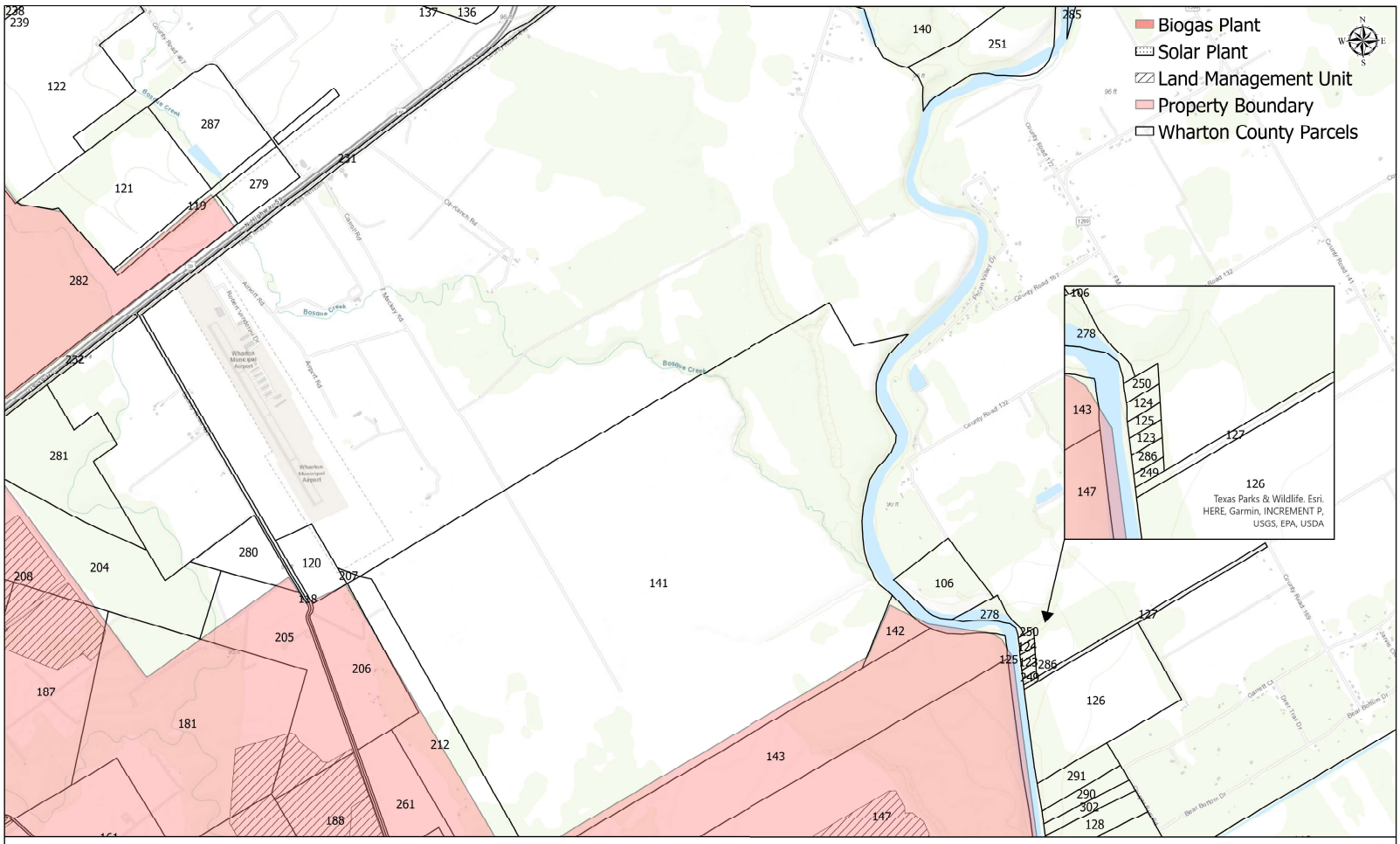
0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 2

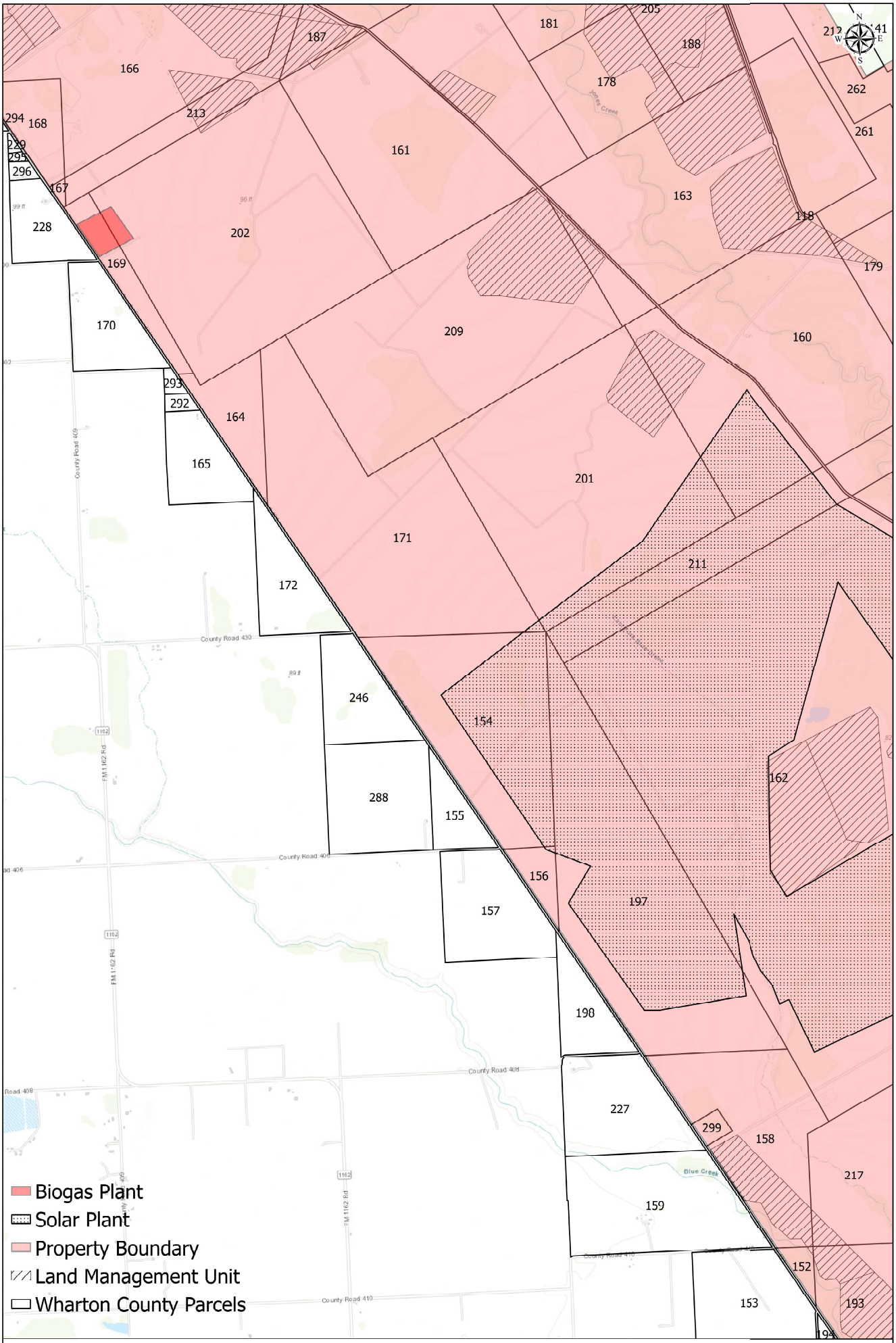
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

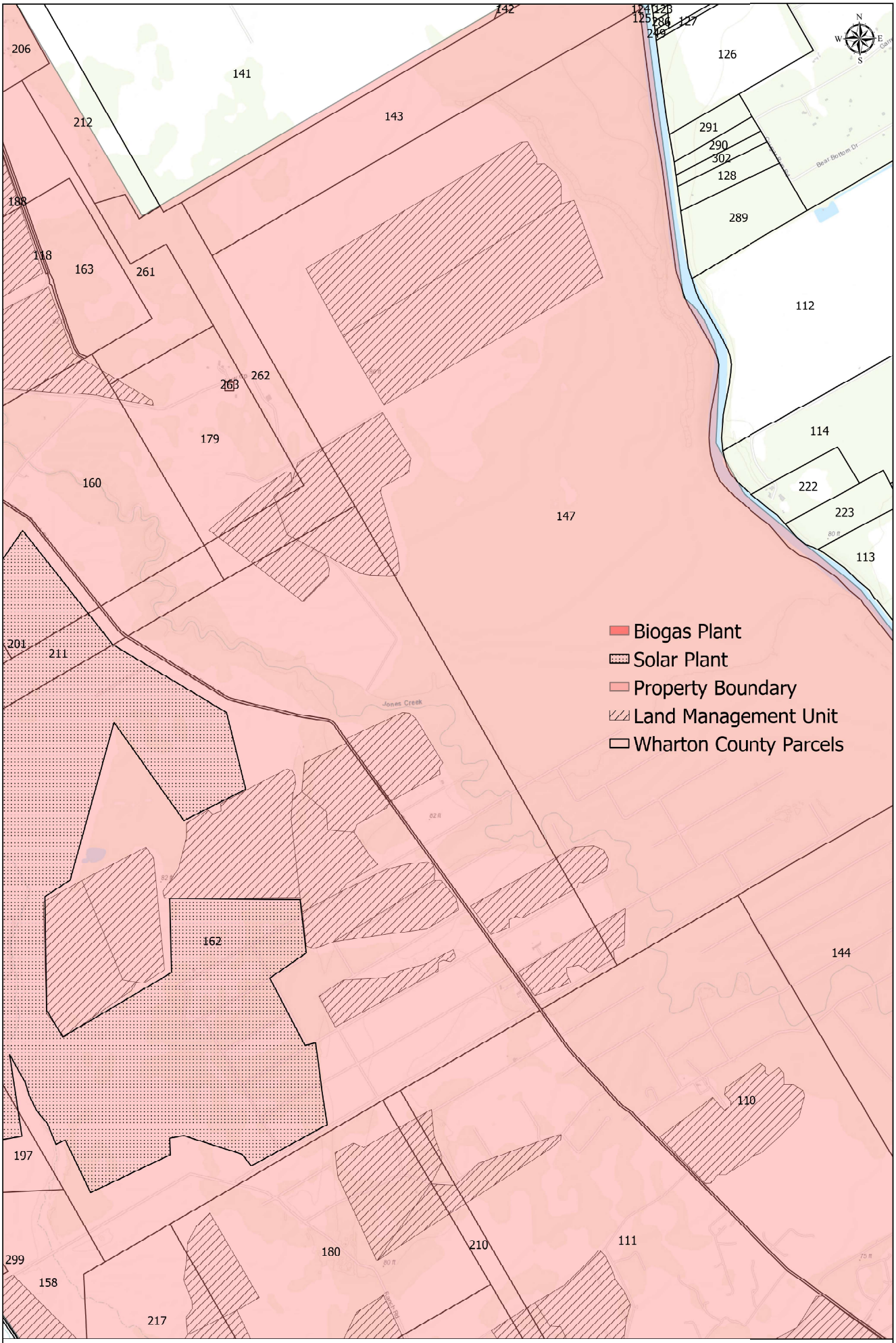


Affected Landowners Map
Segment 3

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

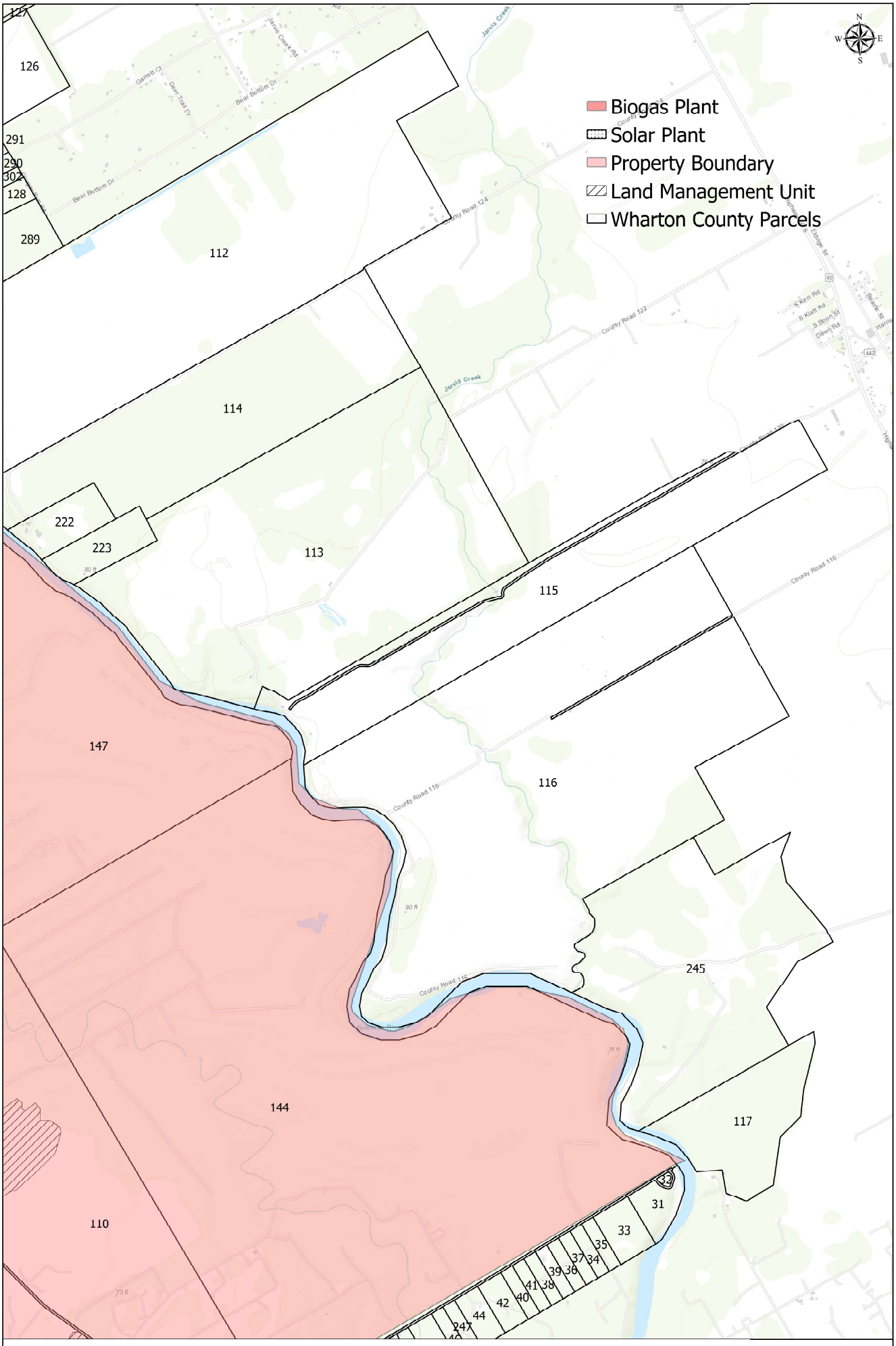

Biogas Plant
Solar Plant
Property Boundary
Land Management Unit
Wharton County Parcels
Affected Landowners Map
Segment 4
0 1,000 2,000 4,000 Feet
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 5

0 1,000 2,000 4,000 Feet

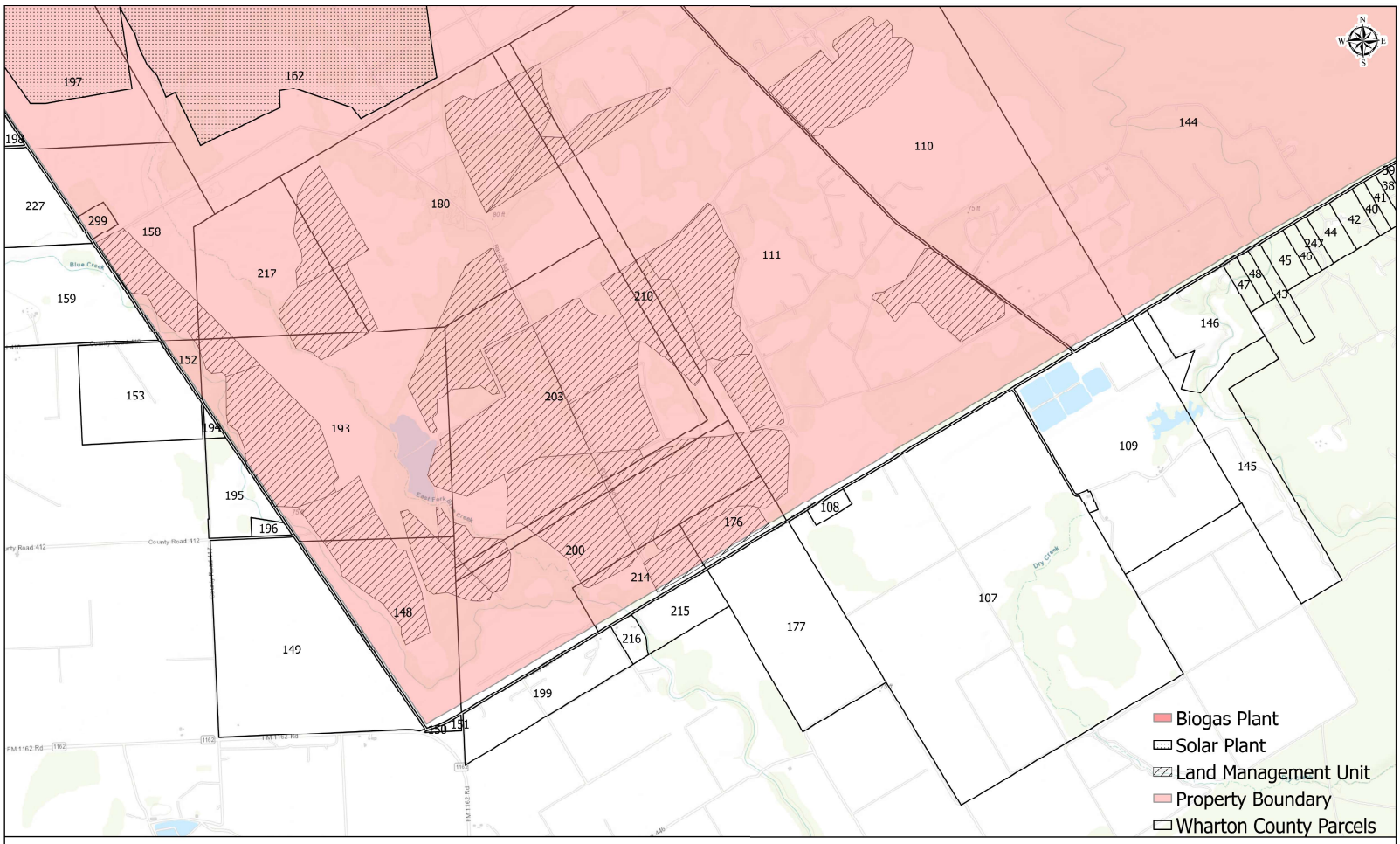
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 6

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 7

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
1	Wharton	15961	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
2	Wharton	17158	BECKER ALVIE D ETUX LAURA J	174 GREENDALE RD	WHARTON	TX	77488
3	Wharton	17159	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
4	Wharton	17160	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
5	Wharton	17161	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
6	Wharton	17166	DORNAK KEITH A	719 WILDERNESS TRL	WHARTON	TX	77488
7	Wharton	17167	PEREZ ANTHONY SR	223 SHIMEK	EL CAMPO	TX	77437
8	Wharton	17168	MCDOUGALL RUSSELL ETUX NANETTE	353 WILDERNESS TRL	WHARTON	TX	77488
9	Wharton	17170	KING LINDA	439 Wilderness Trl	Wharton	TX	77488
10	Wharton	17172	SODERQUIST MICHELLE JANSKY	477 WILDERNESS TRAIL	WHARTON	TX	77488
11	Wharton	17173	CORTES ROLANDO & MARTINEZ ESMERALDA	614 MURPHY	WHARTON	TX	77488
12	Wharton	17174	DEITERICH FRANCES LIFE ESTATE	529 WILDERNESS TRL	WHARTON	TX	77488
13	Wharton	17175	DEITERICH FRANCES LIFE ESTATE	529 WILDERNESS TRL	WHARTON	TX	77488
14	Wharton	17181	ESCAMILLA CHRISSIE M	593 WILDERNESS TRL	WHARTON	TX	77488
15	Wharton	17182	NJOKU LASANDRA	950 BOROS DRIVE	HOUSTON	TX	77024
16	Wharton	17183	CASAREZ ANTONIO	1605 AMBER	EL CAMPO	TX	77437
17	Wharton	17184	SALEM ABDEL	10001 Six Pines Dr	The Woodlands	TX	77380
18	Wharton	17185	ANZALDUA PAUL D	899 WILDERNESS TRAIL	WHARTON	TX	77488
19	Wharton	17202	OKEWUNMI JOHN & KIM	PO BOX 118	ROSHARON	TX	77583
20	Wharton	17207	BOYD CARL A III & KAILA N	586 FORREST LAWN	WHARTON	TX	77488
21	Wharton	17214	SMITH ANTHONY A	552 FORREST LAWN	WHARTON	TX	77488
22	Wharton	17216	Palacios Richard JR & Yvonna	522 Forrest Lawn	Wharton	TX	77488
23	Wharton	17222	WHARTON COUNTY	PO BOX 189	WHARTON	TX	77488
24	Wharton	17223	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
25	Wharton	17223	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
26	Wharton	17227	TRUJILLO SONIA	1502 ENCLAVE PKWY APT 205	HOUSTON	TX	77077
27	Wharton	17228	HOFFMANN PAUL LIFE EST	595 FORREST LAWN	WHARTON	TX	77488
28	Wharton	17229	PALACIOS GILBERT	594 FORREST LAWN RD	WHARTON	TX	77488
29	Wharton	17232	GUERRERO JESUS A ETUX ODETTE	304 OAK POND DR	MANVEL	TX	77578
30	Wharton	17233	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
31	Wharton	17320	LCRA	PO BOX 220	AUSTIN	TX	78767

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
32	Wharton	17320	LCRA	PO BOX 220	AUSTIN	TX	78767
33	Wharton	17323	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
34	Wharton	17325	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
35	Wharton	17327	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
36	Wharton	17329	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
37	Wharton	17331	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
38	Wharton	17333	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
39	Wharton	17335	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
40	Wharton	17337	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
41	Wharton	17339	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
42	Wharton	17341	CAPLIN LLC	4017 MOUNTAIN SHADOW PLACE	RAPID CITY	SD	57702
43	Wharton	17347	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
44	Wharton	17359	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
45	Wharton	17361	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
46	Wharton	17363	HANCOCK JOE BRUCE ETAL	PO BOX 190	EL CAMPO	TX	77437
47	Wharton	17364	LABELLE PROPERTIES LTD	PO BOX 3111	BEAUMONT	TX	77704
48	Wharton	17366	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
49	Wharton	18520	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
50	Wharton	18526	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
51	Wharton	18588	City of Wharton	120 E. Caney	Wharton	TX	77488
52	Wharton	18589	City of Wharton	120 E. Caney	Wharton	TX	77488
53	Wharton	18696	GARCIA EVA RODRIGUEZ	PO BOX 785	WHARTON	TX	77488
54	Wharton	18699	WHARTON CITY OF	PO BOX 311507	NEW BRAUNFELS	TX	78131
55	Wharton	20858	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
56	Wharton	22167	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
57	Wharton	22168	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
58	Wharton	22169	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
59	Wharton	22170	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
60	Wharton	22171	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
61	Wharton	22172	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
62	Wharton	22173	BAUER COLLEEN	5587 BRIGHT TIMBER LANDING DR	SPRING	TX	77386
63	Wharton	22174	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
64	Wharton	22175	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
65	Wharton	22176	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
66	Wharton	22177	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
67	Wharton	22178	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
68	Wharton	22183	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
69	Wharton	22184	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
70	Wharton	22187	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
71	Wharton	22188	GODSEY W R & WF	2127 SPUR TRL	GRAPEVINE	TX	76051
72	Wharton	22189	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
73	Wharton	22190	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
74	Wharton	22191	PIERCE STATION ANTIQUES LLC	PO BOX 501	PIERCE	TX	77467
75	Wharton	22193	TEXAS STATE OF		AUSTIN	TX	78768
76	Wharton	22204	TEXAS STATE OF		AUSTIN	TX	78768
77	Wharton	22207	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
78	Wharton	22210	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
79	Wharton	22218	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
80	Wharton	22223	ACADEMY SQUARE (PIERCE)		PIERCE	TX	77467
81	Wharton	22224	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
82	Wharton	22826	MEHRENS NANCY KAINER & MEHRENS DAVID RAY	1316 FM 1299	WHARTON	TX	77488
83	Wharton	22829	MEHRENS NANCY KAINER	1316 FM 1299	WHARTON	TX	77488
84	Wharton	22830	MATHEWS DARREN R ETUX KIMBERLY D	1318 FM 1299	WHARTON	TX	77488
85	Wharton	22831	Bruton Nelson	1400 FM 1299 RD	Wharton	TX	77488
86	Wharton	22832	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
87	Wharton	22833	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
88	Wharton	22834	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
89	Wharton	22835	JURASEK RUSSELL A ETUX JACQUELIN	1500 FM 1299	WHARTON	TX	77488
90	Wharton	22837	MAYNARD RANDALL C	2100 FM 1299 RD	WHARTON	TX	77488
91	Wharton	23653	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
92	Wharton	23702	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
93	Wharton	23703	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
94	Wharton	23704	WHARTON CITY	120 E CANEY	WHARTON	TX	77488

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
95	Wharton	23705	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
96	Wharton	23706	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
97	Wharton	23707	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
98	Wharton	23708	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
99	Wharton	23709	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
100	Wharton	23710	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
101	Wharton	23711	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
102	Wharton	23712	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
103	Wharton	26694	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
104	Wharton	26697	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
105	Wharton	26755	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
106	Wharton	28404	VOULGARIS MICHAEL D	404 PRICE DR	WHARTON	TX	77488
107	Wharton	28644	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
108	Wharton	28648	HEIMANN GARY W	2172 CR 444 RD	EL CAMPO	TX	77437
109	Wharton	28650	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
110	Wharton	28657	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
111	Wharton	28658	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
112	Wharton	28664	KOSCLSKSIE BARBARA B ETAL	PO BOX 331	BROOKSHIRE	TX	77423
113	Wharton	28676	HAWES BARBARA LOUISE TRUST DATED 8-17-81	PO BOX 686	WHARTON	TX	77488
114	Wharton	28705	KOSCLSKIE BARBARA B ETAL	PO BOX 331	BROOKSHIRE	TX	77423
115	Wharton	28716	LCRA	PO BOX 220	AUSTIN	TX	78767
116	Wharton	28750	LCRA	PO BOX 220	AUSTIN	TX	78767
117	Wharton	28775	SCHMIDT RICHARD E	PO BOX 784	EL CAMPO	TX	77437
118	Wharton	29621	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
119	Wharton	29621	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
120	Wharton	29637	BEARD LONNIE F FAMILY TRUST	2106 NANCY LOU	EL CAMPO	TX	77437
121	Wharton	29671	KRESTA KEITH A & SARA	2394 FM 961 RD	WHARTON	TX	77488
122	Wharton	29688	MCMILLAN BARBARA A & MCMILLAN SHERRY L	2622 HAVERHILL DR	HOUSTON	TX	77008
123	Wharton	30295	MCELVEEN JOAN	3983 FM 1735	MT PLEASANT	TX	75455

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
124	Wharton	30305	JOINES JON ETUX BLANCHE; JOINES CLINT J	1628 CR 235	WHARTON	TX	77488
125	Wharton	30308	DUSEK DOUGLAS ETUX LORRAINE	PO BOX 733	WHARTON	TX	77488
126	Wharton	30315	WHARTON TURF GRASS INC	PO BOX 1029	WHARTON	TX	77488
127	Wharton	30316	WHARTON TURF GRASS INC	PO BOX 1029	WHARTON	TX	77488
128	Wharton	30319	Brown Douglas I	6570 Cougar Crossing	Wharton	TX	77488
129	Wharton	31204	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
130	Wharton	31245	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
131	Wharton	31735	CENTERPOINT ENERGY HOUSTON ELECTRIC	PO BOX 1475	HOUSTON	TX	77251
132	Wharton	31737	MAYNARD RANDALL	2100 FM 1299 RD	WHARTON	TX	77488
133	Wharton	31738	TEXAS STATE OF		AUSTIN	TX	78768
134	Wharton	31741	HOUSTON PIPE LINE CO	PO BOX 660164	DALLAS	TX	75266
135	Wharton	31835	DUSEK DOUGLAS ETUX LORRAINE	PO BOX 733	WHARTON	TX	77488
136	Wharton	32244	BOWERS N A EST	5426 CANDLE CREST	HOUSTON	TX	77091
137	Wharton	32247	BOWERS N A EST	5426 CANDLE CREST DR	HOUSTON	TX	77091
138	Wharton	32896	DAVIS CHARLES A JR	PO BOX 1029	WHARTON	TX	77488
139	Wharton	32897	WHARTON COUNTY EASEMENTS	309 E MILAM #600	WHARTON	TX	77488
140	Wharton	32908	HORTON JM RANCH LLC	11744 SKENE WAY	HOUSTON	TX	77024
141	Wharton	33103	BOETTCHER & QUIREY	PO BOX 384	EAST BERNARD	TX	77435
142	Wharton	33107	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
143	Wharton	33108	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
144	Wharton	33243	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
145	Wharton	33244	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
146	Wharton	33245	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
147	Wharton	35151	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
148	Wharton	36126	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
149	Wharton	36128	SCHOENFIELD GARY & JEANETTE	3181 CR 405 RD	EL CAMPO	TX	77437
150	Wharton	36129	KNIPLING RICHARD F	PO BOX 309	RICHMOND	TX	77469
151	Wharton	36130	WILLIS BROTHERS	PO BOX 271	EL CAMPO	TX	77437
152	Wharton	36213	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
153	Wharton	36214	STAVINOHA ELSIE FAMILY TRUST	PO BOX 1145	EL CAMPO	TX	77437
154	Wharton	36542	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
155	Wharton	36545	ZALMAN JASON A ETUX TISHA M	191 WESTMOOR RD	EL CAMPO	TX	77437
156	Wharton	36839	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
157	Wharton	36841	SHAFER FAMILY FARMS LLC	PO BOX 7602	HORSESHOE BAY	TX	78657
158	Wharton	36850	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
159	Wharton	36856	COX PATSY R FAMILY LTD PTRNSHIP	1509 MICHAEL	EL CAMPO	TX	77437
160	Wharton	37000	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
161	Wharton	37003	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
162	Wharton	37108	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
163	Wharton	37286	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
164	Wharton	37624	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
165	Wharton	37626	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
166	Wharton	37684	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
167	Wharton	37701	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
168	Wharton	37725	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
169	Wharton	37725	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
170	Wharton	37729	HACKER WILLIAM	305 CR 409 RD	EL CAMPO	TX	77437
171	Wharton	37881	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
172	Wharton	37884	ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP	191 WESTMOOR RD	EL CAMPO	TX	77437
173	Wharton	40462	ROD MARVIN J	118 DOGWOOD	LAKE JACKSON	TX	77566
174	Wharton	40463	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
175	Wharton	40465	THOMPSON KEVIN DALE & WF	623 CR 465 RD	EL CAMPO	TX	77437
176	Wharton	40701	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
177	Wharton	40702	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
178	Wharton	40809	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
179	Wharton	40999	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
180	Wharton	41076	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
181	Wharton	41110	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
182	Wharton	41142	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
183	Wharton	41143	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
184	Wharton	41166	WILBECK M P LLC	205 SILVER SADDLE DR	ANGLETON	TX	77515

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
185	Wharton	41178	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
186	Wharton	41179	Z & B PTNRSHIP	1306 AVE K	EL CAMPO	TX	77437
187	Wharton	41181	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
188	Wharton	41325	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
189	Wharton	41548	SWANSON LINDA S	15214 FALL PLACE DR	SAN ANTONIO	TX	78247
190	Wharton	41550	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
191	Wharton	41552	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
192	Wharton	41554	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
193	Wharton	42473	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
194	Wharton	42474	STAVINOHA ELSIE FAMILY TRUST	PO BOX 1145	EL CAMPO	TX	77437
195	Wharton	42476	GANGL JAMES ALLEN	4154 FM 1163 RD	EL CAMPO	TX	77437
196	Wharton	42478	GANGL JAMES ALLEN	4154 FM 1163 RD	EL CAMPO	TX	77437
197	Wharton	42833	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
198	Wharton	42834	SHAFER FAMILY FARMS LLC	PO BOX 7602	HORSESHOE BAY	TX	78657
199	Wharton	43495	KOPECKY ANNA J EST	8427 TAVENOR LN	HOUSTON	TX	77075
200	Wharton	43508	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
201	Wharton	43589	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
202	Wharton	43591	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
203	Wharton	43592	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
204	Wharton	43866	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
205	Wharton	43869	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
206	Wharton	43869	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
207	Wharton	43870	BEARD LONNIE F FAMILY TRUST	2106 NANCY LOU	EL CAMPO	TX	77437
208	Wharton	43942	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
209	Wharton	44320	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
210	Wharton	44361	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
211	Wharton	44362	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
212	Wharton	44394	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
213	Wharton	44396	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
214	Wharton	44462	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
215	Wharton	44463	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
216	Wharton	44465	BARTA WALTER	11726 MIGHTY REDWOOD DR	HOUSTON	TX	77059
217	Wharton	44523	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
218	Wharton	50230	BOEDEKER RONALD D ETUX SHARON H	120 CR 133 RD	WHARTON	TX	77488
219	Wharton	50516	KOEHN KENNETH & ALICE	559 WILDERNESS TRL	WHARTON	TX	77488
220	Wharton	50517	KOEHN KENNETH & ALICE	559 WILDERNESS TRL	WHARTON	TX	77488
221	Wharton	50669	DESIGN SUPERVISION ANALYSIS INC	5201 GARY RD	COLLEGE STATION	TX	77845
222	Wharton	51465	PRATKA MARK C ETUX KAY	PO BOX 1596	EL CAMPO	TX	77437
223	Wharton	51466	PRATKA MARK C ETUX KAY	PO BOX 1596	EL CAMPO	TX	77437
224	Wharton	51670	DEITERICH FRANCES M	529 WILDERNESS TRL	WHARTON	TX	77488
225	Wharton	52260	GARCIA HIGNIO ETAL	2800 CR 463	EL CAMPO	TX	77437
226	Wharton	52351	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
227	Wharton	52878	POPP CEDRIC E	4612 CR 410 RD	EL CAMPO	TX	77437
228	Wharton	55331	BARTOS VLASTA KOCUREK	PO BOX 542	EL CAMPO	TX	77437
229	Wharton	55332	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
230	Wharton	55352	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
231	Wharton	55353	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
232	Wharton	55354	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
233	Wharton	55356	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
234	Wharton	55485	ROD MARVIN J	118 DOGWOOD	LAKE JACKSON	TX	77566
235	Wharton	55487	HANSEN AUDREY A	7431 FM 1095	PALACIOS	TX	77465
236	Wharton	56184	PENDRAY JANE K THORNBURG	1448 CR 428 RD	WHARTON	TX	77488
237	Wharton	56956	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
238	Wharton	59209	F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP	415 FM 2817 RD	WHARTON	TX	77488
239	Wharton	59209	F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP	415 FM 2817 RD	WHARTON	TX	77488
240	Wharton	59308	JURASEK RUSSELL A ETUX JACQUELIN	1500 FM 1299	WHARTON	TX	77488
241	Wharton	60121	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
242	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
243	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
244	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
245	Wharton	60566	D C V K LTD PRTNSHIP	580 MAXIM DR	BOLING	TX	77420
246	Wharton	60806	ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP	191 WESTMOOR RD	EL CAMPO	TX	77437

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
247	Wharton	61231	STUCKENSCHNEIDER TAMMY, HUNN EVELYN AND JETT ERVIN	PO BOX 67	MARTINSBURG	MO	65264
248	Wharton	61558	KAINER KATHRYN LIFE EST	411 AVE J	EL CAMPO	TX	77437
249	Wharton	61691	CJJ RETIREMENT LLC	1110 SUNSET ROAD	ROSHARON	TX	77583
250	Wharton	62297	JOINES JON ETUX BLANCHE	1628 CR 235	WHARTON	TX	77488
251	Wharton	62436	HORTON JM RANCH LLC	11744 SKENE WAY	HOUSTON	TX	77024
252	Wharton	62494	MAREK TRAVIS L	821 CR 123 RD	WHARTON	TX	77488
253	Wharton	62495	MAREK TERENCE D	3079 W EMBERS CT	BRYAN	TX	77808
254	Wharton	62496	MAREK THOMAS E	283 DELLA	EL CAMPO	TX	77437
255	Wharton	62497	WHEELER DEBRA G	5 TORRINGTON CT	AUSTIN	TX	78738
256	Wharton	62932	SCHULZ THERESA & GOTTFRIED O	2299 LONE STAR DR APT 515	SUGAR LAND	TX	77479
257	Wharton	62995	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
258	Wharton	62995	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
259	Wharton	68875	RUST LLOYD FAMILY LMT PRNSHP & RUST TM FAMILY LLC	PO BOX 1027	WHARTON	TX	77488
260	Wharton	69231	RACHUNEK KENNETH G	2123 FM 1299 RD	WHARTON	TX	77488
261	Wharton	69264	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
262	Wharton	69265	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
263	Wharton	69588	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
264	Wharton	70014	OTTO DIANNE	801 PECAN ST	WHARTON	TX	77488
265	Wharton	70201	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
266	Wharton	71262	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
267	Wharton	71263	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
268	Wharton	71264	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
269	Wharton	71265	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
270	Wharton	71266	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
271	Wharton	71267	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
272	Wharton	71268	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
273	Wharton	71269	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
274	Wharton	71270	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
275	Wharton	71271	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
276	Wharton	71875	MEZA RAFAEL & SUSANA	379 CR 456	EL CAMPO	TX	77437
277	Wharton	71959	WHARTON CITY	120 E CANEY	WHARTON	TX	77488

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
278	Wharton	72487	RACHUNEK TIMOTHY J & LAURIANNE ETAL	710 CR 128	WHARTON	TX	77488
279	Wharton	72914	ATTAWAY KIP RAY	24703 HARBOR TERRACE LN	RICHMOND	TX	77406
280	Wharton	72926	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
281	Wharton	72927	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
282	Wharton	72928	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
283	Wharton	72929	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
284	Wharton	72936	MATULA JULIUS & MARY FAMILY TRUST	674 CR 428 RD	WHARTON	TX	77488
285	Wharton	73712	HAWES HUGH R IV & CHRISTOPHER T TRUST	PO BOX 538	PIERCE	TX	77467
286	Wharton	73754	KAINER KATHRYN LIFE EST	411 AVE J	EL CAMPO	TX	77437
287	Wharton	74196	GAVRANOVIC F & D FARMS FLP	415 FM 2817 RD	WHARTON	TX	77488
288	Wharton	74283	BACCAM TOM N	19014 TEBROC CT	HOUSTON	TX	77094
289	Wharton	75617	J & D RIVER VIEW RANCH LLC	8003 ASH VALLEY DR	SPRING	TX	77379
290	Wharton	75852	BROWN DAVID OTIS & MARY JANE LIFE ESTATE	6420 COUGAR CROSSING	WHARTON	TX	77488
291	Wharton	75853	BROWN DAVID OTIS & MARY JANE LIFE ESTATE	6420 COUGAR CROSSING	WHARTON	TX	77488
292	Wharton	77755	JOHNSON CLINE III & CHRISTINE	854 County Road 402	El Campo	TX	77437
293	Wharton	77756	KOCUREK JOSEPH A & DANA	2440 CR 421	EL CAMPO	TX	77437
294	Wharton	77970	Z & B PTNRSHIP	1306 AVE K	EL CAMPO	TX	77437
295	Wharton	78574	KOCUREK PHILIP ETUX BRAND LAURA	1104 COUNTY ROAD 421	EL CAMPO	TX	77437
296	Wharton	78575	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
297	Wharton	78611	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
298	Wharton	78776	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
299	Wharton	79625	AEP TEXAS INC	PO BOX 16428	COLUMBUS	OH	43216
300	Wharton	80627	STATE OF TEXAS	125 E 11TH ST	AUSTIN	TX	78701
301	Wharton	17169	CONFIDENTIAL OWNER	399 WILDERNESS TRL	WHARTON	TX	77488
302	Wharton	81398	Brown Douglas I	6570 COUGAR CROSSING	WHARTON	TX	77488

PHOTOGRAPH

Photograph Location Map

The Photograph Location Map shows the location of each photograph and the direction the camera was facing when the photograph was taken.

Photograph Location Map



Pierce, Texas Wharton County Wharton AD1, LLC	Photograph Location Map	ENVIROENGINEER ENGINEERING CONSULTING

Texas Land Application Permit (TLAP)
Technical Package

Prepared on: December 17th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

LIST OF FIGURES…….....i
LIST OF TABLES……i
T.A: FACILITY MAPS……1
T.B: FLOODPLAIN INFORMATION……8
T.C: AGRONOMIC MANAGEMENT PLAN……..11
T.D: WATER WELL INFORMATION……..13
T.E: GROUNDWATER TECHNICAL REPORT……..16
T.F: SOILS INFORMATION……18
T.G: ENGINEERING REPORT……19
T.H: OFF-SITE WASTES……..22
T.I: POLLUTANT ANALYSIS DATA……...……...23

LIST OF FIGURES

Figure T.A.1: Process Flow Diagram……...2
Figure T.A.2: Vicinity Map……..3
Figure T.A.3: 7.5 Minute USGS Map……..4
Figure T.A.4: Site Map……5
Figure T.A.5: Production Area Map……...10
Figure T.B.1: FEMA Floodplain Map……12
Figure T.D.1: Water Well Map……...15
Figure T.E.1: Geologic Atlas Map……17
Figure T.G.1: Water Balance Calculations……22
Figure T.G.2: Storage Calculations……23

LIST OF TABLES

Table T.D.1: Well and Map Information Table……..16

T.A: FACILITY MAPS

T.A.1 Process Flow Diagram

Figure 1, Process Flow Diagram, provides an overall schematic of the plant processes at the site.

T.A.2 Vicinity Map

Figure 2, Vicinity Map, is a general highway map showing the property and several adjacent properties in the area. The facility's location is depicted on the map.

T.A.3 7.5 Minute USGS Map

Figure 3, entitled 7.5 Minute USGS Map, is a seamless, high-quality copy of the 7.5 Minute USGS quadrangle map [Pierce TX quadrangle) that shows the boundary of the land owned, operated, or controlled by the facility and used as part of the application; and all springs, lakes, or ponds located on-site and within 1 mile of the property boundary.

T.A.4 Site Map

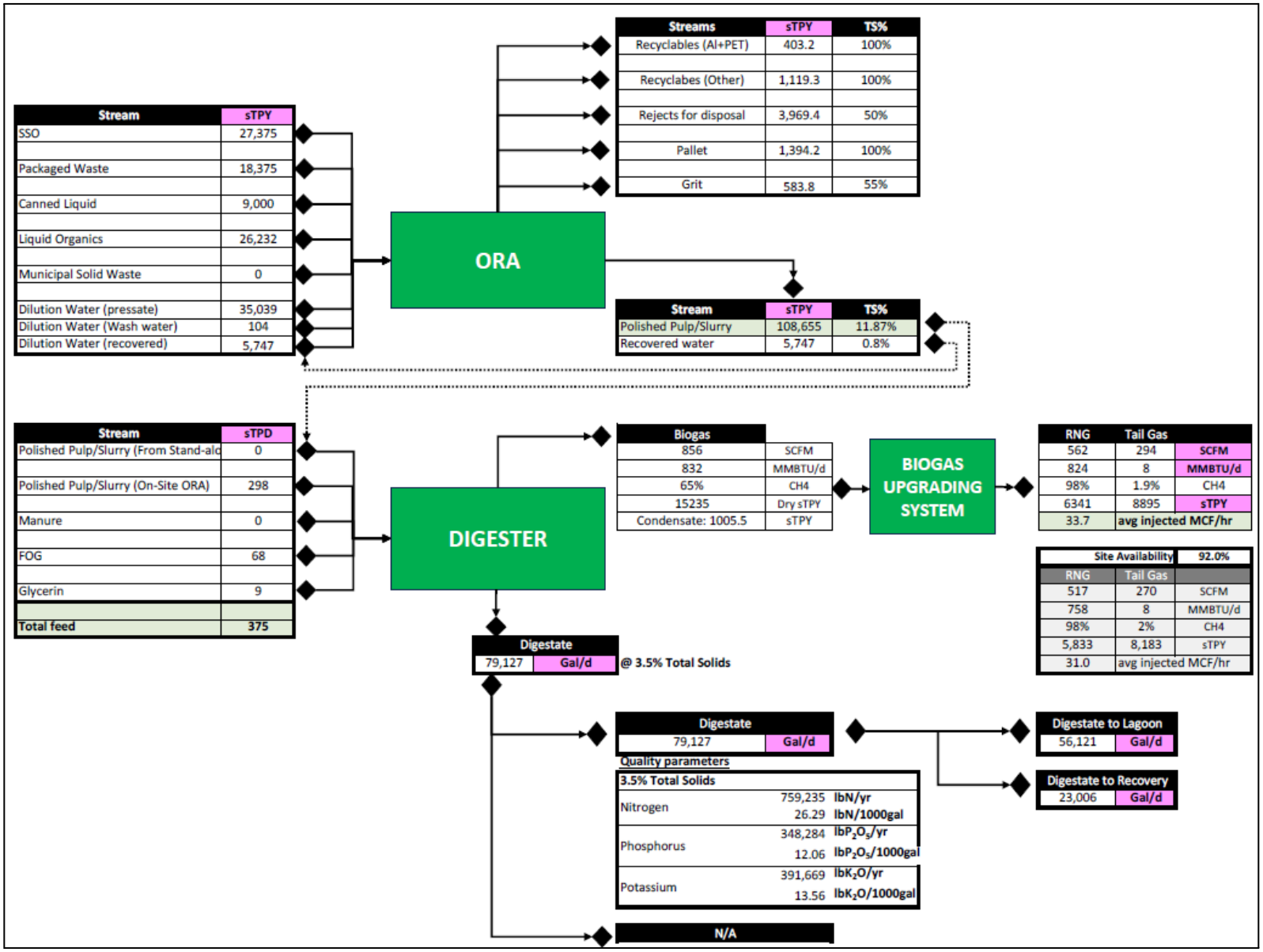
Figure 4, Site Map, is a scaled drawing of the entire property to be permitted showing the locations of the following:

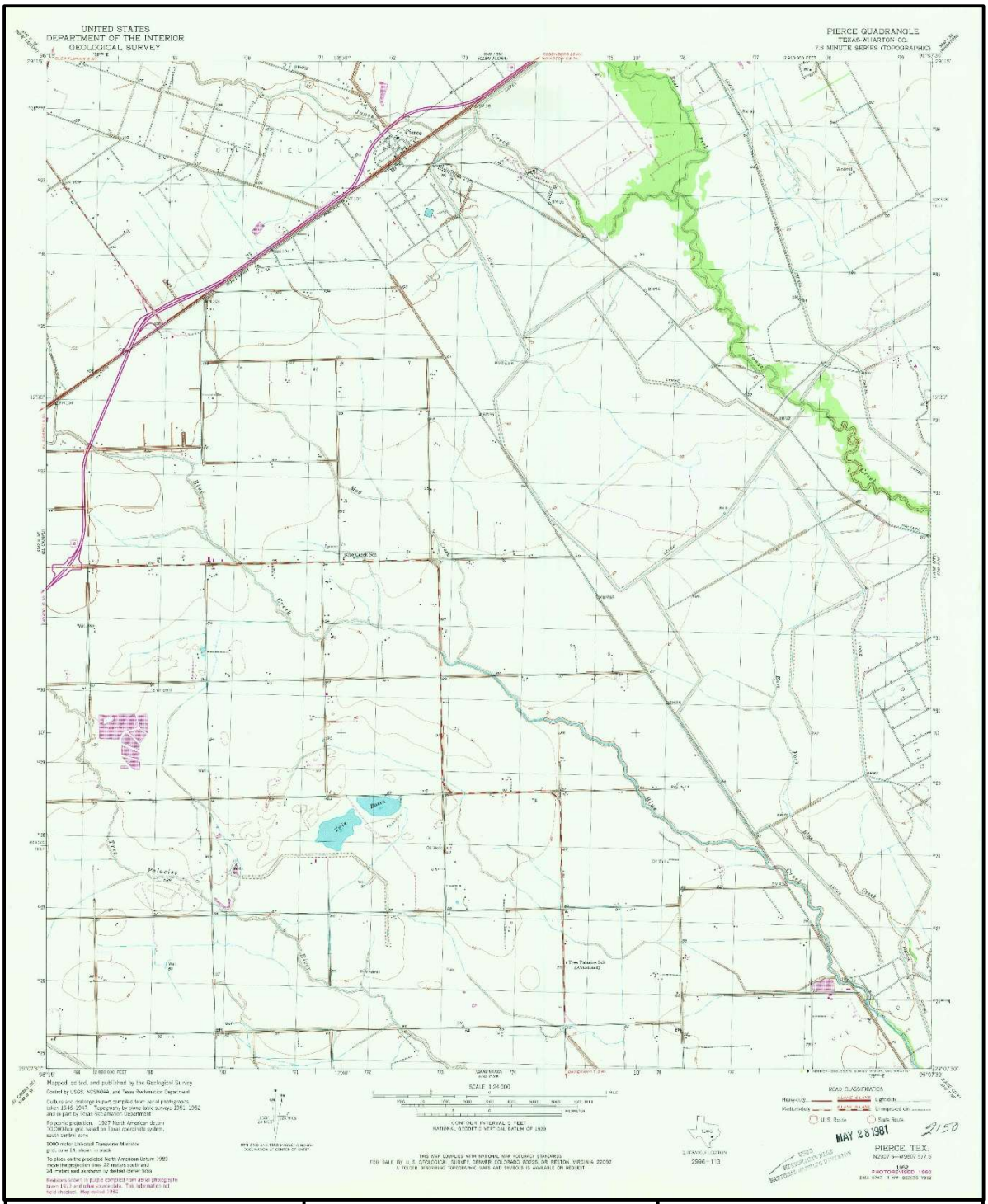
- Digesters
- Hydrolysis tanks
- Heat exchangers
- Transformers
- Containers
- Tank locations
- Loading and off-loading area

T.A.5 Production Area Map

Figure 5, Production Area Map, is a scaled drawing of the production area showing the locations of the digester tanks, organics receiving building, separator & nutrient management building, digestate storage pond, buffer tanks and RNG building

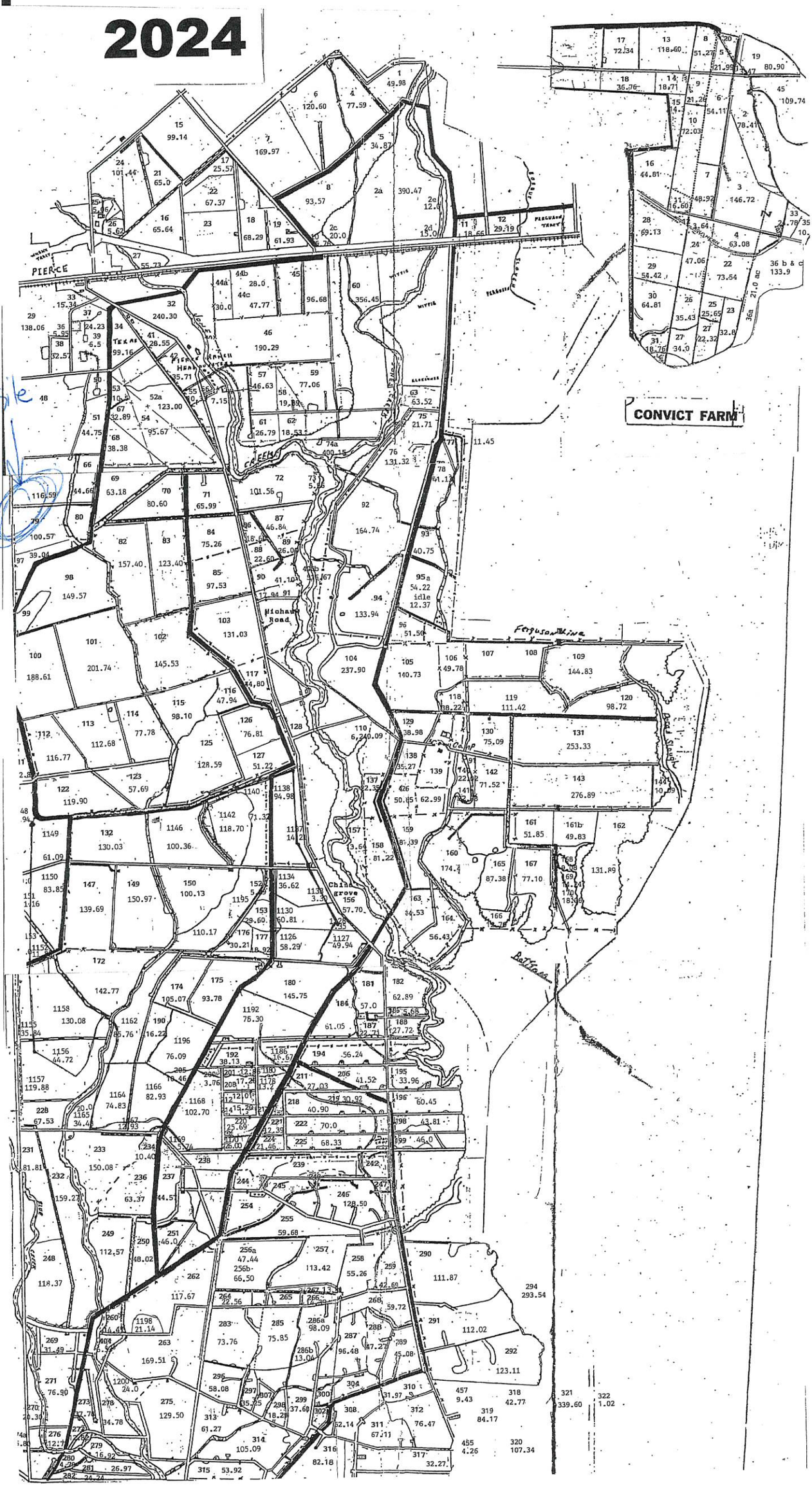
FigT.A.1PROCESS FLOW DIAGRAM

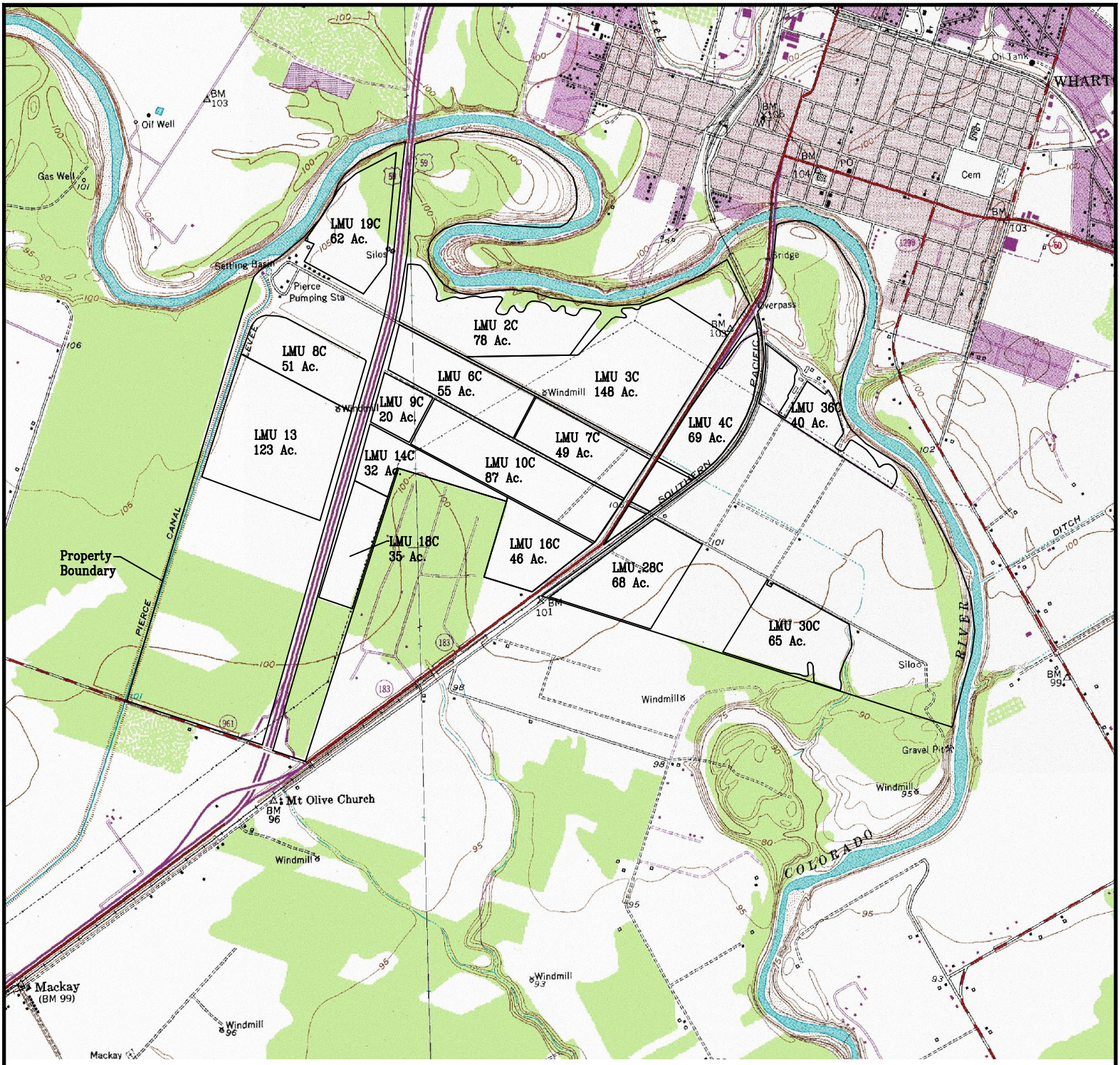




Pierce Ranch, GP Pierce, TX Wharton County	Vicinity Map Pg: 2	ENVIRONEER ENGINEERING CONSULTING

2024


PIERCE
CONVICT FARM
Richard Road
Ferguson Mine
China grove
Battleship



Map Generated 12/17/2024

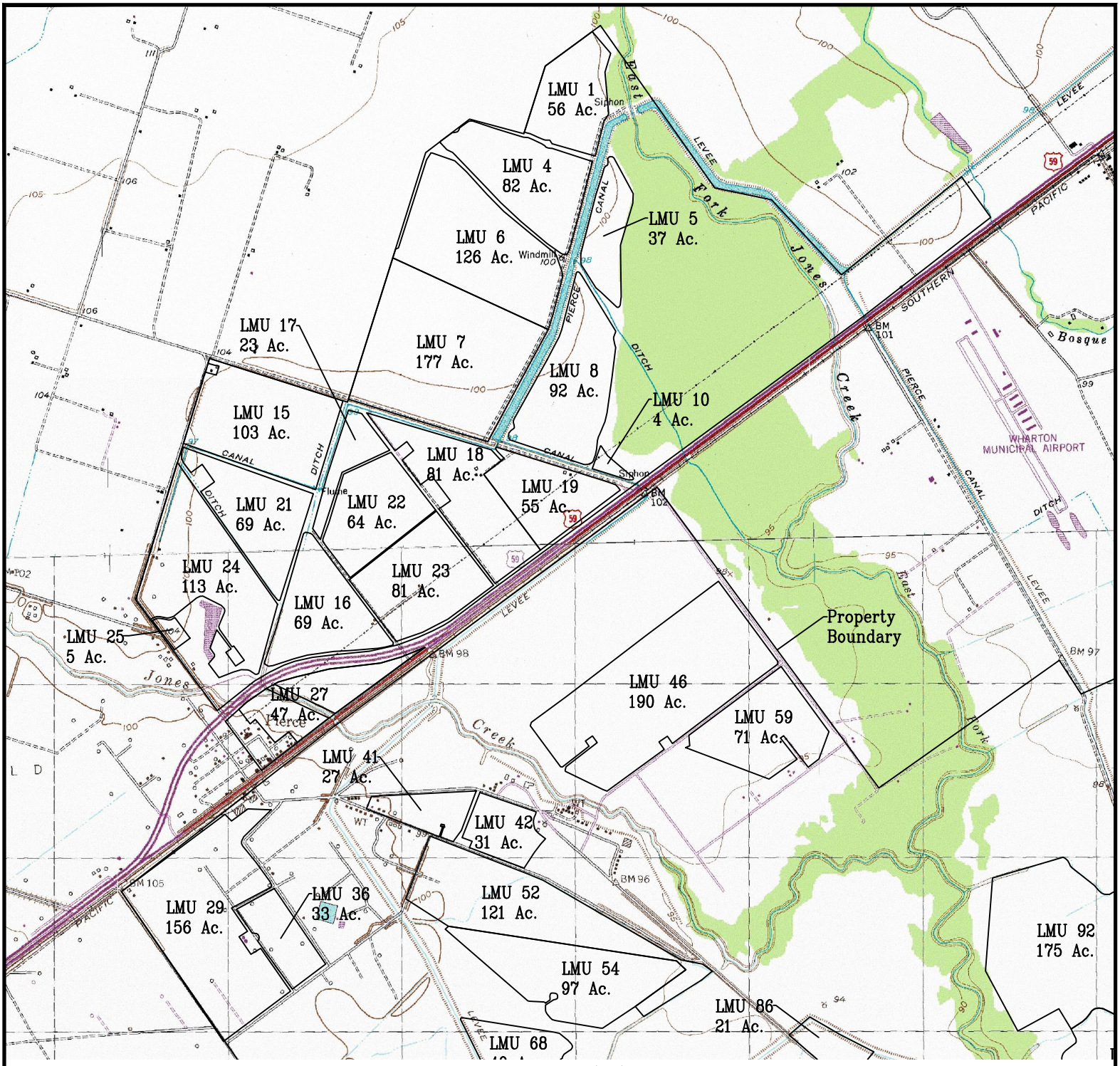
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map A Pg: 2	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

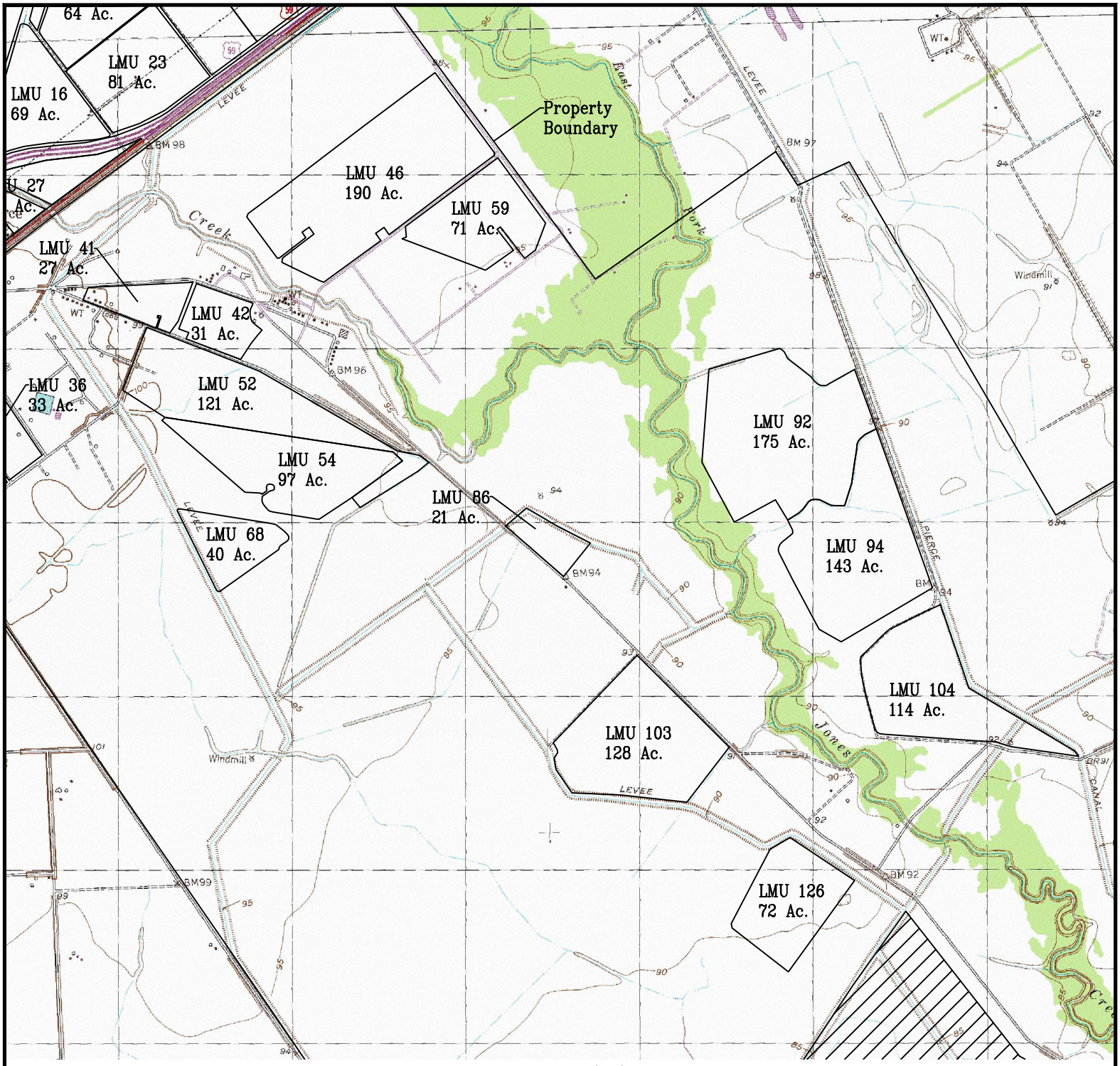
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map B Pg: 3	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

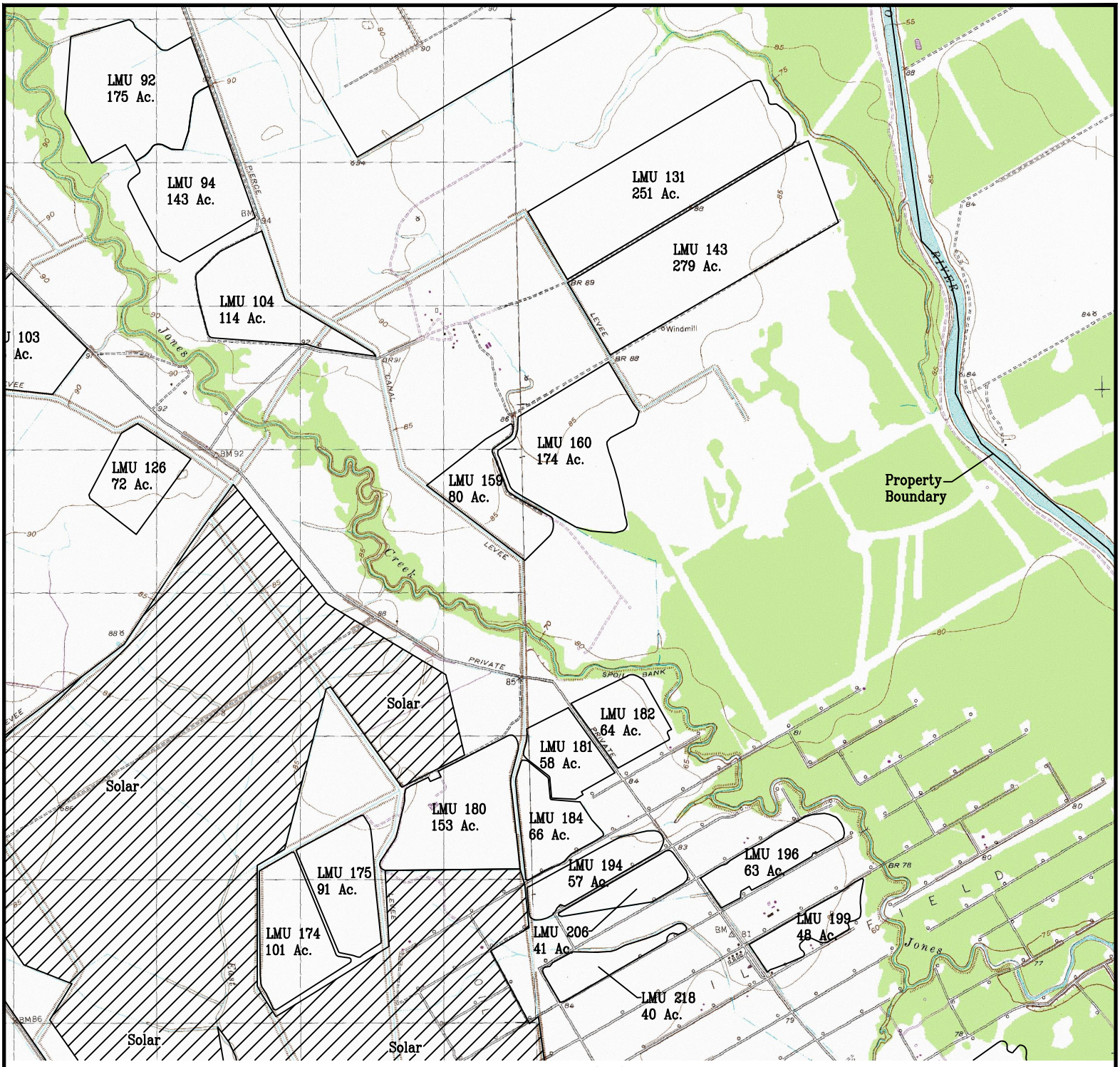
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map C Pg: 4	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

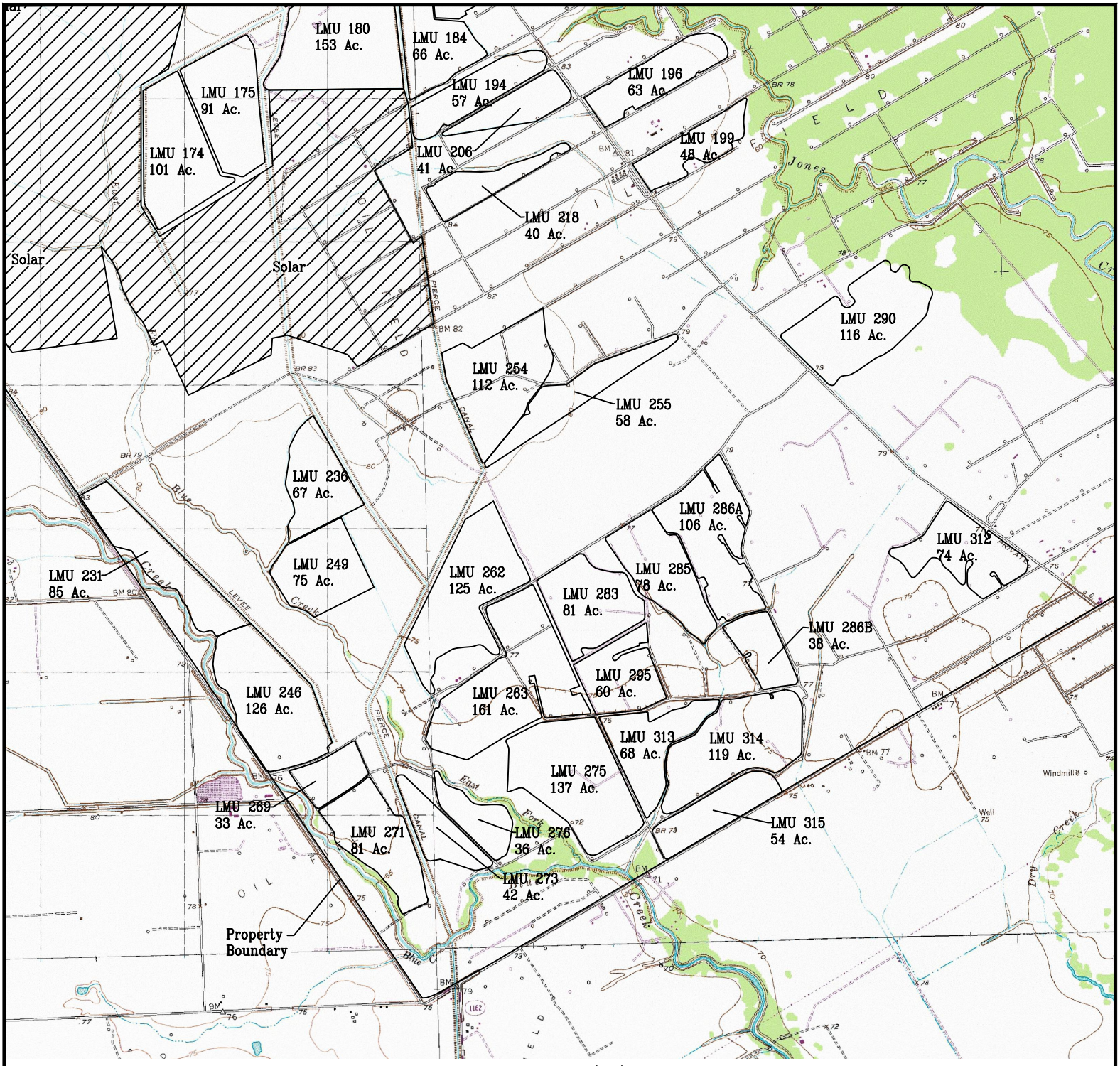
S

1600' 0 1600' 3200'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map D Pg: 5	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

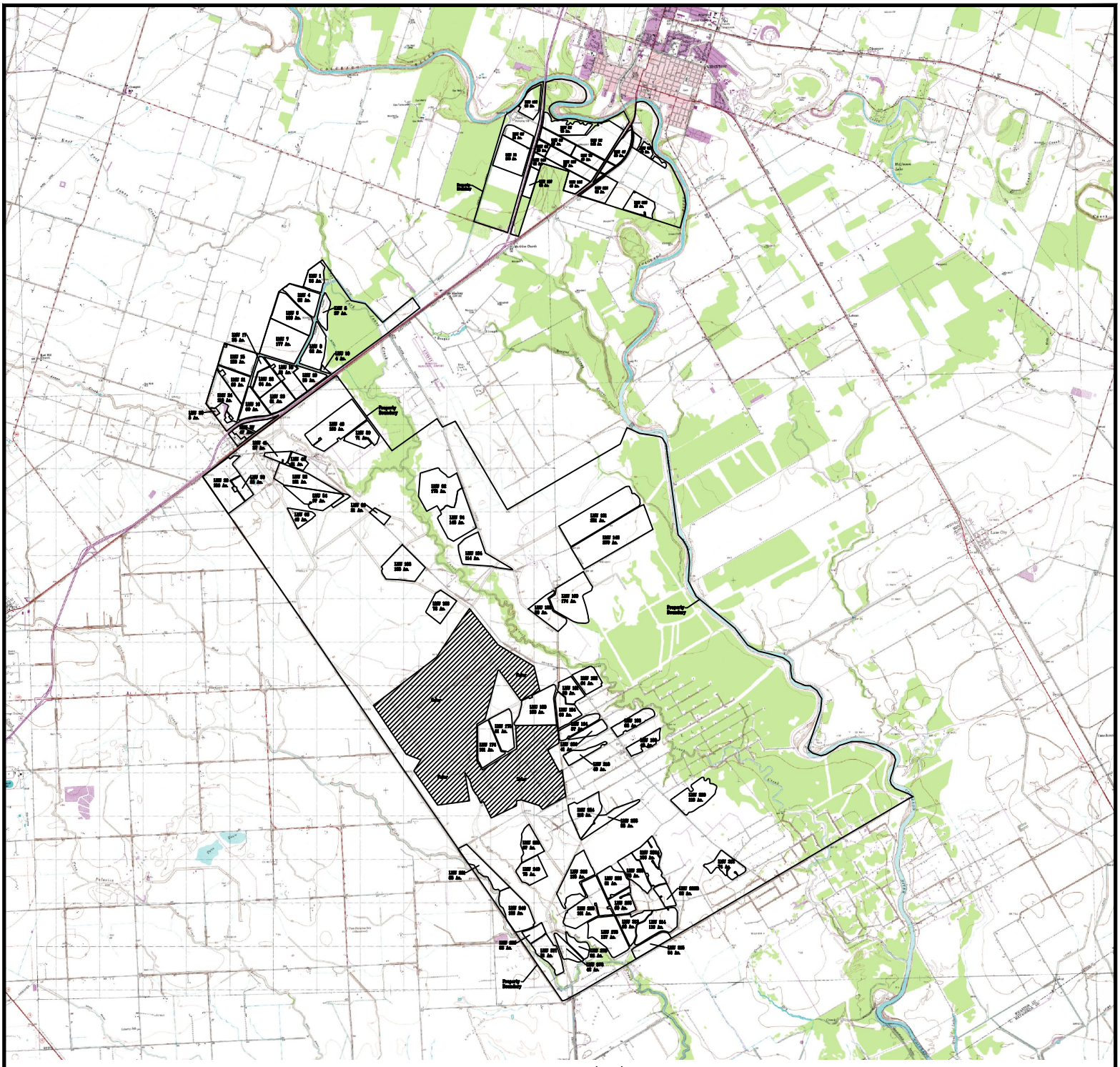
S

1600' 0 1600' 3200'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map E Pg: 6	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Production Area Map Pg: 7	ENVIRONEER ENGINEERING CONSULTING

T.B. FLOODPLAIN INFORMATION

FEMA Floodplain Map

Figure 6, FEMA Floodplain Map, shows the production areas and waste disposal areas overlain on a copy of the FEMA map panels for this area of Wharton County.

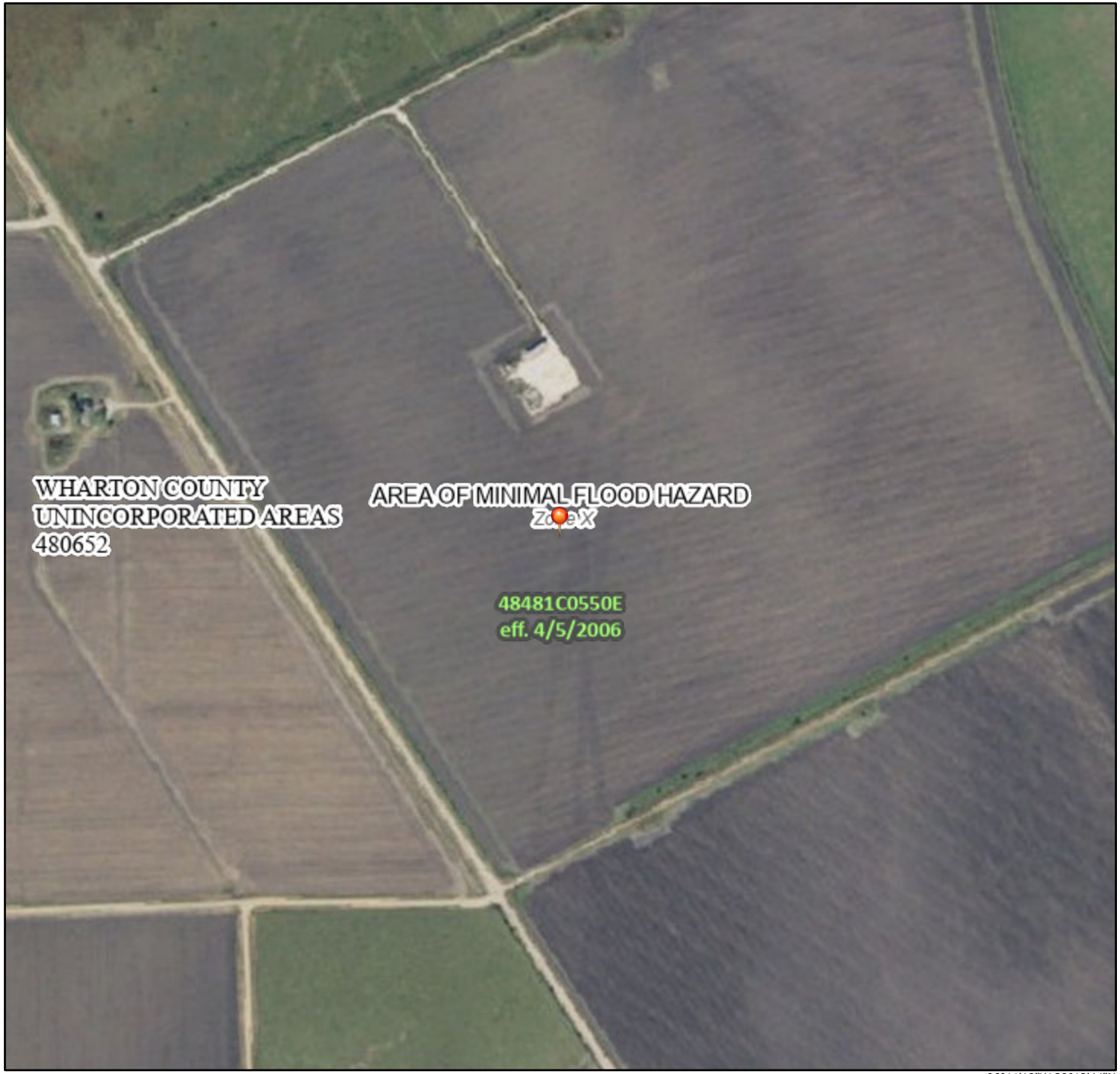
Protective Measures

According to the FEMA map for Wharton County, the production area and waste disposal areas are not located in a 100-year floodplain and are in an area of minimal flood hazard.

National Flood Hazard Layer FIRMette

FEMA

96°11'56"W 29°13'15"N



96°11'18"W 29°12'44"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Pg: 9 *Basemap Imagery Source: USGS National Map 2023*

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/16/2024 at 8:31 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

T.C. AGRONOMIC MANAGEMENT PLAN

TABLE OF CONTENTS

List of Figures

Figure 1: Land Application Map 3

List of Tables

Table 1: Estimated Soil Properties
Table 2: Nutrient Budgets

Attachment A - Permitted Crops for Growing 3

AGRONOMIC MANAGEMENT PLAN

Purpose

This document is in support of the Wharton AD1, LLC land application of wastes as prescribed by the Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). It is the purpose of this Agronomic Management Plan (AMP) to illustrate the beneficial use of the effluent from the proposed facility. All effluent application is managed in a manner that ensures environmental stability and maximum crop production.

This plan is updated on an annual basis to address current soil and waste analysis, climatic data, previous water demands, and proposed crop water usage for the next plan year. Application rate calculations will be developed and maintained on-site for use by the operator to determine application timing and rates.

Background

Wharton AD1, LLC is applying for a TLAP authorization through the TCEQ to beneficially irrigate effluent from the renewable energy facility located near Pierce, Wharton County, Texas. The treated effluent generated is 0.075 MGD. Effluent from the storage pond is land applied on 28,955 acres of irrigated farmland.

General Objectives of AMP

- Present information about the effluent, soils, and crops.
- Present information about crop rotations and yield goals to illustrate the appropriateness of the selected crops for use with this project.
- A description of effluent usage for land application. This will include information pertaining to actual application rates of effluent to meet the crop hydraulic/nutrient demands and maximize crop yield goals.
- An estimation of the annual loading of nutrients supplied by the effluent.
- An overview of wastewater/nutrient storage needed in the soil profile and a pre-plant scenario to serve as a starter fertilizer.
- Monitoring soil profiles to ensure no saturated soils are present within 3 feet of the surface.

Overview

The digestate is transferred to the storage lagoon at an average of 0.075 MGD. It is then distributed to high-production farmland that has been typically planted with corn grain and cotton. These crops are intensively managed for maximum production. The stated crop yield goals will be provided by data from the NRCS or from historical data obtained from the farmer.

Management practices are in place and used by the landowner to ensure maximized crop production. High residue crops are utilized, and deep tillage is necessary to maximize the ability of the soils to store and retain water, allowing for maximum root penetration.

All solids produced from this facility will be recycled/disposed of under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). Land application of solid wastes will occur at agronomic rates.

Site Features

The renewable energy facility, associated infrastructure, and irrigation tracts are located in Wharton County, Texas, immediately south of Pierce, Texas. This area is located in south Texas, roughly 65 miles southwest of Houston down the US Highway 59-South.

The regional climate is classified as subtropical humid, with warm summers and mild winters. The growing season averages 268 days. The average annual rainfall is 42 inches and generally occurs during the warm season months of May, June, July, and August.

The optimum yields can only be achieved through supplemental irrigation of the crops due to low rainfall and high evaporative rates. Most cropping systems will require preseason irrigation with growing season application depending upon stored water to produce the maximum yield goals. These are standard operational production practices in this area. To achieve optimum production, the permittee requests preseason irrigation up to 30 days before crop planting. This will allow the facility to manage application events to build up a moisture and nutrient profile in the soil prior to planting. This management tool would reduce the need to use groundwater for pre-water and the costs associated with pre-plant starter fertilizers.

Soils

According to information in the Wharton Soil Survey, soils of the property tract and the surrounding area consist of Dacosta sandy clay loam, Bernard-Edna complex, Edna loam, Lake Charles clay and Bernard loam series. The physical and hydrological properties of these soils are illustrated in Table l below. More soil information can be found in supporting documentation.

Table 1: Estimated Soil Properties

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Total for Area of Interest		**23,766.8**	**100.0%**

As depicted in Table l, the map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. When calculating the application rates of specific irrigation areas, care will be taken to ensure that these limitations are considered. Specifically, application rates per application event will be decreased with an increase in the total number of events to ensure that the nutrient and water demands of the crops are met.

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 Wharton County, Texas



February 14, 2025

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map (Pierce Ranch Boundary).....9
Legend.....10
Map Unit Legend (Pierce Ranch Boundary).....11
Map Unit Descriptions (Pierce Ranch Boundary).....11
Wharton County, Texas.....14
BcA—Dacosta sandy clay loam, 0 to 1 percent slopes.....14
BeA—Bernard-Edna complex, 0 to 1 percent slopes.....15
Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded.....18
Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes.....19
EdA—Edna loam, 0 to 1 percent slopes.....21
Eh—Edna silty clay, 0 to 1 percent slopes, overwash.....23
EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes.....24
LcA—Lake Charles clay, 0 to 1 percent slopes.....26
Md—Bernard loam, 0 to 1 percent slopes.....28
Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded.....29
MidB—Midfield loam, 0 to 2 percent slopes.....31
NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded.....33
Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes.....34
W—Water.....37
References.....38

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.

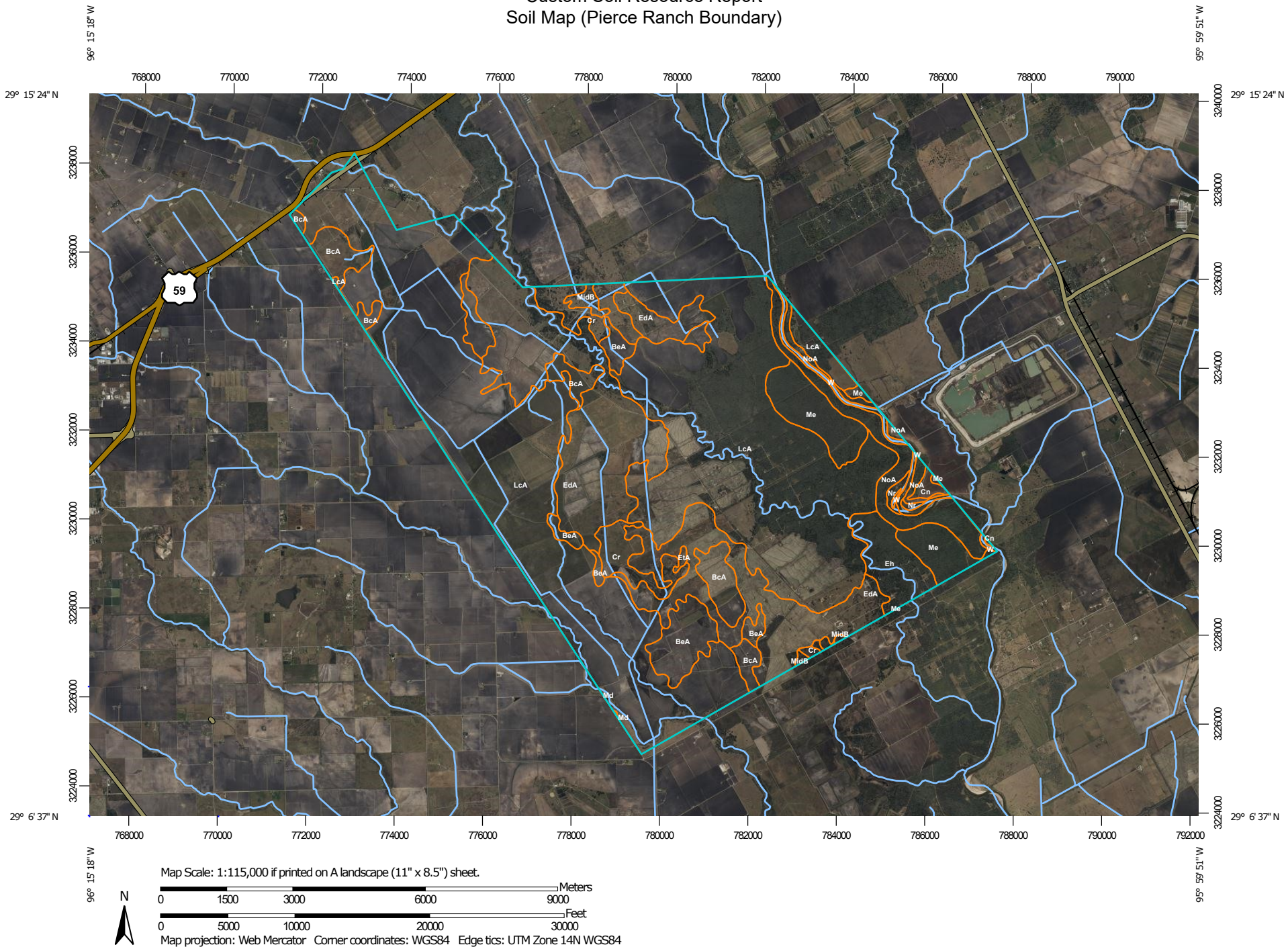
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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.

Custom Soil Resource Report
Soil Map (Pierce Ranch Boundary)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wharton County, Texas
Survey Area Data: Version 20, Aug 30, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 13, 2022—Mar 20, 2022

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.

Map Unit Legend (Pierce Ranch Boundary)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Totals for Area of Interest		**23,766.8**	**100.0%**

Map Unit Descriptions (Pierce Ranch Boundary)

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.

Wharton County, Texas

BcA—Dacosta sandy clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c1
Elevation: 10 to 220 feet
Mean annual precipitation: 30 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dacosta and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dacosta

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: sandy clay loam
Bt1 - 10 to 22 inches: sandy clay loam
Bt2 - 22 to 43 inches: clay
Btk - 43 to 74 inches: sandy clay
2BCt - 74 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Minor Components

Laewest

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Telferner

Percent of map unit: 1 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

BeA—Bernard-Edna complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cg
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 60 percent
Edna and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 6 inches: clay loam
Bt - 6 to 31 inches: clay
Btk1 - 31 to 50 inches: clay
Btk2 - 50 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.9 to 2.4 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Pimple mounds
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 4 to 10 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
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: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Verland

Percent of map unit: 10 percent
Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Lake charles

Percent of map unit: 5 percent
Landform: Flats
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Leton

Percent of map unit: 2 percent
Landform: Meandering channels
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2syc1
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Clemville

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 12 inches: silty clay loam
Bw - 12 to 30 inches: silt loam
Ab - 30 to 50 inches: silty clay
Bb - 50 to 80 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Norwood

Percent of map unit: 10 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2x3y9
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F

Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Tidehaven

Setting

Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 18 inches: fine sandy loam
Bt1 - 18 to 42 inches: clay
Bt2 - 42 to 61 inches: clay loam
2Btk - 61 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 3 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Midfield

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Edna

Percent of map unit: 1 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY542TX - Sandy Loam
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

EdA—Edna loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cc
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex

Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Eh—Edna silty clay, 0 to 1 percent slopes, overwash

Map Unit Setting

National map unit symbol: 2v3cf
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna, overwash, and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna, Overwash

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 11 inches: silty clay
A - 11 to 19 inches: fine sandy loam
Bt1 - 19 to 30 inches: clay loam
Bt2 - 30 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (1.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard
Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno
Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner
Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2vv5p
Elevation: 80 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 280 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Edna and similar soils: 70 percent
Cieno and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: loam
Bt1 - 10 to 20 inches: clay
Bt2 - 20 to 60 inches: clay
Btk - 60 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Description of Cieno

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Early pleistocene loamy fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 7 inches: loam
E/B - 7 to 27 inches: sandy clay loam
Btg1 - 27 to 48 inches: clay loam
Btg2 - 48 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 6.0
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 5 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

LcA—Lake Charles clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c4
Elevation: 20 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lake charles and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lake Charles

Setting

Landform: Backswamps
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 11 inches: clay
Bss - 11 to 53 inches: clay
Bkss1 - 53 to 69 inches: clay
Bkss2 - 69 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.5 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 6 percent
Landform: Meander scars
Landform position (three-dimensional): Talf, rise
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Meander scars
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Cieno, hydric

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Md—Bernard loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: djdp
Elevation: 10 to 150 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 68 to 70 degrees F
Frost-free period: 260 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 52 inches: clay
H3 - 52 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2v39c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Brazoria and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brazoria

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 6 inches: clay
Bss1 - 6 to 35 inches: clay
Bss2 - 35 to 57 inches: clay
Bkss - 57 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 11 percent
Maximum salinity: Nonsaline to slightly saline (0.9 to 6.8 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Minor Components

Pledger

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 3 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Norwood

Percent of map unit: 1 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

MidB—Midfield loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x3y8
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F
Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Midfield

Setting

Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 5 inches: loam
Bt1 - 5 to 32 inches: clay loam
Bt2 - 32 to 40 inches: silty clay
2Btk - 40 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Tidehaven

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Fordtran

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY543TX - Sandy Prairie
Hydric soil rating: No

NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2vv3c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Norwood and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam
Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
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: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Brazoria

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2vv3g
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Mohat and similar soils: 50 percent
Norwood and similar soils: 40 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mohat

Setting

Landform: Bars
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 8 inches: loam
Bw1 - 8 to 29 inches: very fine sandy loam
Bw2 - 29 to 48 inches: loam
Bw3 - 48 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: 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: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam

Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Asa

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Brazoria

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 100 percent

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

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

SOIL ANALYSIS REPORT

CLIENT:	
6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23283	285	0 - 6	7.5		0.11	Lo	1.4	2.7	5	10	141	5	9	3393	558	85	1.4	113	52	2.0	
23284	286A	0 - 6	7.8		0.13	Lo	1.6	2.7	5	9	182	6	11	4782	761	79	1.3	95	83	2.0	
23285	286B	0 - 6	8.0		0.14	Lo	0.9	2.3	4	5	159	6	11	3872	479	44	1.4	80	68	2.1	
23286	290	0 - 6	7.6		0.16	No	1.5	3.6	6	3	228	7	13	4975	1090	103	0.6	110	55	2.1	
23287	295	0 - 6	7.6		0.19	Lo	1.3	7.3	13	4	188	4	7	5522	668	38	0.6	71	50	1.5	
23288	312	0 - 6	7.4		0.11	No	0.9	3.2	6	16	123	9	16	2532	367	35	1.8	164	36	1.8	
23289	313	0 - 6	7.4		0.15	Lo	1.6	6.6	12	11	174	5	9	4614	664	60	1.2	90	59	1.8	
23290	314	0 - 6	6.6		0.14	No	1.5	7.1	13	5	140	4	7	3526	648	74	1.3	98	70	1.6	
23291	315	0 - 6	6.3		0.15	No	1.5	6.3	11	5	144	5	9	3660	726	33	0.9	110	81	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23283	285	0 - 6	11/20/24																		
23284	286A	0 - 6	11/20/24																		
23285	286B	0 - 6	11/20/24																		
23286	290	0 - 6	11/20/24																		
23287	295	0 - 6	11/20/24																		
23288	312	0 - 6	11/20/24																		
23289	313	0 - 6	11/20/24																		
23290	314	0 - 6	11/20/24																		
23291	315	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23283	285																
23284	286A																
23285	286B																
23286	290																
23287	295																
23288	312																
23289	313																
23290	314																
23291	315																

Cation Exchange Capacity

Lab Number	CEC	%H	%K	%Ca	%Mg	%Na
23283	22	0	2	76	21	2
23284	31	0	2	77	20	1
23285	24	0	2	81	17	1
23286	35	0	2	71	26	1
23287	31	0	2	80	18	1
23288	16	0	2	78	19	1
23289	29	0	2	79	19	1
23290	24	0	2	74	23	1
23291	25	0	1	74	24	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23283, 23284, 23285, 23286, 23287, 23288, 23289, 23290, 23291
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23283					
23284					
23285					
23286					
23287					
23288					
23289					
23290					
23291					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/19/24
Date Shipped: 11/22/24

Project Manager: Norman Mullin

484

Lab Use	Sample ID/Description	Depth	Crop	YG	Test Requested
23228	1 2 Convict	0 to 6			TCEQ Complete
23229	2 3 Convict	0 to 6			
23230	3 4 Convict	0 to 6			
23231	4 6 Convict	0 to 6			
23232	5 7 Convict	0 to 6			
23233	6 8 Convict	0 to 6			
23234	7 9 Convict	0 to 6			
23235	8 10 Convict	0 to 6			
23236	9 14 Convict	0 to 6			
23237	10 16 Convict	0 to 6			
23238	11 18 Convict	0 to 6			
23239	12 19 Convict	0 to 6			
23240	13 30 Convict	0 to 6			
23241	14 36 Convict	0 to 6			
	15	0 to 6			
	16	0 to 6			
	17	0 to 6			
	18	0 to 6			
	19	0 to 6			
	20	0 to 6			
	21	0 to 6			
	22	0 to 6			
	23	0 to 6			
	24	0 to 6			
	25	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/22 9am	Date/Time:
Received By:	Received By: Kaitlyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23203	1	0 - 6	6.7		0.14	No	1.6	2.1	4	35	218	5	9	4153	669	52	0.8	132	66	2.0	
23204	4	0 - 6	6.1		0.13	No	1.7	3.4	6	27	204	5	9	3693	560	42	0.6	171	74	2.1	
23205	5	0 - 6	7.7		0.18	No	1.6	3.1	6	7	236	9	16	4638	868	97	0.6	117	72	2.3	
23206	6	0 - 6	6.3		0.16	No	1.7	9.8	18	19	199	6	11	4083	652	43	0.5	108	64	1.9	
23207	7	0 - 6	6.9		0.15	No	1.8	3.5	6	20	274	8	14	5272	864	65	0.6	110	64	2.0	
23208	8	0 - 6	7.4		0.22	Lo	1.9	7.1	13	16	290	13	23	5936	1094	117	0.8	128	83	2.1	
23209	10	0 - 6	6.4		0.18	No	2.8	1.5	3	4	305	8	14	4633	775	52	0.9	127	34	2.2	
23210	13	0 - 6	8.2		0.28	Hi	1.7	5.8	10	11	320	7	13	7967	437	39	0.8	78	73	2.4	
23211	15	0 - 6	6.7		0.22	No	1.7	6.5	12	10	257	8	14	5013	980	89	0.8	126	62	2.2	
23212	16	0 - 6	6.6		0.27	No	2.1	11.6	21	6	280	7	13	4652	1210	94	1.0	130	70	2.1	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23203	1	0 - 6	11/20/24																		
23204	4	0 - 6	11/20/24																		
23205	5	0 - 6	11/20/24																		
23206	6	0 - 6	11/20/24																		
23207	7	0 - 6	11/20/24																		
23208	8	0 - 6	11/20/24																		
23209	10	0 - 6	11/20/24																		
23210	13	0 - 6	11/20/24																		
23211	15	0 - 6	11/20/24																		
23212	16	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23203	1																
23204	4																
23205	5																
23206	6																
23207	7																
23208	8																
23209	10																
23210	13																
23211	15																
23212	16																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
27	0	2	77	21	1
24	0	2	77	20	1
31	0	2	74	23	1
27	0	2	77	20	1
33	0	2	79	22	1
35	0	2	71	26	1
31	0	3	76	21	1
30	0	3	84	12	1
34	0	2	73	24	1
34	0	2	67	29	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23203, 23204, 23205, 23206, 23207, 23208, 23209, 23210, 23211, 23212
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23210
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23203					
23204					
23205					
23206					
23207					
23208					
23209					
23210					
23211					
23212					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23233	8 CONVICT	0 - 6	8.3		0.25	Hi	1.7	10.2	18	22	376	9	16	7383	414	32	1.4	68	80	2.5	
23234	9 CONVICT	0 - 6	8.3		0.18	Hi	1.6	5.1	9	20	240	6	11	6721	263	30	0.7	67	90	2.1	
23235	10 CONVICT	0 - 6	7.4		0.15	Lo	1.5	2.7	5	29	182	3	5	4592	371	21	0.5	94	53	1.9	
23236	14 CONVICT	0 - 6	8.4		0.18	Hi	1.8	3.7	7	23	313	10	18	7342	363	28	1.6	77	76	3.0	
23237	16 CONVICT	0 - 6	7.4		0.13	Lo	1.5	1.8	3	28	235	4	7	5551	480	28	0.5	100	45	2.1	
23238	18 CONVICT	0 - 6	8.4		0.24	Hi	1.2	2.9	5	10	194	6	11	6525	279	23	0.5	70	70	2.3	
23239	19 CONVICT	0 - 6	8.2		0.30	Hi	3.3	2.5	5	14	463	10	18	6856	322	27	2.2	70	24	2.8	
23240	30 CONVICT	0 - 6	8.2		0.27	Hi	2.4	3.4	6	6	261	6	11	7543	328	24	0.9	72	58	2.3	
23241	36 CONVICT	0 - 6	8.2		0.32	Hi	1.9	5.9	11	14	336	11	20	7762	385	24	0.9	65	64	2.3	
23242	52	0 - 6	7.1		0.17	No	3.4	2.1	4	3	209	6	11	3485	434	40	1.6	42	11	0.7	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23233	8 CONVICT	0 - 6	11/19/24																		
23234	9 CONVICT	0 - 6	11/19/24																		
23235	10 CONVICT	0 - 6	11/19/24																		
23236	14 CONVICT	0 - 6	11/19/24																		
23237	16 CONVICT	0 - 6	11/19/24																		
23238	18 CONVICT	0 - 6	11/19/24																		
23239	19 CONVICT	0 - 6	11/19/24																		
23240	30 CONVICT	0 - 6	11/19/24																		
23241	36 CONVICT	0 - 6	11/19/24																		
23242	52	0 - 6	11/20/24																		

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: Amy Meier
Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23233	8 CONVICT																	30	0	3	85	12	0
23234	9 CONVICT																	28	0	2	89	8	0
23235	10 CONVICT																	27	0	2	86	12	0
23236	14 CONVICT																	29	0	3	86	10	0
23237	16 CONVICT																	30	0	2	84	13	0
23238	18 CONVICT																	28	0	2	90	8	0
23239	19 CONVICT																	29	0	4	86	9	0
23240	30 CONVICT																	29	0	2	88	10	0
23241	36 CONVICT																	29	0	3	86	11	0
23242	52																	22	0	2	80	17	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23233, 23234, 23235, 23236, 23237, 23238, 23239, 23240, 23241, 23242
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23233, 23234, 23236, 23238, 23239, 23240, 23241
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23233					
23234					
23235					
23236					
23237					
23238					
23239					
23240					
23241					
23242					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23213	17	0 - 6	7.2		0.20	No	1.7	4.9	9	43	292	8	14	5779	720	42	0.9	144	65	2.3	
23214	18	0 - 6	6.7		0.21	No	1.7	6.7	12	8	298	9	16	4801	1260	106	0.6	119	73	2.1	
23215	19	0 - 6	6.6		0.22	No	1.7	6.8	12	10	262	8	14	5017	1172	104	0.9	121	69	2.6	
23216	21	0 - 6	6.8		0.21	No	1.9	7.1	13	10	277	6	11	4795	1013	68	0.6	127	69	1.9	
23217	22	0 - 6	8.1		0.31	Hi	1.9	7.0	13	23	388	8	14	8045	371	28	0.9	82	83	2.9	
23218	23	0 - 6	6.4		0.26	No	3.1	4.7	8	5	258	8	14	4526	1123	121	0.6	176	77	1.9	
23219	24	0 - 6	7.4		0.25	Lo	2.1	4.5	8	14	320	11	20	6609	1046	66	0.7	94	62	1.5	
23220	25	0 - 6	7.0		0.22	No	1.7	6.2	11	13	306	8	14	4721	1036	174	0.6	111	65	1.9	
23221	27	0 - 6	8.1		0.25	Hi	2.6	4.8	9	8	323	6	11	7785	323	33	0.9	85	62	2.7	
23222	28	0 - 6	8.0		0.20	Lo	1.7	2.6	5	22	207	9	16	6182	422	31	0.5	91	40	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23213	17	0 - 6	11/20/24																		
23214	18	0 - 6	11/20/24																		
23215	19	0 - 6	11/20/24																		
23216	21	0 - 6	11/20/24																		
23217	22	0 - 6	11/20/24																		
23218	23	0 - 6	11/20/24																		
23219	24	0 - 6	11/20/24																		
23220	25	0 - 6	11/20/24																		
23221	27	0 - 6	11/20/24																		
23222	28	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23213	17																
23214	18																
23215	19																
23216	21																
23217	22																
23218	23																
23219	24																
23220	25																
23221	27																
23222	28																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
32	0	2	90	19	1
36	0	2	67	29	1
36	0	2	70	27	1
33	0	2	72	25	1
29	0	3	86	11	0
33	0	2	68	28	2
35	0	2	72	25	1
34	0	2	70	26	2
29	0	3	87	9	1
29	0	2	86	12	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23213, 23214, 23215, 23216, 23217, 23218, 23219, 23220, 23221, 23222
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23217, 23221
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23213					
23214					
23215					
23216					
23217					
23218					
23219					
23220					
23221					
23222					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20 - 11/21/24
Date Shipped: 11/22/24

284

Lab Use		Sample ID/Description	Depth	Crop	YG	Test Requested
23242	1	52	0 to 6			
23243	2	54	0 to 6			
23244	3	59	0 to 6			
23245	4	68	0 to 6			
23246	5	86	0 to 6			
23247	6	92	0 to 6			
23248	7	94	0 to 6			
23249	8	103	0 to 6			
23250	9	104	0 to 6			
23251	10	126	0 to 6			
23252	11	131	0 to 6			
23253	12	143	0 to 6			
23254	13	159	0 to 6			
23255	14	160	0 to 6			
23256	15	174	0 to 6			
23257	16	175	0 to 6			
23258	17	180	0 to 6			
23259	18	181	0 to 6			
23260	19	182	0 to 6			
23261	20	184	0 to 6			
23262	21	194	0 to 6			
23263	22	196	0 to 6			
23264	23	199	0 to 6			
23265	24	206	0 to 6			
23266	25	218	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/25 9am	Date/Time:
Received By:	Received By: Katelyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23243	54	0 - 6	7.0		0.22	No	2.9	3.7	7	7	238	10	18	3648	609	71	1.1	124	33	2.3	
23244	59	0 - 6	7.3		0.20	No	2.5	<1.0	<2	4	207	6	11	3632	726	74	0.7	124	42	1.9	
23245	68	0 - 6	6.0		0.14	No	3.6	6.9	12	9	305	9	16	2993	580	49	2.2	178	42	2.1	
23246	86	0 - 6	6.4		0.17	No	1.9	22.1	40	22	178	8	14	3400	532	53	1.5	144	79	2.4	
23247	92	0 - 6	6.4		0.15	No	1.7	11.6	21	18	199	9	16	2908	637	63	1.9	184	70	2.2	
23248	94	0 - 6	6.6		0.08	No	1.0	4.0	7	12	117	6	11	1756	422	46	1.9	216	32	1.3	
23249	103	0 - 6	5.9		0.07	No	1.7	1.1	<2	5	63	6	11	1008	235	49	0.8	264	40	1.0	
23250	104	0 - 6	5.6		0.07	No	1.2	2.3	4	6	82	5	9	624	161	36	0.9	288	27	0.8	
23251	126	0 - 6	6.8		0.09	No	1.3	2.6	5	6	100	5	9	1832	359	47	1.0	152	62	1.4	
23252	131	0 - 6	7.4		0.14	No	1.7	2.3	4	12	221	6	11	4500	953	92	1.0	111	69	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23243	54	0 - 6	11/20/24																		
23244	59	0 - 6	11/20/24																		
23245	68	0 - 6	11/20/24																		
23246	86	0 - 6	11/20/24																		
23247	92	0 - 6	11/20/24																		
23248	94	0 - 6	11/20/24																		
23249	103	0 - 6	11/20/24																		
23250	104	0 - 6	11/20/24																		
23251	126	0 - 6	11/20/24																		
23252	131	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23243	54																	24	0	3	75	21	1
23244	59																	25	0	2	72	24	1
23245	68																	21	0	4	72	23	1
23246	86																	22	0	2	77	20	1
23247	92																	21	0	2	70	26	1
23248	94																	13	0	2	69	27	2
23249	103																	7	0	2	68	27	3
23250	104																	5	0	4	65	28	3
23251	126																	13	0	2	73	24	2
23252	131																	31	0	2	72	25	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23243, 23244, 23245, 23246, 23247, 23248, 23249, 23250, 23251, 23252
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23243					
23244					
23245					
23246					
23247					
23248					
23249					
23250					
23251					
23252					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20-11/21/24
Date Shipped: 11/22/24

384

Lab Use		Sample ID/Description	Depth	Crop	YG	Test Requested
23267	1	231	0 to 6			
23268	2	236	0 to 6			
23269	3	246	0 to 6			
23270	4	248	0 to 6			
23271	5	249	0 to 6			
23272	6	254	0 to 6			
23273	7	255	0 to 6			
23274	8	262	0 to 6			
23275	9	263	0 to 6			
23276	10	269	0 to 6			
23277	11	271	0 to 6			
23278	12	273	0 to 6			
23279	13	275	0 to 6			
23280	14	276	0 to 6			
23281	15	278	0 to 6			
23282	16	283	0 to 6			
23283	17	285	0 to 6			
23284	18	286a	0 to 6			
23285	19	286b	0 to 6			
23286	20	290	0 to 6			
23287	21	295	0 to 6			
23288	22	312	0 to 6			
23289	23	313	0 to 6			
23290	24	314	0 to 6			
23291	25	315	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/25 8am	Date/Time:
Received By:	Received By: Katelyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23223	29	0 - 6	8.1		0.21	Hi	1.8	4.5	8	21	248	6	11	7040	303	24	0.6	79	60	2.1	
23224	36	0 - 6	6.9		0.21	No	4.1	1.6	3	8	334	9	16	4684	793	88	1.5	111	60	1.8	
23225	41	0 - 6	6.8		0.18	No	4.2	3.2	6	5	322	9	16	4688	820	100	1.7	138	39	2.2	
23226	42	0 - 6	7.0		0.16	No	2.5	7.5	14	18	164	7	13	3909	593	62	1.2	129	41	1.6	
23227	46	0 - 6	6.6		0.10	No	2.7	1.1	<2	4	203	9	16	3227	911	88	0.6	122	26	1.4	
23228	2 CONVICT	0 - 6	8.1		0.33	Hi	2.0	10.3	19	13	358	7	13	8209	417	31	0.8	77	70	3.1	
23229	3 CONVICT	0 - 6	8.1		0.28	Hi	1.8	5.6	10	11	285	6	11	7826	491	34	0.6	72	53	2.3	
23230	4 CONVICT	0 - 6	7.3		0.14	Lo	2.7	<1.0	<2	5	180	4	7	5867	373	32	0.6	103	31	2.7	
23231	6 CONVICT	0 - 6	8.2		0.21	Hi	1.8	4.6	8	22	324	7	13	7513	478	38	0.8	91	84	2.7	
23232	7 CONVICT	0 - 6	7.7		0.18	Lo	1.7	5.8	10	28	260	6	11	5874	511	31	0.8	112	76	3.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23223	29	0 - 6	11/20/24																		
23224	36	0 - 6	11/20/24																		
23225	41	0 - 6	11/20/24																		
23226	42	0 - 6	11/20/24																		
23227	46	0 - 6	11/20/24																		
23228	2 CONVICT	0 - 6	11/19/24																		
23229	3 CONVICT	0 - 6	11/19/24																		
23230	4 CONVICT	0 - 6	11/19/24																		
23231	6 CONVICT	0 - 6	11/19/24																		
23232	7 CONVICT	0 - 6	11/19/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity CEC	%H	%K	%Ca	%Mg	%Na
23223	29																	28	0	2	88	9	0
23224	36																	31	0	3	75	21	1
23225	41																	32	0	3	74	22	1
23226	42																	25	0	2	78	20	1
23227	46																	25	0	2	66	31	2
23228	2 CONVICT																	30	0	3	85	12	0
23229	3 CONVICT																	30	0	2	83	14	0
23230	4 CONVICT																	29	0	2	87	11	0
23231	6 CONVICT																	30	0	3	83	13	1
23232	7 CONVICT																	30	0	2	83	14	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23223, 23224, 23225, 23226, 23227, 23228, 23229, 23230, 23231, 23232
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23223, 23228, 23229, 23231
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23223					
23224					
23225					
23226					
23227					
23228					
23229					
23230					
23231					
23232					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23253	143	0 - 6	6.6		0.17	No	2.0	3.8	7	12	249	8	14	4276	917	70	1.9	123	94	2.1	
23254	159	0 - 6	6.7		0.14	No	1.7	2.5	5	17	207	8	14	3566	830	82	1.4	158	89	2.4	
23255	160	0 - 6	7.3		0.17	No	1.6	3.7	7	8	191	9	16	3152	654	126	1.0	115	91	2.2	
23256	174	0 - 6	6.9		0.16	No	1.0	10.3	19	23	156	10	18	1759	394	53	0.7	288	22	1.7	
23257	175	0 - 6	7.2		0.11	No	0.8	2.3	4	18	109	9	16	1353	276	52	0.9	219	17	1.2	
23258	180	0 - 6	7.2		0.16	No	1.5	6.2	11	9	178	10	18	2735	481	53	0.9	151	70	1.9	
23259	181	0 - 6	7.0		0.10	No	1.3	4.3	8	7	147	6	11	3507	814	79	0.5	110	68	2.1	
23260	182	0 - 6	7.7		0.16	No	1.0	3.0	5	8	183	5	9	4517	857	75	0.4	90	41	1.7	
23261	184	0 - 6	7.3		0.13	No	1.0	4.2	8	5	139	6	11	3151	628	69	0.6	101	69	2.1	
23262	194	0 - 6	7.9		0.22	Lo	1.3	3.0	5	6	198	6	11	4841	716	76	1.0	101	92	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23253	143	0 - 6	11/20/24																		
23254	159	0 - 6	11/20/24																		
23255	160	0 - 6	11/20/24																		
23256	174	0 - 6	11/20/24																		
23257	175	0 - 6	11/20/24																		
23258	180	0 - 6	11/20/24																		
23259	181	0 - 6	11/20/24																		
23260	182	0 - 6	11/20/24																		
23261	184	0 - 6	11/20/24																		
23262	194	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
				6.0	6.5	7.0											
23253	143																
23254	159																
23255	160																
23256	174																
23257	175																
23258	180																
23259	181																
23260	182																
23261	184																
23262	194																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
30	0	2	71	26	1
26	0	2	70	27	1
22	0	2	71	24	2
13	0	3	69	26	2
10	0	3	71	24	2
18	0	2	74	22	1
25	0	2	70	27	1
31	0	2	74	23	1
22	0	2	73	24	1
31	0	2	78	19	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23253, 23254, 23255, 23256, 23257, 23258, 23259, 23260, 23261, 23262
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23253					
23254					
23255					
23256					
23257					
23258					
23259					
23260					
23261					
23262					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23263	196	0 - 6	7.9		0.20	No	1.5	2.3	4	9	273	6	11	5717	1095	111	0.7	108	85	2.3	
23264	199	0 - 6	7.5		0.18	No	1.7	2.4	4	8	235	7	13	5093	978	92	0.7	105	87	2.3	
23265	206	0 - 6	7.6		0.16	No	1.2	1.6	3	6	210	7	13	4763	875	96	0.8	104	75	2.3	
23266	218	0 - 6	7.2		0.15	No	1.4	2.5	5	6	207	7	13	4067	879	89	1.0	118	95	2.6	
23267	231	0 - 6	6.4		0.16	No	1.6	4.9	9	20	224	7	13	3751	1018	69	0.8	130	55	2.0	
23268	236	0 - 6	7.4		0.16	No	1.4	3.7	7	20	172	8	14	3348	689	57	1.7	113	104	2.3	
23269	246	0 - 6	6.9		0.14	No	1.2	2.7	5	6	118	8	14	2517	501	60	1.5	136	60	1.9	
23270	248	0 - 6	6.4		0.13	No	1.5	1.1	<2	25	186	6	11	3289	836	56	0.8	131	42	1.9	
23271	249	0 - 6	6.6		0.16	No	1.5	9.2	17	12	182	6	11	3642	659	46	1.1	95	73	2.0	
23272	254	0 - 6	6.3		0.13	No	2.1	2.0	4	5	121	9	16	1614	307	145	1.0	296	13	1.4	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23263	196	0 - 6	11/20/24																		
23264	199	0 - 6	11/20/24																		
23265	206	0 - 6	11/20/24																		
23266	218	0 - 6	11/20/24																		
23267	231	0 - 6	11/20/24																		
23268	236	0 - 6	11/20/24																		
23269	246	0 - 6	11/20/24																		
23270	248	0 - 6	11/20/24																		
23271	249	0 - 6	11/20/24																		
23272	254	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23263	196																	35	0	2	81	26	1
23264	199																	34	0	2	75	24	1
23265	206																	32	0	2	74	23	1
23266	218																	29	0	2	71	26	1
23267	231																	28	0	2	67	30	1
23268	236																	23	0	2	72	25	1
23269	246																	17	0	2	73	24	2
23270	248																	24	0	2	68	29	1
23271	249																	24	0	2	75	23	1
23272	254																	12	0	3	70	22	5

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23263, 23264, 23265, 23266, 23267, 23268, 23269, 23270, 23271, 23272
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23263					
23264					
23265					
23266					
23267					
23268					
23269					
23270					
23271					
23272					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23273	255	0 - 6	6.8		0.09	No	1.3	2.0	4	6	126	6	11	2238	453	49	1.5	147	57	1.7	
23274	262	0 - 6	7.2		0.14	No	1.4	7.0	13	9	170	7	13	3742	596	81	1.6	108	66	1.8	
23275	263	0 - 6	7.2		0.09	No	1.1	4.0	7	6	148	5	9	2910	558	76	0.9	129	54	2.1	
23276	269	0 - 6	7.4		0.19	Lo	1.6	4.1	7	21	274	10	18	4655	893	234	1.0	130	70	1.9	
23277	271	0 - 6	6.7		0.11	No	1.5	8.0	14	30	236	7	13	3740	865	53	0.9	155	58	2.0	
23278	273	0 - 6	6.8		0.15	No	1.4	8.7	16	11	190	7	13	3563	879	53	0.9	108	74	1.9	
23279	275	0 - 6	7.3		0.11	No	1.3	8.8	16	11	165	5	9	3786	633	55	0.9	114	69	2.0	
23280	276	0 - 6	6.6		0.09	No	1.5	3.4	6	18	224	7	13	3608	947	66	0.7	139	74	1.7	
23281	278	0 - 6	6.4		0.18	No	1.7	14.3	26	15	195	8	14	3558	863	53	0.8	119	67	2.1	
23282	283	0 - 6	7.3		0.10	No	1.2	4.0	7	6	145	5	9	3827	613	39	0.7	96	63	1.9	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23273	255	0 - 6	11/20/24																		
23274	262	0 - 6	11/20/24																		
23275	263	0 - 6	11/20/24																		
23276	269	0 - 6	11/20/24																		
23277	271	0 - 6	11/20/24																		
23278	273	0 - 6	11/20/24																		
23279	275	0 - 6	11/20/24																		
23280	276	0 - 6	11/20/24																		
23281	278	0 - 6	11/20/24																		
23282	283	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23273	255																	16	0	2	72	24	1
23274	262																	24	0	2	76	20	1
23275	263																	20	0	2	73	23	2
23276	269																	32	0	2	72	23	3
23277	271																	27	0	2	70	27	1
23278	273																	26	0	2	69	28	1
23279	275																	25	0	2	76	21	1
23280	276																	27	0	2	67	29	1
23281	278																	26	0	2	69	28	1
23282	283																	25	0	2	77	21	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23273, 23274, 23275, 23276, 23277, 23278, 23279, 23280, 23281, 23282
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23273					
23274					
23275					
23276					
23277					
23278					
23279					
23280					
23281					
23282					

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: Amy Meier, Data Review Coordinator

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.

ENVIRO-AG ENGINEERING, INC.
EAE
AMARILLO - STEPHENVILLE- ARTESIA

Corporate Office:
3404 Airway Blvd.
Amarillo TX 79118

Central Texas:
9855 FM 847
Dublin TX 76446

New Mexico:
110 East Mill Road
Artesia NM 88210

MEMORANDUM

February 28, 2025

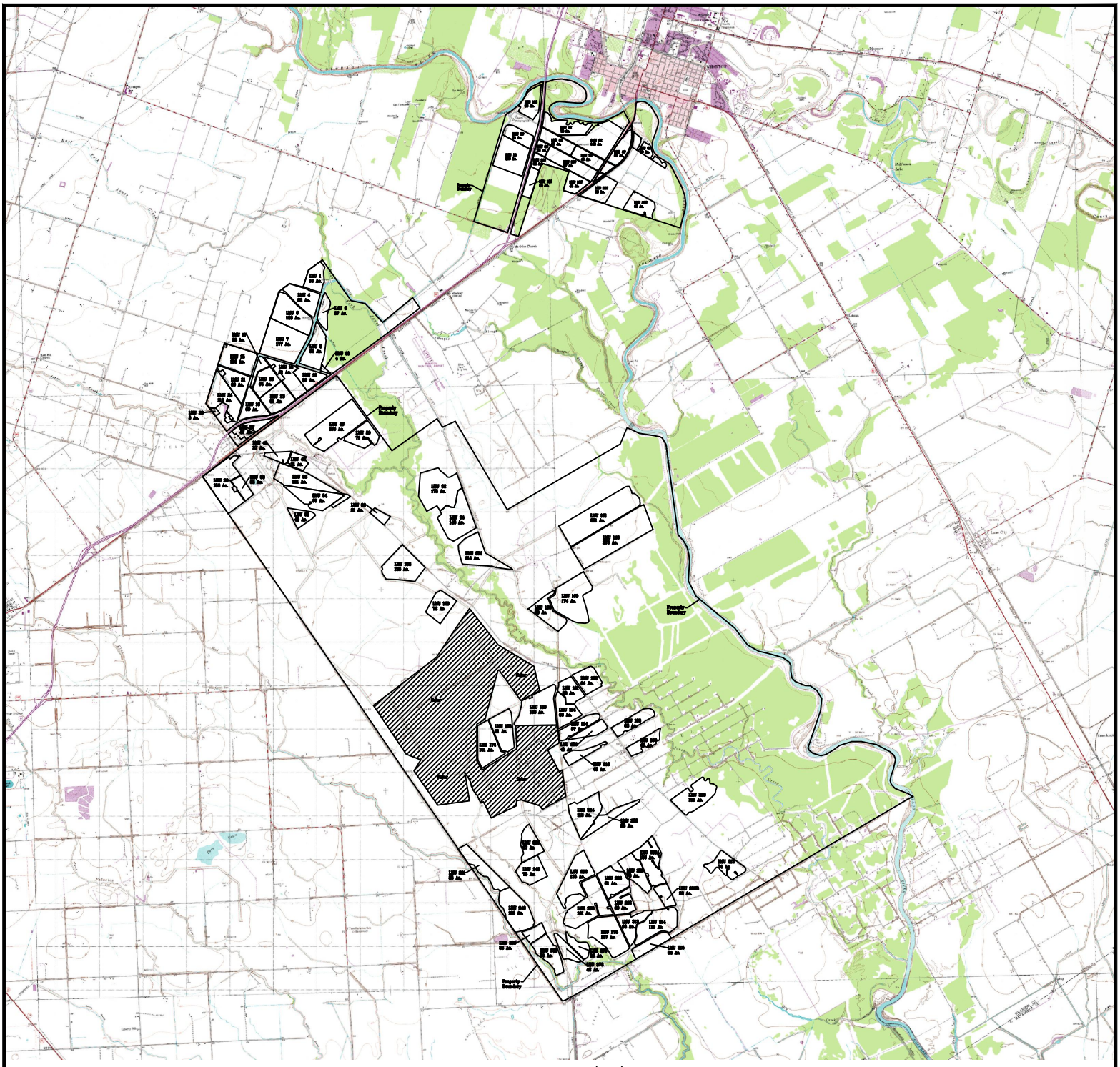
Via Email

To: Mr. Stephen Megina, Vanguard Renewables

From: Norman Mullin, P.E.

Subject: Pierce Ranch, Wharton County, Texas

Attached are the maps of the fields we sampled, the associated laboratory analysis, and the tabular summary of the nutrient budgets. There are approximately 250 fields depicted on the map provided by the Owner. The Owner identified specific fields he wanted sampled that included the two major soil textures (sandy clay and clay). We sampled those fields along with adjacent fields to ensure we captured the current nutrient loading in those areas for both cultivated and improved grass pastures. We sampled 89 fields comprising 7,373 gross acres which is a representation of the two major soil types and cropping schemes (corn, cotton, and grass) across the entire geographic area of the ranch. For permitting purposes, sampling the entirety of the fields would not be beneficial and cost prohibitive for permitting purposes. The laboratory data indicates very little residual levels of nitrogen and phosphorous in the top 6-inches. The nutrient budgets used county averages for yields and the TCEQ "S" tables for nutrient uptake. Since these fields have not been previously utilized for TCEQ regulated waste application, the results provided should remain similar for the following crop years with similar yields.



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Land Application Map Pg: 4	ENVIRONEER ENGINEERING CONSULTING

Effluent Characteristics

Effluent Storage

The effluent from the digestion tanks is pumped to an earthen storage lagoon and it is later removed from the lagoon are hauled off-site for proper disposal or beneficial use under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). If the facility chooses to apply effluent from digestate, then before the land application, the facility will implement an NMP per the Texas NRCS Practice Standard Code 590. The NMP will be updated annually to incorporate the most recent manure, wastewater, and soil analysis.

Effluent Quality

For the purposes of this plan, the Total Nitrogen content of the effluent to be land applied is 713 lb./ac-in TKN and Total Phosphorus is 328 lb./ac-in as P2O5, based on similar projects. Based on the geographical location of the facility and farm practices, the permittee estimates 80% of the total nitrogen is available after volatilization and mineralization.

Effluent Quantity

The average annual amount of effluent available for spreading is projected to be 20.5 million gallons (62.86 ac-ft/yr.).

Annual Cropping Plan

Crop Selection

It is the goal of Wharton AD1, LLC to grow any of the permitted crops listed in Attachment A. Table 2 illustrates the amount of effluent to be applied is based upon the most limiting nutrient, nitrogen. The total ac-in was derived based upon a crop rotation that depicts the acreages planted to various permitted crops. These crops will be rotated to ensure that nutrient/salts and the hydraulic requirements of the plant are managed properly.

The following formula will be utilized to determine the annual application rates based upon the most limiting nutrient content of effluent, nutrients in the soil, and crop requirements.

Total nutrient required by crop *((lb.lac)- Soil Test (lb.lac)) I ((lb.* per *Ac-in* of *Nut. in Effl* x *0.80)) = Annual Application* Rate *(Ac-in)*

In the event that the effluent from the digestate is land applied to an application field, the facility will deduct any applied nutrient from the solids and or fertilizer application against the planned effluent application rates.

Other Crop Inputs

Supplemental fertilizers may be needed to achieve yield goals, but determinations will be made annually on a field-by-field basis using soil test results. Based on the effluent pH, EC and sodium content, soil amendments such as elemental sulfur, gypsum or other inputs may be used to help manage soil pH and salinity.

Wharton AD1, LLC
Pierce Ranch
Attachment 1 - Nutrient Management Budget
Table 1 Generated 12/18/2024

			Columns													
			A	B	D	E	G		H	I	J	K	L	M		
Field ID w/Acreage	Planned Crop Rotation	Projected Yield bu/ac or tons/ac (1)	Crop N Requirement rate lb/Ac (1)	Crop P2O5 Requirement Rate lb/Ac (1)	0-6" Soil N Residual lb/Ac (2)	0-6" Soil P Residual ppm (2)	Remainder Crop N required lb/Ac (3)	Manure Source (4)	Wastewater N lb/Ac-in (4a)	Adjusted Plant Available N lb/ Ac-in (5)	Maximum Ac-In/Ac of Wastewater to apply	Wastewater P2O5 lb per Ac-in (4a)	Recommended Ac-In/Ac to apply	P205 Applied at N Rate lb/Ac (6)	Acre-Feet of Wastewater Applied	Gallons of Wastewater Applied
1 (56 acres)	Corn Grain	120 bu/ac	144	105	3	35	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	1.2	375,366.42
4 (82 acres)	Corn Grain	120 bu/ac	144	105	6	27	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.7	537,949.14
5 (37 acres)	Corn Grain	120 bu/ac	144	105	6	7	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	0.7	242,733.15
6 (126 acres)	Corn Grain	120 bu/ac	144	105	18	19	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	2.3	754,726.10
7 (177 acres)	Corn Grain	120 bu/ac	144	105	6	20	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	3.6	1,161,182.90
8 (92 acres)	Corn Grain	120 bu/ac	144	105	13	16	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.8	572,937.70
10 (4 acres)	Coastal Grazing	1 au/3ac	160	70	3	4	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.1	23,180.39
13 (123 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.4	783,534.62
15 (103 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	2.0	646,337.62
16 (69 acres)	Corn Grain	120 bu/ac	144	105	21	6	123	Digestate	714	571.20	0.22	328.00	0.22	70.63	1.2	403,461.86
17 (23acres)	Corn Grain	120 bu/ac	144	105	9	43	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.5	147,608.00
18 (81 acres)	Corn Grain	120 bu/ac	144	105	12	8	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.6	508,284.93
19 (55 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.1	345,131.74
21 (69 acres)	Corn Grain	120 bu/ac	144	105	13	10	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.3	429,703.28
22 (64 acres)	Corn Grain	120 bu/ac	144	105	13	24	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.2	398,565.36
23 (81 acres)	Coastal Grazing	1 au/3ac	160	70	8	5	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.4	469,402.82
24 (113 acres)	Corn Grain	120 bu/ac	144	105	8	14	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	2.2	730,576.39
25 (5 acres)	Corn Grain	120 bu/ac	144	105	11	13	133	Digestate	714	571.20	0.23	328.00	0.23	76.37	0.1	31,613.31
27 (47 acres)	Coastal Grazing	1 au/3ac	160	70	9	8	151	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.8	272,369.54
28 (68 acres)	Corn Grain	120 bu/ac	144	105	5	22	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.4	449,336.81
29 (156 acres)	Coastal Grazing	1 au/3ac	160	70	8	21	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.8	904,035.06
36 (33 acres)	Coastal Grazing	1 au/3ac	160	70	3	8	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	191,238.19
41 (27 acres)	Coastal Grazing	1 au/3ac	160	70	6	5	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.5	156,467.61
42 (31 acres)	Coastal Grazing	1 au/3ac	160	70	14	18	146	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	179,647.99
46 (190 acres)	Coastal Grazing	1 au/3ac	160	70	2	4	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	3.4	1,101,068.34
2C (78 acres)	Corn Grain	120 bu/ac	144	105	19	13	125	Digestate	714	571.20	0.22	328.00	0.22	71.78	1.4	463,503.37
3C (148 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.9	942,789.62
4C (69 acres)	Corn Grain	120 bu/ac	144	105	2	5	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.4	465,785.23
6C (55 acres)	Corn Grain	120 bu/ac	144	105	8	22	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	1.1	355,590.28
7C (49 acres)	Corn Grain	120 bu/ac	144	105	10	28	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	1.0	312,139.81
8C (51 acres)	Corn Grain	120 bu/ac	144	105	18	22	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	0.9	305,484.38
9C (20 acres)	Corn Grain	120 bu/ac	144	105	9	20	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.4	128,354.78
10C (87 acres)	Corn Grain	120 bu/ac	144	105	5	29	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.8	574,886.80
14C (32 acres)	Corn Grain	120 bu/ac	144	105	7	23	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	0.6	208,410.13
16C (46 acres)	Corn Grain	120 bu/ac	144	105	3	28	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	0.9	308,336.70
18C (35 acres)	Corn Grain	120 bu/ac	144	105	5	10	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	0.7	231,276.30
19C (62 acres)	Coastal Grazing	1 au/3ac	160	70	5	14	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.1	359,295.99
30C (65 acres)	Corn Grain	120 bu/ac	144	105	6	6	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.3	426,423.10
36C (40 acres)	Coastal Grazing	1 au/3ac	160	70	11	14	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.7	231,803.86
52 (121 acres)	Coastal Grazing	1 au/3ac	160	70	4	3	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.2	701,206.68
54 (97 acres)	Corn Grain	120 bu/ac	144	105	7	7	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	1.9	631,743.21
59 (71 acres)	Corn Grain	120 bu/ac	144	105	2	4	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.5	479,286.25
68 (40 acres)	Corn Grain	120 bu/ac	144	105	12	9	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	0.8	251,004.90

86 (21 acres)	Coastal Grazing	1 au/3ac	160	70	40	22	120	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.4	121,697.03
92 (175 acres)	Cotton	2 bales/ac	100	105	21	18	79	Digestate	714	571.20	0.14	328.00	0.14	45.36	2.0	657,224.01
94 (143 acres)	Coastal Grazing	1 au/3ac	160	70	7	12	153	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.5	828,698.81
103 (128 acres)	Coastal Grazing	1 au/3ac	160	70	2	5	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.3	741,772.36
104 (114 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.0	660,641.01
126 (72 acres)	Coastal Grazing	1 au/3ac	160	70	5	6	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	417,246.95
131 (251 acres)	Cotton	2 bales/ac	100	105	4	12	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	3.5	1,145,495.10
143 (279 acres)	Cotton	2 bales/ac	100	105	7	12	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	3.8	1,233,489.43
159 (80 acres)	Cotton	2 bales/ac	100	105	5	17	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	361,294.93
160 (174 acres)	Cotton	2 bales/ac	100	105	7	8	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.4	769,272.98
174 (101 acres)	Coastal Grazing	1 au/3ac	160	70	19	23	141	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.8	585,304.75
175 (91 acres)	Coastal Grazing	1 au/3ac	160	70	4	18	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.6	527,353.79
180 (153 acres)	Coastal Grazing	1 au/3ac	160	70	11	9	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.7	886,649.77
181 (58 acres)	Cotton	2 bales/ac	100	105	8	7	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.8	253,667.08
182 (64 acres)	Cotton	2 bales/ac	100	105	5	8	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.9	289,035.95
184 (66 acres)	Cotton	2 bales/ac	100	105	8	5	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.9	288,655.64
194 (57 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.8	257,422.64
196 (63 acres)	Cotton	2 bales/ac	100	105	4	9	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.9	287,514.71
199 (48 acres)	Cotton	2 bales/ac	100	105	4	8	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.7	219,058.82
206 (41 acres)	Cotton	2 bales/ac	100	105	3	6	97	Digestate	714	571.20	0.17	328.00	0.17	55.70	0.6	189,061.84
218 (40 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.6	180,647.47
231 (85 acres)	Cotton	2 bales/ac	100	105	9	10	91	Digestate	714	571.20	0.16	328.00	0.16	52.25	1.1	367,712.67
236 (67 acres)	Cotton	2 bales/ac	100	105	7	20	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	0.9	296,214.31
246 (128 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.8	578,071.90
249 (75 acres)	Cotton	2 bales/ac	100	105	17	12	83	Digestate	714	571.20	0.15	328.00	0.15	47.66	0.9	295,929.07
254 (112 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	1.6	511,137.25
255 (58 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.0	336,115.60
262 (125 acres)	Cotton	2 bales/ac	100	105	13	9	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.6	516,984.53
263 (161 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.2	711,798.56
271 (81 acres)	Cotton	2 bales/ac	100	105	14	30	86	Digestate	714	571.20	0.15	328.00	0.15	49.38	1.0	331,155.33
273 (42 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	0.5	167,716.91
275 (137 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	1.7	547,076.59
276 (36 acres)	Cotton	2 bales/ac	100	105	6	18	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	0.5	160,871.32
283 (81 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	1.1	358,109.83
285 (78 acres)	Cotton	2 bales/ac	100	105	5	10	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	352,262.56
286A (106 acres)	Cotton	2 bales/ac	100	105	5	9	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.5	478,715.79
286B (38 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.5	173,421.57
290 (116 acres)	Cotton	2 bales/ac	100	105	6	3	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	1.6	518,363.15
295 (69 acres)	Cotton	2 bales/ac	100	105	13	4	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	0.9	285,375.46
312 (74 acres)	Coastal Grazing	1 au/3ac	160	70	6	16	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	428,837.14
313 (68 acres)	Cotton	2 bales/ac	100	105	12	11	88	Digestate	714	571.20	0.15	328.00	0.15	50.53	0.9	284,472.22
314 (119 acres)	Cotton	2 bales/ac	100	105	13	5	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.5	492,169.27
315 (54 acres)	Cotton	2 bales/ac	100	105	11	5	89	Digestate	714	571.20	0.16	328.00	0.16	51.11	0.7	228,471.51
7,207															**118.20**	**38,539,149**

Notes:

(1) From NRCS 590-633 software alternative crops.
(2) Taken from annual soil test results from November 2024. It is assumed that residual N will be utilized with the first crop rotation. The facility will conduct soil sampling every year for verification, and the budgets will be updated to reflect the latest soil analysis.
(3) Column A- Column D = Remainder Crop N Required. Negative value indicates residual is higher than requirement. No wastewater application planned.
(4) The source shown is the primary for wastewater source, however, wastewater from any other lagoon structure can also be pumped to the field. The max rate as indicated by the Phophorous Index Rating shall no be exceeded by any sources.
(4a) Wastewater N and P from site specific analysis.
(5) Availability of N is estimated utilizing 80%.
(6) Illustrates P205 applied at the Nitrogen application rate.

Application Methods & Timing

Land Application Methods

The effluent from the digestate will be applied to the land using the spreading technique. This method ensures uniform distribution of nutrients across the application area, facilitating efficient nutrient absorption by the soil and crops. The spreading technique helps in optimizing the utilization of nitrogen, phosphorus, and potassium present in the effluent while minimizing nutrient runoff and environmental impact.

Soil Moisture Monitoring

Soil moisture monitoring is crucial for solid digestate land application, ensuring proper absorption and preventing runoff. The most important aspect of moisture management is accurately evaluating and maintaining optimal soil conditions. In application fields, soil moisture is assessed using the feel and appearance method, following USDA guidelines. This method provides a quick, practical evaluation of moisture levels before digestate spreading. Proper monitoring helps maintain soil health, nutrient efficiency, and environmental sustainability.

Operation and Maintenance

Procedures

The land application systems should be operated by the TLAP and with the following Best Management Practices (BMPs):

- Effluent application will not occur when the ground is frozen, saturated within 3 feet of the surface or during rainfall events unless necessary to prevent imminent overflow of the storage pond.
- Effluent application will not exceed maximum crop nutrient requirements.
- Effluent application will not occur to fallow lands except pre-watering as described in the previous section. Application to dormant perennial or winter crops shall be limited to the planned rate shown in the NMP.
- Records of the amount of effluent applied, the crops grown, the planting and harvest dates, and crop yields are maintained for each field.
- Personnel whose job responsibilities require the handling, or land application of digestate should be trained to ensure proper procedures are followed and appropriate records are kept.

Monitoring

Monitoring should occur before and after effluent spreading to ensure proper nutrient application and prevent over-application. No puddling, runoff, or soil erosion should occur. A visual inspection should be performed during and after spreading to detect any signs of surface accumulation or runoff. Corrective actions include, but are not limited to:

- Cease effluent spreading if soil becomes saturated.
- Adjust application rates and timing to match soil absorption capacity.

Monitoring of soil moisture, rainfall, and crop ET should occur at a minimum of weekly during the growing season.

As part of monitoring, annual soil tests will be reviewed. The following best management practices (BMPs) may be utilized to minimize nutrient leaching:

- Apply effluent before planting and after harvesting to enhance nutrient availability.
- Time applications to align with crop nutrient uptake during the growing season.
- Use conventional nitrogen fertilizers in conjunction with effluent application to optimize plant uptake.
- Retain crop residues to enhance soil organic matter and moisture retention.
- Adjust application schedules based on weather, soil moisture levels, and crop needs.
- Incorporate organic amendments to improve soil structure and prevent excessive nutrient leaching.
- Implement cover cropping or double cropping to enhance nutrient retention.
- Use nitrification inhibitors to minimize nitrogen losses, especially during high leaching periods.

Soil samples will be collected from each field before and after application, following TLAP guidelines. Effluent samples will also be collected as specified in TLAP to verify nutrient levels and ensure compliance with application limits.

System Maintenance

The effluent spreading system should be operated and maintained in accordance with manufacturer recommendations to ensure long-term reliability and efficiency. Proper operation and maintenance help prevent equipment failure, ensure uniform application, and minimize environmental risks. The spreading equipment, tanks, pipelines, and distribution components should be inspected regularly to maintain functionality.

All measuring devices, valves, spreaders, distribution nozzles, and mechanical components should be checked periodically, with worn or damaged parts repaired or replaced as needed. Nozzles and spreaders must be properly aligned, in good condition, and operated at the planned

application rate to ensure even distribution and prevent excessive accumulation in localized areas.

Maintain all pumps, piping, spreader attachments, and electrical or mechanical components as per manufacturer guidelines. Regularly clean screens and filters to avoid blockages that could affect application rates. Protect equipment from rodents, insects, heat, flooding, lightning, and power failures to avoid operational disruptions. Ensure all electrical connections are secure and replace worn-out wiring or fittings when first noticed. Periodically check for leaks and unintended discharge points. Display bilingual operating instructions and safety warnings as necessary. During non-operational periods, drain and secure pipelines, valves, and movable equipment to prevent damage.

Pollution hazards to groundwater and surface water can be minimized by following proper effluent spreading management. Runoff and deep percolation should be controlled by applying effluent only when soil moisture conditions allow for proper absorption. Avoid spills of agricultural chemicals, fuels, and lubricants near application sites to prevent contamination. Regularly review and adjust application schedules based on soil conditions, weather forecasts, and nutrient management plans to ensure safe and efficient effluent use.

8.0 **REFERENCES**

Information used to develop this plan was obtained, in part, from the following sources:

EPA 430-B-20-001 Project Development Handbook - A Handbook for Developing Anaerobic Digestion/Biogas Systems on Farms in the United States - 3rd Edition

Maas and Grattan. 1999. Agricultural drainage water management in arid and semi-arid areas. FAO Irrigation and Drainage Paper 61, Annex l. Crop salt tolerance data. Retrieved December 2022. http://www.fao.org/docrep/005/y4263e/y4263e0e.htm

Texas A&M Agrilife Extension. Retrieved 2023. Using Animal Manure and Wastewater for Crops and Pastures. https://agrilifeextension.tamu.edu/library/farming/

Texas Almanac. Retrieved May 2023. Texas Temperature, Freeze, Growing Season and Precipitation Records by County. https://texasalmanac.com/sites/default/tiles/images/olmanac-feature/countyweaf her A.pdt

USDA - NRCS Web Soil Survey, Wharton County, accessed May 2023.

USDA- NRCS (2012/2013 TLAP Permit List). Texas Waste Utilization and Nutrient Management 590- 633 Plan. Version 5, S Tables.

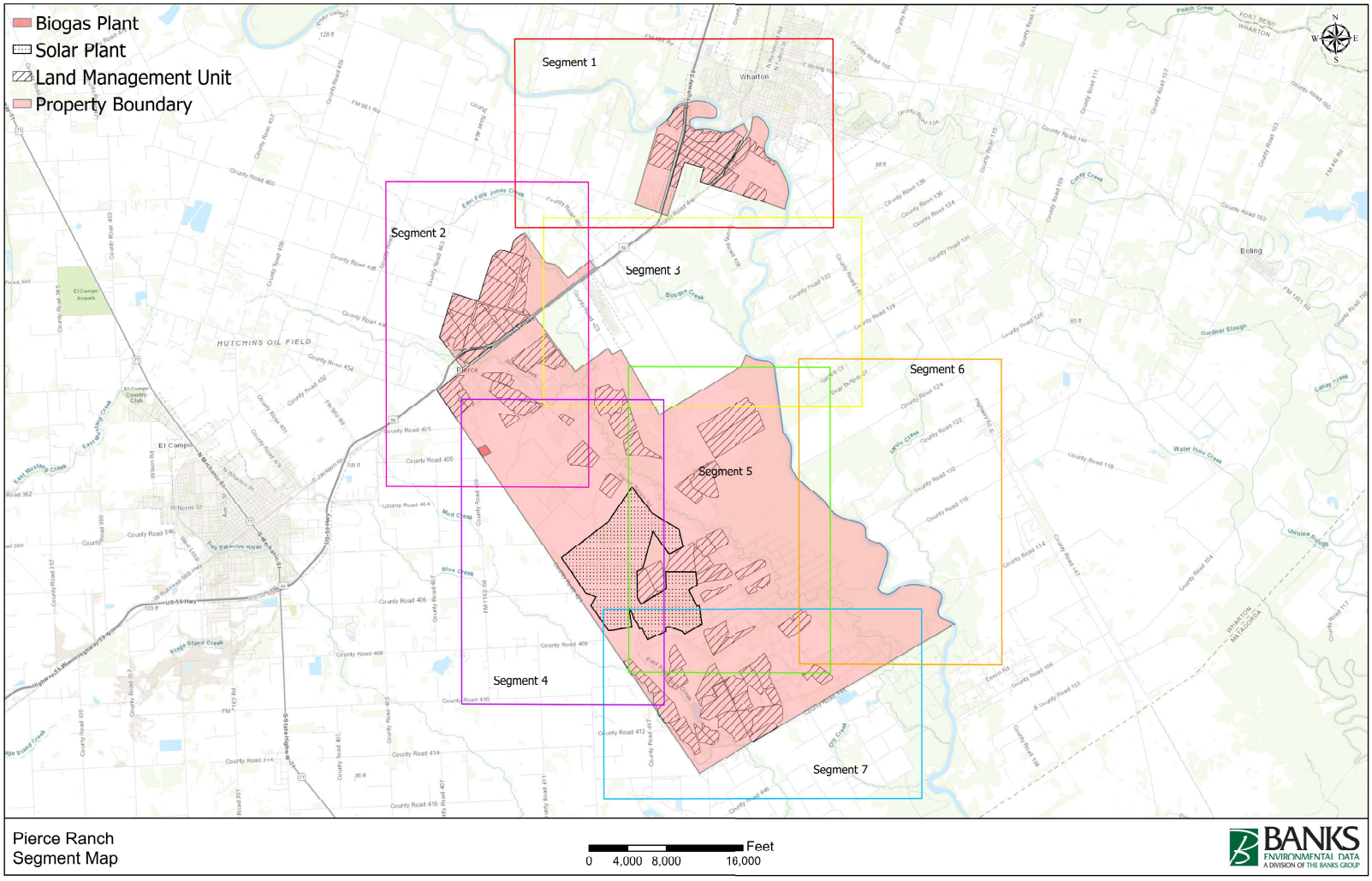
T.D.WATER WELL INFORMATION

Water Well Map

Figure 7, the Water Well Map, shows the locations of water wells within 1 mile of the property boundary. Water wells within the fields or adjacent to fields will be protected with 150-ft buffers.

Water Well Information

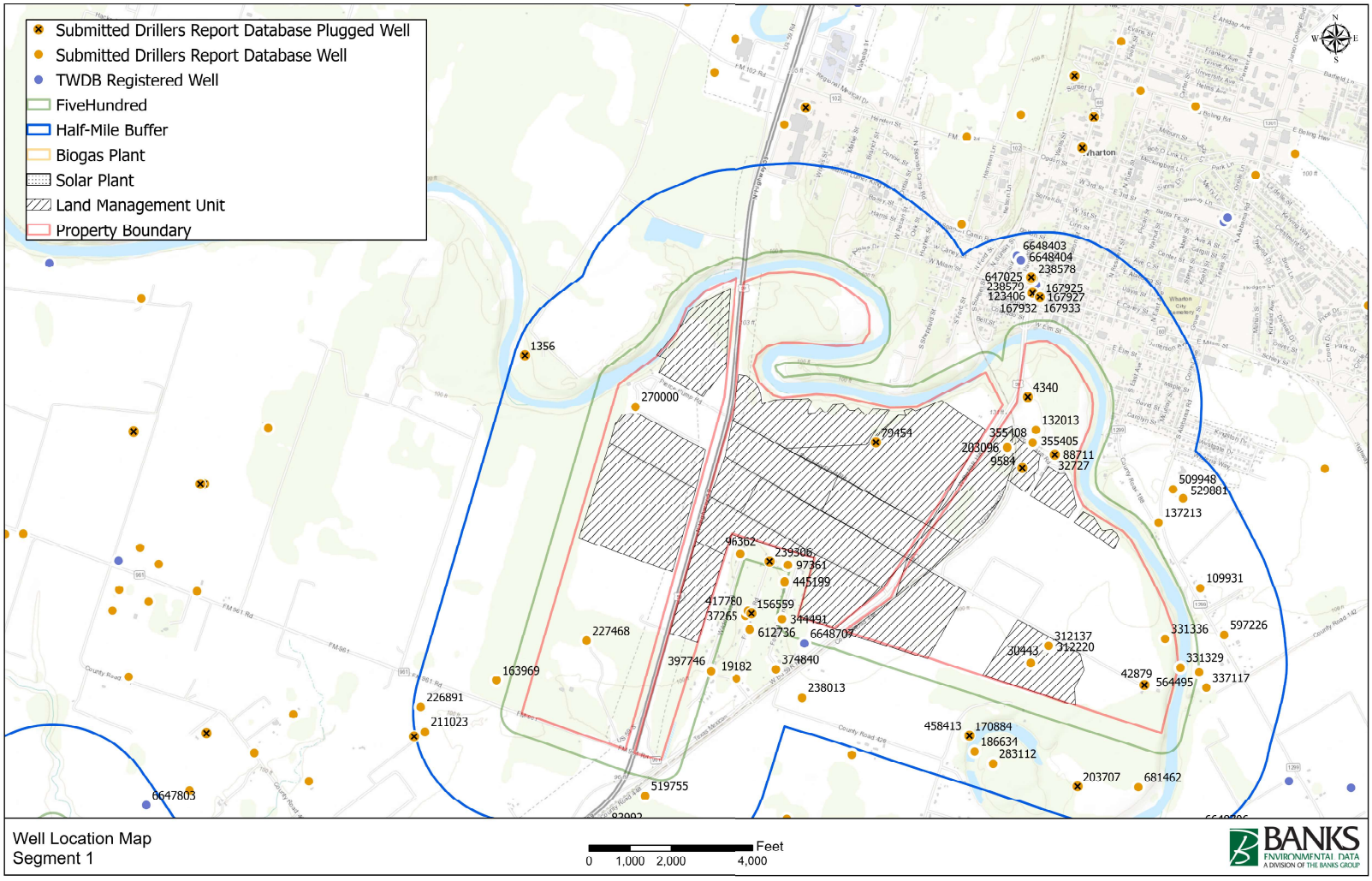
Water well data was obtained from a variety of sources, including on-site inspections, research, a database research firm in Toronto, ON-Canada, and the Texas Water Development Board (TWDB) WIID online database. The information provided by Environmental Risk Information Services (ERIS) was obtained from a variety of public sources. ERIS does not ensure and makes no warranty or representation as to the accuracy, reliability, quality, or errors occurring from data conversion or the interpretation of their report. The TWDB WIID database includes data from the TWDB Groundwater Database and Submitted Driller's Reports. ERIS and TWDB wells are shown on maps and in Table T.E. l if the location could be verified on-site or using the well log or district database information. Well information is provided in Worksheet 3-Section 4 of the Technical Report.

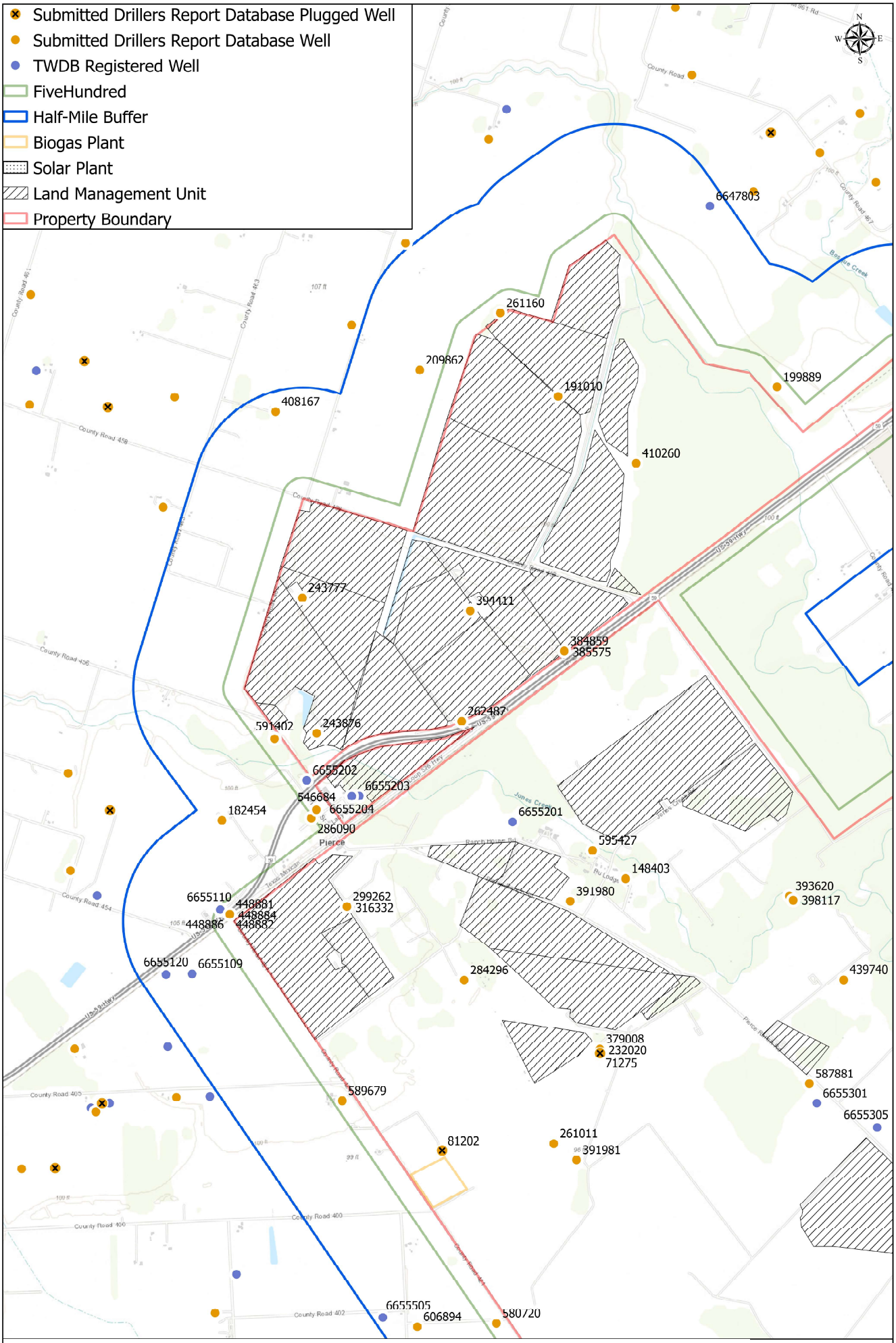


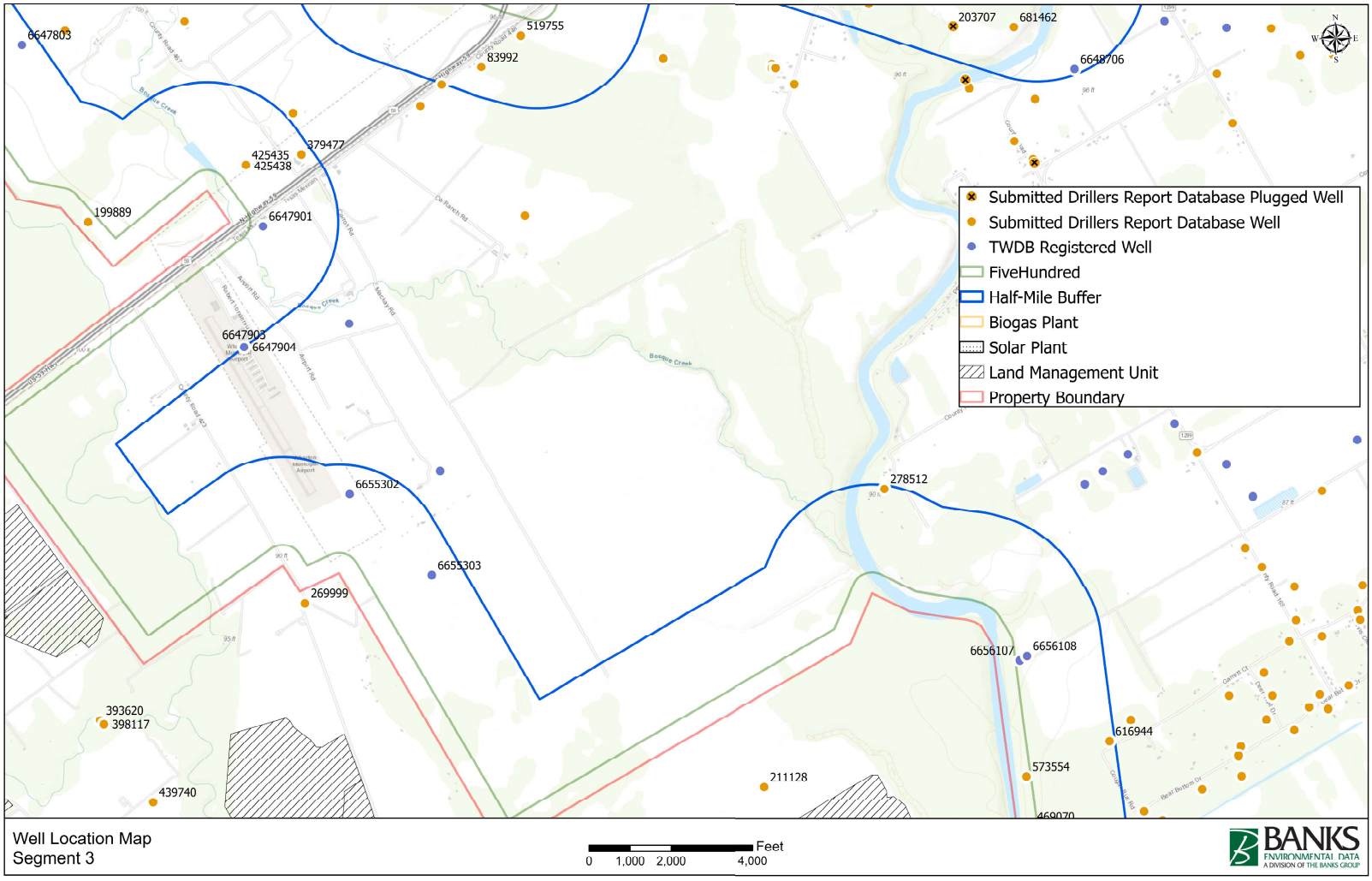
Pierce Ranch
Segment Map

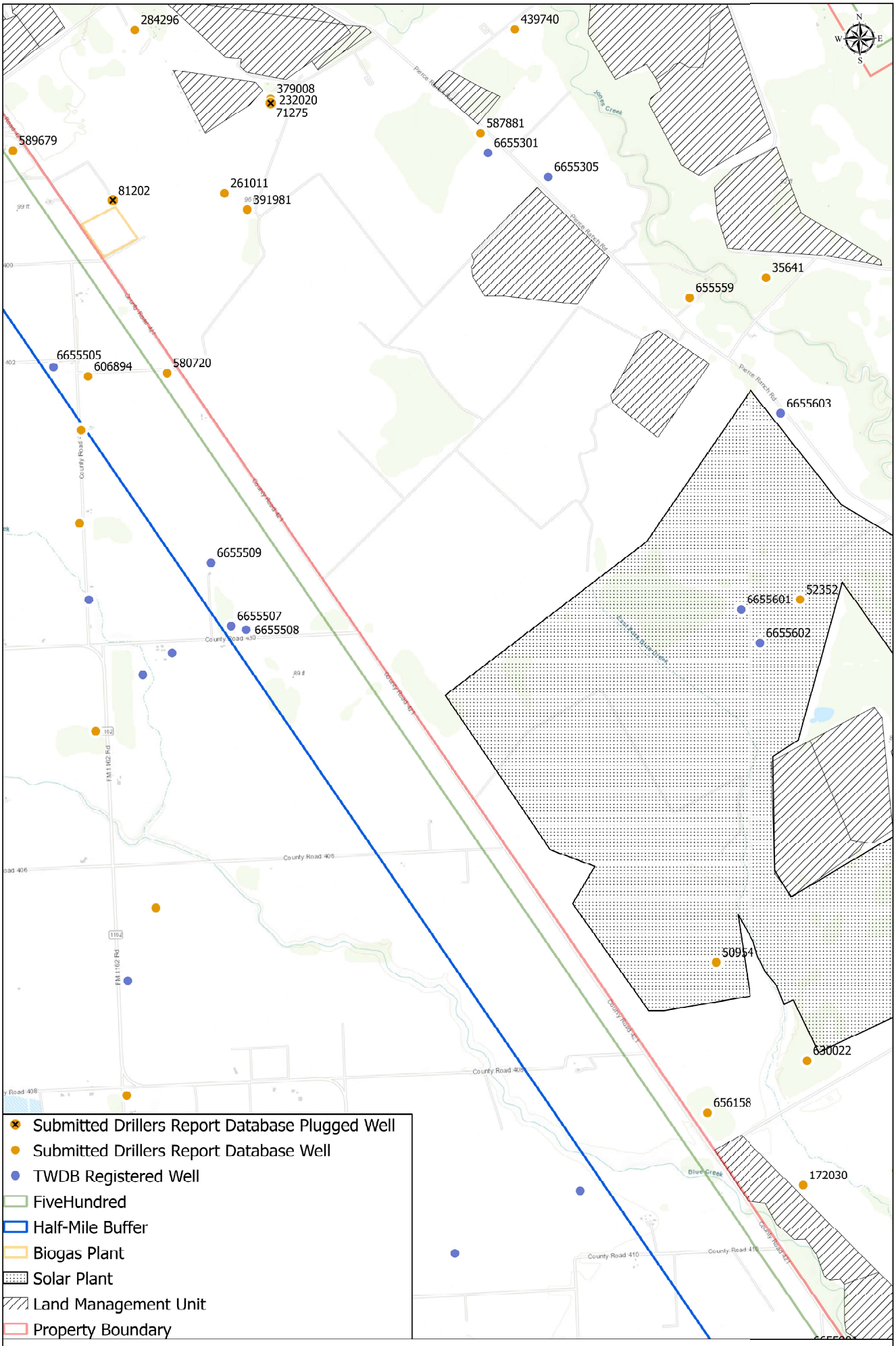
0 4,000 8,000 16,000 Feet

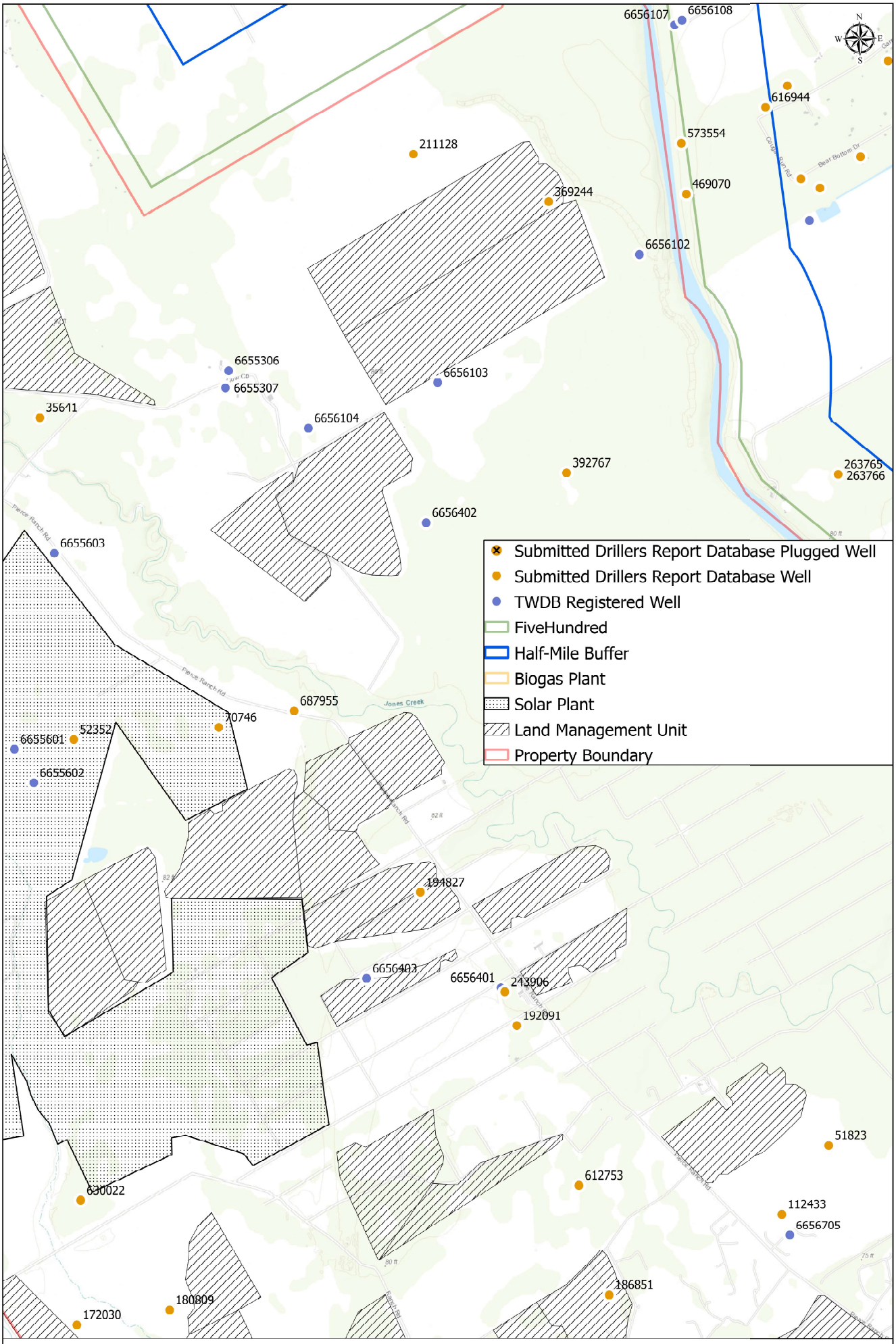
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
N
W
E
S
Wharton
6648403
6648404
238578
647025
238579
167925
123406
167927
167932
167933
1356
270000
4340
132013
79454
355408
355405
203096
88711
9584
32727
509948
529081
137213
96362
239306
97361
445199
109931
417780
156559
37265
344491
227468
612736
664870
312137
312220
30443
331336
597226
331329
42879
564495
337117
397746
19182
374840
163969
238013
226891
211023
458413
170884
186634
283112
203707
681462
6647803
519755
Well Location Map
Segment 1
Feet
0
1,000
2,000
4,000
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
6647803
261160
209862
199889
191010
408167
410260
243777
391111
384859
385575
262487
591402
243876
6655202
6655203
546684
6655204
182454
286090
Pierce
6655201
595427
148403
391980
393620
398117
6655110
448881
448884
448882
448886
299262
316332
6655120
6655109
284296
439740
379008
232020
71275
587881
6655301
6655305
589679
81202
261011
391981
6655505
606894
580720
County Road 458
County Road 436
County Road 454
County Road 405
County Road 400
County Road 402
US-59 Hwy
Jones Creek
Bu Lodge
Pierce Rd
Bayside Creek
Well Location Map
Segment 2
Feet
0
1,000
2,000
4,000
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


6647803
519755
83992
203707
681462
6648706
425435
425438
379477
199889
6647901
6647903
6647904
6655302
6655303
269999
278512
6656107
6656108
616944
573554
211128
393620
398117
439740
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 3
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

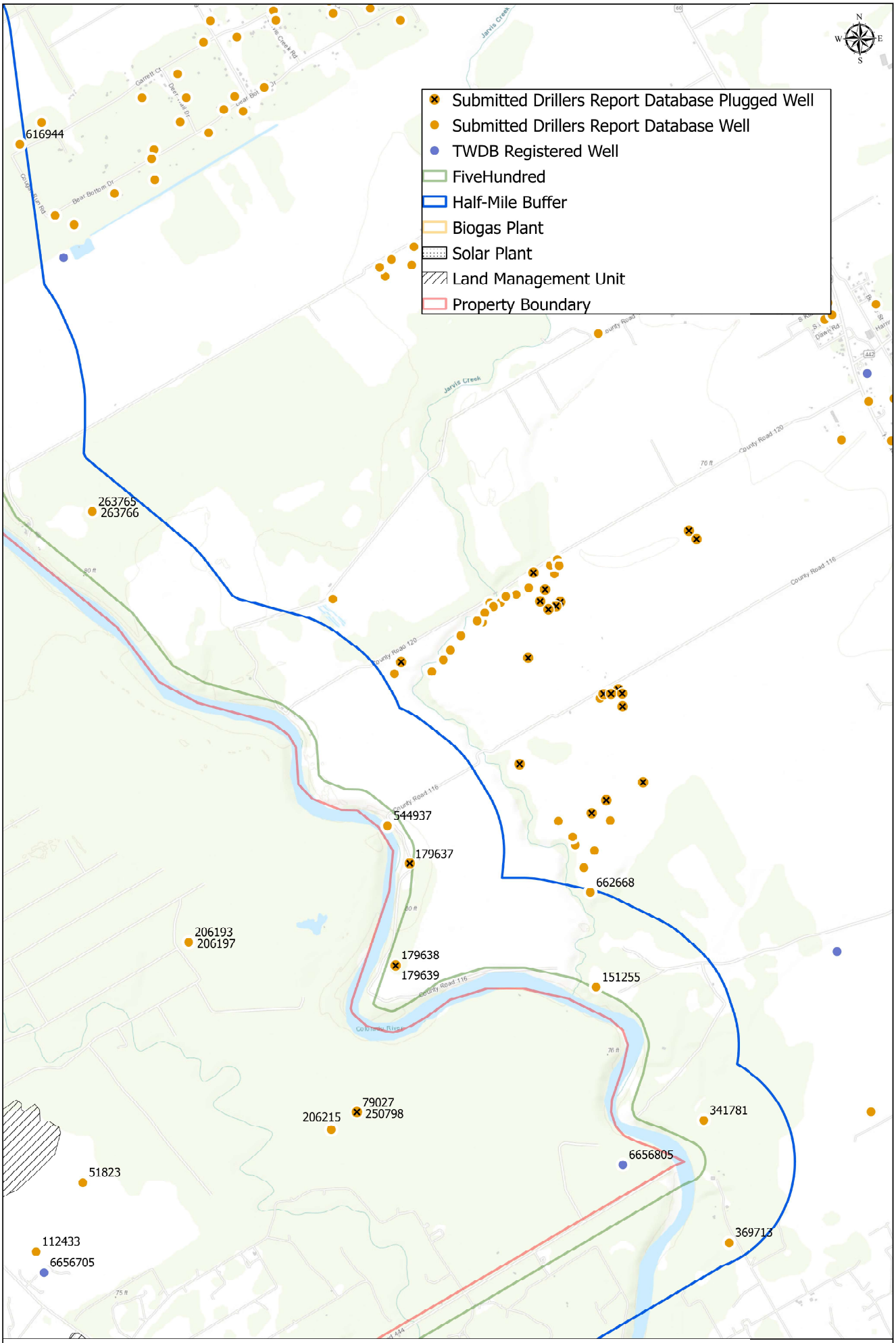

284296
439740
379008
232020
71275
587881
6655301
589679
6655305
81202
261011
391981
35641
655559
6655505
606894
580720
6655603
6655509
6655507
6655508
6655601
52352
6655602
50954
630022
656158
172030
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 4
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Well Location Map
Segment 5

0 1,000 2,000 4,000 Feet

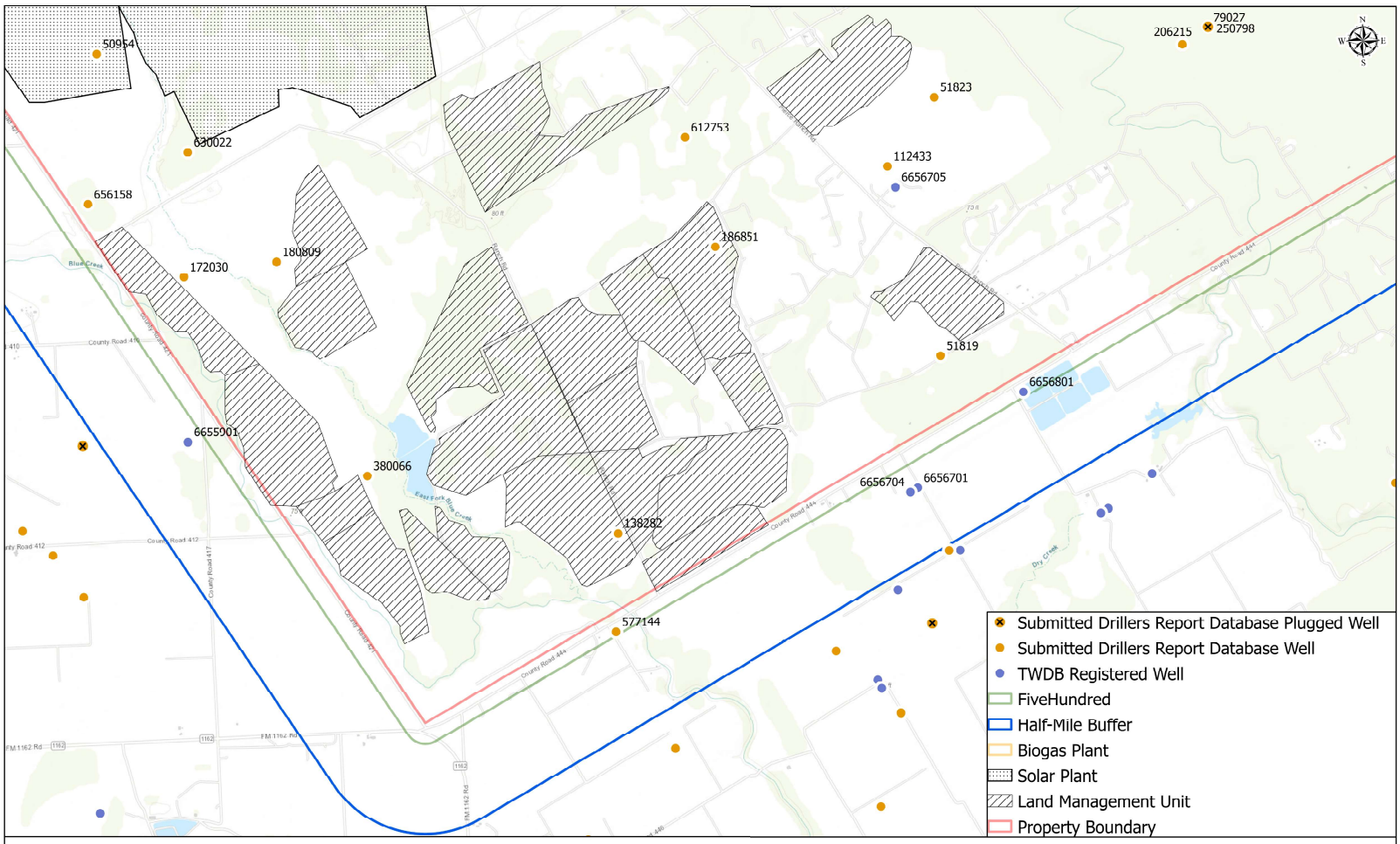
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Well Location Map
Segment 6

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


50954
630022
656158
172030
180809
617753
186851
51823
112433
6656705
206215
79027
250798
51819
6656801
6655901
380066
6656704
6656701
138282
577144
County Road 416
County Road 417
County Road 412
County Road 44a
FM 1162 Rd
Blue Creek
East Fork Big Creek
Dry Creek
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 7
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

T.E. GROUNDWATER TECHNICAL REPORT

Purpose

The purpose of this section is to provide information on the geologic features and groundwater resources at the Wharton AD1, LLC facility located near Pierce, Texas.

Geologic Atlas Map

Figure 8, Geologic Atlas Map, shows the geologic formations located at the property.

Geomorphologic/Geologic Features

The following information is from a report from the Texas Board of Water Engineers discussing soil and groundwater conditions in Wharton County.

Wharton County has around 30,000 acres of land irrigated in the early 20th century for the county's rice production. The wells used to irrigate the rice are mostly located in the western part of the county, ranging in depth from 150 to 500 feet. Periodic measurements show that the net water level in Wharton County has stayed relatively constant since 1934.

Aquifer Information

The Gulf Coast Aquifer includes several aquifers, such as the Jasper, Evangeline, and Chicot, composed of sand, silt, clay, and gravel layers. The total sand thickness of the aquifer ranges from 700 feet in the southern regions to 1,300 feet in the northern regions, with an average freshwater-saturated thickness of about 1,000 feet.

Water quality varies depending on depth and location. It tends to be good in the central and northeastern areas, where total dissolved solids are less than 500 milligrams per liter. However, it becomes more saline toward the south, with concentrations of total dissolved solids typically ranging from 1,000 to over 10,000 milligrams per liter. In these southern areas, aquifer productivity also decreases. Higher salinity levels along the central and eastern Gulf Coast are often linked to saltwater intrusion caused by groundwater pumping, brine migration due to oil field activities, or the natural flow of brine from salt domes into the aquifer.

The aquifer is used for municipal, industrial, and irrigation purposes. In counties such as Harris, Galveston, Fort Bend, Jasper, and Wharton, significant water level declines of up to 350 feet have resulted in land subsidence.

References

"Texas Water Development Board." Gulf Coast Aquifer | Texas Water Development Board, (TWDB)

www.twdb.texas.gov/groundwater/aquifer/majors/gulf-coast.asp. Accessed 17 Dec. 2024.

TEXAS WATER WELL REPORT

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167* *El Campo TX 77437*
Project No:	
Order No:	*25012900355*
Requested by:	*Environeer Engineering Consulting*
Date Completed:	*January 30, 2025*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Table of Contents.....2
Executive Summary.....3
Executive Summary: Report Summary.....4
Executive Summary: Site Report Summary - Project Property.....5
Executive Summary: Site Report Summary - Surrounding Properties.....6
Map.....7
Aerial.....10
Detail Report.....12
Appendix: Database Descriptions.....21
Definitions.....23

Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as database review of environmental records.

License for use of information in Report: No page of this report can be used without this cover page, this notice and the project property identifier. The information in Report(s) may not be modified or re-sold.

Your Liability for misuse: Using this Service and/or its reports in a manner contrary to this Notice or your agreement will be in breach of copyright and contract and ERIS may obtain damages for such mis-use, including damages caused to third parties, and gives ERIS the right to terminate your account, rescind your license to any previous reports and to bar you from future use of the Service.

No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by ERIS Information Inc. ("ERIS") using various sources of information, including information provided by Federal and State government departments. The report applies only to the address and up to the date specified on the cover of this report, and any alterations or deviation from this description will require a new report. This report and the data contained herein does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein and does not constitute a legal opinion nor medical advice. Although ERIS has endeavored to present you with information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

Trademark and Copyright: You may not use the ERIS trademarks or attribute any work to ERIS other than as outlined above. This Service and Report (s) are protected by copyright owned by ERIS Information Inc. Copyright in data used in the Service or Report(s) (the "Data") is owned by ERIS or its licensors. The Service, Report(s) and Data may not be copied or reproduced in whole or in any substantial part without prior written consent of ERIS.

Executive Summary

Property Information:

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167 El Campo TX 77437*
Project No:	
Coordinates:	
Latitude:	*29.215278*
Longitude:	*-96.194167*
UTM Northing:	*3,235,122.77*
UTM Easting:	*772,831.34*
UTM Zone:	*14R*
Target Property Geometry:	*POLYGON*
County/Parish Covered:	*Wharton (TX)*
Zipcode(s) Covered:	*El Campo TX: 77437*
State(s) Covered:	*TX*

Executive Summary: Report Summary

Database	Searched	Project Property	Within 0.50mi	Total
Federal				
FED USGS	Y	0	0	0
State				
TCEQ WELL LOGS	Y	0	**2**	**2**
SDRW WELLS	Y	0	**2**	**2**
GWDB	Y	0	**1**	**1**
WW FORT BEND	Y	0	0	0
WW HIGH PLAINS	Y	0	0	0
WW HARRIS GAL	Y	0	0	0
WUD	Y	0	0	0
Total:		0	**5**	**5**

**** PO – Property Only***

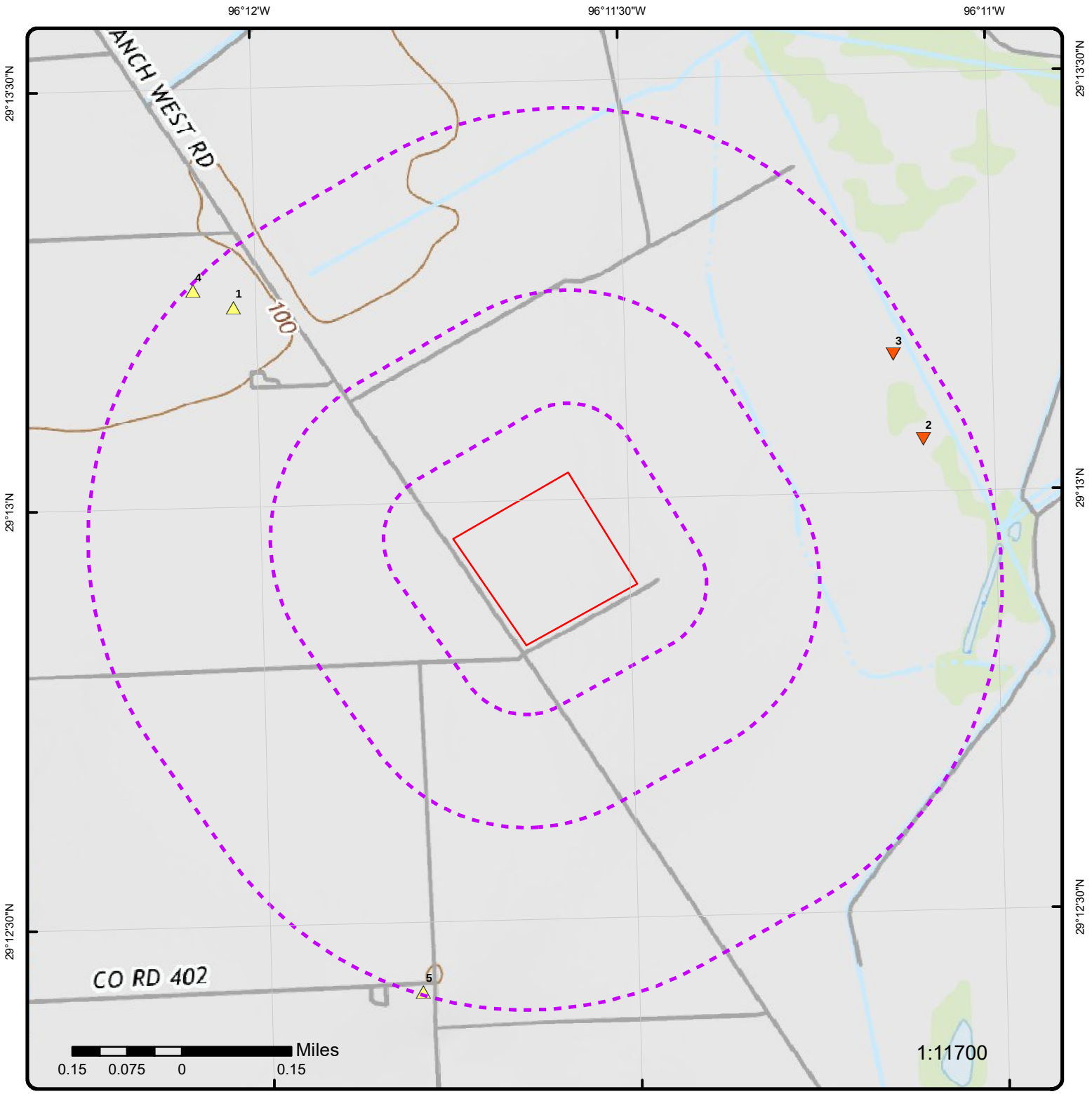
Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number
1	SDRW WELLS	Philip Kocurek	1104 Cr 421 El Camop TX 77437 ***Track NO:*** *589679*	NW	0.44 / 2,307.69	12
2	SDRW WELLS	Pierce Ranch	East of CR 421 and CR 400 Intersection Pierce TX 77467 ***Track NO:*** *261011*	ENE	0.44 / 2,322.58	13
3	TCEQ WELL LOGS	PIERCE RANCH	TX ***Grid No | Owners Name:*** *66-55-2E | PIERCE RANCH*	ENE	0.46 / 2,449.98	14
4	TCEQ WELL LOGS	FLOYD WATZ	TX ***Grid No | Owners Name:*** *66-55-2J | FLOYD WATZ*	NW	0.49 / 2,599.05	16
5	GWDB	John Boyd	TX ***State Well No | Owner Name:*** *6655505 | John Boyd*	SSW	0.50 / 2,616.31	18



Map: 0.5 Mile Radius
Order Number: 25012900355
Address: 29.215278, -96.194167, El Campo, TX

ERIS

Plotted Water Wells

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Eris Areas with Higher Elevation
- Eris Areas with Same Elevation
- Eris Areas with Lower Elevation
- Eris Areas with Unknown Elevation



Aerial **Year: 2022**

Order Number: 25012900355

Address: 29.215278, -96.194167, El Campo, TX

© ERIS Information Inc.

Source: ESRI World Imagery

Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
1	1 of 1	NW	0.44 / 2,307.69	Philip Kocurek 1104 Cr 421 El Camop TX 77437	SDRW WELLS

Track NO: 589679
Date Submitted: 2021-11-23
Owner Name: Philip Kocurek
Owner Address: 1104 Cr 421
Owner Address2:
Owner City: El Camop
Owner State: TX
Owner Zip: 77437
County: Wharton
Type of Work: New Well
Typ of Wrk Oth Descr:
Proposed Use: Domestic
Prop Use Oth Descr:
Latitude: 29.2209
Longitude: -96.2007
Drilling Date Started: 2021-09-09
Drilling Date Completed: 2021-09-11
Chemical Analysis: No
Company Name: Kight Water Well Service
Company Address: 1073 COUNTY ROAD 479
CompanyAddress2:
Company City: EL CAMPO
Company State: TX
Company Zip: 77437
Company Country:
Data Source: Full SDR Database; SDRDB Well Location (Map)
Report Link: https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=589679&Type=SDR-Well

Well Borehole Information

Top Depth: 0
Bottom Depth: 366

Top Depth:
Bottom Depth: 366.0

Well Levels

Measurement: 62
Measurement Date: 2021-09-12

Well Strata

Water Type:

Good

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
2	1 of 1	ENE	0.44 / 2,322.58	Pierce Ranch East of CR 421 and CR 400 Intersection Pierce TX 77467	SDRW WELLS

Track NO: 261011
Date Submitted: 2011-07-29
Owner Name: Pierce Ranch
Owner Address: P.O. Box 538
Owner Address2:
Owner City: Pierce
Owner State: TX
Owner Zip: 77467
County: Wharton
Type of Work: New Well
Typ of Wrk Oth Descr:
Proposed Use: Irrigation
Prop Use Oth Descr:
Latitude: 29.217778
Longitude: -96.185
Drilling Date Started: 2011-06-27
Drilling Date Completed: 2011-07-06
Chemical Analysis: No
Company Name: Weisinger Incorporated
Company Address: 2200 East Davis
CompanyAddress2:
Company City: Conroe
Company State: TX
Company Zip: 77301
Company Country:
Data Source: Full SDR Database; SDRDB Well Location (Map)
Report Link: https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=261011&Type=SDR-Well

Well Borehole Information

Top Depth: 0
Bottom Depth: 710

Top Depth: 0
Bottom Depth: 8

Top Depth:
Bottom Depth: 710.0

Well Levels

Measurement: 82
Measurement Date: 2011-07-20

Well Strata

Water Type:

Fresh

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
3	1 of 1	ENE	0.46 / 2,449.98	PIERCE RANCH TX	TCEQ WELL LOGS

Grid No:	66-55-2E
Date Drilled:	11/08/1972
Owners Name:	PIERCE RANCH
County:	WHARTON
Water Usage:	DOMESTIC
Static Level:	44
Depth Drilled:	196
Latitude:	
Longtiude:	

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-45-5
Located on map XSS
Received: 2-2-73
Jilda

1) OWNER:
Person having well drilled Pierce Ranch (Name) Address Pierce (Street or RFD) Tex (City) (State)
Landowner Same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Wharton 5 miles in NE (N.E., S.W., etc.) direction from El Campo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
See MAP ON 66-45-5B
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor League J. Talfener
Block 516 Survey
Abstract No. A-453
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check): New Well ✓ Deepening; Reconditioning; Plugging
4) PROPOSED USE (Check): Domestic ✓ Industrial; Municipal; Irrigation; Test Well; Other
5) TYPE OF WELL (Check): Rotary ✓ Driven; Dug; Cable; Jetted; Bored

6) WELL LOG:
Diameter of hole 7 in. Depth drilled 196 ft. Depth of completed well 196 ft. Date drilled 1-8-73
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Top Soil
5	28	Clay R
28	55	Sand
55	122	Clay R
122	138	Sand + G
138	146	Clay W
146	158	Sand
158	170	Clay R
170	196	Sand + G

(Use reverse side if necessary)

9) Casing: Type: Old; New ✓ Steel; Plastic ✓; Other
Cemented from ft. to ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4	0	194	SCH 40

10) SCREEN: Type PVC
Perforated; Slotted ✓

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
4	194	196	014

7) COMPLETION (Check): Straight wall; Gravel packed; Other; Under reamed; Open Hole

8) WATER LEVEL:
Static level 44 ft. below land surface Date
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc., ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No If yes, by whom?
Yield: gpm with ft. drawdown after hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? Yes No
Did any strata contain undesirable water? Yes No
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Praytor (Type or Print) Water Well Drillers Registration No. 407
ADDRESS P.O. Box 63 (Street or RFD) El Campo (City) Tex (State)
(Signed) W. C. Praytor (Water Well Driller) Praytor Drilling (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-6

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
4	1 of 1	NW	0.49 / 2,599.05	FLOYD WATZ TX	TCEQ WELL LOGS

Grid No:	66-55-2J
Date Drilled:	03/15/1977
Owners Name:	FLOYD WATZ
County:	WHARTON
Water Usage:	RENT
Static Level:	37
Depth Drilled:	75
Latitude:	
Longtiude:	

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-55-2J
Located on map 1 of 5
Received: 7-1-77
dlc

1) OWNER:
Person having well drilled: Floyd Watt (Name) — Address: Rt 1 (Street or RFD) — El Campo (City) — Tex (State)
Landowner: Same (Name) — Address: (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County: Wharton, 3½ miles in E (N.E., S.W., etc.) direction from El Campo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
map on 66-63-39
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor _____ League _____
Block _____ Survey _____
Abstract No. _____
(NW¼ NE¼ SW¼ SE¼) of Section _____

3) TYPE OF WORK (Check): New Well ✓ Deepening / Reconditioning / Plugging
4) PROPOSED USE (Check): Domestic / Industrial / Municipal / Irrigation / Test Well / Other Rent
5) TYPE OF WELL (Check): Rotary ✓ Driven / Dug / Cable / Jetted / Bored

6) WELL LOG:
Diameter of hole 4½ in. Depth drilled 75 ft. Depth of completed well 75 ft. Date drilled 3-15-77
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Topsoil
5	49	Clay R
49	75	Sand

9) Casing:
Type: Old / New / Steel / Plastic / Other
Cemented from _____ ft. to _____ ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
7	0	69	Sch 40

10) SCREEN:
Type PA
Perforated / Slotted ✓

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
2	69	75	.010

(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ✓ / Gravel packed / Other
Under reamed / Open Hole

8) WATER LEVEL:
Static level 37 ft. below land surface Date _____
Artesian pressure _____ lbs. per square inch Date _____
Depth to pump bowls, cylinder, jet, etc., _____ ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes / No If yes, by whom? _____
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.
Bailer test _____ gpm with _____ ft. drawdown after _____ hrs.
Artesian flow _____ gpm
Temperature of water _____

12) WATER QUALITY:
Was a chemical analysis made? Yes / No
Did any strata contain undesirable water? Yes / No
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Praytor (Type or Print) — Water Well Drillers Registration No. 407
ADDRESS P.O. Box (Street or RFD) — El Campo (City) — Tex (State)
(Signed) W. C. Praytor (Water Well Driller) — Praytor Drlg. Co. (Company Name)

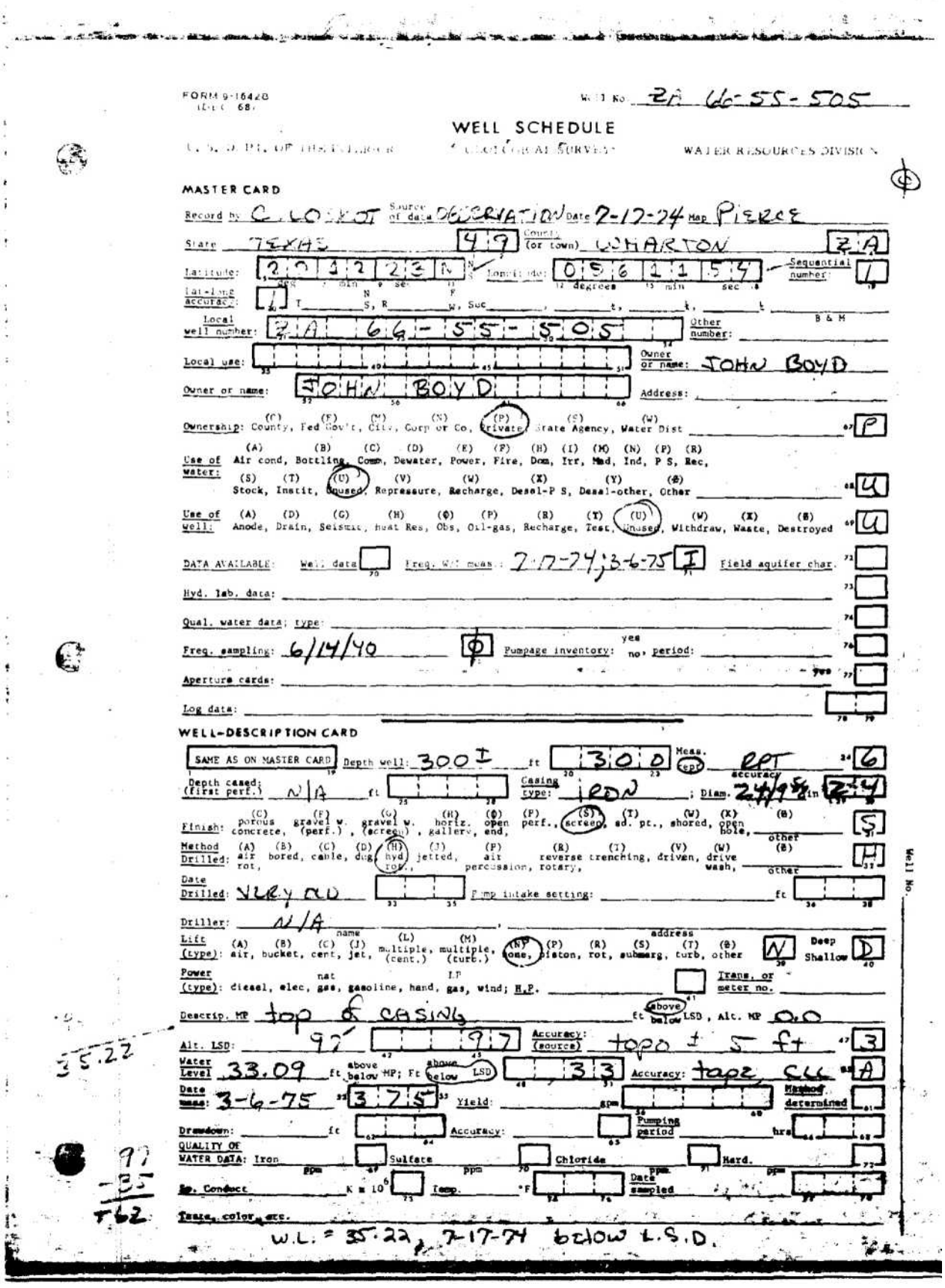
Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-8

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
5	1 of 1	SSW	0.50 / 2,616.31	John Boyd TX	GWDB

Well Rep Track No:	
State Well No:	6655505
Owner Name:	John Boyd
Drilling Start Dt:	
Drilling Month:	
Drilling Day:	
Drilling Year:	
Well Depth:	300
Well Usage:	Unused
Water Level Status:	
Latitude:	29.2066670
Longitude:	-96.1980560
Data Source:	Groundwater Database (GWDB) Reports; GIS shapefile of GWDB well locations
Well Info Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=6655505&Type=GWDB
Document Link:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetScannedImage.aspx?Num=6655505&Cnty=Wharton



FORM 9-1642B
(REV. 68)

Well No. 2A 66-55-505

WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

MASTER CARD

Record by C. LOVOI Source of data DESCRIPTION Date 7-17-74 Map PIERCE

State TEXAS 49 County (or town) WHARTON ZA

Latitude: 29 23 23 N Longitude: 096 11 54 Sequential number: 1

Lat-long accuracy: 1 T ____ S, R ____ W, Sec ____, ____, ____, ____

Local well number: ZA 66-55-505 Other number: ____ B & M

Local use: ____ Owner or name: JOHN BOYD

Owner or name: JOHN BOYD Address: ____

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist P

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Ind, (N) P S, (P) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Y) Desal-other, (@) Other U

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (@) Destroyed U

DATA AVAILABLE: Well data ____ Freq. WL meas.: 7-17-74; 3-6-75 I Field aquifer char. ____

Hyd. lab. data: ____

Qual. water data; type: ____

Freq. sampling: 6/14/40 Pumpage inventory: yes / no, period: ____

Aperture cards: ____

Log data: ____

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 300 I ft 310 Meas. rpt accuracy 6

Depth cased; (first perf.) N/A ft Casing type: RDW ; Diam. 24/9 5/8 in 2-4

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (Ø) open end, (P) perf., (S) screen, (T) sd. pt., (W) shored, (X) open hole, (@) other S

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (@) other H

Date Drilled: VERY OLD Pump intake setting: ____ ft

Driller: N/A name address

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple, (cent.), (M) multiple, (turb.), (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (@) other N Deep / Shallow D

Power (type): diesel, elec, gas, gasoline, hand, gas, wind; nat H.P. LP Trans. or meter no. ____

Descrip. MP top of CASING ft above / below LSD, Alt. MP 0.0

Alt. LSD: 97 917 Accuracy (source): topo ± 5 ft 3

Water Level 33.09 ft above / below MP; Ft above / below LSD 33 Accuracy: topo SLL A

Date meas: 3-6-75 375 Yield: ____ gpm Method determined ____

Drawdown: ____ ft Accuracy: ____ Pumping period ____ hrs

QUALITY OF WATER DATA: Iron ____ ppm Sulfate ____ ppm Chloride ____ ppm Hard. ____ ppm

Sp. Conduct ____ K x 10^6 Temp. ____ °F Date sampled ____

Tests, color, etc. W.L. = 35.22, 7-17-74 below L.S.D.

35.22

97
-35
T62

Well No.

Well No. 24 66-55-505

Latitude-longitude 29 d 12 m 23 s 96 d 11 m 54 s

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD | Physiographic Province: COASTAL PLAIN | 03 | Section:

F | Drainage Basin: | 521 | Subbasin:

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, (L) swamp, (O) offshore, (P) pediment, (S) hillside, (T) terrace, (U) undulating, (V) valley flat | F

MAJOR AQUIFER: ____ system, ____ series | J | ____ aquifer, formation, group | S

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

MINOR AQUIFER: ____ system, ____ series | ____ aquifer, formation, group

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

Intervals Screened:

Depth to consolidated rock: ft | Source of data:

Depth to basement: ft | Source of data:

Surficial material: | Infiltration characteristics:

Coefficient Trans: gpd/Ft | Coefficient Storage:

Coefficient Perm: gpd/ft^2; Spec cap: gpm/ft; Number of geologic cards:

40' - 24" CSG

MEASURED ~32" CSG - WELL MAY HAVE BEEN REWORKED

WELL NO.

GPO 865-801

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update.

Federal

Wells from NWIS: FED USGS

The U.S. Geological Survey's (USGS) National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This select NWIS Wells dataset contains specific Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well, Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern. Applicable NWIS database information is obtained through the Water Quality Data Portal (WQP). The WQP is a cooperative service sponsored by the USGS, the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC).

Government Publication Date: Mar 11, 2024

State

Well Log Reports from Plotted Water Wells: TCEQ WELL LOGS

Locations of TCEQ Water Wells as derived from well logs in the Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer, which includes unnumbered water wells and those plotted to 2.5 minute grid locations (2-3 miles). In this collection of Well Log Reports, locations have been manually verified.

Government Publication Date: Jul 26, 2022

Select Wells from SDR: SDRW WELLS

Locations of wells from the Submitted Drillers Report (SDR) Database with select proposed usage: Domestic, Fracking Supply, Industrial, Irrigation, Other, Public Supply, Rig Supply, Stock, Unknown. SDR is populated from the online Texas Well Report Submission and Retrieval System (TWRSRS), a cooperative Texas Department of Licensing and Regulation (TDLR) and Texas Water Development Board (TWDB) application requiring registered water-well drillers to submit reports. Excludes SDR records with the following proposed usage: Closed-Loop Geothermal, De-watering, Environmental Soil Boring, Extraction, Injection, Monitor, Test Well.

Government Publication Date: Sep 24, 2024

Groundwater Database: GWDB

The Texas Water Development Board (TWDB) Groundwater Database (GWDB) contains information on selected water wells, springs, oil/gas tests (that were originally intended to be or were converted to water wells), water levels and water quality.

Government Publication Date: Apr 12, 2024

Fort Bend Subsidence District Water Wells: WW FORT BEND

List of water wells in the Fort Bend Subsidence District, boundaries of which are defined as all the territory within Fort Bend County. The Fort Bend Subsidence District was created by the Texas Legislature in 1989 as a conservation and reclamation district to control land subsidence and manage groundwater resources through regulation, conservation, and coordination with suppliers of alternative water sources to assure an adequate quantity and quality of water for the future. The District's purpose is to provide for the regulation of the withdrawal of groundwater within the District to prevent subsidence that contributes to flooding, inundation or overflow of areas within the District, including rising waters resulting from storms or hurricanes.

Government Publication Date: Sep 23, 2024

High Plains Water Wells: WW HIGH PLAINS

Inventory of water wells in the High Plains Underground Water Conservation District No. 1 (HPUWCD), which was created in 1951. As a political subdivision of Texas, HPUWCD is charged with protecting, preserving and conserving aquifers within the District's 16-county service area.

Government Publication Date: Apr 14, 2024

Harris Galveston Subsidence District Water Wells: WW HARRIS GAL

List of water wells in the Harris-Galveston Subsidence District (HGSD). The HGSD was created by the 64th Texas Legislature as an underground water conservation district in 1975 to provide regulation of groundwater withdrawal to control subsidence.

Government Publication Date: Sep 23, 2024

Water Utility Database: WUD

The Water Utility Database is defined as a collection of data from Texas Water Districts, Public Drinking Water Systems and Water and Sewer Utilities who submit information to the TCEQ. This database is an integrated database designed and developed to replace over 160 stand alone legacy systems representing over 5 million records of the former Texas Water Commission and the Texas Department of Health.

Government Publication Date: Oct 1, 2020

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

T.F. SOILS INFORMATION

Soil Features

Soil mapping units included in this section for the production area and waste disposal areas were taken from the electronic Web Soil Survey for Wharton County. Soil descriptions are included in the supporting documentation and were taken from the most current version of the soil information database for Wharton County as obtained on February 7th, 2025.

T.G. ENGINEERING REPORT

Purpose

This report is prepared as part of the application for Wharton AD1, LLC. for a Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). Water balance models have been developed to illustrate the hydraulic and nutrient demands of the planned crops.

Background

Wharton AD1, LLC. is applying for a new Industrial Water Quality TLAP Permit No. WQ0000000000 to dispose of digestate (effluent) from two onsite anaerobic digesters. The entire process will generate an average of 75,000 gallons per day (GPO) of effluent for land application.

Water Balance Calculations

Figure 9, Water Balance Calculations, is designed to evaluate the maximum application rate (hydraulic loading rate) for the land application area, estimates the inflows and withdrawals from the direct rainfall, process-generated wastewater, evaporation, and irrigation withdrawal based on crop demand.

Storage Calculations

Figure 10, Storage Calculations, is designed to evaluate the storage capacity and surface area of the storage ponds.

Figure T.G.1

WATER BALANCE CALCULATIONS

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.:

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

(1) Month	(2) Avg Rain	(3) Avg Runoff	(4) Avg Infilt Rainfall	(5) Evapo-trans.	(6) Required Leach	(7) Total Water Needs	(8) Effluent Needed in Root Zone	(9a) Raw Net Evap. from Reservoir	(9b) Reservoir Net Evap. (as inches on plot acres)	(10) Effluent Needed Based on Irrigation Efficiency	(11) Reservoir Consumtion (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.41	1.95	0.81	0.00	0.81	0.00	-1.03	0.00	0.00	0.00
February	2.15	0.58	1.57	1.17	0.00	1.17	0.00	0.11	0.00	0.00	0.00
March	2.90	1.07	1.82	0.45	0.00	0.45	0.00	0.67	0.00	0.00	0.00
April	3.07	1.20	1.87	1.7	0.00	1.70	0.00	1.34	0.00	0.00	0.00
May	4.50	2.32	2.18	4.5	0.58	5.08	2.90	0.40	0.00	3.41	3.41
June	4.08	1.97	2.10	8.75	1.66	10.41	8.31	1.66	0.00	9.77	9.77
July	3.46	1.49	1.97	4.7	0.68	5.38	3.41	2.67	0.00	4.01	4.01
August	3.40	1.44	1.96	1.7	0.00	1.70	0.00	2.87	0.00	0.00	0.00
September	3.89	1.82	2.07	5.13	0.77	5.90	3.83	1.11	0.00	4.50	4.50
October	4.10	1.99	2.11	4.05	0.49	4.54	2.43	0.07	0.00	2.85	2.85
November	3.78	1.74	2.04	2.07	0.01	2.08	0.03	-0.82	0.00	0.04	0.04
December	2.71	0.95	1.77	0.99	0.00	0.99	0.00	-0.63	0.00	0.00	0.00
Totals	41.41	18.00	23.41	36.02	4.18	40.20	20.90	8.41	0.00	24.59	24.59

Crop is	Coastal	
CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	5.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate =	2.05	*ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate =		*ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis =	N/A	*ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit = 2.05 *ac-in/ac/month* **OR** *ac-ft/ac/year*

Limiting factor = Click this cell to choose from list.

Gross rate check (from flow, acres) = 0.00 **OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = ⟦(*average rainfall* – (0.2*((1000/*CN*) – 10)))⟧^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall – average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019
(6) Required leaching = ← Edit
If: *evapotranspiration – average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration – average infiltrated rainfall* > 0, *Ce* /(*Cl – Ce*)*(*evapotranspiration – avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration + required leaching*
(8) Effluent needed in root zone = *total water needs – average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface + effluent needed based on irrigation efficiency*

Figure T.G.2
STORAGE CALCULATIONS

STORAGE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: Wharton AD1, LLC
Permit No.: 0

The storage calculations are designed to evaluate the storage capacity and surface area of the applicant's storage pond (or multiple ponds). The pond must have enough surface area to evaporate all the flow to the pond under low-net evaporation and corresponding annual rainfall conditions. The pond is considered adequately sized when the adidtional storage required is equal to zero (or "none"). If the additional storage required is greater than zero, then:
(1) the pond's storage capacity must be increase, (2) the pond's surface area must be increased, (3) the effluent flow must be reduced, or (4) other approved measures must be taken to ensure that no accumulation occurs during low-net evaporation and corresponding annual rainfall conditions.

(12)	(13)	(14a)	(14b)	(15)	(16)	(17)	(18a)	(18b)	(19)	(20)
Month	Effluent Available (as inches on plot acres)	Average Rainfall Distrib. (%)	Rain Worst Year	Field Runoff Worst Year	Infiltrated Rain	Avail Water	Average Net Evap. Distrib. (%)	Low Net Evap. from Reservoir Surface	Effluent to Storage (as inches on plot acres)	Accum Storage (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	8.11%	5.04	2.77	2.27	2.27	-12.28%	0.00	0.00	-
February	0.00	5.19%	3.22	1.31	1.91	1.92	1.31%	0.00	0.00	-
March	0.00	6.99%	4.34	2.19	2.15	2.16	7.99%	0.00	0.00	0.01
April	0.00	7.41%	4.60	2.40	2.20	2.20	15.96%	0.00	0.00	0.01
May	0.00	10.88%	6.76	4.29	2.47	2.47	4.77%	0.00	-3.07	-
June	0.00	9.85%	6.12	3.72	2.40	2.41	19.77%	0.00	-9.42	-
July	0.00	8.37%	5.20	2.91	2.29	2.29	31.68%	0.00	-3.64	-
August	0.00	8.22%	5.10	2.83	2.27	2.28	34.09%	0.00	0.00	-
September	0.00	9.40%	5.84	3.47	2.37	2.37	13.18%	0.00	-4.14	-
October	0.00	9.91%	6.15	3.75	2.41	2.41	0.78%	0.00	-2.50	-
November	0.00	9.13%	5.67	3.32	2.35	2.35	-9.76%	0.00	0.00	-
December	0.00	6.55%	4.07	1.97	2.10	2.11	-7.50%	0.00	0.00	-
Totals	0.03	100%	62.12	34.93	27.19	27.23	100%	0.00	—	-

Worst (low) net evap. =	-18.96 inches	Storage required =	29.87 *ac-ft*
Corresponding rain =	62.12 inches	Actual storage =	*ac-ft*
Worst-case net year =	2004	Additional storage required =	29.87 *ac-ft*
		Storage days =	130 *days*

(13) Effluent available for irrigation (assumes design flow is applied to entire acerage unless different flow values are justified).
(14a) Average rainfall distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(14b) Rainfall worst year = (*rainfall distribution* as fraction or %/100*) *maximum annual rainfall*
(15) Field runoff worst year = ⟦(*rainfall worst year* – (0.2*((1000/*CN*) – 10)))⟧^2/((*rainfall worst year* + (0.8*((1000/*CN*) – 10))))
(16) Infiltrated rainfall = (rainfall worst year- field runoff worst year)
(17) Available water = (effluent available for land application + infiltrated rainfall check)
(18) (18a) Average net evaporation distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(18b) Net low evaporation from reservoir surface = [(|*low net evaporation*|)*(*net low evaporation avg. dist*)]* [(*pond area*)/(*irrigation area*)]
(19) Storage =
If: (*total water needs – infiltrated rainfall*) < 0, (*effluent available for land application – net low evaporation from reservoir surface*);
If: (*total water needs – infiltrated rainfall*) ≥ 0,
(effluent available for land application – net low evaporation from reservoir surface) * [(total water needs – infiltrated rainfall)/ (irrigation efficiency)]
(20) Accumulated storage =
If: *net low evaporation from reservoir surface + storage* ≤ 0, 0
If: *net low evaporation from reservoir surface + storage* > 0, enter value

T.H. OFF-SITE WASTES:

Volume and Type of Incoming Feedstock

Wharton AD1, LLC estimates a capacity to digest approximately 121,872 tons of feed stock per year; approximately 80,000 tons per year ("tpy") would originate from source separated organics, packaged waste, canned liquid and liquid organics and approximately 40,000 tpy would consist of dilution water (pressate, wash water and recovered). These wastes are to be acquired from multiple sources from Greater Houston Area. The total volume and percent of each source will fluctuate based on availability and needs of the digester. A summary of the proposed waste categories is as follows:

Category 1: Source-separated Organics (SSO)

Description: Source-Separated Organics (SSO) serve as a feedstock for biogas plants, providing high-energy organic material for anaerobic digestion (AD). The process breaks down food waste, yard waste, and soiled paper in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (nutrient-rich fertilizer).

Anticipated Quantity: 75 (tpd) (27,375 tpy)

Category 2: Packaged Waste

Description: Before material is brought on-site, the material must meet quality standards and haulers must provide a manifest for each truck. The waste undergoes depackaging to separate the organic fraction from non-biodegradable materials. The organic content is then fed into an anaerobic digestion (AD) system, where it decomposes in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (fertilizer).

Anticipated Quantity: 50 tpd (18,375 tpy)

Category 3: Canned liquid

Description: Canned liquid waste, like expired beverages and dairy, serves as a high-energy feedstock for biogas plants after depackaging. Rich in sugars, fats, and proteins, it enhances biogas production while reducing landfill waste. The process generates biogas for energy and digestate for fertilizer, promoting sustainability.

Anticipated Quantity: 25 tpd (9,000 tpy)

Category 4: Liquid Organics

Description: Liquid organics, such as food processing waste, dairy waste, and expired beverages, serve as an efficient feedstock for biogas plants. High in sugars, fats, and proteins, they accelerate anaerobic digestion, boosting biogas production and energy recovery.

Anticipated Quantity: 72 tpd (26,232 tpy)

Category 5: Other

Description: Dilution water, including pressate, wash water, and recovered water, enhances biogas production by optimizing feedstock consistency in anaerobic digestion. Pressate provides soluble organics, wash water adds biodegradable residues, and recovered water improves digestion efficiency. Their use increases methane yield, stabilizes the process, and supports resource recovery.

Anticipated Quantity: 112 tpd (40,890 tpy)

T.I. POLLUTANT ANALYSIS DATA

Pollutant analysis data is not available. Once the facility is in operation, samples will be collected and submitted to the TCEQ to meet the permit requirements.

TEXAS BOARD OF WATER ENGINEERS

Durwood Manford, Chairman
R. M. Dixon, Member
O. F. Dent, Member

BULLETIN 6019

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

November 1960

Reprinted July 1962

TEXAS BOARD OF WATER ENGINEERS

Durwood Manford, Chairman
R. M. Dixon, Member
O. F. Dent, Member

BULLETIN 6019

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

By

Louis L. McDaniels
Surface Water Division
Texas Board of Water Engineers

November 1960

Reprinted July 1962

First Printing, November 1960

Second Printing, September 1961

Third Printing, July 1962

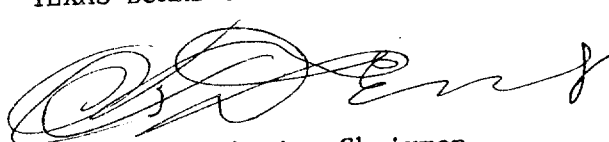
FOREWORD

Irrigation is practiced in different parts of Texas under various climatic conditions. In the far western portion of the State, irrigation supplies almost all of the water used by crops, while in the State's central region a significant part of crop water requirements is derived from rainfall. Rainfall on the eastern section of the State is sufficient for crop production most of the time, but crop yields are often assured through the use of "insurance" irrigation during infrequent critical dry periods of a few weeks duration.

This bulletin presents information on the water requirements of plants regardless of whether this water is supplied by precipitation directly, or by irrigation. The values given herein are not the amounts of water which are to be applied to the land, or pumped from a water supply source, to achieve agricultural production. Diversion amounts and field application volumes are dependent upon the soil characteristics, canal losses, deep percolation, and variations in times and amounts of rainfall. All these factors have to be considered in determining the amounts of water to be diverted from a supply for irrigation.

In order to determine the amount of irrigation water to be applied to the land, it is necessary to know the water requirements of plants. This bulletin presents the fundamental data of these water requirements of plants for use in water resources planning. Subsequent publications will describe studies of effective rainfall, irrigation efficiencies, and total diversion requirements.

TEXAS BOARD OF WATER ENGINEERS



O. F. Dent, Acting Chairman
November 23, 1960

TABLE OF CONTENTS

	Page
ABSTRACT	1
INTRODUCTION	3
ACKNOWLEDGEMENTS	3
PERSONNEL	4
DEFINITIONS	4
GENERAL DISCUSSION	5
Divisions of the State	5
Crops and Crop Groupings	5
Crop Seasons	6
Methods of Estimating Consumptive Use	7
TBWE METHOD	8
Procedure of Computation	8
BASIC DATA	10
Consumptive Use of Water by Crops	10
Climatic Index	12
USE COEFFICIENTS	12
TABULATIONS OF DATA	13
SELECTED BIBLIOGRAPHY	15

TABLE OF CONTENTS (Cont'd.)

APPENDICES

Page

Appendix A - Descriptive Figures ---------- A-1

Figure 1. Land resource divisions and irrigated areas ---------- A-3

2. Subdivision of irrigated areas ---------- A-4

3. Average-annual CLIMATIC-INDEX numbers for subdivisions of irrigated areas ---------- A-5

4. Average planting date and length of growing season of crops, by areas, in Texas ---------- A-6

Appendix B - Tables of Experiment Data and Basic Relations ---------- B-1

Table 1. Basic Data ---------- B-3

2. U. S. Weather Bureau First-Order Stations ---------- B-6

3. Climatic-Index Coefficients ---------- B-7

4. Climatic-Index Numbers ---------- B-8

Appendix C - Tables of Crop Consumptive Use ---------- C-1

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Table 5. Alfalfa ---------- C-3

6. Corn ---------- C-4

7. Cotton ---------- C-5

8. Grains, Small ---------- C-6

9. Orchards, Citrus ---------- C-7

10. Orchards, Deciduous Fruit ---------- C-7

11. Orchards, Pecan ---------- C-7

12. Peanuts ---------- C-8

13. Rice ---------- C-8

14. Sorghum, Grain ---------- C-9

15. Vegetables, Deep-Rooted ---------- C-10

16. Vegetables, Shallow-Rooted ---------- C-12

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

ABSTRACT

The study that resulted in the publication of this report was undertaken in order to obtain fundamental data of the average amounts of water used consumptively by agricultural crops, grown under favorable conditions including a full water supply, and thus to fulfill partly the need for information required for use in estimating the water requirements for irrigation.

The results published herein are estimates of average consumptive-use amounts for 12 major crops and crop groupings, and are tabulated by months for the respective length of growing season for each crop in each of 24 areas of major production in the State.

A method for estimating consumptive use of water by crops was developed by the Board of Water Engineers and used for the computation of the estimates tabulated. The TBWE (Texas Board of Water Engineers) Method is a procedure of relating experiment consumptive-use data to a composite relation of air temperature, dew point temperature, wind movement, and solar radiation, to obtain constant ratios or use coefficients for specific periods of time which vary with respect to length of periods and stage of development of vegetal growths.

The experiment data used were published consumptive-use amounts determined for crops grown in Texas, California, and Arizona. A composite relation of the aforementioned climatic data was used to compute average values for all areas of the state for the period 1946-55. These average values are called CLIMATIC-INDEX numbers. These numbers were used in conjunction with the use coefficients derived from the basic studies to compute estimates of monthly consumptive use by specific crops in each area of the State.

The estimated consumptive-use amounts for specific crops, as computed by this method, vary from place to place directly with the climatic-index number only.

These data provide a basis for estimating the monthly water requirements of plants on an average for production of agricultural crops in all areas of the State; and thus provide a basis for estimating amounts of water required from a source for irrigation when used with information describing amounts of rainfall effective in supplying the water requirements of crops, soil moisture available to crops, and losses involved with the distribution and application of water for crop use.

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

INTRODUCTION

The quantity of water required for the production of agricultural crops under irrigation must be known and inventoried in planning agricultural water-supply development.

This report presents estimates of average monthly depths of water used consumptively by major crops grown in Texas under conditions favorable to the production of agricultural crops, which includes a full water supply. Also included is a description of the TBWE (Texas Board of Water Engineers) method which has been developed for and used in the computation of these estimates of consumptive use. The values which are given for the water used consumptively by each crop are based on reliable data available at this time and are recommended for interim use until more extensive and precise data are obtained.

The estimates appearing in this report represent water requirements of plants only and not the gross amounts of water necessary for diversion from a surface or underground source to supply these plant requirements. Gross diversion requirements include consideration of many variable factors; such as canal losses, soil type, and method of water application, in addition to the water requirements of the plants. However, the water requirements of plants constitute the fundamental data used to develop estimates of quantities of water to be diverted for irrigation and are presented herein for this purpose.

ACKNOWLEDGEMENTS

All individuals and agencies, private and public, who have participated in the observation and collection of basic data related to the subject of this report are to be commended for their contributions. Particularly acknowledgement for assistance in the collection of basic data and in the interpretation of that data directly related to this report is given to:

The late Mr. Richard D. W. Blood, State Climatologist, U. S. Weather Bureau, Austin, Texas

Mr. Dean W. Bloodgood, Retired Irrigation Engineer, Board of Water Engineers, Austin, Texas and former Irrigation Engineer, U. S. Agricultural Research Service.

Dr. Morris E. Bloodworth, Professor of Soil Physics, Department of Agronomy, A. & M. College of Texas.

U. S. Study Commission-Texas, Irrigation Collaboration Group: Mr. Paul T. Gillett, Chairman; and members from the U. S. Bureau of Reclamation, the U. S. Soil Conservation Service, the State Soil Conservation Board, and the A. & M. College of Texas.

Mr. Tor J. Nordenson, Chief of Hydrologic Investigations Section, Hydrologic Services Division, U. S. Weather Bureau, Washington, D. C.

Mr. Robert V. Thurmond, Portland Cement Association, Austin, Texas. (Former Associate Planning Engineer, Texas Board of Water Engineers, and former Irrigation Engineer, Agricultural Extension Service, A. & M. College of Texas.)

PERSONNEL

Preliminary planning and inception of a report on consumptive use of water by, and irrigation requirements of, major crops grown under irrigation in Texas is credited to Robert V. Thurmond, working under the direction of McDonald D. Weinert, former Chief Engineer.

This report was prepared in Engineering Services, Board of Water Engineers, under the general supervision of John J. Vandertulip, Chief Engineer, and Seth D. Breeding, Chief Surface Water Engineer, by the Surface Water Division-Hydrologic Section for use by the Planning Division and is based on a method for consumptive-use determinations developed by Louis L. McDaniels, Acting Chief of the Hydrologic Section.

The Data Processing Division, directed by Ivan M. Stout, assisted Mr. McDaniels by performing extensive computations and preparing listings in tests of several accepted methods in preliminary studies prior to the development of the objective TBWE method for computing consumptive use of water by major crops grown under favorable conditions of available water.

DEFINITIONS

Terms used in this report to describe the method employed and to identify the relations and factors expressed are specifically defined, as follows:

CLIMATIC INDEX is a number expressing a composite relation of four climatic factors--air temperature, dew point temperature, wind movement, and solar radiation--as expressed by plate 2 in the USWB (U. S. Weather Bureau) Technical Paper 37 [1/] which in turn is based on Equation 14 in the USWB Research Paper 38 [2/].

[1/] Kohler, M. A., Nordenson, T. J., and Baker, D. R., 1959, Evaporation Maps for the United States: U. S. Weather Bureau Tech. Paper 37.

[2/] Kohler, M. A., Nordenson, T. J., and Fox, W. E., 1955, Evaporation from Pans and Lakes: U. S. Weather Bureau Research Paper 38.

Equation 14 was derived from evaporation research studies at Lake Hefner 3/ and at Lake Mead 4/.

CONSUMPTIVE USE is the depth of water, in inches, removed from a vegetated area by evaporation of moisture from soil surface, by evaporation of intercepted water from plant surfaces, by development of plant tissue, and by transpiration from vegetal growths. (Literature containing discussions of consumptive use of water by vegetation, evapotranspiration, and irrigation requirements of agricultural crops is quite voluminous. In lieu of many specific citations, a selected bibliography is presented at the end of this text.)

USE COEFFICIENT is a number expressing the ratio of a CONSUMPTIVE USE amount to a CLIMATIC INDEX.

The above terms are used in abbreviation, as follows: IC (CLIMATIC INDEX), UC (CONSUMPTIVE USE), AND KU (USE COEFFICIENT).

GENERAL DISCUSSION

Divisions of the State

The State was divided into eight areas (see figure 1, appendix A, page A-3) to form major land-resource divisions based on a complex characterized by similarities of vegetation, soil, climate, and water availability. These eight areas were further divided into 24 smaller areas (see figure 2, appendix A, page A-4) on a similar but more refined basis.

Crops and Crop Groupings

The following basic crops and crop groups are those for which consumptive-use amounts are presented:

Alfalfa
Corn
Cotton
Grains, Small
Orchards, Citrus
Orchards, Deciduous Fruit
Orchards, Pecan
Peanuts
Rice
Sorghum, Grain
Vegetables, Deep-Rooted
Vegetables, Shallow-Rooted

3/ U. S. Geological Survey, 1954, Water Loss Investigations: Vol. 1--Lake Hefner Studies: U. S. Geol. Survey Prof. Paper 269.

4/ U. S. Geological Survey, 1958, Water Loss Investigations: Lake Mead Studies: U. S. Geol. Survey Prof. Paper 298.

Included under deep-rooted vegetables, are the following:

Beans
Beets
Cantaloupe
Carrots
Chard
Cucumbers
Eggplant
Okra
Peas
Peppers
Pumpkin
Squash
Sweet Potatoes
Tomatoes
Turnips
Watermelons

Included under shallow-rooted vegetables, are the following:

Brussels Sprouts
Cabbage
Cauliflower
Celery
Lettuce
Onions
Radishes
Spinach
Sweet Corn

Consumptive-use amounts for five of the major crops (alfalfa, corn, cotton, small grains, and grain sorghum) are shown for all areas of the state for purposes of comparison and reference. For other crops, these amounts are given for areas of major production only.

Three of these crops were used as a basis for determining consumptive-use amounts for certain other crops. Consumptive use of water by perennial pasture was based on amounts shown for alfalfa; by leguminous fertilizers (used as soil conditioners) on amounts shown for small grains; and by silage sorghum and by forage sorghum on amounts shown for grain sorghum.

Crop Seasons

The variations in the climate and the habits and practices of farmers and agriculturists in Texas, from year to year and from area to area, necessitated the selection of uniform planting dates and length of growing season for crops in each area for use in this report. These selections, which use the first day or the sixteenth day of a month as starting dates for crops, were made on a practical basis from areal information to minimize the variations.

The average planting date in each of the 24 areas and the length of growing season for each crop in this report was based on field reports (except for shallow-rooted vegetables) from Agricultural Experiment Stations of the A. & M. College of Texas, and data revealing the physiology of plants which were collected and furnished by Dr. Morris E. Bloodworth. These dates and lengths of growing seasons are shown on figure 4 (appendix A, page A-6). For the shallow-rooted vegetable group, the one exception, one or more 3½-month growing seasons were indicated in the field reports. The lack of basic data on consumptive use, and the variations in planting dates and length of growing season for crops in this group were the reasons for the use of a 7-month season for shallow-rooted vegetables. This 7-month period generally spans the season characterized by staggered plantings and harvests of mixed combinations of vegetables in this group.

Methods of Estimating Consumptive Use

The need for knowledge of the consumptive use of water by major crops and native vegetation has been the incentive for extensive research and experiment. This need has been the stimulus for the development of methods for extrapolating the experiment data to other areas and different climatic regions. Recognizing that atmospheric phenomena, in addition to soil conditions, affected the growth of plants and their use of water, scientists have related research and experiment data to climatic data as a vehicle for use in estimating the consumptive use by crops in other areas. The sensitiveness and the objectiveness of these methods have been controlled by the type, the quantity, and the extent of the climatic data available. The number of atmospheric phenomena which comprise our climatic data recorded at meteorologic stations are few with respect to area of coverage and completeness of expression. The fewness of these data has been responsible generally for the development of methods which are adaptable to extensive areal usage, but which are lacking in sensitivity to changes in our geographic and climatic regions.

Several recognized methods for estimating consumptive use by agricultural crops and native vegetation have been used in the United States and in foreign countries. Some of the better-known methods are those discussed in "Methods of Computing Consumptive Use of Water" by Wayne D. Criddle, Paper 1507, IR-1, Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, January 1958, which include the following:

Lowry-Johnson Method
Thornthwaite Method
Blaney-Criddle Method
Hargreaves Method
Penman Method

The cited methods vary somewhat each from the other in the climatic data required and used to express relations in empirical or theoretical determinations of consumptive use during a part of, or throughout the life cycle of, specific vegetal growths at research and experiment sites.

Of these methods, the widely used Blaney-Criddle Method was seriously considered for use in estimating average-monthly consumptive-use amounts for the major crops grown in Texas under favorable conditions of available water. This method entails the use of: one variable which is mean air temperature, a constant for the site which is the percentage of daytime hours of a year at that latitude, and a use coefficient for each crop.

In the application of the Blaney-Criddle Method, the complexity of the use coefficient becomes apparent. This coefficient expresses an integration of the physiologic characteristics of a plant together with the effect of atmospheric phenomena other than (1) air temperature, and (2) the possible percentage of daytime hours of a year during each month. Heretofore, adjustment of this coefficient on the basis of relative humidity variations has been practiced in an effort to compensate for differences between geographic and climatic regions. Satisfactory results have been obtained in some areas by this procedure. The distribution of monthly and seasonal coefficients has been dependent on individual judgment.

Recognition of the subjectiveness of some of these methods previously adapted to widespread use reveals the acumen and adroitness of the cited authors and others whose work in this field is testimonial of their experience and judgment. However, the judgment procedures necessary to distribute the Blaney-Criddle use coefficients precluded the adoption of this method for use in estimating consumptive-use amounts for crops grown in Texas in this report, and provided the stimulus which led to the development of the method used.

TBWE METHOD

The TBWE Method developed for use in estimating consumptive-use amounts utilizes some of the basic research and experiment consumptive-use data presented by the cited authors. Similar data recently collected in Texas by the U. S. Agricultural Research Service and the Texas Agricultural Experiment Stations were used to develop constant-value USE COEFFICIENTS for a given crop.

The TBWE Method differs from other methods in the number of climatic variables utilized to express variations in consumptive-use amounts from place to place. Development of this method has been possible because of the availability of Equation 14, USWB Research Paper 38, and the related procedures presented in USWB Technical Paper 37, which provide the means of processing a greater and more varied amount of climatic data than heretofore practical.

The TBWE Method of estimating consumptive-use amounts for crops, is a procedure of relating a measured CONSUMPTIVE USE for a crop during a period of time, to a CLIMATIC INDEX at the site of measurement during the same period of time, to obtain a USE COEFFICIENT. This USE COEFFICIENT can then be applied to a CLIMATIC INDEX for the same length of time at any other site for which consumptive-use amounts are desired for that crop. This method and others are homogeneous in basic principles. However, this method employs constant USE COEFFICIENTS (KU) for specific crops in all geographic and climatic regions, and utilizes the variations in the composite relation of the four atmospheric phenomena to determine variations in consumptive-use (UC) amounts. Therefore, the amount of consumptive use estimated for a crop varies directly with the CLIMATIC INDEX (IC) only.

The only variation in a set of USE COEFFICIENTS for a crop is effected by the planting date and length of growing season; such as, the first of a month, the sixteenth of a month, or whatever date of a month is used. A set of USE COEFFICIENTS developed for a crop started on a specific planting date during any month and continuing throughout the length of the growing season for that crop from that date can be used without adjustment at sites other than the experiment site and beginning on the like planting date during any month. For example, USE COEFFICIENTS developed for cotton planted February 16 at Weslaco in Area 4A (see figure 4) can be used without change for cotton planted May 16 at Lubbock in Area 1B. The USE COEFFICIENTS developed were used in this manner for each specific crop in all areas having the same planting date of a month and the same length of growing season.

Procedure of Computation

The computation of USE COEFFICIENTS for each crop was accomplished in accordance with procedures described as follows:

A. Basic experiment data were related to CLIMATIC-INDEX numbers.

1. Measured CONSUMPTIVE-USE amounts were arranged by 15-day periods beginning with the planting date acknowledged in the experiment data used. These 15-day periods were arranged so that adjustments of the basic data could be made for use for crops started on the first or on the sixteenth day of a month.

2. CLIMATIC-INDEX numbers were computed for the same 15-day periods from climatic data for the experiment site or the nearest USWB first-order climatic station in accordance with the procedures described in the USWB Technical Paper 37. Paper 37 contains nomographs for the solution of Equation 14, USWB Research Paper 38. These numbers are called Evaporation from Lake Surfaces in the cited papers.

3. Each 15-day CONSUMPTIVE-USE amount was divided by the CLIMATIC INDEX for the corresponding 15-day period. The resulting ratios are 15-day USE COEFFICIENTS. (These 15-day ratios can be transferred to other sites and related to CLIMATIC-INDEX numbers for like periods to obtain estimates of CONSUMPTIVE USE by 15-day periods if desired.)

4. The 15-day amounts and numbers obtained in steps A1-3 were used to define growth-use curves which were plotted as histograms showing 15-day relations, and also plotted as mass curves showing total consumptive use for each crop during the period of experiment data available. These growth-use curves represent the consumptive use during various stages of vegetal growth.

B. The basic assumption of this method is that the growth of each crop and its corresponding water use is directly related to the four climatic factors described in the definition of CLIMATIC INDEX, and that this assumption is valid with the differing physiologic characteristics of various crops.

C. On the basis of the stated assumption under B, the growth-use curves described under A4 were used to adjust the experiment consumptive-use data to planting dates beginning on the first and sixteenth day of any month as desired.

1. CLIMATIC-INDEX numbers were computed for 15-day periods as needed for each experiment site in order to adjust experiment data for each crop to the selected planting dates used in the various areas.

2. The USE-COEFFICIENT numbers obtained by step A3 were used as constants for respective 15-day periods in sequence and were multiplied sequentially by the 15-day CLIMATIC-INDEX numbers obtained by step C1 to estimate CONSUMPTIVE-USE amounts at the experiment site as though a respective crop had been planted and grown at that site during the selected periods.

3. The CONSUMPTIVE-USE amounts and the CLIMATIC-INDEX numbers computed by steps C1 and C2 were combined into desired half-month and full-month arrangements to agree with the desired planting dates and the adopted length of growing season.

4. The half-month and full month values as combined in step C3 were then processed: UC/IC=KU--CONSUMPTIVE USE divided by CLIMATIC INDEX equals USE COEFFICIENT.

The KU numbers computed by the above-described procedure comprised sets of constant-value USE COEFFICIENTS which were employed in the computation of estimates of CONSUMPTIVE-USE amounts for respective crops in the areas of major production as desired.

BASIC DATA

Consumptive Use of Water by Crops

Amounts of water used consumptively by various crops, as determined at basic research and experiment sites, and presented in published and unpublished reports, were part of the basic data used to develop the relations and estimated consumptive-use amounts described and presented herein. These data were obtained at various sites in Arizona, California, and Texas. The sources of data for respective crops, are as follows:

Alfalfa consumptive-use amounts in San Fernando Valley, California, in 1940 5/

Corn based on consumptive-use amounts for grain sorghum at Bushland, Texas, 1956-58 5/,6/ and adjusted on the basis of growth-use relations for the two crops as indicated by figure 29 in Bulletin 937 7/

Cotton consumptive-use amounts at Weslaco, Texas, in 1958 8/

Small Grains consumptive use at Bushland, Texas, 1956-58 5/,6/

5/ Blaney, H. F., Haise, H. R., and Jensen, M. E., Monthly Consumptive Use by Irrigated Crops in Western United States: Supplement to U. S. Soil Conservation Service Tech. Paper 96.

6/ Jensen, M. E., and Sletten, W. H., 1959, Agricultural Reasearch Service Project Reports: ARS-SWC, Fort Collins, Colorado and Bushland, Texas.

7/ Bloodworth, M. E., 1959, Some Principles and Practices in the Irrigation of Texas Soils: Texas Agricultural Experiment Station Bull. 937, A. & M. College of Texas.

8/ Ross, P. E., and Boykin, J. W., Unpublished data for 1958 cotton crop at ARS-SWC station in Weslaco, Texas.

Citrus consumptive use is average of amounts for oranges and grapefruit in Salt River Valley, Arizona, 1931-54 9/ and the amounts for oranges in San Fernando Valley, California, in 1940 5/

Deciduous Fruit consumptive use in San Joaquin-Sacramento Delta, California, in 1928 9/

Pecans consumptive use based on amounts for walnuts in San Fernando Valley, California, in 1928 5/

Peanuts estimated average consumptive use in east Texas based on data in Bulletin 937 7/

Rice consumptive use and cultural flooding based on data from Rice-Pasture Experiment Station at Beaumont and Eagle Lake, Texas, in 1954

Grain sorghum consumptive use at Bushland, Texas, 1956-58 5/,6/

Deep-Rooted Vegetables consumptive use by tomatoes in Sacramento Valley, California, 1933-55 5/

Shallow-Rooted Vegetables consumptive use in San Joaquin Delta, California, in 1928 5/

The relations of the consumptive use of water by perennial pasture; by leguminous or other crops, used as fertilizers or soil conditioners; by silage sorghum and forage sorghum; to the consumptive use by the base crops described previously, were determined on the basis of sparse experiment data and recommendations by some of the agriculturists acknowledged.

The basic amounts of consumptive use at respective experiment sites by the above crops, as used to develop the USE COEFFICIENTS employed in the TBWE Method, are shown on table 1 (appendix B, page B-3). In some instances, the amounts shown as UC (CONSUMPTIVE USE) vary slightly from the amounts presented in the cited references. These variations result from the adjustment of the experiment data because of differences in planting dates.

5/ See footnote 5, page 10.

6/ See footnote 6, page 10.

7/ See footnote 7, page 10.

9/ Blaney, H. F., March 1959, Monthly Consumptive Use Requirements for Irrigated Crops: Am. Soc. Civil Engineers Proc. Paper 1963, Journal of the Irrigation and Drainage Division, Vol. 85, No. IR-1, Part I.

Climatic Index

The basic value of the average annual CLIMATIC INDEX determined for each of the 24 areas of the state described under GENERAL DISCUSSION, Divisions of the State, is shown by the large numerals on figure 3 (appendix A, page A-5). These values were obtained by replotting the respective isograms shown on plate 2, USWB Technical Paper 37, onto a map of Texas showing the 24 areas, and then determining an average from these isograms in each area. The resulting chart shows the variation in the average-annual value of the CLIMATIC INDEX for the 10-year period 1946-55 across the State.

As mentioned before, the values shown on plate 2, USWB Technical Paper 37, and entitled: "AVERAGE ANNUAL LAKE EVAPORATION IN INCHES, PERIOD 1946-55", are called CLIMATIC-INDEX numbers in this report.

Monthly values of the CLIMATIC-INDEX numbers for each of the 24 areas were determined by multiplying the average annual CLIMATIC-INDEX number for an area by the monthly distribution coefficients for that area as shown in table 3 (appendix B, page B-7). These distribution coefficients were determined from values of the average monthly CLIMATIC-INDEX number computed for 31 USWB first-order climatic stations--20 in Texas and 11 in adjacent states. These first-order stations are listed in table 2 (appendix B, page B-6). The distribution coefficients are the ratios obtained by dividing the average monthly CLIMATIC-INDEX number by the average annual CLIMATIC-INDEX number. If expressed as a percentage, these coefficients represent the percentage of the annual CLIMATIC-INDEX number occurring each month of a year on an average. The distribution coefficients were assigned to each of the 24 areas on the basis of the definition afforded by the numbers computed for each first-order climatic station--using such numbers direct when applicable, and interpolating between such numbers for adjacent areas when applicable. The resulting CLIMATIC-INDEX numbers are shown in table 3.

Monthly values of the CLIMATIC-INDEX number were computed for each experiment site, for each year or each average of years, as needed for relating to CONSUMPTIVE-USE amounts for crops comprising the basic agricultural data used herein. These numbers are shown as IC for the respective sites and crops in table 1.

USE COEFFICIENTS

Constant-value USE COEFFICIENTS for each crop at each experiment site were computed from the basic data as previously described under TBWE METHOD, Procedure of Computation. For practical application of the method, the USE COEFFICIENTS for half-month periods were recomputed and related to one-half of a monthly CLIMATIC-INDEX number. This procedure allows the use of monthly values of the CLIMATIC-INDEX number divided by two when computing estimates of consumptive use by crops planted on the sixteenth of a month or harvested by the fifteenth of a month. The USE COEFFICIENTS for each crop and each starting date and length of growing season are shown as KU in table 1.

The consumptive-use amounts computed and shown for each crop are estimates of the average depth of water, in inches, required for the growth and full development of that crop under conditions favorable to the production of

agricultural crops having a full water supply in each of the areas for the periods indicated. These amounts are constituted as defined and do not include estimates of losses of water from distribution, leaching, seepage, and other causes not inherently a part of the experiment consumptive-use data described and used.

TABULATIONS OF DATA

A set of tables, numbers 1 to 4 (appendix B) and numbers 5 to 16 (appendix C), are used to present the relations described and the results obtained by the procedures set forth. These tables contain the basic experiment CONSUMPTIVE-USE data adjusted to planting dates used herein, the CLIMATIC-INDEX numbers for the experiment sites, the TBWE USE COEFFICIENTS evolved, the distribution coefficients used to convert average-annual climatic-index numbers to monthly numbers in the 24 areas covering Texas, the average-monthly and average-annual climatic-index numbers computed for each of the 24 areas, and monthly and seasonal consumptive-use amounts by areas for the crops included and listed under GENERAL DISCUSSION, Crops and Crop Groupings.

The 24 areas were listed on the tables in a sequence chosen to attain reasonably smooth transition between the extremes in the general geographic and climatic areas of the State.

SELECTED BIBLIOGRAPHY

Abbe, Cleveland, 1905, A First Report of the Relations Between Climates and Crops: U. S. Weather Bureau Bull. 36.

Allen, S. W., 1955, Conserving Natural Resources, Principles and Practices in a Democracy: New York, McGraw-Hill Book Company.

Am. Geophys. Union, June 1934, Report of the Committee on Absorption and Transpiration, 1933-34: Am. Geophys. Union Trans., Washington, U. S. Govt. Printing Office.

Am. Soc. Civil Engineers, 1952, Consumptive Use of Water: Paper 2524 - a symposium, Am. Soc. Civil Engineers Trans., Vol. 117.

_____, 1930, Consumptive Use of Water in Irrigation: Progress Report of the Duty of Water Committee of the Irrigation, Am. Soc. Civil Engineers Trans., Vol. 94.

_____, 1949, Hydrology Handbook: Am. Soc. Civil Engineers Manuels of Engineering Practice, No. 28.

Beauchamp, K. H., September 1958, Potential Use of Water by Irrigation in the Humid Area: Am. Soc. Civil Engineers Proc. Paper 1750, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-3.

Biggar, J. W., Bloodworth, M. E., and Burleson, C. A., 1957, Effect of Irrigation Differentials and Planting Dates on the Growth, Yield, and Fiber Characteristics of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 1940, A. & M. College of Texas.

Blanney, H. F., 1952, Consumptive Use of Water: Am. Soc. Civil Engineers Trans., Vol. 117.

_____, October 1955, Evaporation and Evapotranspiration Investigations in the San Francisco Bay Area: Am. Geophys. Union Trans., Vol. 36, No. 5.

_____, 1938, Field Methods of Determining Consumptive Use of Water: Division of Irrigation, U. S. Dept. of Agriculture.

_____, March 1959, Monthly Consumptive Use Requirements for Irrigated Crops: Am. Soc. Civil Engineers Proc. Paper 1963, Journal of the Irrigation and Drainage Division, Vol. 85, No. IR-1, Part I.

_____, and Criddle, W. D., August 1950, Determining Water Requirements in Irrigated Areas from Climatological and Irrigation Data: U. S. Soil Conservation Service Tech. Paper 96.

_____, Ewing, P. A., Morin, K. V., and Criddle, W. D., June 1942, Consumptive Water Use and Requirements: Natl. Resources Planning Board, Pecos River Joint Investigation - Reports of the participating agencies, Washington, U. S. Govt. Printing Office.

Blaney, H. F., Ewing, P. A., Israelsen, O. W., Rohwer, Carl, and Scobey, F. C., February 1938, Water Utilization, Upper Rio Grande Basin: National Resources Committee, Part III.

_____, Haise, H. R., and Jensen, M. E., August 1950, Monthly Consumptive Use by Irrigated Crops in Western United States - a Provisional Supplement to SCS-TP-96, Determining Water Requirements in Irrigated Areas from Climatological and Irrigation Data: U. S. Soil Conservation Service Tech. Paper 96.

_____, and Harris, Karl, December 1951, Consumptive Use and Irrigation Requirements of Crops in Arizona: U. S. Soil Conservation Service.

_____, and Morin, K. V., 1942, Evaporation and Consumptive Use of Water Empirical Formulas: Am. Geophys. Union Trans., Vol. 23.

_____, and Stockwell, H. J., Jr., June 1941, Progress Report on Cooperative Research Studies on Water Utilization, San Fernando Valley, California, Irrigation Season of 1940: Division of Irrigation, U. S. Dept. of Agriculture.

_____, Taylor, C. A., Nickle, M. G., and Young, A. A., 1933, Water Losses Under Natural Conditions from Wet Areas in Southern California: Division of Water Resources Bull. 44, California State Dept. of Public Works, Pomona, California.

_____, Taylor, C. A., and Young, A. A., 1930, Rainfall Penetration and Consumptive Use of Water in Santa Ana River Valley and Coastal Plain: Division of Water Resources Bull. 33, California State Dept. of Public Works, Pomona, California.

Bloodgood, D. W., /no date/, Biennial Reports: Texas Board of Water Engineers, Austin, Texas.

_____, and Curry, A. S., 1925, Net Requirements of Crops for Irrigation Water in the Mesilla Valley, New Mexico: New Mexico Experiment Station Bull. 149.

Bloodworth, M. E., September 1959, Some Principles and Practices in the Irrigation of Texas Soils: Texas Agricultural Experiment Station Bull. 937, A. & M. College of Texas.

_____, Burleson, C. A., and Cowley, W. R., 1956, Effect of Irrigation Differentials and Planting Dates on the Growth, Yield, and Fiber Characteristics of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 1866, A. & M. College of Texas.

_____, Cowley, W. R., and Morris, J. S., 1950, Growth and Yield of Cotton on Willacy Loam as Affected by Different Irrigation Levels: Texas Agricultural Experiment Station Progress Report 1217, A. & M. College of Texas.

Bodman, G. B., and Colman, E. A., 1944, Moisture and Energy Conditions During Downward Entry of Water into Moist and Layered Soils: Am. Soil Science Society Proc., Vol. 8.

Bonnen, C. A., McArthur, W. C., Magee, A. C., and Hughes, W. F., 1952, Use of Irrigation Water on the High Plains: Texas Agricultural Experiment Station Bull. 756, A. & M. College of Texas.

Briggs, L. J., and Shantz, H. L., October 1916, Daily Transpiration During the Normal Growth Period and its Correlation with the Weather: Journal of Agricultural Research, Vol. 7.

_____, and Shantz, H. L., January 1916, Hourly Transpiration Rate on Clear Days as Determined by Cyclic Environmental Factors: Journal of Agricultural Research, Vol. 5.

Colman, E. A., and Bodman, G. B., 1945, Moisture and Energy Conditions During Downward Entry of Water into Moist and Layered Soils: Am. Soil Science Society Proc., Vol. 9.

Conkling, H., 1930, Consumptive Use of Water in Irrigation: Progress Report of the Duty of Water Committee of the Irrigation Division, Am. Soc. Civil Engineers Trans., Vol. 94.

Criddle, W. D., January 1958, Influence of Climate on Irrigation Agriculture: Am. Soc. Civil Engineers Proc. Paper 1504, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-1.

_____, January 1958, Methods of Computing Consumptive Use of Water: Am. Soc. Civil Engineers Proc. Paper 1507, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-1.

Davis, J. R., August 1956, Future of Irrigation in Humid Areas: Journal of the Am. Water Works Assoc., Vol. 48, No. 8.

_____, 1956, Water Demand Potential of Irrigation in Humid Areas: Report to Indiana Water Resources Study Committee, Purdue University, Lafayette, Indiana.

Draper, E. L. July 1947, Supporting Data, Middle Rio Grande Project Report Study of Valley Consumptive Use and Irrigation Demand at Otowi: U. S. Bureau of Reclamation, Albuquerque, New Mexico.

Fisher, C. E., and Burnett, E., 1953, Conservation and Utilization of Soil Moisture: Texas Agricultural Experiment Station Bull. 767, A. & M. College of Texas.

Fortier, Samuel, 1927, Orchard Irrigations: U. S. Dept. of Agriculture Farmers' Bull. 1518.

_____, and Young, A. A., June 1930, Irrigation Requirements of the Arid and Semiarid Lands of the Southwest: Division of Agricultural Engineering Tech. Bull. 185, Bureau of Public Roads, U. S. Dept. of Agriculture, Washington, U. S. Govt. Printing Office.

Gardner, W., and Widtsoe, J., 1921, The Movement of Soil Moisture: Soil Science, 11.

Garton, J. E. A., July 1951, Graphic Method of Finding the Depth of Irrigation Applied: Agricultural Engineering.

Gatewood, J. S., Robinson, T. W., Colby, B. R., Hem, J. D., and Halpenny, L. C., 1950, Use of Water by Bottom-Land Vegetation in Lower Safford Valley, Arizona: U. S. Geol. Survey Water-Supply Paper 1103.

Gerard, C. J., Bloodworth, M. E., Burleson, C. A., and Cowley, W. R., 1958, Cotton Irrigation in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Bull. 916, A. & M. College of Texas.

_____, Burleson, C. A., Biggar, J. W., and Cowley, W. R., 1958, Effect of Irrigation Differentials and Planting Dates on Yield of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 2016, A. & M. College of Texas.

Halkias, N. A., Veihmeyer, F. J., and Hendrickson, A. H., December 1955, Determining Water Needs for Crops from Climatic Data: Hilgardia, Vol. 24, No. 9, University of California.

Hall, W. A., April 1956, Estimating Irrigation Border Flow: Agricultural Engineering.

Hansen, V. E., February 2, 1955, Infiltration and Soil Water Movement During Irrigation: Soil Science, 79.

Hargreaves, G. H., November 1956, Irrigation Requirements Based on Climatic Data: Am. Soc. Civil Engineers Proc. Paper 1105, Journal of the Irrigation and Drainage Division, Vol. 82, No. IR-3.

Harris, Karl, Kinnison, A. F., and Albertt, O. W., 1936, Use of Water by Washinton Navel Oranges and Marsh Grapefruit Trees in Salt River Valley, Arizona: Arizona Agricultural Experiment Station Bull. 153.

Hildreth, R. J., 1956, Risk and Uncertainty Arising From Soil-Moisture Yield Relationships in the Great Plains: Paper for Southwestern Social Science Association Program, March 30, 1956, Dept. of Agricultural Economics and Sociology, A. & M. College of Texas.

Horton, R. E., 1923, Transpiration by Forest Trees: U. S. Weather Bureau Monthly Weather Review, Vol. 51.

Hughes, W. F., and Motheral, J. R., September 1950, Irrigated Agriculture in Texas: Texas Agricultural Experiment Station Misc. Pub. 59, A. & M. College of Texas.

Iowa State University, July 1959, Chances of Receiving Selected Amounts of Precipitation in the North Central Region of the U. S.: Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa.

_____, /no date/, Transpiration and Evapotranspiration as Related to Meteorological Factors (U. S. Weather Bureau Contract 9295): Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa.

Israelsen, O. W., September 1958, The Engineer and Worldwide Conservation of Soil and Water: Am. Soc. Civil Engineers Proc. Paper 1775, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-3.

_____, 1950, Irrigation Principles and Practices: New York, John Wiley and Sons, Inc.

Jensen, M. E., 1957, Research Shows When to Irrigate Winter Wheat: Soils and Water.

Kansas State College, 1956-57, The Evapotranspiration Problem First Contribution Report (U. S. Weather Bureau Contract 8806): Manhattan, Kansas.

Kohler, K. O., Jr., 1955, Trends in the Utilization of Water: Yearbook of Agriculture.

Kohler, M. A., 1957, Computation of Evaporation and Evapotranspiration from Meteorological Observations: Paper for presentation at Am. Meteorological Society Meeting in Chicago, March 19-21, 1957.

_____, Nordenson, T. J., and Baker, D. R., 1959, Evaporation Maps for the United States: U. S. Weather Bureau Tech. Paper 37.

_____, Nordenson, T. J., and Fox, W. E., 1955, Evaporation from Pans and Lakes: U. S. Weather Bureau Research Paper 38.

Linsley, R. K., /no date/, Techniques for Surveying Surface-Water Resources: World Meteorological Organization No. 82, Tech. Paper 32, Tech. Note 26.

Lowry, R. L., Jr., and Johnson, A. F., April 1941, Consumptive Use of Water for Irrigation: Am. Soc. Civil Engineers Proc., Vol. 67.

_____, and Johnson, A. F., 1942, Consumptive Use of Water for Agriculture: Am. Soc. Civil Engineers Trans., Vol. 107.

McCulloch, A. A., August 1957, The Economics of Sprinkler Irrigation Systems: Irrigation - Engineering and Maintenance.

Magee, A. C., Bonnen, C. A., McArthur, W. C., and Hughes, W. F., 1953, Production Practices for Irrigated Crops on the High Plains: Texas Agricultural Experiment Station Bull. 763, A. & M. College of Texas.

Maierhofer, C. R., January 1958, Drainage in Relation to a Permanent Irrigation Agriculture: Am. Soc. Civil Engineers Proc. Paper 1506, Journal of the Irrigation and Drainage Division, Vol. 84, No. 1R-1.

Mickey, K. B., 1945, Man and The Soil: International Harvester Company.

Muldrow, W. C., 1948, Forecasting Productivity of Irrigable Lands: Am. Soc. Civil Engineers Trans., Vol. 113.

Nettles, V. F., Jamison, F. S., and Jones, B. E., June 1952, Irrigation and Other Cultural Studies with Cabbage, Sweet Corn, Snap Beans, Onions, Tomatoes and Cucumbers: University of Florida Agricultural Experiment Station Bull. 495, Gainsville, Florida.

Osborn, Ben, /no date/, Water and the Land: U. S. Soil Conservation Service Tech. Paper 134.

Palmer, V. J., April 1946, Retardance Coefficients for Low Flow in Channels Lines with Vegetation: Am. Geophys. Union Trans. 27.

Palmer, W. C., April 1958, A Graphical Technique for Determining Evapotranspiration by the Thornwaite Method: U. S. Weather Bureau, Washington, U. S. Govt. Printing Office.

Parshall, R. L., 1937, Laboratory Measurement of Evapo-Transpiration Losses: Journal of Forestry, pp. 1033-1040.

Penman, H. L., February 1956, Estimating Evaporation: Am. Geophys. Union Trans., Vol. 37, No. 1.

_____, 1948, Natural Evaporation from Open Water, Bare Soil and Grass: Proceedings of the Royal Society, Series A-193, London, England.

_____, 1952, Water and Plant Growth: Agricultural Progress, Vol. 27, Part 2.

Pruitt, W. O., and Jensen, M. C., June 1955, Determining when to Irrigate: Agricultural Engineering.

Ree, W. O., 1939, Some Experiments on Shallow Flows Over a Grassed Slope: Am. Geophys. Union Trans., Part IV.

Reynolds, E. B., 1954, Research on Rice Production in Texas: Texas Agricultural Experiment Station Bull. 775, A. & M. College of Texas.

Robinson, A. R., Jr., and Rohwer, Carl, 1957, Measurement of Canal Seepage: Am. Soc. Civil Engineers Trans., Vol. 122.

Russell, E. J., 1950, Soil Conditions and Plant Growth: New York, Longmans, Green and Company.

Shaw, B. T. (Editor), 1952, Soil Physical Conditions and Plant Growth: New York, Academic Press.

South Dakota State College, February 1959, Seasonal Variations of Soil Moisture in South Dakota: South Dakota Agricultural Experiment Station, Economics Dept. Pamphlet 99, Brookings, South Dakota.

Staten, T. D., 1957, Alfalfa Production in Texas: Texas Agricultural Experiment Station Bull. 955, A. & M. College of Texas.

Swanson, N. P., and Thaxton, E. L., 1956, Irrigation Requirements for Grain Sorghum Production on the High Plains: Texas Agricultural Experiment Station Bull. 846, A. & M. College of Texas.

Texas Agricultural Experiment Station, June 1954, Summary of Soil and Water Conservation Research from the Blackland Experiment Station, Temple, Texas, 1942-53: Texas Agricultural Experiment Station Bull. 781, A. & M. College of Texas.

Texas Crop and Livestock Reporting Service, /no date/, Texas Vegetable Statistics, 1939-58: Agricultural Marketing Service, U. S. Dept. of Agriculture.

Thaxton, E. L., and Swanson, N. P., 1956, Guides in Cotton Irrigation on the High Plains: Texas Agricultural Experiment Station Bull. 838, A. & M. College of Texas.

Thornthwaite, C. W., 1948, An Approach toward a Rational Classification of Climate: Geographical Review 38.

Thornthwaite, C. W., and Mather, J. R., 1957, Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance: Drexel Institute of Technology Pub. in Climatology, Vol. X, No. 3, Centerton, New Jersey.

_____, and Mather, J. R., 1955, The Water Balance: Drexel institute of Technology Pub. in Climatology, Vol. VIII, No. 1, Centerton, New Jersey.

Thornton, J. D., and Templin, E. H., /no date/, The Soils of Texas: Texas Agricultural Extension Service Leaflet 74, A. & M. College of Texas.

Thurmond, R. V., /no date/, How to Estimate Soil Moisture by Feel: Texas Agricultural Extension Service Leaflet 355, A. & M. College of Texas.

_____, /no date/, Soil Moisture Storage: Texas Agricultural Extension Service Leaflet 357, A. & M. College of Texas.

_____, Box, J., and Elliott, F. C., Texas Guide for Growing Irrigated Cotton: Texas Agricultural Extension Service Bull. 896, A. & M. College of Texas.

Trew, E. M., and Hoveland, C. S., 1955, Irrigated Pastures for South Texas: Texas Agricultural Extension Service and Texas Agricultural Experiment Station Bull. 819, A. & M. College of Texas.

U. S. Geological Survey, 1954, Water-Loss Investigations: Vol. 1 - Lake Hefner Studies: U. S. Geol. Survey Prof. Paper 269.

_____, 1958, Water-Loss Investigations: Lake Mead Studies: U. S. Geol. Survey Prof. Paper 298.

Van Bavel, C. H. M., 1953, A Drought Criterion and Its Application in Evaluating Drought Incidence and Hazard: Agronomy Journal, Vol. 45.

_____, and Wilson, T. V., 1952, Evapotranspiration Estimates as Criteria for Determining Time of Irrigation: Agricultural Engineering, Vol. 33.

Veihmeyer, F. J., 1938, Evaporation from Soils and Transpiration: Am. Geophys. Union Trans., Vol. 19.

Young, A. A., 1945, Irrigation Requirements of California Crops: Division of Water Resources Bull. 51, California State Dept. of Public Works, Pomona, California.

_____, and Blaney, H. F., 1942, Use of Water by Native Vegetation: California State Division of Water Resources Bull. 50, Sacramento, California.

APPENDIX A

Descriptive Figures

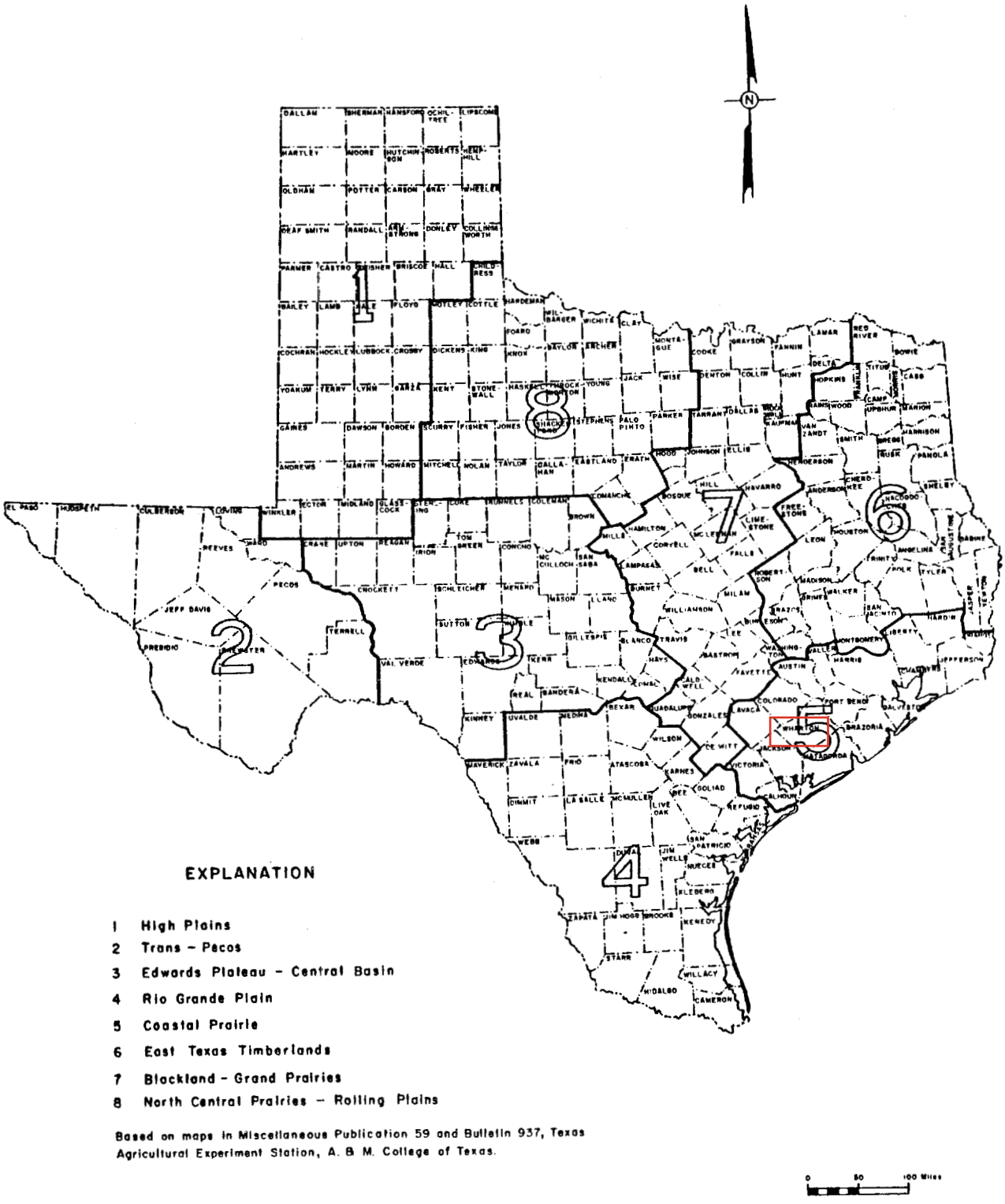


FIGURE 1. - Land resource divisions and irrigated areas.

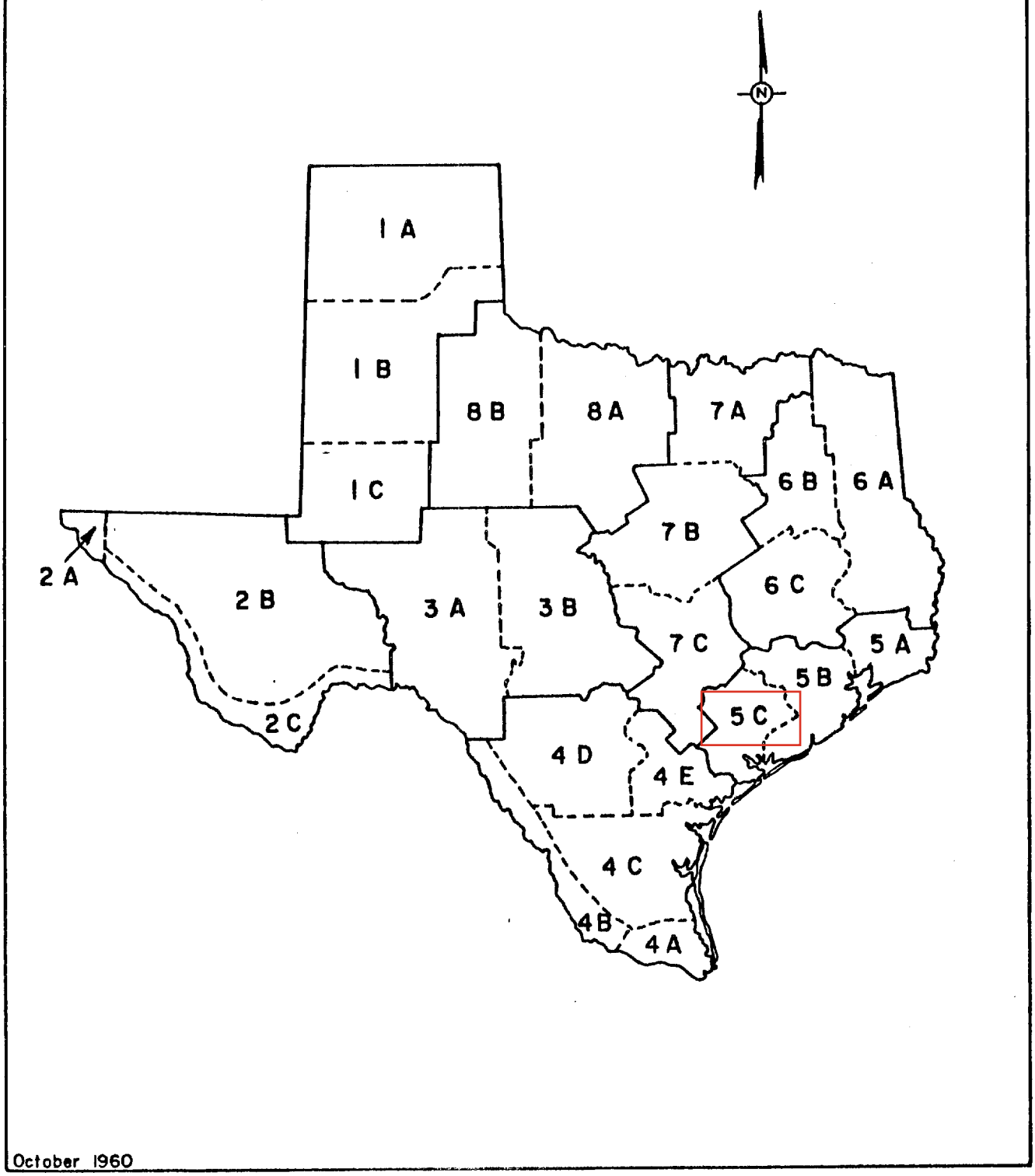


FIGURE 2.— Subdivisions of irrigated areas

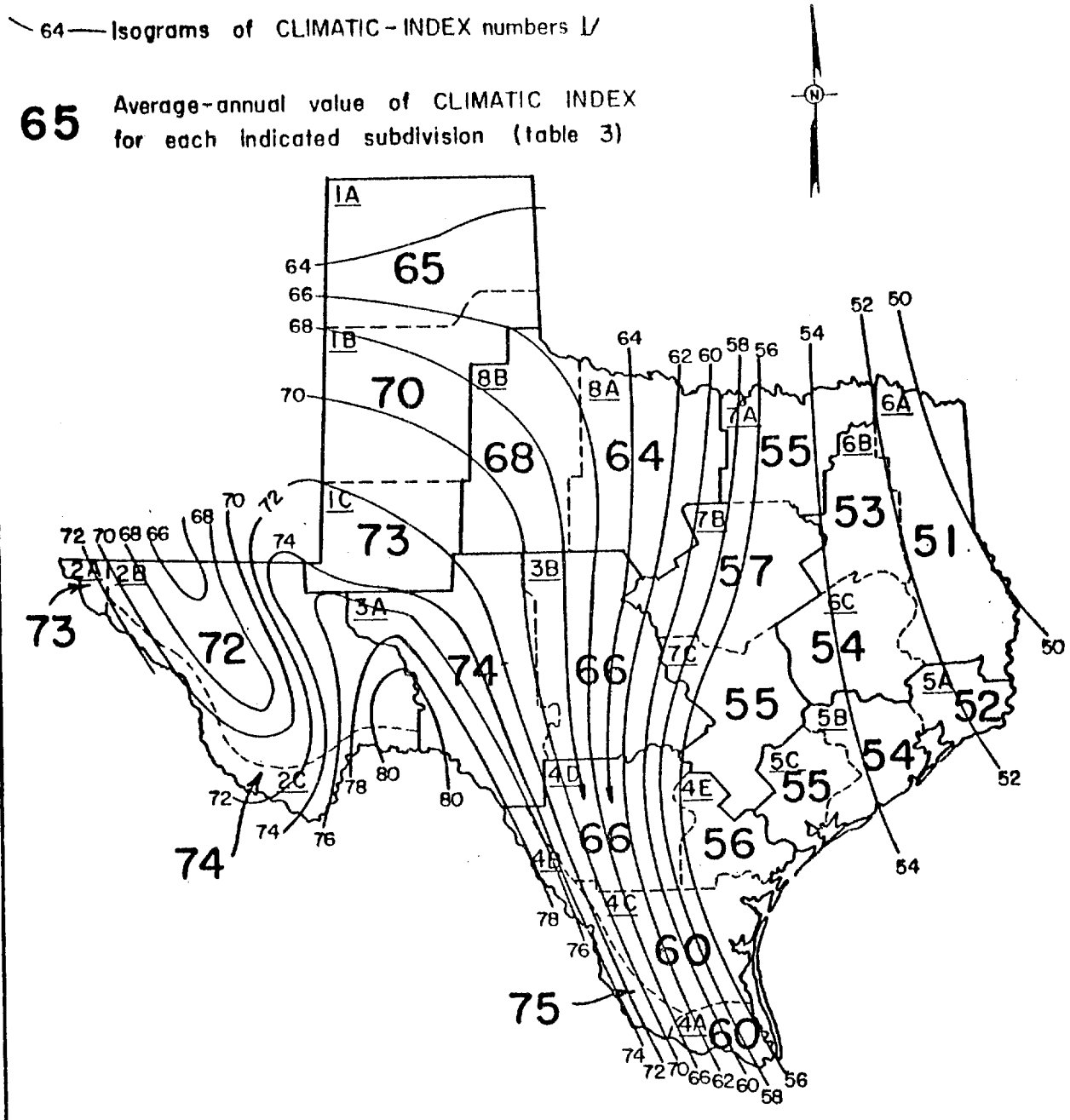


FIGURE 3.- Average-annual CLIMATIC-INDEX numbers for subdivisions of irrigated areas

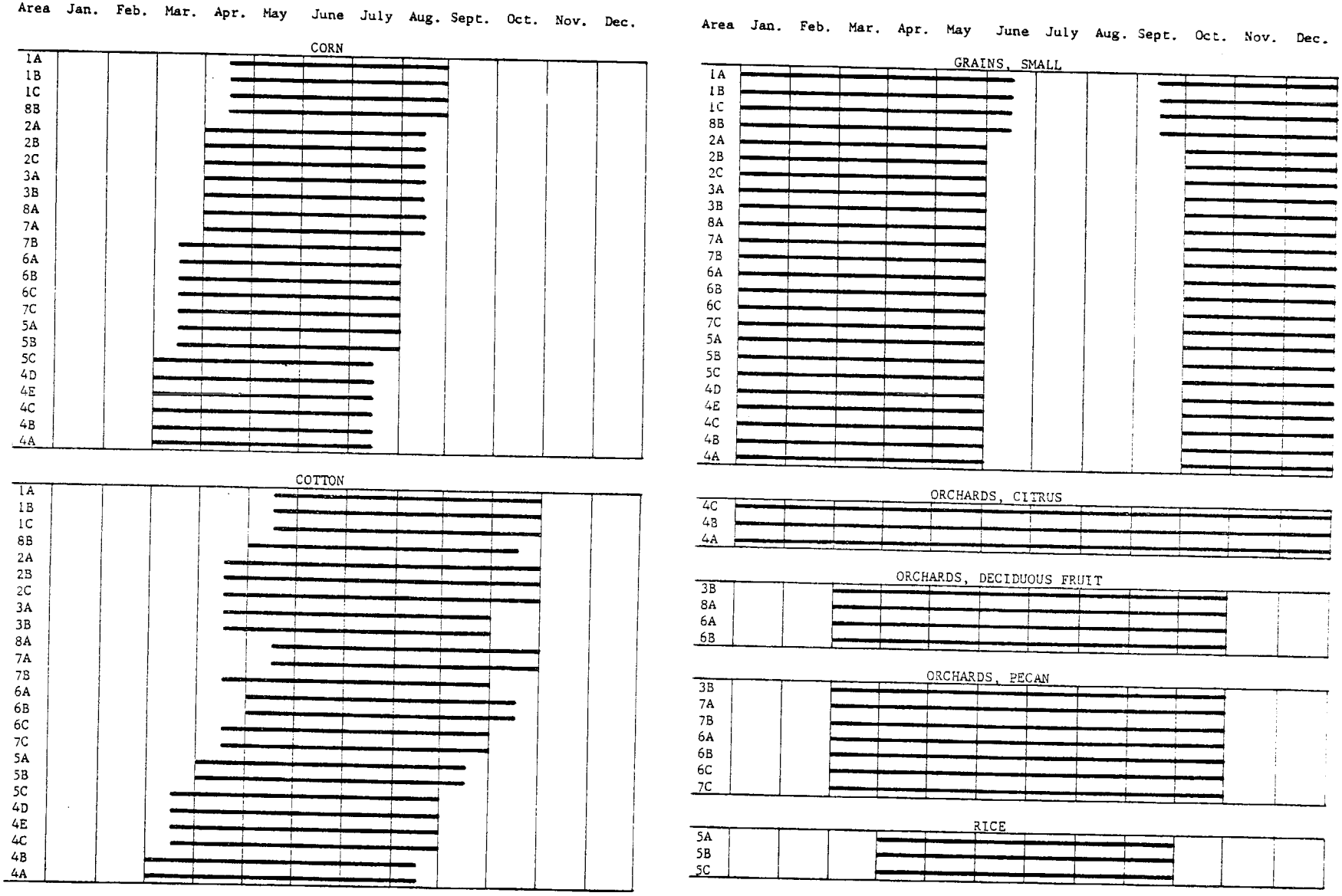
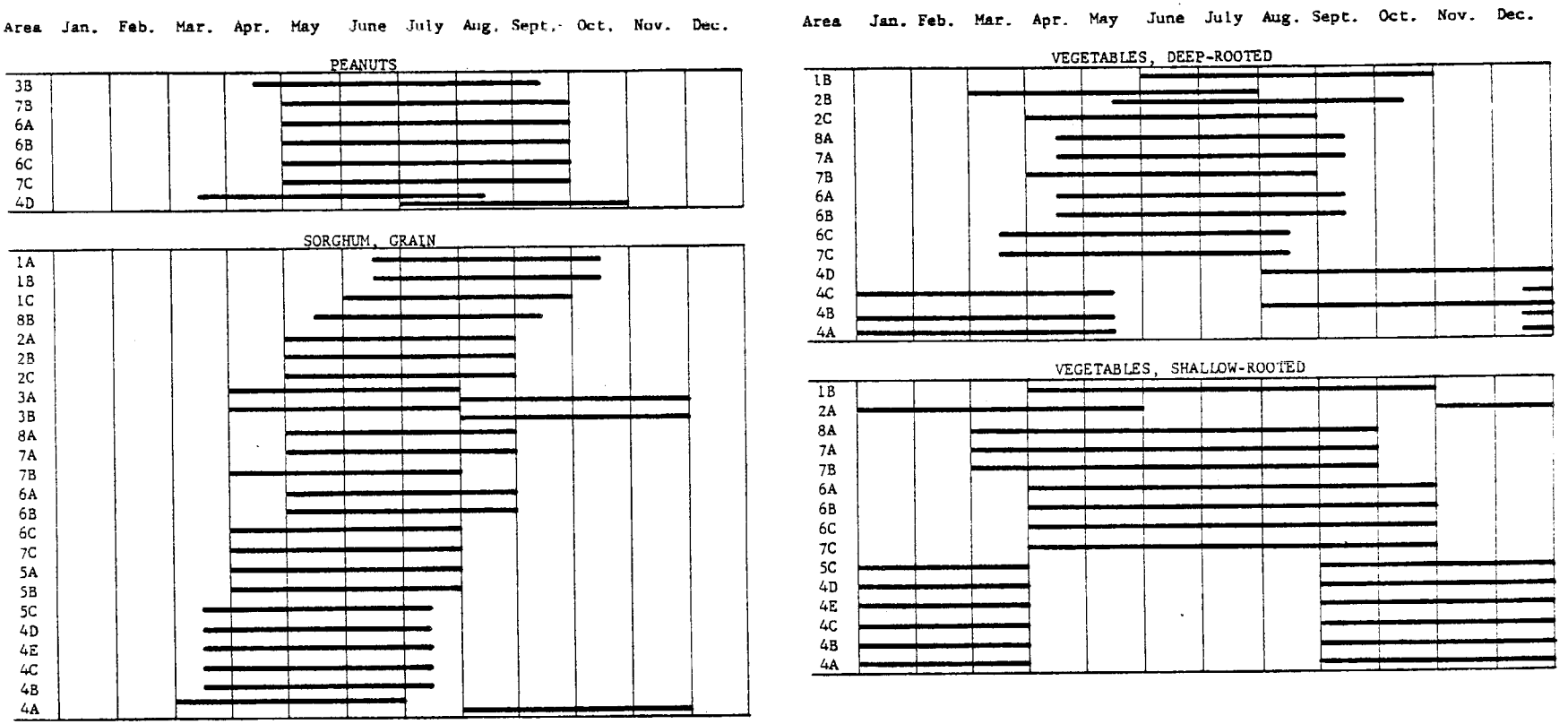


FIGURE 4.-Average planting date and length of growing season of crops, by areas, in Texas



Note.--Alfalfa, a perennial usually planted in September, is omitted from the above chart. The average planting date used for each crop is the first or middle of a month as indicated. In some areas for some crops, two bars indicate two crops yearly.

FIGURE 4. --Continued

APPENDIX B

Tables of Experiment Data and Basic Relations

Table 1

BASIC DATA

UC--CONSUMPTIVE USE; IC--CLIMATIC INDEX; KU--USE COEFFICIENT; values at experiment sites and times

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
ALFALFA: San Fernando Valley, California, 1940													
UC	1.3	1.6	3.1	3.3	6.7	5.4	7.8	4.2	5.6	4.4	3.1	1.3	47.8
IC	2.2	2.7	3.8	4.3	5.9	5.4	7.6	5.9	5.4	4.3	3.8	2.7	54.0
KU	0.59	0.59	0.82	0.77	1.14	1.00	1.03	0.71	1.04	1.02	0.82	0.48	0.89
CORN: Based on grain sorghum at Bushland, Texas, 1956-58, planted on 1st day of a month													
UC						1.3	4.0	6.5	8.4	*2.9			23.1
IC						8.4	8.8	8.0	6.2	5.7÷2			34.2
KU						0.15	0.45	0.81	1.35	1.00			0.68
CORN: Based on grain sorghum at Bushland, Texas, 1956-58, planted on 16th day of month													
UC						*0.4	2.8	4.6	7.3	6.7			21.6
IC						8.4÷2	8.8	8.0	6.2	5.7			32.9
KU						0.09	0.32	0.58	1.18	1.18			0.66
COTTON: Weslaco, Texas, 1958, planted on 1st day of a month, 5½-month season													
UC			0.7	1.2	6.1	5.5	4.5	*.04					18.4
IC			3.1	5.1	5.9	6.6	7.4	7.8÷2					32.0
KU			0.23	0.24	1.03	0.83	0.61	0.10					0.58
COTTON: Weslaco, Texas, 1958, planted on 16th day of a month, 5½-month season													
UC			*0.3	1.3	4.0	7.2	5.1	1.7					19.6
IC			3.1÷2	5.1	5.9	6.6	7.4	7.8					34.3
KU			0.18	0.25	0.68	1.09	0.69	0.22					0.57
COTTON: Weslaco, Texas, 1958, planted on 16th day of a month, 6½-month season													
UC			*0.3	1.3	3.6	6.0	6.4	5.5	3.5				26.6
IC			3.1÷2	5.1	5.9	6.6	7.4	7.8	4.5				38.3
KU			0.18	0.25	0.61	0.91	0.86	0.71	0.77				[illegible]

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
GRAINS, SMALL: Bushland, Texas, 1956-58, planted on 1st day of a month, 8-month season													
UC	1.6	2.4	5.4	7.5	6.4					1.6	1.6	1.5	28.0
IC	2.0	2.3	3.6	5.1	6.9					5.7	2.8	2.5	30.9
KU	0.80	1.04	1.50	1.47	0.93					0.28	0.57	0.60	0.91
GRAINS, SMALL: Bushland, Texas, 1956-58, planted on 16th day of a month, 9-month season													
UC	1.0	1.8	3.9	6.5	7.0	*3.1			*0.7	1.6	1.4	1.1	28.1
IC	2.0	2.3	3.6	5.1	6.9	8.4÷2			6.2÷2	5.7	2.8	2.5	38.2
KU	0.50	0.78	1.08	1.27	1.01	0.74			0.23	0.28	0.50	0.44	0.74
ORCHARDS, CITRUS: Average for oranges and grapefruit, Salt River Valley, Arizona, 1931-54													
UC	1.6	1.7	2.5	3.2	4.2	4.9	5.6	5.6	4.8	3.5	2.4	1.7	41.7
IC	2.3	3.3	5.0	7.1	8.9	9.9	9.2	8.1	5.2	5.0	3.0	2.2	69.2
KU	0.69	0.52	0.50	0.45	0.47	0.49	0.61	0.69	0.92	0.70	0.80	0.77	0.60
Oranges, San Fernando Valley, California, 1940													
UC	1.1	2.2	2.3	4.0	4.4	4.6	4.0	3.4	2.8	2.6	2.0	1.6	35.0
IC	2.2	2.7	3.8	4.3	5.9	5.4	7.6	5.9	5.4	4.3	3.8	2.7	54.0
KU	0.50	0.81	0.61	0.93	0.75	0.85	0.53	0.58	0.52	0.60	0.53	0.59	0.65
ORCHARDS, CITRUS: Average values													
KU	0.60	0.66	0.56	0.69	0.61	0.67	0.57	0.64	0.72	0.65	0.66	0.68	0.62
ORCHARDS, DECIDUOUS FRUIT: San Joaquin-Sacramento Delta, California, 1928													
UC			1.0	2.2	3.8	6.0	6.8	4.8	2.8	0.8			28.2
IC			2.4	4.8	4.3	5.8	7.2	6.7	6.2	3.4			40.8
KU			0.42	0.46	0.88	1.03	0.92	0.72	0.45	0.24			0.69
ORCHARDS, PECAN: San Fernando Valley, California, 1928													
UC			1.5	3.8	5.0	5.9	6.1	5.0	2.8	2.0			32.6
IC			2.6	5.1	4.6	6.1	7.6	7.1	6.6	3.6			43.3
KU			0.58	0.75	1.09	0.97	0.80	0.70	0.42	0.56			0.75

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
PEANUTS: Estimated UC, East Texas, planted on 1st day of a month, 4-month season													
UC					2.1	5.1	6.4	4.3					17.9
IC					5.6	6.6	7.1	6.6					25.9
KU					0.38	0.77	0.90	0.65					0.69
PEANUTS: Estimated UC, East Texas, planted on 1st day of a month, 5-month season													
UC					1.1	2.9	4.3	6.3	3.5				18.1
IC					5.6	6.6	7.1	6.6	5.1				31.0
KU					0.20	0.44	0.61	0.95	0.69				0.58
PEANUTS: Estimated UC, East Texas, planted on 16th day of a month, 5-month season													
UC				*0.4	2.0	3.4	5.5	5.3	*1.3				17.9
IC				4.6÷2	5.6	6.6	7.1	6.6	5.1÷2				30.8
KU				0.15	0.33	0.49	0.80	0.90	0.54				0.58
RICE: Based on data from Rice-Pasture Experiment Stations, Beaumont and Eagle Lake, Texas, 1954													
UC				7.6	6.8	15.0	10.2	6.8	9.6				56.0
IC				4.2	6.8	7.5	6.8	6.8	6.0				38.1
KU				1.80	1.00	2.00	1.50	1.00	1.60				1.47
SORGHUM, GRAIN: Bushland, Texas, 1956-58, planted on 1st day of a month													
UC						3.6	7.4	8.1	3.7				22.8
IC						8.4	8.8	8.0	6.2				31.4
KU						0.43	0.84	1.01	0.60				0.73
SORGHUM, GRAIN: Bushland, Texas, 1956-58, planted on 16th day of a month													
UC						*0.9	5.8	8.6	5.0	*1.1			21.5
IC						8.4÷2	8.8	8.0	6.2	5.7÷2			30.0
KU						0.21	0.66	1.08	0.81	0.38			0.72
VEGETABLES, DEEP-ROOTED: Tomatoes, Sacramento Valley, California, 1933-55, planted on 1st day of a month													
UC						3.0	4.2	7.0	5.1	2.1			21.4
IC						7.8	8.7	7.5	6.5	3.7			34.2
KU						0.38	0.48	0.93	0.78	0.57			0.63

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
VEGETABLES, DEEP-ROOTED: Tomatoes, Sacramento Valley, California, 1933-55, planted on 16th day of a month													
UC					*1.2	3.3	5.7	7.3	4.5	*0.8			22.8
IC					6.1÷2	7.8	8.7	7.5	6.5	3.7÷2			35.4
KU					0.38	0.42	0.66	0.97	0.69	0.43			0.66
VEGETABLES, SHALLOW-ROOTED: San Joaquin Delta, California, 1928, planted on 1st day of a month													
UC				1.2	3.0	6.0	5.4	5.4	3.6	1.8			26.4
IC				4.8	4.3	5.8	7.2	6.7	6.2	3.4			38.4
KU				0.25	0.70	1.03	0.75	0.81	0.58	0.53			0.69

*One-half month.

Table 2

U. S. WEATHER BUREAU First-Order Stations

Texas

Abilene	Dallas	Houston	San Angelo
Amarillo	Del Rio	Laredo	San Antonio
Austin	El Paso	Lubbock	Victoria
Brownsville	Fort Worth	Palestine	Waco
Corpus Christi	Galveston	Port Arthur	Wichita Falls

Arkansas	Louisiana	New Mexico	Oklahoma
Fort Smith	Baton Rouge	Albuquerque	Oklahoma City
Little Rock	Lake Charles	Clayton	Tulsa
Texarkana	Shreveport	Roswell	

Table 3

CLIMATIC-INDEX COEFFICIENTS

Coefficients for monthly distribution of average-annual climatic-index numbers, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	0.03	0.04	0.07	0.10	0.11	0.14	0.13	0.12	0.10	0.07	0.05	0.04	1.00
1B	.03	.05	.08	.10	.11	.14	.13	.13	.09	.07	.04	.03	1.00
1C	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
8B	.03	.04	.07	.09	.11	.14	.14	.13	.10	.07	.05	.03	1.00
2A	.03	.04	.07	.10	.13	.14	.13	.11	.10	.07	.05	.03	1.00
2B	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
2C	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
3A	.03	.04	.07	.09	.12	.13	.14	.12	.10	.08	.05	.03	1.00
3B	.04	.04	.07	.09	.11	.13	.13	.12	.10	.08	.05	.04	1.00
8A	.03	.04	.07	.09	.11	.14	.14	.13	.10	.08	.04	.03	1.00
7A	.03	.04	.07	.09	.11	.14	.14	.14	.10	.07	.04	.03	1.00
7B	.03	.04	.07	.09	.11	.13	.14	.14	.10	.08	.04	.03	1.00
6A	.03	.04	.07	.09	.11	.13	.14	.13	.10	.08	.04	.04	1.00
6B	.03	.04	.07	.09	.11	.13	.14	.14	.10	.07	.04	.04	1.00
6C	.03	.04	.07	.09	.11	.13	.14	.13	.10	.08	.04	.04	1.00
7C	.03	.04	.07	.09	.11	.13	.13	.13	.10	.08	.05	.04	1.00
5A	.03	.05	.07	.09	.12	.13	.12	.12	.10	.08	.05	.04	1.00
5B	.03	.04	.06	.09	.11	.14	.13	.13	.10	.08	.05	.04	1.00
5C	.03	.04	.07	.09	.11	.13	.13	.13	.10	.08	.05	.04	1.00
4D	.04	.05	.07	.08	.11	.12	.14	.13	.09	.08	.05	.04	1.00
4E	.04	.05	.07	.09	.11	.12	.13	.13	.09	.08	.05	.04	1.00
4C	.04	.05	.07	.09	.10	.12	.14	.13	.09	.08	.05	.04	1.00
4B	.04	.05	.06	.09	.11	.12	.14	.13	.09	.08	.05	.04	1.00
4A	.04	.05	.07	.09	.11	.12	.14	.12	.09	.08	.05	.04	1.00

Table 4

CLIMATIC-INDEX NUMBERS

Average monthly and annual climatic-index numbers, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	2.0	2.6	4.6	6.5	7.2	9.1	8.4	7.8	6.5	4.6	3.2	2.6	65
1B	2.1	3.5	5.6	7.0	7.7	9.8	9.1	9.1	6.3	4.9	2.8	2.1	70
1C	2.2	2.9	5.1	7.3	8.8	9.5	10.2	8.8	7.3	5.1	3.6	2.2	73
8B	2.0	2.7	4.8	6.1	7.5	9.5	9.5	8.8	6.8	4.8	3.4	2.0	68
2A	2.2	2.9	5.1	7.3	9.5	10.2	9.5	8.0	7.3	5.1	3.6	2.2	73
2B	2.2	2.9	5.0	7.2	8.6	9.4	10.1	8.6	7.2	5.0	3.6	2.2	72
2C	2.2	3.0	5.2	7.4	8.9	9.6	10.4	8.9	7.4	5.2	3.7	2.2	74
3A	2.2	3.0	5.2	6.7	8.9	9.6	10.4	8.9	7.4	5.9	3.7	2.2	74
3B	2.6	2.6	4.6	5.9	7.3	8.6	8.6	7.9	6.6	5.3	3.3	2.6	66
8A	1.9	2.6	4.5	5.8	7.0	9.0	9.0	8.3	6.4	5.1	2.6	1.9	64
7A	1.6	2.2	3.8	5.0	6.0	7.7	7.7	7.7	5.5	3.8	2.2	1.6	55
7B	1.7	2.3	4.0	5.1	6.3	7.4	8.0	8.0	5.7	4.6	2.3	1.7	57
6A	1.5	2.0	3.6	4.6	5.6	6.6	7.1	6.6	5.1	4.1	2.0	2.0	51
6B	1.6	2.1	3.7	4.8	5.8	6.9	7.4	7.4	5.3	3.7	2.1	2.1	53
6C	1.6	2.2	3.8	4.9	5.9	7.0	7.6	7.0	5.4	4.3	2.2	2.2	54
7C	1.6	2.2	3.8	5.0	6.0	7.2	7.2	7.2	5.5	4.4	2.8	2.2	55
5A	1.6	2.6	3.6	4.7	6.2	6.8	6.2	6.2	5.2	4.2	2.6	2.1	52
5B	1.6	2.2	3.2	4.9	5.9	7.6	7.0	7.0	5.4	4.3	2.7	2.2	54
5C	1.6	2.2	3.8	5.0	6.0	7.2	7.2	7.2	5.5	4.4	2.8	2.2	55
4D	2.6	3.3	4.6	5.3	7.3	7.9	9.2	8.6	5.9	5.3	3.3	2.6	66
4E	2.2	2.8	3.9	5.0	6.2	6.7	7.3	7.3	5.0	4.5	2.8	2.2	56
4C	2.4	3.0	4.2	5.4	6.0	7.2	8.4	7.8	5.4	4.8	3.0	2.4	60
4B	3.0	3.8	4.5	6.8	8.2	9.0	10.5	9.8	6.8	6.0	3.8	3.0	75
4A	2.4	3.0	4.2	5.4	6.6	7.2	8.4	7.2	5.4	4.8	3.0	2.4	60

APPENDIX C

Tables of Crop Consumptive Use

Average monthly and annual consumptive use,
depth in inches, by areas, 1946-55

Table 5

ALFALFA

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	1.2	1.5	3.8	5.0	8.2	9.1	8.7	5.5	6.8	4.7	2.6	1.2	58.3
1B	1.2	2.1	4.6	5.4	8.8	9.8	9.4	6.5	6.6	5.0	2.3	1.0	62.7
1C	1.3	1.7	4.2	5.6	10.0	9.5	10.5	6.2	7.6	5.2	3.0	1.1	65.9
8B	1.2	1.6	3.9	4.7	8.6	9.5	9.8	6.2	7.1	4.9	2.8	1.0	61.3
2A	1.3	1.7	4.2	5.6	10.8	10.2	9.8	5.7	7.6	5.2	3.0	1.1	66.2
2B	1.3	1.7	4.1	5.5	9.8	9.4	10.4	6.1	7.5	5.1	3.0	1.1	65.0
2C	1.3	1.8	4.3	5.7	10.1	9.6	10.7	6.3	7.7	5.3	3.0	1.1	66.9
3A	1.3	1.8	4.3	5.2	10.1	9.6	10.7	6.3	7.7	6.0	3.0	1.1	67.1
3B	1.5	1.5	3.8	4.5	8.3	8.6	8.9	5.6	6.9	5.4	2.7	1.2	58.9
8A	1.1	1.5	3.7	4.5	8.0	9.0	9.3	5.9	6.7	5.2	2.1	.9	57.9
7A	.9	1.3	3.1	3.8	6.8	7.7	7.9	5.5	5.7	3.9	1.8	.8	49.2
7B	1.0	1.4	3.3	3.9	7.2	7.4	8.2	5.7	5.9	4.7	1.9	.8	51.4
6A	.9	1.2	3.0	3.5	6.4	6.6	7.3	4.7	5.3	4.2	1.6	1.0	45.7
6B	.9	1.2	3.0	3.7	6.6	6.9	7.6	5.3	5.5	3.8	1.7	1.0	47.2
6C	.9	1.3	3.1	3.8	6.7	7.0	7.8	5.0	5.6	4.4	1.8	1.1	48.5
7C	.9	1.3	3.1	3.8	6.8	7.2	7.4	5.1	5.7	4.5	2.3	1.1	49.2
5A	.9	1.5	3.0	3.6	7.1	6.8	6.4	4.4	5.4	4.3	2.1	1.0	46.5
5B	.9	1.3	2.6	3.8	6.7	7.6	7.2	5.0	5.6	4.4	2.2	1.1	48.4
5C	.9	1.3	3.1	3.8	6.8	7.2	7.4	5.1	5.7	4.5	2.3	1.1	49.2
4D	1.5	1.9	3.8	4.1	8.3	7.9	9.5	6.1	6.1	5.4	2.7	1.2	58.5
4E	1.3	1.7	3.2	3.8	7.1	6.7	7.5	5.2	5.2	4.6	2.3	1.1	49.7
4C	1.4	1.8	3.4	4.2	6.8	7.2	8.7	5.5	5.6	4.9	2.5	1.2	53.2
4B	1.8	2.2	3.7	5.2	9.3	9.0	10.8	7.0	7.1	6.1	3.1	1.4	66.7
4A	1.4	1.8	3.4	4.2	7.5	7.2	8.7	5.1	5.6	4.9	2.5	1.2	53.5

Note.--PERENNIAL PASTURE: Use 90 percent of monthly amount shown for ALFALFA as estimate of consumptive use.

Table 6

CORN

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A				*0.3	2.3	5.3	9.9	9.2					27.0
1B				*.3	2.5	5.7	10.7	10.7					29.9
1C				*.3	2.8	5.5	12.0	10.4					31.0
8B				*.3	2.4	5.5	11.2	10.4					29.8
2A				1.1	4.3	8.3	12.8	*4.0					30.5
2B				1.1	3.9	7.6	13.6	*4.3					30.5
2C				1.1	4.0	7.8	14.0	*4.4					31.3
3A				1.0	4.0	7.8	14.0	*4.4					31.2
3B				.9	3.3	7.0	11.6	*4.0					26.8
8A				.9	3.2	7.3	12.2	*4.2					27.8
7A				.8	2.7	6.2	10.4	*3.8					23.9
7B			*0.2	1.6	3.7	8.7	9.4						23.6
6A			*.2	1.5	3.2	7.8	8.4						21.1
6B			*.2	1.5	3.4	8.1	8.7						21.9
6C			*.2	1.6	3.4	8.3	9.0						22.5
7C			*.2	1.6	3.5	8.5	8.5						22.3
5A			*.2	1.5	3.6	8.0	7.3						20.6
5B			*.1	1.6	3.4	9.0	8.3						22.4
5C			.6	2.2	4.9	9.7	*3.6						21.0
4D			.7	2.4	5.9	10.7	*4.6						24.3
4E			.6	2.2	5.0	9.0	*3.6						20.4
4C			.6	2.4	4.9	9.7	*4.2						21.8
4B			.7	3.1	6.6	12.2	*5.2						27.8
4A			.6	2.4	5.3	9.7	*4.2						22.2

* One-half month.

Table 7

COTTON

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A					*0.6	2.3	5.7	8.5	4.5	1.0			22.8
1B					*.7	2.4	6.2	9.9	4.3	1.1			24.6
1C					*.8	2.4	6.9	9.6	5.0	1.1			25.8
8B					1.7	2.3	9.8	7.3	4.1	*.2			25.4
2A				*0.7	2.4	6.2	8.6	6.9	5.2	3.9			33.9
2B				*.6	2.2	5.7	9.2	7.4	5.1	3.8			34.0
2C				*.7	2.2	5.9	9.5	7.7	5.3	4.0			35.3
3A				*.6	2.2	6.5	11.3	6.1	1.6				28.3
3B				*.5	1.8	5.8	9.4	5.5	1.5				24.5
8A					*.6	2.2	6.1	9.0	4.4	1.1			23.4
7A					*.5	1.9	5.2	8.4	3.8	.8			20.6
7B				*.5	1.6	5.0	8.7	5.5	1.3				22.6
6A					1.3	1.6	7.3	5.5	3.1	*.2			19.0
6B					1.3	1.7	7.6	6.1	3.2	*.2			20.1
6C				*.4	1.5	4.8	8.3	4.8	1.2				21.0
7C				*.4	1.5	4.9	7.8	5.0	1.2				20.8
5A				1.1	1.5	7.0	5.1	3.8	*.3				18.8
5B				1.1	1.4	7.8	5.8	4.3	*.3				20.7
5C			*0.3	1.2	4.1	7.8	5.0	1.6					20.0
4D			*.4	1.3	5.0	8.6	6.3	1.9					23.5
4E			*.4	1.2	4.2	7.3	5.0	1.6					19.7
4C			*.4	1.4	4.1	7.8	5.8	1.7					21.2
4B			1.0	1.6	8.4	7.5	6.4	*.5					25.4
4A			1.0	1.3	6.8	6.0	5.1	*.4					20.6

* One-half month

Table 8

GRAINS, SMALL

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A	1.0	2.0	5.0	8.3	7.3	*3.4			*0.7	1.3	1.6	1.1	31.7
1B	1.0	2.7	6.0	8.9	7.8	*3.6			*.7	1.4	1.4	.9	34.4
1C	1.1	2.3	5.5	9.3	8.9	*3.5			*.8	1.4	1.8	1.0	35.6
8B	1.0	2.1	5.2	7.7	7.6	*3.5			*.8	1.3	1.7	.9	31.8
2A	1.8	3.0	7.6	10.7	8.8					1.4	2.1	1.3	36.7
2B	1.8	3.0	7.5	10.6	8.0					1.4	2.1	1.3	35.7
2C	1.8	3.1	7.8	10.9	8.3					1.5	2.1	1.3	36.8
3A	1.8	3.1	7.8	9.8	8.3					1.7	2.1	1.3	35.9
3B	2.1	2.7	6.9	8.7	6.8					1.5	1.9	1.6	32.2
8A	1.5	2.7	6.8	8.5	6.5					1.4	1.5	1.1	30.0
7A	1.3	2.3	5.7	7.4	5.6					1.1	1.3	1.0	25.7
7B	1.4	2.4	6.0	7.5	5.9					1.3	1.3	1.0	26.8
6A	1.2	2.1	5.4	6.8	5.2					1.1	1.1	1.2	24.1
6B	1.3	2.2	5.6	7.1	5.4					1.0	1.2	1.3	25.1
6C	1.3	2.3	5.7	7.2	5.5					1.2	1.3	1.3	25.8
7C	1.3	2.3	5.7	7.4	5.6					1.2	1.6	1.3	26.4
5A	1.3	2.7	5.4	6.9	5.8					1.2	1.5	1.3	26.1
5B	1.3	2.3	4.8	7.2	5.5					1.2	1.5	1.3	25.1
5C	1.3	2.3	5.7	7.4	5.6					1.2	1.6	1.3	26.4
4D	2.1	3.4	6.9	7.8	6.8					1.5	1.9	1.6	32.0
4E	1.8	2.9	5.8	7.4	5.8					1.3	1.6	1.3	27.9
4C	1.9	3.1	6.3	7.9	5.6					1.3	1.7	1.4	29.2
4B	2.4	4.0	6.8	10.0	7.6					1.7	2.2	1.8	36.5
4A	1.9	3.1	6.3	7.9	6.1					1.3	1.7	1.4	29.7

* One-half month

Note.--LEGUMINOUS FERTILIZERS: Use monthly amount shown for SMALL GRAINS for respective periods of growth.

Table 9

ORCHARDS, CITRUS

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
4C	1.4	2.0	2.4	3.7	3.7	4.8	4.8	5.0	3.9	3.1	2.0	1.6	38.4
4B	1.8	2.5	2.5	4.7	5.0	6.0	6.0	6.3	4.9	3.9	2.5	2.0	48.1
4A	1.4	2.0	2.4	3.7	4.0	4.8	4.8	4.6	3.9	3.1	2.0	1.6	38.3

Table 10

ORCHARDS, DECIDUOUS FRUIT

3B	1.9	2.7	6.4	8.9	7.9	5.7	3.0	1.3	37.8
8A	1.9	2.7	6.2	9.3	8.3	6.0	2.9	1.2	38.5
6A	1.5	2.1	4.9	6.8	6.5	4.8	2.3	1.0	29.9
6B	1.6	2.2	5.1	7.1	6.8	5.3	2.4	0.9	31.4

Table 11

ORCHARDS, PECAN

3B	2.7	4.4	8.0	8.3	6.9	5.5	2.8	3.0	41.6
7A	2.2	3.8	6.5	7.5	6.2	5.4	2.3	2.1	36.0
7B	2.3	3.8	6.9	7.2	6.4	5.6	2.4	2.6	37.2
6A	2.1	3.4	6.1	6.4	5.7	4.6	2.1	2.3	32.7
6B	2.1	3.6	6.3	6.7	5.9	5.2	2.2	2.1	34.1
6C	2.2	3.7	6.4	6.8	6.1	4.9	2.3	2.4	34.8
7C	2.2	3.8	6.5	7.0	5.8	5.0	2.3	2.5	35.1

Table 12

PEANUTS

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
3B				*0.4	2.4	4.2	6.9	7.1	*1.8				
7B					1.3	3.3	4.9	7.6	3.9				22.8
6A					1.1	2.9	4.3	6.3	3.5				21.0
6B					1.2	3.0	4.5	7.0	3.7				18.1
6C													19.4
7C					1.2	3.1	4.6	6.6	3.7				
≠4D					1.2	3.2	4.4	6.8	3.8				19.2
≠4D			*0.3	1.7	3.6	6.3	8.3	*2.3					19.4
							3.5	6.6	5.3	3.4			22.5
													18.8

Table 13

RICE

5A				8.5	6.2	13.6	9.3	6.2	8.3				52.1
5B				8.8	5.9	15.2	10.5	7.0	8.6				56.0
5C				9.0	6.0	14.4	10.8	7.2	8.8				56.2

* One-half month.
≠ Two crops yearly.

Table 14

SORGHUM, GRAIN

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A						*1.0	5.5	8.4	5.3	*0.9			21.1
1B						*1.0	6.0	9.8	5.1	*.9			22.8
1C						4.1	8.6	8.9	4.4				26.0
8B					*0.8	6.3	10.3	7.1	*1.3				25.8
2A					4.1	8.6	9.6	4.8					27.1
2B					3.7	7.9	10.2	5.2					27.0
2C					3.8	8.1	10.5	5.3					27.7
≠3A				2.9	7.5	9.7	6.2						26.3
≠3B				2.5	6.1	8.7	5.2						22.5
8A					3.0	7.6	9.1	5.0					24.7
7A					2.6	6.5	7.8	4.6					21.5
7B				2.2	5.3	7.5	4.8						19.8
6A					2.4	5.5	7.2	4.0					19.1
6B					2.5	5.8	7.5	4.4					20.2
6C				2.1	5.0	7.1	4.6						18.8
7C				2.2	5.0	7.3	4.3						18.8
5A				2.0	5.2	6.9	3.7						17.8
5B				2.1	5.0	7.7	4.2						19.0
5C			*0.4	3.3	6.5	5.8	*1.4						17.4
4D			*.5	3.5	7.9	6.4	*1.7						20.0
4E			*.4	3.3	6.7	5.4	*1.4						17.2
4C			*.4	3.6	6.5	5.8	*1.6						17.9
4B			*.5	4.5	8.9	7.3	*2.0						23.2
≠4A			1.8	4.5	6.7	4.3							17.3

* One-half month.
≠ Two crops yearly.

Table 14--Continued

SORGHUM, GRAIN

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
≠4A								3.1	4.5	4.8	1.8		14.2
≠3A								3.8	6.2	6.0	2.2		18.2
≠3B								3.4	5.5	5.4	2.0		16.3

≠ Two crops yearly.
Note.--SORGHUM, SILAGE AND FORAGE: Use monthly amount shown for GRAIN SORGHUM for respective periods of growth.

Table 15

VEGETABLES, DEEP-ROOTED

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1B						3.7	4.4	8.5	4.9	2.8			24.3
≠2B			1.9	3.5	8.0	7.3	5.8						26.5
≠2B					*1.6	3.9	6.7	8.3	5.0	*1.1			26.6
2C				2.8	4.3	8.9	8.1	5.1					29.2
8A				*1.1	2.9	5.9	8.7	5.7	*1.4				25.7
7A				*1.0	2.5	5.1	7.5	5.3	*1.2				22.6
7B				1.9	3.0	6.9	6.2	4.6					22.6
6A				*.9	2.4	4.4	6.9	4.6	*1.1				20.3
6B				*.9	2.4	4.6	7.2	5.1	*1.1				21.3
6C			*.7	2.1	3.9	6.8	5.2	*1.5					20.2
7C			*.7	2.1	4.0	7.0	5.0	*1.5					20.3
4D								3.3	2.8	4.9	2.6	1.5	15.1

* One-half month.
≠ Two crops yearly.

Table 15--Continued

VEGETABLES, DEEP-ROOTED

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
4C	1.0	2.0	4.1	3.7	*1.3							*0.5	12.6
≠4B								3.7	3.3	5.6	3.0	1.7	17.3
≠4B	1.3	2.5	4.4	4.7	*1.8							*.6	15.3
4A	1.0	2.0	4.1	3.7	*1.4							*.5	12.7

Crops Included

Beans	Chard	Okra	Pumpkin	Tomatoes
Beets	Cucumbers	Peas	Squash	Turnips
Cantaloupe	Eggplant	Peppers	Sweet potatoes	Watermelons
Carrots				

* One-half month.
≠ Two crops yearly.

Table 16

VEGETABLES, SHALLOW-ROOTED

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1B				1.8	5.4	10.1	6.8	7.4	3.7	2.6			37.8
2A	2.3	2.2	4.1	4.2	5.0						0.9	1.5	20.2
8A			1.1	4.1	7.2	6.8	7.3	4.8	3.4				34.7
7A			1.0	3.5	6.2	5.8	6.2	4.5	2.9				30.1
7B			1.0	3.6	6.5	5.6	6.5	4.6	3.0				30.8
6A				1.2	3.9	6.8	5.3	5.3	3.0	2.2			27.7
6B				1.2	4.1	7.1	5.6	6.0	3.1	2.0			29.1
6C				1.2	4.1	7.2	5.7	5.7	3.1	2.3			29.3
7C				1.2	4.2	7.4	5.4	5.8	3.2	2.3			29.5
5C	1.3	1.3	2.0						1.4	3.1	2.9	1.6	13.6
4D	2.1	1.9	2.4						1.5	3.7	3.4	2.0	17.0
4E	1.8	1.6	2.1						1.2	3.2	2.9	1.6	14.4
4C	1.9	1.7	2.2						1.4	3.4	3.1	1.8	15.5
4B	2.4	2.2	2.4						1.7	4.2	3.9	2.2	19.0
4A	1.9	1.7	2.2						1.4	3.4	3.1	1.8	15.5

Crops Included

Brussels sprouts
Cabbage
Cauliflower
Celery
Lettuce
Onions
Radishes
Spinach
Sweet Corn

Area type for Wharton County - 5C

Consumptive use				
	Corn	Cotton	Alfa-alfa	Average
January			0.81	0.81
February			1.17	1.17
March	0.6	0.3		0.45
April	2.2	1.2		1.7
May	4.9	4.1		4.5
June	9.7	7.8		8.75
July	3.6	5.8		4.7
August		1.7		1.7
September			5.13	5.13
October			4.05	4.05
November			2.07	2.07
December			0.99	0.99

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.:

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

(1) Month	(2) Avg Rain	(3) Avg Runoff	(4) Avg Infilt Rainfall	(5) Evapo-trans.	(6) Required Leach	(7) Total Water Needs	(8) Effluent Needed in Root Zone	(9a) Raw Net Evap. from Reservoir	(9b) Reservoir Net Evap. (as inches on plot acres)	(10) Effluent Needed Based on Irrigation Efficiency	(11) Reservoir Consumtion (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.41	1.95	0.81	0.00	0.81	0.00	-1.03	0.00	0.00	0.00
February	2.15	0.58	1.57	1.17	0.00	1.17	0.00	0.11	0.00	0.00	0.00
March	2.90	1.07	1.82	0.45	0.00	0.45	0.00	0.67	0.00	0.00	0.00
April	3.07	1.20	1.87	1.7	0.00	1.70	0.00	1.34	0.00	0.00	0.00
May	4.50	2.32	2.18	4.5	0.58	5.08	2.90	0.40	0.00	3.41	3.41
June	4.08	1.97	2.10	8.75	1.66	10.41	8.31	1.66	0.00	9.77	9.77
July	3.46	1.49	1.97	4.7	0.68	5.38	3.41	2.67	0.00	4.01	4.01
August	3.40	1.44	1.96	1.7	0.00	1.70	0.00	2.87	0.00	0.00	0.00
September	3.89	1.82	2.07	5.13	0.77	5.90	3.83	1.11	0.00	4.50	4.50
October	4.10	1.99	2.11	4.05	0.49	4.54	2.43	0.07	0.00	2.85	2.85
November	3.78	1.74	2.04	2.07	0.01	2.08	0.03	-0.82	0.00	0.04	0.04
December	2.71	0.95	1.77	0.99	0.00	0.99	0.00	-0.63	0.00	0.00	0.00
Totals	41.41	18.00	23.41	36.02	4.18	40.20	20.90	8.41	0.00	24.59	24.59

Crop is Coastal

CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	5.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate = 2.05 *ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate = *ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis = N/A *ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit = 2.05 *ac-in/ac/month* **OR** *ac-ft/ac/year*

Limiting factor = Click this cell to choose from list.

Gross rate check (from flow, acres) = 0.00 **OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = (*average rainfall* – (0.2*((1000/*CN*) – 10))) ^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall – average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019
(6) Required leaching = ← Edit
If: *evapotranspiration – average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration – average infiltrated rainfall* > 0, *Ce* /(*Cl – Ce*)*(*evapotranspiration – avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration + required leaching*
(8) Effluent needed in root zone = *total water needs – average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface + effluent needed based on irrigation efficiency*

STORAGE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: Wharton AD1, LLC
Permit No.: 0

The storage calculations are designed to evaluate the storage capacity and surface area of the applicant's storage pond (or multiple ponds). The pond must have enough surface area to evaporate all the flow to the pond under low-net evaporation and corresponding annual rainfall conditions. The pond is considered adequately sized when the adidtional storage required is equal to zero (or "none"). If the additional storage required is greater than zero, then:
(1) the pond's storage capacity must be increase, (2) the pond's surface area must be increased, (3) the effluent flow must be reduced, or (4) other approved measures must be taken to ensure that no accumulation occurs during low-net evaporation and corresponding annual rainfall conditions.

(12) Month	(13) Effluent Available (as inches on plot acres)	(14a) Average Rainfall Distrib. (%)	(14b) Rain Worst Year	(15) Field Runoff Worst Year	(16) Infiltrated Rain	(17) Avail Water	(18a) Average Net Evap. Distrib. (%)	(18b) Low Net Evap. from Reservoir Surface	(19) Effluent to Storage (as inches on plot acres)	(20) Accum Storage (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	8.11%	5.04	2.77	2.27	2.27	-12.28%	0.00	0.00	-
February	0.00	5.19%	3.22	1.31	1.91	1.92	1.31%	0.00	0.00	-
March	0.00	6.99%	4.34	2.19	2.15	2.16	7.99%	0.00	0.00	0.01
April	0.00	7.41%	4.60	2.40	2.20	2.20	15.96%	0.00	0.00	0.01
May	0.00	10.88%	6.76	4.29	2.47	2.47	4.77%	0.00	-3.07	-
June	0.00	9.85%	6.12	3.72	2.40	2.41	19.77%	0.00	-9.42	-
July	0.00	8.37%	5.20	2.91	2.29	2.29	31.68%	0.00	-3.64	-
August	0.00	8.22%	5.10	2.83	2.27	2.28	34.09%	0.00	0.00	-
September	0.00	9.40%	5.84	3.47	2.37	2.37	13.18%	0.00	-4.14	-
October	0.00	9.91%	6.15	3.75	2.41	2.41	0.78%	0.00	-2.50	-
November	0.00	9.13%	5.67	3.32	2.35	2.35	-9.76%	0.00	0.00	-
December	0.00	6.55%	4.07	1.97	2.10	2.11	-7.50%	0.00	0.00	-
Totals	0.03	100%	62.12	34.93	27.19	27.23	100%	0.00	—	-

Worst (low) net evap. = -18.96 inches
Corresponding rain = 62.12 inches
Worst-case net year = 2004

Storage required = 29.87 *ac-ft*
Actual storage = *ac-ft*
Additional storage required = 29.87 *ac-ft*
Storage days = 130 *days*

← You must manually enter a starting value for accumulated storage. **Click the link for instructions.**
Instructions for setting the accumulated storage start value'

FALSE ← Special case (all positive storage values)

(13) Effluent available for irrigation (assumes design flow is applied to entire acerage unless different flow values are justified).
(14a) Average rainfall distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(14b) Rainfall worst year = (*rainfall distribution* as fraction or %/100)**maximum annual rainfall*
(15) Field runoff worst year = (*rainfall worst year* – (0.2*((1000/*CN*) – 10))) ^2/((*rainfall worst year* + (0.8*((1000/*CN*) – 10))))
(16) Infiltrated rainfall = (rainfall worst year- field runoff worst year)
(17) Available water = (effluent available for land application + infiltrated rainfall check)
(18a) Average net evaporation distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(18b) Net low evaporation from reservoir surface = [(|*low net evaporation*|)*(*net low evaporation avg. dist*)]*[(*pond area*)/(*irrigation area*)]
(19) Storage =
If: (*total water needs – infiltrated rainfall*) < 0, (*effluent available for land application – net low evaporation from reservoir surface*);
If: (*total water needs – infiltrated rainfall*) ≥ 0,
(effluent available for land application – net low evaporation from reservoir surface) * [(total water needs – infiltrated rainfall)/(irrigation efficiency)]
(20) Accumulated storage =
If: *net low evaporation from reservoir surface + storage* ≤ 0, 0
If: *net low evaporation from reservoir surface + storage* > 0, enter value

From:	Sowmiya Kannappan
To:	Sara Holmes
Cc:	Hannah Zellner; Stephen Megnia; development@vanguardrenewables.com; Michael Zhang | Environeer Engineering Consulting
Subject:	Re: Pretech comments - WQ0005487000
Date:	Sunday, April 6, 2025 10:43:23 AM
Attachments:	Outlook-A picture .png Outlook-Graphical .png

Hi Sara,

I have uploaded the following documents in the link below for your review:

Drive Link: https://drive.google.com/drive/folders/10Inw3dXcS8oDUeLqlr0R-jeqC2iZ4Spg?usp=sharing

1. Revised version of the TLAP application
2. CN and ET calculation sheet
3. Completed irrigation spreadsheet
4. Bulletin 6019 - marked with the specific ET value chosen for the Wharton county and the crops to be grown on the property.

Please let us know if you have any questions.

Sowmiya Kannappan
Environmental Consultant
Office: (281)-845-9889 | Mobile: (346)-441-9582
Address: University of Houston Technology Bridge
5000 Gulf Freeway, Bldg 4, Houston, TX, 77023
www.environeerconsulting.com



From: Sara Holmes <Sara.Holmes@tceq.texas.gov>
Sent: Monday, March 17, 2025 1:23 PM
To: Sowmiya Kannappan <sowmiya.kannappan@environeerconsulting.com>; Michael Zhang | Environeer Engineering Consulting <michael.zhang@environeerconsulting.com>
Cc: Hannah Zellner <Hannah.Zellner@Tceq.Texas.Gov>
Subject: Pretech comments - WQ0005487000

Good afternoon,

The Water Quality Assessment (WQA) Team of the Texas Commission on Environmental Quality has completed a preliminary review of the permit application information and identified deficiencies (attached) that must be addressed before the WQA Team can continue with the technical review. The deficient item(s) will require your response in a timely, complete, and accurate manner.

An accurate and complete revised permit application is essential for making recommendations to the commission regarding whether this permit should be issued. Based on the information provided in the application, the executive director does not have sufficient information to make a recommendation. Therefore, you must send updated technically complete and accurate information within **14 days** (March 31, 2025) of the date of this email.

Any revisions can be sent electronically to this email. If you have any questions, please feel free to contact either me or Hannah.

Thank you,

Sara Holmes
Natural Resource Specialist II
Water Quality Assessment Team
12100 Park 35 Circle
Austin, TX 78753
512-239-4534

TEXAS BOARD OF WATER ENGINEERS

Durwood Manford, Chairman
R. M. Dixon, Member
O. F. Dent, Member

BULLETIN 6019

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

November 1960

Reprinted July 1962

TEXAS BOARD OF WATER ENGINEERS

Durwood Manford, Chairman
R. M. Dixon, Member
O. F. Dent, Member

BULLETIN 6019

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

By

Louis L. McDaniels
Surface Water Division
Texas Board of Water Engineers

November 1960

Reprinted July 1962

First Printing, November 1960

Second Printing, September 1961

Third Printing, July 1962

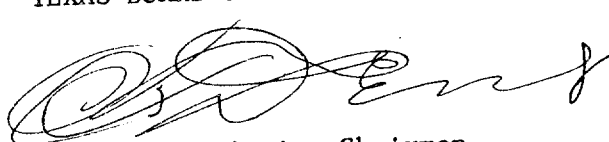
FOREWORD

Irrigation is practiced in different parts of Texas under various climatic conditions. In the far western portion of the State, irrigation supplies almost all of the water used by crops, while in the State's central region a significant part of crop water requirements is derived from rainfall. Rainfall on the eastern section of the State is sufficient for crop production most of the time, but crop yields are often assured through the use of "insurance" irrigation during infrequent critical dry periods of a few weeks duration.

This bulletin presents information on the water requirements of plants regardless of whether this water is supplied by precipitation directly, or by irrigation. The values given herein are not the amounts of water which are to be applied to the land, or pumped from a water supply source, to achieve agricultural production. Diversion amounts and field application volumes are dependent upon the soil characteristics, canal losses, deep percolation, and variations in times and amounts of rainfall. All these factors have to be considered in determining the amounts of water to be diverted from a supply for irrigation.

In order to determine the amount of irrigation water to be applied to the land, it is necessary to know the water requirements of plants. This bulletin presents the fundamental data of these water requirements of plants for use in water resources planning. Subsequent publications will describe studies of effective rainfall, irrigation efficiencies, and total diversion requirements.

TEXAS BOARD OF WATER ENGINEERS



O. F. Dent, Acting Chairman
November 23, 1960

TABLE OF CONTENTS

	Page
ABSTRACT	1
INTRODUCTION	3
ACKNOWLEDGEMENTS	3
PERSONNEL	4
DEFINITIONS	4
GENERAL DISCUSSION	5
Divisions of the State	5
Crops and Crop Groupings	5
Crop Seasons	6
Methods of Estimating Consumptive Use	7
TBWE METHOD	8
Procedure of Computation	8
BASIC DATA	10
Consumptive Use of Water by Crops	10
Climatic Index	12
USE COEFFICIENTS	12
TABULATIONS OF DATA	13
SELECTED BIBLIOGRAPHY	15

TABLE OF CONTENTS (Cont'd.)

APPENDICES

Page

Appendix A - Descriptive Figures ---------- A-1

Figure 1. Land resource divisions and irrigated areas ---------- A-3

2. Subdivision of irrigated areas ---------- A-4

3. Average-annual CLIMATIC-INDEX numbers for subdivisions of irrigated areas ---------- A-5

4. Average planting date and length of growing season of crops, by areas, in Texas ---------- A-6

Appendix B - Tables of Experiment Data and Basic Relations ---------- B-1

Table 1. Basic Data ---------- B-3

2. U. S. Weather Bureau First-Order Stations ---------- B-6

3. Climatic-Index Coefficients ---------- B-7

4. Climatic-Index Numbers ---------- B-8

Appendix C - Tables of Crop Consumptive Use ---------- C-1

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Table 5. Alfalfa ---------- C-3

6. Corn ---------- C-4

7. Cotton ---------- C-5

8. Grains, Small ---------- C-6

9. Orchards, Citrus ---------- C-7

10. Orchards, Deciduous Fruit ---------- C-7

11. Orchards, Pecan ---------- C-7

12. Peanuts ---------- C-8

13. Rice ---------- C-8

14. Sorghum, Grain ---------- C-9

15. Vegetables, Deep-Rooted ---------- C-10

16. Vegetables, Shallow-Rooted ---------- C-12

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

ABSTRACT

The study that resulted in the publication of this report was undertaken in order to obtain fundamental data of the average amounts of water used consumptively by agricultural crops, grown under favorable conditions including a full water supply, and thus to fulfill partly the need for information required for use in estimating the water requirements for irrigation.

The results published herein are estimates of average consumptive-use amounts for 12 major crops and crop groupings, and are tabulated by months for the respective length of growing season for each crop in each of 24 areas of major production in the State.

A method for estimating consumptive use of water by crops was developed by the Board of Water Engineers and used for the computation of the estimates tabulated. The TBWE (Texas Board of Water Engineers) Method is a procedure of relating experiment consumptive-use data to a composite relation of air temperature, dew point temperature, wind movement, and solar radiation, to obtain constant ratios or use coefficients for specific periods of time which vary with respect to length of periods and stage of development of vegetal growths.

The experiment data used were published consumptive-use amounts determined for crops grown in Texas, California, and Arizona. A composite relation of the aforementioned climatic data was used to compute average values for all areas of the state for the period 1946-55. These average values are called CLIMATIC-INDEX numbers. These numbers were used in conjunction with the use coefficients derived from the basic studies to compute estimates of monthly consumptive use by specific crops in each area of the State.

The estimated consumptive-use amounts for specific crops, as computed by this method, vary from place to place directly with the climatic-index number only.

These data provide a basis for estimating the monthly water requirements of plants on an average for production of agricultural crops in all areas of the State; and thus provide a basis for estimating amounts of water required from a source for irrigation when used with information describing amounts of rainfall effective in supplying the water requirements of crops, soil moisture available to crops, and losses involved with the distribution and application of water for crop use.

CONSUMPTIVE USE OF WATER BY MAJOR CROPS IN TEXAS

INTRODUCTION

The quantity of water required for the production of agricultural crops under irrigation must be known and inventoried in planning agricultural water-supply development.

This report presents estimates of average monthly depths of water used consumptively by major crops grown in Texas under conditions favorable to the production of agricultural crops, which includes a full water supply. Also included is a description of the TBWE (Texas Board of Water Engineers) method which has been developed for and used in the computation of these estimates of consumptive use. The values which are given for the water used consumptively by each crop are based on reliable data available at this time and are recommended for interim use until more extensive and precise data are obtained.

The estimates appearing in this report represent water requirements of plants only and not the gross amounts of water necessary for diversion from a surface or underground source to supply these plant requirements. Gross diversion requirements include consideration of many variable factors; such as canal losses, soil type, and method of water application, in addition to the water requirements of the plants. However, the water requirements of plants constitute the fundamental data used to develop estimates of quantities of water to be diverted for irrigation and are presented herein for this purpose.

ACKNOWLEDGEMENTS

All individuals and agencies, private and public, who have participated in the observation and collection of basic data related to the subject of this report are to be commended for their contributions. Particularly acknowledgement for assistance in the collection of basic data and in the interpretation of that data directly related to this report is given to:

The late Mr. Richard D. W. Blood, State Climatologist, U. S. Weather Bureau, Austin, Texas

Mr. Dean W. Bloodgood, Retired Irrigation Engineer, Board of Water Engineers, Austin, Texas and former Irrigation Engineer, U. S. Agricultural Research Service.

Dr. Morris E. Bloodworth, Professor of Soil Physics, Department of Agronomy, A. & M. College of Texas.

U. S. Study Commission-Texas, Irrigation Collaboration Group: Mr. Paul T. Gillett, Chairman; and members from the U. S. Bureau of Reclamation, the U. S. Soil Conservation Service, the State Soil Conservation Board, and the A. & M. College of Texas.

Mr. Tor J. Nordenson, Chief of Hydrologic Investigations Section, Hydrologic Services Division, U. S. Weather Bureau, Washington, D. C.

Mr. Robert V. Thurmond, Portland Cement Association, Austin, Texas. (Former Associate Planning Engineer, Texas Board of Water Engineers, and former Irrigation Engineer, Agricultural Extension Service, A. & M. College of Texas.)

PERSONNEL

Preliminary planning and inception of a report on consumptive use of water by, and irrigation requirements of, major crops grown under irrigation in Texas is credited to Robert V. Thurmond, working under the direction of McDonald D. Weinert, former Chief Engineer.

This report was prepared in Engineering Services, Board of Water Engineers, under the general supervision of John J. Vandertulip, Chief Engineer, and Seth D. Breeding, Chief Surface Water Engineer, by the Surface Water Division-Hydrologic Section for use by the Planning Division and is based on a method for consumptive-use determinations developed by Louis L. McDaniels, Acting Chief of the Hydrologic Section.

The Data Processing Division, directed by Ivan M. Stout, assisted Mr. McDaniels by performing extensive computations and preparing listings in tests of several accepted methods in preliminary studies prior to the development of the objective TBWE method for computing consumptive use of water by major crops grown under favorable conditions of available water.

DEFINITIONS

Terms used in this report to describe the method employed and to identify the relations and factors expressed are specifically defined, as follows:

CLIMATIC INDEX is a number expressing a composite relation of four climatic factors--air temperature, dew point temperature, wind movement, and solar radiation--as expressed by plate 2 in the USWB (U. S. Weather Bureau) Technical Paper 37 [1/] which in turn is based on Equation 14 in the USWB Research Paper 38 [2/].

[1/] Kohler, M. A., Nordenson, T. J., and Baker, D. R., 1959, Evaporation Maps for the United States: U. S. Weather Bureau Tech. Paper 37.

[2/] Kohler, M. A., Nordenson, T. J., and Fox, W. E., 1955, Evaporation from Pans and Lakes: U. S. Weather Bureau Research Paper 38.

Equation 14 was derived from evaporation research studies at Lake Hefner 3/ and at Lake Mead 4/.

CONSUMPTIVE USE is the depth of water, in inches, removed from a vegetated area by evaporation of moisture from soil surface, by evaporation of intercepted water from plant surfaces, by development of plant tissue, and by transpiration from vegetal growths. (Literature containing discussions of consumptive use of water by vegetation, evapotranspiration, and irrigation requirements of agricultural crops is quite voluminous. In lieu of many specific citations, a selected bibliography is presented at the end of this text.)

USE COEFFICIENT is a number expressing the ratio of a CONSUMPTIVE USE amount to a CLIMATIC INDEX.

The above terms are used in abbreviation, as follows: IC (CLIMATIC INDEX), UC (CONSUMPTIVE USE), AND KU (USE COEFFICIENT).

GENERAL DISCUSSION

Divisions of the State

The State was divided into eight areas (see figure 1, appendix A, page A-3) to form major land-resource divisions based on a complex characterized by similarities of vegetation, soil, climate, and water availability. These eight areas were further divided into 24 smaller areas (see figure 2, appendix A, page A-4) on a similar but more refined basis.

Crops and Crop Groupings

The following basic crops and crop groups are those for which consumptive-use amounts are presented:

Alfalfa
Corn
Cotton
Grains, Small
Orchards, Citrus
Orchards, Deciduous Fruit
Orchards, Pecan
Peanuts
Rice
Sorghum, Grain
Vegetables, Deep-Rooted
Vegetables, Shallow-Rooted

3/ U. S. Geological Survey, 1954, Water Loss Investigations: Vol. 1--Lake Hefner Studies: U. S. Geol. Survey Prof. Paper 269.

4/ U. S. Geological Survey, 1958, Water Loss Investigations: Lake Mead Studies: U. S. Geol. Survey Prof. Paper 298.

Included under deep-rooted vegetables, are the following:

Beans
Beets
Cantaloupe
Carrots
Chard
Cucumbers
Eggplant
Okra
Peas
Peppers
Pumpkin
Squash
Sweet Potatoes
Tomatoes
Turnips
Watermelons

Included under shallow-rooted vegetables, are the following:

Brussels Sprouts
Cabbage
Cauliflower
Celery
Lettuce
Onions
Radishes
Spinach
Sweet Corn

Consumptive-use amounts for five of the major crops (alfalfa, corn, cotton, small grains, and grain sorghum) are shown for all areas of the state for purposes of comparison and reference. For other crops, these amounts are given for areas of major production only.

Three of these crops were used as a basis for determining consumptive-use amounts for certain other crops. Consumptive use of water by perennial pasture was based on amounts shown for alfalfa; by leguminous fertilizers (used as soil conditioners) on amounts shown for small grains; and by silage sorghum and by forage sorghum on amounts shown for grain sorghum.

Crop Seasons

The variations in the climate and the habits and practices of farmers and agriculturists in Texas, from year to year and from area to area, necessitated the selection of uniform planting dates and length of growing season for crops in each area for use in this report. These selections, which use the first day or the sixteenth day of a month as starting dates for crops, were made on a practical basis from areal information to minimize the variations.

The average planting date in each of the 24 areas and the length of growing season for each crop in this report was based on field reports (except for shallow-rooted vegetables) from Agricultural Experiment Stations of the A. & M. College of Texas, and data revealing the physiology of plants which were collected and furnished by Dr. Morris E. Bloodworth. These dates and lengths of growing seasons are shown on figure 4 (appendix A, page A-6). For the shallow-rooted vegetable group, the one exception, one or more 3½-month growing seasons were indicated in the field reports. The lack of basic data on consumptive use, and the variations in planting dates and length of growing season for crops in this group were the reasons for the use of a 7-month season for shallow-rooted vegetables. This 7-month period generally spans the season characterized by staggered plantings and harvests of mixed combinations of vegetables in this group.

Methods of Estimating Consumptive Use

The need for knowledge of the consumptive use of water by major crops and native vegetation has been the incentive for extensive research and experiment. This need has been the stimulus for the development of methods for extrapolating the experiment data to other areas and different climatic regions. Recognizing that atmospheric phenomena, in addition to soil conditions, affected the growth of plants and their use of water, scientists have related research and experiment data to climatic data as a vehicle for use in estimating the consumptive use by crops in other areas. The sensitiveness and the objectiveness of these methods have been controlled by the type, the quantity, and the extent of the climatic data available. The number of atmospheric phenomena which comprise our climatic data recorded at meteorologic stations are few with respect to area of coverage and completeness of expression. The fewness of these data has been responsible generally for the development of methods which are adaptable to extensive areal usage, but which are lacking in sensitivity to changes in our geographic and climatic regions.

Several recognized methods for estimating consumptive use by agricultural crops and native vegetation have been used in the United States and in foreign countries. Some of the better-known methods are those discussed in "Methods of Computing Consumptive Use of Water" by Wayne D. Criddle, Paper 1507, IR-1, Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, January 1958, which include the following:

Lowry-Johnson Method
Thornthwaite Method
Blaney-Criddle Method
Hargreaves Method
Penman Method

The cited methods vary somewhat each from the other in the climatic data required and used to express relations in empirical or theoretical determinations of consumptive use during a part of, or throughout the life cycle of, specific vegetal growths at research and experiment sites.

Of these methods, the widely used Blaney-Criddle Method was seriously considered for use in estimating average-monthly consumptive-use amounts for the major crops grown in Texas under favorable conditions of available water. This method entails the use of: one variable which is mean air temperature, a constant for the site which is the percentage of daytime hours of a year at that latitude, and a use coefficient for each crop.

In the application of the Blaney-Criddle Method, the complexity of the use coefficient becomes apparent. This coefficient expresses an integration of the physiologic characteristics of a plant together with the effect of atmospheric phenomena other than (1) air temperature, and (2) the possible percentage of daytime hours of a year during each month. Heretofore, adjustment of this coefficient on the basis of relative humidity variations has been practiced in an effort to compensate for differences between geographic and climatic regions. Satisfactory results have been obtained in some areas by this procedure. The distribution of monthly and seasonal coefficients has been dependent on individual judgment.

Recognition of the subjectiveness of some of these methods previously adapted to widespread use reveals the acumen and adroitness of the cited authors and others whose work in this field is testimonial of their experience and judgment. However, the judgment procedures necessary to distribute the Blaney-Criddle use coefficients precluded the adoption of this method for use in estimating consumptive-use amounts for crops grown in Texas in this report, and provided the stimulus which led to the development of the method used.

TBWE METHOD

The TBWE Method developed for use in estimating consumptive-use amounts utilizes some of the basic research and experiment consumptive-use data presented by the cited authors. Similar data recently collected in Texas by the U. S. Agricultural Research Service and the Texas Agricultural Experiment Stations were used to develop constant-value USE COEFFICIENTS for a given crop.

The TBWE Method differs from other methods in the number of climatic variables utilized to express variations in consumptive-use amounts from place to place. Development of this method has been possible because of the availability of Equation 14, USWB Research Paper 38, and the related procedures presented in USWB Technical Paper 37, which provide the means of processing a greater and more varied amount of climatic data than heretofore practical.

The TBWE Method of estimating consumptive-use amounts for crops, is a procedure of relating a measured CONSUMPTIVE USE for a crop during a period of time, to a CLIMATIC INDEX at the site of measurement during the same period of time, to obtain a USE COEFFICIENT. This USE COEFFICIENT can then be applied to a CLIMATIC INDEX for the same length of time at any other site for which consumptive-use amounts are desired for that crop. This method and others are homogeneous in basic principles. However, this method employs constant USE COEFFICIENTS (KU) for specific crops in all geographic and climatic regions, and utilizes the variations in the composite relation of the four atmospheric phenomena to determine variations in consumptive-use (UC) amounts. Therefore, the amount of consumptive use estimated for a crop varies directly with the CLIMATIC INDEX (IC) only.

The only variation in a set of USE COEFFICIENTS for a crop is effected by the planting date and length of growing season; such as, the first of a month, the sixteenth of a month, or whatever date of a month is used. A set of USE COEFFICIENTS developed for a crop started on a specific planting date during any month and continuing throughout the length of the growing season for that crop from that date can be used without adjustment at sites other than the experiment site and beginning on the like planting date during any month. For example, USE COEFFICIENTS developed for cotton planted February 16 at Weslaco in Area 4A (see figure 4) can be used without change for cotton planted May 16 at Lubbock in Area 1B. The USE COEFFICIENTS developed were used in this manner for each specific crop in all areas having the same planting date of a month and the same length of growing season.

Procedure of Computation

The computation of USE COEFFICIENTS for each crop was accomplished in accordance with procedures described as follows:

A. Basic experiment data were related to CLIMATIC-INDEX numbers.

1. Measured CONSUMPTIVE-USE amounts were arranged by 15-day periods beginning with the planting date acknowledged in the experiment data used. These 15-day periods were arranged so that adjustments of the basic data could be made for use for crops started on the first or on the sixteenth day of a month.

2. CLIMATIC-INDEX numbers were computed for the same 15-day periods from climatic data for the experiment site or the nearest USWB first-order climatic station in accordance with the procedures described in the USWB Technical Paper 37. Paper 37 contains nomographs for the solution of Equation 14, USWB Research Paper 38. These numbers are called Evaporation from Lake Surfaces in the cited papers.

3. Each 15-day CONSUMPTIVE-USE amount was divided by the CLIMATIC INDEX for the corresponding 15-day period. The resulting ratios are 15-day USE COEFFICIENTS. (These 15-day ratios can be transferred to other sites and related to CLIMATIC-INDEX numbers for like periods to obtain estimates of CONSUMPTIVE USE by 15-day periods if desired.)

4. The 15-day amounts and numbers obtained in steps A1-3 were used to define growth-use curves which were plotted as histograms showing 15-day relations, and also plotted as mass curves showing total consumptive use for each crop during the period of experiment data available. These growth-use curves represent the consumptive use during various stages of vegetal growth.

B. The basic assumption of this method is that the growth of each crop and its corresponding water use is directly related to the four climatic factors described in the definition of CLIMATIC INDEX, and that this assumption is valid with the differing physiologic characteristics of various crops.

C. On the basis of the stated assumption under B, the growth-use curves described under A4 were used to adjust the experiment consumptive-use data to planting dates beginning on the first and sixteenth day of any month as desired.

1. CLIMATIC-INDEX numbers were computed for 15-day periods as needed for each experiment site in order to adjust experiment data for each crop to the selected planting dates used in the various areas.

2. The USE-COEFFICIENT numbers obtained by step A3 were used as constants for respective 15-day periods in sequence and were multiplied sequentially by the 15-day CLIMATIC-INDEX numbers obtained by step C1 to estimate CONSUMPTIVE-USE amounts at the experiment site as though a respective crop had been planted and grown at that site during the selected periods.

3. The CONSUMPTIVE-USE amounts and the CLIMATIC-INDEX numbers computed by steps C1 and C2 were combined into desired half-month and full-month arrangements to agree with the desired planting dates and the adopted length of growing season.

4. The half-month and full month values as combined in step C3 were then processed: UC/IC=KU--CONSUMPTIVE USE divided by CLIMATIC INDEX equals USE COEFFICIENT.

The KU numbers computed by the above-described procedure comprised sets of constant-value USE COEFFICIENTS which were employed in the computation of estimates of CONSUMPTIVE-USE amounts for respective crops in the areas of major production as desired.

BASIC DATA

Consumptive Use of Water by Crops

Amounts of water used consumptively by various crops, as determined at basic research and experiment sites, and presented in published and unpublished reports, were part of the basic data used to develop the relations and estimated consumptive-use amounts described and presented herein. These data were obtained at various sites in Arizona, California, and Texas. The sources of data for respective crops, are as follows:

Alfalfa consumptive-use amounts in San Fernando Valley, California, in 1940 5/

Corn based on consumptive-use amounts for grain sorghum at Bushland, Texas, 1956-58 5/,6/ and adjusted on the basis of growth-use relations for the two crops as indicated by figure 29 in Bulletin 937 7/

Cotton consumptive-use amounts at Weslaco, Texas, in 1958 8/

Small Grains consumptive use at Bushland, Texas, 1956-58 5/,6/

5/ Blaney, H. F., Haise, H. R., and Jensen, M. E., Monthly Consumptive Use by Irrigated Crops in Western United States: Supplement to U. S. Soil Conservation Service Tech. Paper 96.

6/ Jensen, M. E., and Sletten, W. H., 1959, Agricultural Reasearch Service Project Reports: ARS-SWC, Fort Collins, Colorado and Bushland, Texas.

7/ Bloodworth, M. E., 1959, Some Principles and Practices in the Irrigation of Texas Soils: Texas Agricultural Experiment Station Bull. 937, A. & M. College of Texas.

8/ Ross, P. E., and Boykin, J. W., Unpublished data for 1958 cotton crop at ARS-SWC station in Weslaco, Texas.

Citrus consumptive use is average of amounts for oranges and grapefruit in Salt River Valley, Arizona, 1931-54 9/ and the amounts for oranges in San Fernando Valley, California, in 1940 5/

Deciduous Fruit consumptive use in San Joaquin-Sacramento Delta, California, in 1928 9/

Pecans consumptive use based on amounts for walnuts in San Fernando Valley, California, in 1928 5/

Peanuts estimated average consumptive use in east Texas based on data in Bulletin 937 7/

Rice consumptive use and cultural flooding based on data from Rice-Pasture Experiment Station at Beaumont and Eagle Lake, Texas, in 1954

Grain sorghum consumptive use at Bushland, Texas, 1956-58 5/,6/

Deep-Rooted Vegetables consumptive use by tomatoes in Sacramento Valley, California, 1933-55 5/

Shallow-Rooted Vegetables consumptive use in San Joaquin Delta, California, in 1928 5/

The relations of the consumptive use of water by perennial pasture; by leguminous or other crops, used as fertilizers or soil conditioners; by silage sorghum and forage sorghum; to the consumptive use by the base crops described previously, were determined on the basis of sparse experiment data and recommendations by some of the agriculturists acknowledged.

The basic amounts of consumptive use at respective experiment sites by the above crops, as used to develop the USE COEFFICIENTS employed in the TBWE Method, are shown on table 1 (appendix B, page B-3). In some instances, the amounts shown as UC (CONSUMPTIVE USE) vary slightly from the amounts presented in the cited references. These variations result from the adjustment of the experiment data because of differences in planting dates.

5/ See footnote 5, page 10.

6/ See footnote 6, page 10.

7/ See footnote 7, page 10.

9/ Blaney, H. F., March 1959, Monthly Consumptive Use Requirements for Irrigated Crops: Am. Soc. Civil Engineers Proc. Paper 1963, Journal of the Irrigation and Drainage Division, Vol. 85, No. IR-1, Part I.

Climatic Index

The basic value of the average annual CLIMATIC INDEX determined for each of the 24 areas of the state described under GENERAL DISCUSSION, Divisions of the State, is shown by the large numerals on figure 3 (appendix A, page A-5). These values were obtained by replotting the respective isograms shown on plate 2, USWB Technical Paper 37, onto a map of Texas showing the 24 areas, and then determining an average from these isograms in each area. The resulting chart shows the variation in the average-annual value of the CLIMATIC INDEX for the 10-year period 1946-55 across the State.

As mentioned before, the values shown on plate 2, USWB Technical Paper 37, and entitled: "AVERAGE ANNUAL LAKE EVAPORATION IN INCHES, PERIOD 1946-55", are called CLIMATIC-INDEX numbers in this report.

Monthly values of the CLIMATIC-INDEX numbers for each of the 24 areas were determined by multiplying the average annual CLIMATIC-INDEX number for an area by the monthly distribution coefficients for that area as shown in table 3 (appendix B, page B-7). These distribution coefficients were determined from values of the average monthly CLIMATIC-INDEX number computed for 31 USWB first-order climatic stations--20 in Texas and 11 in adjacent states. These first-order stations are listed in table 2 (appendix B, page B-6). The distribution coefficients are the ratios obtained by dividing the average monthly CLIMATIC-INDEX number by the average annual CLIMATIC-INDEX number. If expressed as a percentage, these coefficients represent the percentage of the annual CLIMATIC-INDEX number occurring each month of a year on an average. The distribution coefficients were assigned to each of the 24 areas on the basis of the definition afforded by the numbers computed for each first-order climatic station--using such numbers direct when applicable, and interpolating between such numbers for adjacent areas when applicable. The resulting CLIMATIC-INDEX numbers are shown in table 3.

Monthly values of the CLIMATIC-INDEX number were computed for each experiment site, for each year or each average of years, as needed for relating to CONSUMPTIVE-USE amounts for crops comprising the basic agricultural data used herein. These numbers are shown as IC for the respective sites and crops in table 1.

USE COEFFICIENTS

Constant-value USE COEFFICIENTS for each crop at each experiment site were computed from the basic data as previously described under TBWE METHOD, Procedure of Computation. For practical application of the method, the USE COEFFICIENTS for half-month periods were recomputed and related to one-half of a monthly CLIMATIC-INDEX number. This procedure allows the use of monthly values of the CLIMATIC-INDEX number divided by two when computing estimates of consumptive use by crops planted on the sixteenth of a month or harvested by the fifteenth of a month. The USE COEFFICIENTS for each crop and each starting date and length of growing season are shown as KU in table 1.

The consumptive-use amounts computed and shown for each crop are estimates of the average depth of water, in inches, required for the growth and full development of that crop under conditions favorable to the production of

agricultural crops having a full water supply in each of the areas for the periods indicated. These amounts are constituted as defined and do not include estimates of losses of water from distribution, leaching, seepage, and other causes not inherently a part of the experiment consumptive-use data described and used.

TABULATIONS OF DATA

A set of tables, numbers 1 to 4 (appendix B) and numbers 5 to 16 (appendix C), are used to present the relations described and the results obtained by the procedures set forth. These tables contain the basic experiment CONSUMPTIVE-USE data adjusted to planting dates used herein, the CLIMATIC-INDEX numbers for the experiment sites, the TBWE USE COEFFICIENTS evolved, the distribution coefficients used to convert average-annual climatic-index numbers to monthly numbers in the 24 areas covering Texas, the average-monthly and average-annual climatic-index numbers computed for each of the 24 areas, and monthly and seasonal consumptive-use amounts by areas for the crops included and listed under GENERAL DISCUSSION, Crops and Crop Groupings.

The 24 areas were listed on the tables in a sequence chosen to attain reasonably smooth transition between the extremes in the general geographic and climatic areas of the State.

SELECTED BIBLIOGRAPHY

Abbe, Cleveland, 1905, A First Report of the Relations Between Climates and Crops: U. S. Weather Bureau Bull. 36.

Allen, S. W., 1955, Conserving Natural Resources, Principles and Practices in a Democracy: New York, McGraw-Hill Book Company.

Am. Geophys. Union, June 1934, Report of the Committee on Absorption and Transpiration, 1933-34: Am. Geophys. Union Trans., Washington, U. S. Govt. Printing Office.

Am. Soc. Civil Engineers, 1952, Consumptive Use of Water: Paper 2524 - a symposium, Am. Soc. Civil Engineers Trans., Vol. 117.

_____, 1930, Consumptive Use of Water in Irrigation: Progress Report of the Duty of Water Committee of the Irrigation, Am. Soc. Civil Engineers Trans., Vol. 94.

_____, 1949, Hydrology Handbook: Am. Soc. Civil Engineers Manuels of Engineering Practice, No. 28.

Beauchamp, K. H., September 1958, Potential Use of Water by Irrigation in the Humid Area: Am. Soc. Civil Engineers Proc. Paper 1750, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-3.

Biggar, J. W., Bloodworth, M. E., and Burleson, C. A., 1957, Effect of Irrigation Differentials and Planting Dates on the Growth, Yield, and Fiber Characteristics of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 1940, A. & M. College of Texas.

Blanney, H. F., 1952, Consumptive Use of Water: Am. Soc. Civil Engineers Trans., Vol. 117.

_____, October 1955, Evaporation and Evapotranspiration Investigations in the San Francisco Bay Area: Am. Geophys. Union Trans., Vol. 36, No. 5.

_____, 1938, Field Methods of Determining Consumptive Use of Water: Division of Irrigation, U. S. Dept. of Agriculture.

_____, March 1959, Monthly Consumptive Use Requirements for Irrigated Crops: Am. Soc. Civil Engineers Proc. Paper 1963, Journal of the Irrigation and Drainage Division, Vol. 85, No. IR-1, Part I.

_____, and Criddle, W. D., August 1950, Determining Water Requirements in Irrigated Areas from Climatological and Irrigation Data: U. S. Soil Conservation Service Tech. Paper 96.

_____, Ewing, P. A., Morin, K. V., and Criddle, W. D., June 1942, Consumptive Water Use and Requirements: Natl. Resources Planning Board, Pecos River Joint Investigation - Reports of the participating agencies, Washington, U. S. Govt. Printing Office.

Blaney, H. F., Ewing, P. A., Israelsen, O. W., Rohwer, Carl, and Scobey, F. C., February 1938, Water Utilization, Upper Rio Grande Basin: National Resources Committee, Part III.

_____, Haise, H. R., and Jensen, M. E., August 1950, Monthly Consumptive Use by Irrigated Crops in Western United States - a Provisional Supplement to SCS-TP-96, Determining Water Requirements in Irrigated Areas from Climatological and Irrigation Data: U. S. Soil Conservation Service Tech. Paper 96.

_____, and Harris, Karl, December 1951, Consumptive Use and Irrigation Requirements of Crops in Arizona: U. S. Soil Conservation Service.

_____, and Morin, K. V., 1942, Evaporation and Consumptive Use of Water Empirical Formulas: Am. Geophys. Union Trans., Vol. 23.

_____, and Stockwell, H. J., Jr., June 1941, Progress Report on Cooperative Research Studies on Water Utilization, San Fernando Valley, California, Irrigation Season of 1940: Division of Irrigation, U. S. Dept. of Agriculture.

_____, Taylor, C. A., Nickle, M. G., and Young, A. A., 1933, Water Losses Under Natural Conditions from Wet Areas in Southern California: Division of Water Resources Bull. 44, California State Dept. of Public Works, Pomona, California.

_____, Taylor, C. A., and Young, A. A., 1930, Rainfall Penetration and Consumptive Use of Water in Santa Ana River Valley and Coastal Plain: Division of Water Resources Bull. 33, California State Dept. of Public Works, Pomona, California.

Bloodgood, D. W., /no date/, Biennial Reports: Texas Board of Water Engineers, Austin, Texas.

_____, and Curry, A. S., 1925, Net Requirements of Crops for Irrigation Water in the Mesilla Valley, New Mexico: New Mexico Experiment Station Bull. 149.

Bloodworth, M. E., September 1959, Some Principles and Practices in the Irrigation of Texas Soils: Texas Agricultural Experiment Station Bull. 937, A. & M. College of Texas.

_____, Burleson, C. A., and Cowley, W. R., 1956, Effect of Irrigation Differentials and Planting Dates on the Growth, Yield, and Fiber Characteristics of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 1866, A. & M. College of Texas.

_____, Cowley, W. R., and Morris, J. S., 1950, Growth and Yield of Cotton on Willacy Loam as Affected by Different Irrigation Levels: Texas Agricultural Experiment Station Progress Report 1217, A. & M. College of Texas.

Bodman, G. B., and Colman, E. A., 1944, Moisture and Energy Conditions During Downward Entry of Water into Moist and Layered Soils: Am. Soil Science Society Proc., Vol. 8.

Bonnen, C. A., McArthur, W. C., Magee, A. C., and Hughes, W. F., 1952, Use of Irrigation Water on the High Plains: Texas Agricultural Experiment Station Bull. 756, A. & M. College of Texas.

Briggs, L. J., and Shantz, H. L., October 1916, Daily Transpiration During the Normal Growth Period and its Correlation with the Weather: Journal of Agricultural Research, Vol. 7.

_____, and Shantz, H. L., January 1916, Hourly Transpiration Rate on Clear Days as Determined by Cyclic Environmental Factors: Journal of Agricultural Research, Vol. 5.

Colman, E. A., and Bodman, G. B., 1945, Moisture and Energy Conditions During Downward Entry of Water into Moist and Layered Soils: Am. Soil Science Society Proc., Vol. 9.

Conkling, H., 1930, Consumptive Use of Water in Irrigation: Progress Report of the Duty of Water Committee of the Irrigation Division, Am. Soc. Civil Engineers Trans., Vol. 94.

Criddle, W. D., January 1958, Influence of Climate on Irrigation Agriculture: Am. Soc. Civil Engineers Proc. Paper 1504, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-1.

_____, January 1958, Methods of Computing Consumptive Use of Water: Am. Soc. Civil Engineers Proc. Paper 1507, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-1.

Davis, J. R., August 1956, Future of Irrigation in Humid Areas: Journal of the Am. Water Works Assoc., Vol. 48, No. 8.

_____, 1956, Water Demand Potential of Irrigation in Humid Areas: Report to Indiana Water Resources Study Committee, Purdue University, Lafayette, Indiana.

Draper, E. L. July 1947, Supporting Data, Middle Rio Grande Project Report Study of Valley Consumptive Use and Irrigation Demand at Otowi: U. S. Bureau of Reclamation, Albuquerque, New Mexico.

Fisher, C. E., and Burnett, E., 1953, Conservation and Utilization of Soil Moisture: Texas Agricultural Experiment Station Bull. 767, A. & M. College of Texas.

Fortier, Samuel, 1927, Orchard Irrigations: U. S. Dept. of Agriculture Farmers' Bull. 1518.

_____, and Young, A. A., June 1930, Irrigation Requirements of the Arid and Semiarid Lands of the Southwest: Division of Agricultural Engineering Tech. Bull. 185, Bureau of Public Roads, U. S. Dept. of Agriculture, Washington, U. S. Govt. Printing Office.

Gardner, W., and Widtsoe, J., 1921, The Movement of Soil Moisture: Soil Science, 11.

Garton, J. E. A., July 1951, Graphic Method of Finding the Depth of Irrigation Applied: Agricultural Engineering.

Gatewood, J. S., Robinson, T. W., Colby, B. R., Hem, J. D., and Halpenny, L. C., 1950, Use of Water by Bottom-Land Vegetation in Lower Safford Valley, Arizona: U. S. Geol. Survey Water-Supply Paper 1103.

Gerard, C. J., Bloodworth, M. E., Burleson, C. A., and Cowley, W. R., 1958, Cotton Irrigation in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Bull. 916, A. & M. College of Texas.

_____, Burleson, C. A., Biggar, J. W., and Cowley, W. R., 1958, Effect of Irrigation Differentials and Planting Dates on Yield of Cotton in the Lower Rio Grande Valley: Texas Agricultural Experiment Station Progress Report 2016, A. & M. College of Texas.

Halkias, N. A., Veihmeyer, F. J., and Hendrickson, A. H., December 1955, Determining Water Needs for Crops from Climatic Data: Hilgardia, Vol. 24, No. 9, University of California.

Hall, W. A., April 1956, Estimating Irrigation Border Flow: Agricultural Engineering.

Hansen, V. E., February 2, 1955, Infiltration and Soil Water Movement During Irrigation: Soil Science, 79.

Hargreaves, G. H., November 1956, Irrigation Requirements Based on Climatic Data: Am. Soc. Civil Engineers Proc. Paper 1105, Journal of the Irrigation and Drainage Division, Vol. 82, No. IR-3.

Harris, Karl, Kinnison, A. F., and Albertt, O. W., 1936, Use of Water by Washinton Navel Oranges and Marsh Grapefruit Trees in Salt River Valley, Arizona: Arizona Agricultural Experiment Station Bull. 153.

Hildreth, R. J., 1956, Risk and Uncertainty Arising From Soil-Moisture Yield Relationships in the Great Plains: Paper for Southwestern Social Science Association Program, March 30, 1956, Dept. of Agricultural Economics and Sociology, A. & M. College of Texas.

Horton, R. E., 1923, Transpiration by Forest Trees: U. S. Weather Bureau Monthly Weather Review, Vol. 51.

Hughes, W. F., and Motheral, J. R., September 1950, Irrigated Agriculture in Texas: Texas Agricultural Experiment Station Misc. Pub. 59, A. & M. College of Texas.

Iowa State University, July 1959, Chances of Receiving Selected Amounts of Precipitation in the North Central Region of the U. S.: Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa.

_____, /no date/, Transpiration and Evapotranspiration as Related to Meteorological Factors (U. S. Weather Bureau Contract 9295): Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa.

Israelsen, O. W., September 1958, The Engineer and Worldwide Conservation of Soil and Water: Am. Soc. Civil Engineers Proc. Paper 1775, Journal of the Irrigation and Drainage Division, Vol. 84, No. IR-3.

_____, 1950, Irrigation Principles and Practices: New York, John Wiley and Sons, Inc.

Jensen, M. E., 1957, Research Shows When to Irrigate Winter Wheat: Soils and Water.

Kansas State College, 1956-57, The Evapotranspiration Problem First Contribution Report (U. S. Weather Bureau Contract 8806): Manhattan, Kansas.

Kohler, K. O., Jr., 1955, Trends in the Utilization of Water: Yearbook of Agriculture.

Kohler, M. A., 1957, Computation of Evaporation and Evapotranspiration from Meteorological Observations: Paper for presentation at Am. Meteorological Society Meeting in Chicago, March 19-21, 1957.

_____, Nordenson, T. J., and Baker, D. R., 1959, Evaporation Maps for the United States: U. S. Weather Bureau Tech. Paper 37.

_____, Nordenson, T. J., and Fox, W. E., 1955, Evaporation from Pans and Lakes: U. S. Weather Bureau Research Paper 38.

Linsley, R. K., /no date/, Techniques for Surveying Surface-Water Resources: World Meteorological Organization No. 82, Tech. Paper 32, Tech. Note 26.

Lowry, R. L., Jr., and Johnson, A. F., April 1941, Consumptive Use of Water for Irrigation: Am. Soc. Civil Engineers Proc., Vol. 67.

_____, and Johnson, A. F., 1942, Consumptive Use of Water for Agriculture: Am. Soc. Civil Engineers Trans., Vol. 107.

McCulloch, A. A., August 1957, The Economics of Sprinkler Irrigation Systems: Irrigation - Engineering and Maintenance.

Magee, A. C., Bonnen, C. A., McArthur, W. C., and Hughes, W. F., 1953, Production Practices for Irrigated Crops on the High Plains: Texas Agricultural Experiment Station Bull. 763, A. & M. College of Texas.

Maierhofer, C. R., January 1958, Drainage in Relation to a Permanent Irrigation Agriculture: Am. Soc. Civil Engineers Proc. Paper 1506, Journal of the Irrigation and Drainage Division, Vol. 84, No. 1R-1.

Mickey, K. B., 1945, Man and The Soil: International Harvester Company.

Muldrow, W. C., 1948, Forecasting Productivity of Irrigable Lands: Am. Soc. Civil Engineers Trans., Vol. 113.

Nettles, V. F., Jamison, F. S., and Jones, B. E., June 1952, Irrigation and Other Cultural Studies with Cabbage, Sweet Corn, Snap Beans, Onions, Tomatoes and Cucumbers: University of Florida Agricultural Experiment Station Bull. 495, Gainsville, Florida.

Osborn, Ben, /no date/, Water and the Land: U. S. Soil Conservation Service Tech. Paper 134.

Palmer, V. J., April 1946, Retardance Coefficients for Low Flow in Channels Lines with Vegetation: Am. Geophys. Union Trans. 27.

Palmer, W. C., April 1958, A Graphical Technique for Determining Evapotranspiration by the Thornwaite Method: U. S. Weather Bureau, Washington, U. S. Govt. Printing Office.

Parshall, R. L., 1937, Laboratory Measurement of Evapo-Transpiration Losses: Journal of Forestry, pp. 1033-1040.

Penman, H. L., February 1956, Estimating Evaporation: Am. Geophys. Union Trans., Vol. 37, No. 1.

_____, 1948, Natural Evaporation from Open Water, Bare Soil and Grass: Proceedings of the Royal Society, Series A-193, London, England.

_____, 1952, Water and Plant Growth: Agricultural Progress, Vol. 27, Part 2.

Pruitt, W. O., and Jensen, M. C., June 1955, Determining when to Irrigate: Agricultural Engineering.

Ree, W. O., 1939, Some Experiments on Shallow Flows Over a Grassed Slope: Am. Geophys. Union Trans., Part IV.

Reynolds, E. B., 1954, Research on Rice Production in Texas: Texas Agricultural Experiment Station Bull. 775, A. & M. College of Texas.

Robinson, A. R., Jr., and Rohwer, Carl, 1957, Measurement of Canal Seepage: Am. Soc. Civil Engineers Trans., Vol. 122.

Russell, E. J., 1950, Soil Conditions and Plant Growth: New York, Longmans, Green and Company.

Shaw, B. T. (Editor), 1952, Soil Physical Conditions and Plant Growth: New York, Academic Press.

South Dakota State College, February 1959, Seasonal Variations of Soil Moisture in South Dakota: South Dakota Agricultural Experiment Station, Economics Dept. Pamphlet 99, Brookings, South Dakota.

Staten, T. D., 1957, Alfalfa Production in Texas: Texas Agricultural Experiment Station Bull. 955, A. & M. College of Texas.

Swanson, N. P., and Thaxton, E. L., 1956, Irrigation Requirements for Grain Sorghum Production on the High Plains: Texas Agricultural Experiment Station Bull. 846, A. & M. College of Texas.

Texas Agricultural Experiment Station, June 1954, Summary of Soil and Water Conservation Research from the Blackland Experiment Station, Temple, Texas, 1942-53: Texas Agricultural Experiment Station Bull. 781, A. & M. College of Texas.

Texas Crop and Livestock Reporting Service, /no date/, Texas Vegetable Statistics, 1939-58: Agricultural Marketing Service, U. S. Dept. of Agriculture.

Thaxton, E. L., and Swanson, N. P., 1956, Guides in Cotton Irrigation on the High Plains: Texas Agricultural Experiment Station Bull. 838, A. & M. College of Texas.

Thornthwaite, C. W., 1948, An Approach toward a Rational Classification of Climate: Geographical Review 38.

Thornthwaite, C. W., and Mather, J. R., 1957, Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance: Drexel Institute of Technology Pub. in Climatology, Vol. X, No. 3, Centerton, New Jersey.

_____, and Mather, J. R., 1955, The Water Balance: Drexel institute of Technology Pub. in Climatology, Vol. VIII, No. 1, Centerton, New Jersey.

Thornton, J. D., and Templin, E. H., /no date/, The Soils of Texas: Texas Agricultural Extension Service Leaflet 74, A. & M. College of Texas.

Thurmond, R. V., /no date/, How to Estimate Soil Moisture by Feel: Texas Agricultural Extension Service Leaflet 355, A. & M. College of Texas.

_____, /no date/, Soil Moisture Storage: Texas Agricultural Extension Service Leaflet 357, A. & M. College of Texas.

_____, Box, J., and Elliott, F. C., Texas Guide for Growing Irrigated Cotton: Texas Agricultural Extension Service Bull. 896, A. & M. College of Texas.

Trew, E. M., and Hoveland, C. S., 1955, Irrigated Pastures for South Texas: Texas Agricultural Extension Service and Texas Agricultural Experiment Station Bull. 819, A. & M. College of Texas.

U. S. Geological Survey, 1954, Water-Loss Investigations: Vol. 1 - Lake Hefner Studies: U. S. Geol. Survey Prof. Paper 269.

_____, 1958, Water-Loss Investigations: Lake Mead Studies: U. S. Geol. Survey Prof. Paper 298.

Van Bavel, C. H. M., 1953, A Drought Criterion and Its Application in Evaluating Drought Incidence and Hazard: Agronomy Journal, Vol. 45.

_____, and Wilson, T. V., 1952, Evapotranspiration Estimates as Criteria for Determining Time of Irrigation: Agricultural Engineering, Vol. 33.

Veihmeyer, F. J., 1938, Evaporation from Soils and Transpiration: Am. Geophys. Union Trans., Vol. 19.

Young, A. A., 1945, Irrigation Requirements of California Crops: Division of Water Resources Bull. 51, California State Dept. of Public Works, Pomona, California.

_____, and Blaney, H. F., 1942, Use of Water by Native Vegetation: California State Division of Water Resources Bull. 50, Sacramento, California.

APPENDIX A

Descriptive Figures

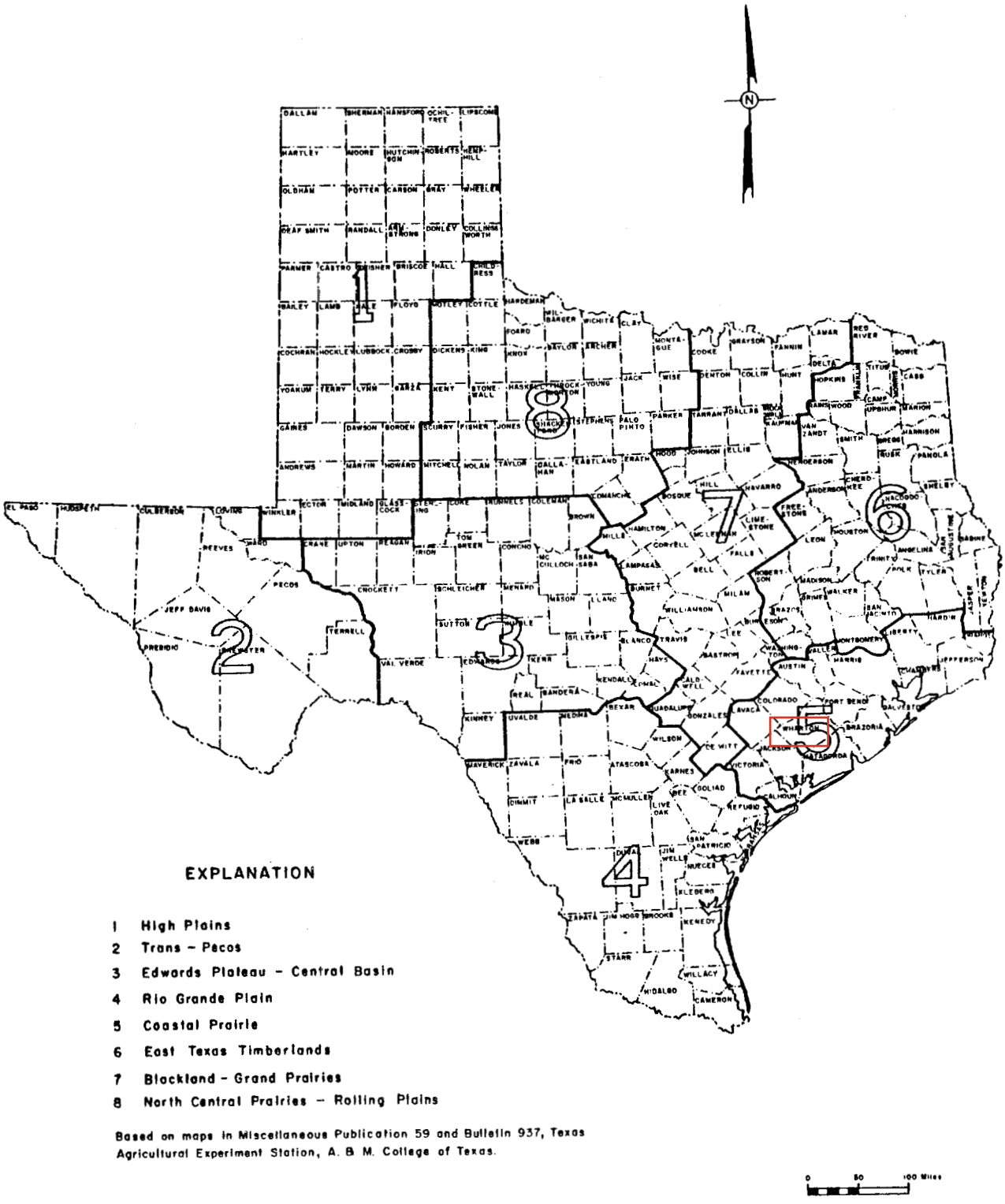


FIGURE 1. - Land resource divisions and irrigated areas.

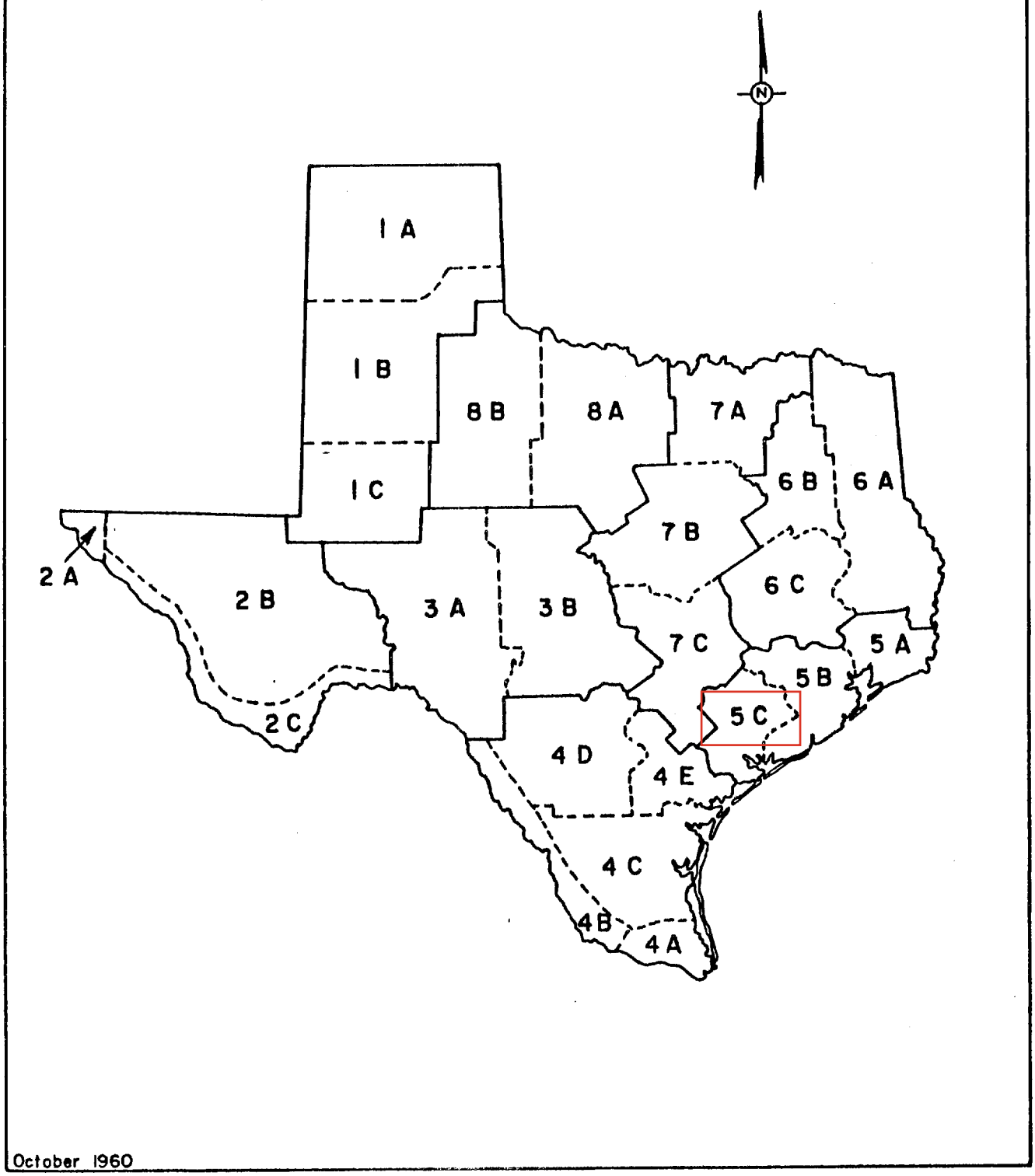


FIGURE 2.— Subdivisions of irrigated areas

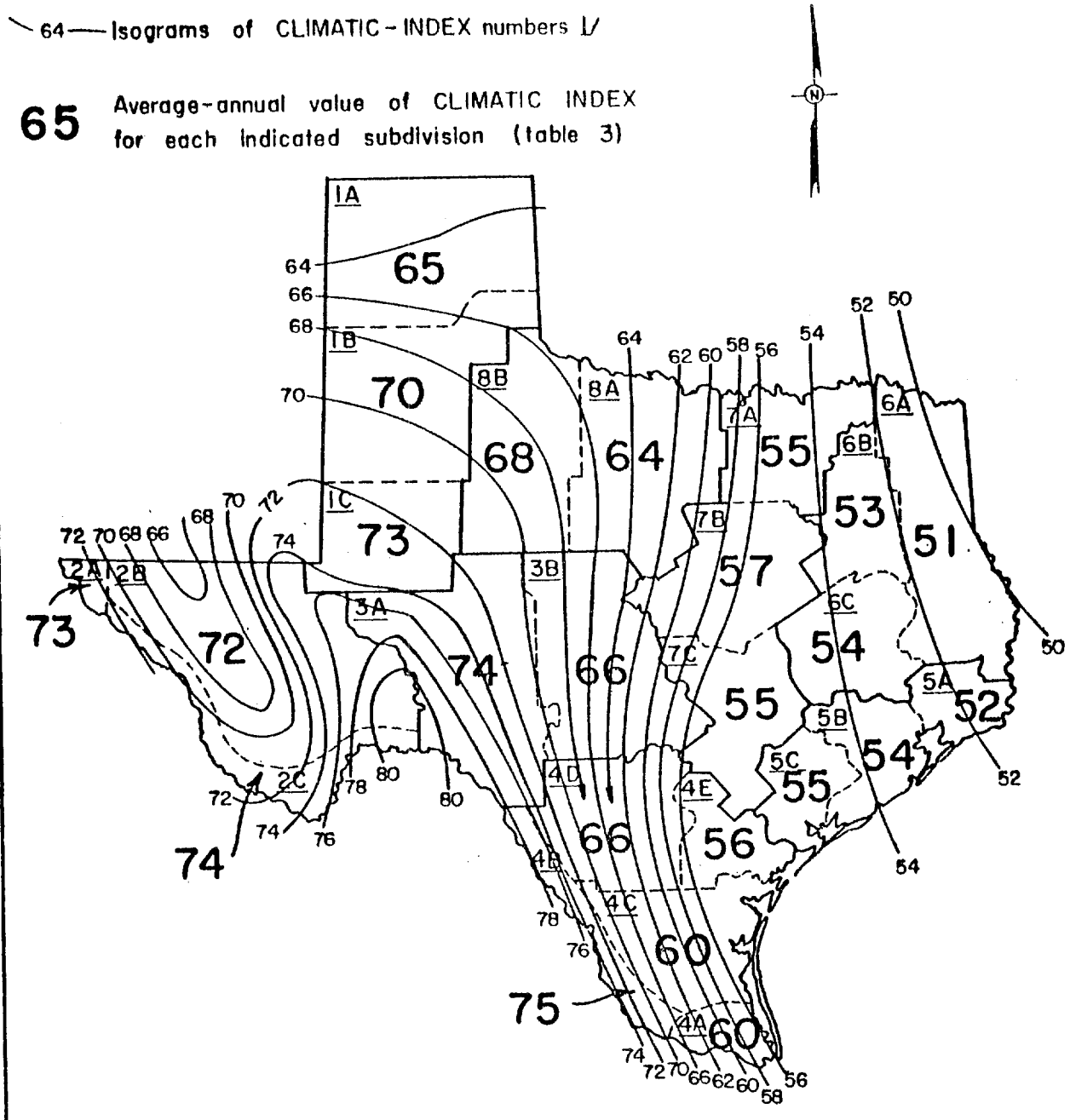


FIGURE 3.- Average-annual CLIMATIC-INDEX numbers for subdivisions of irrigated areas

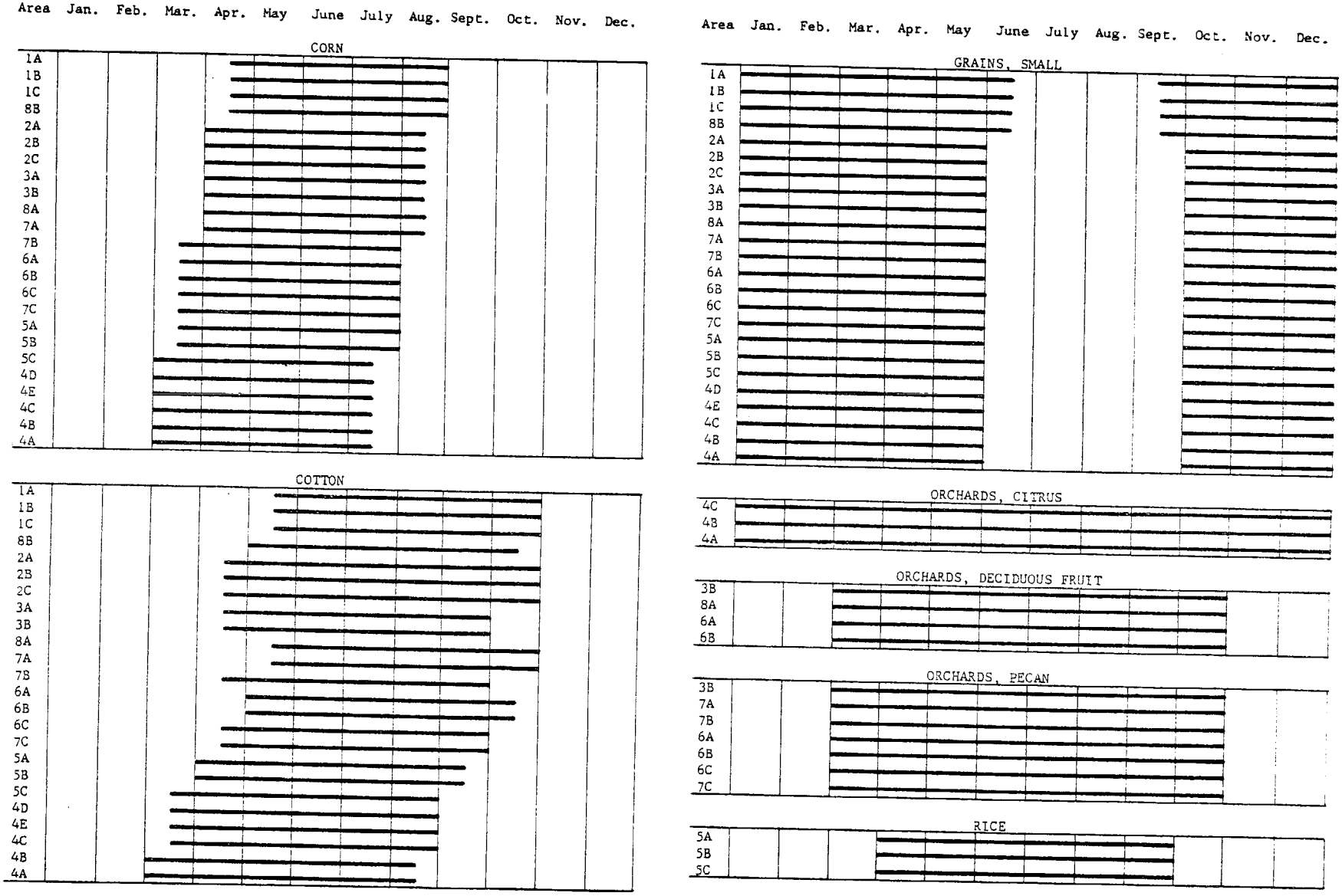
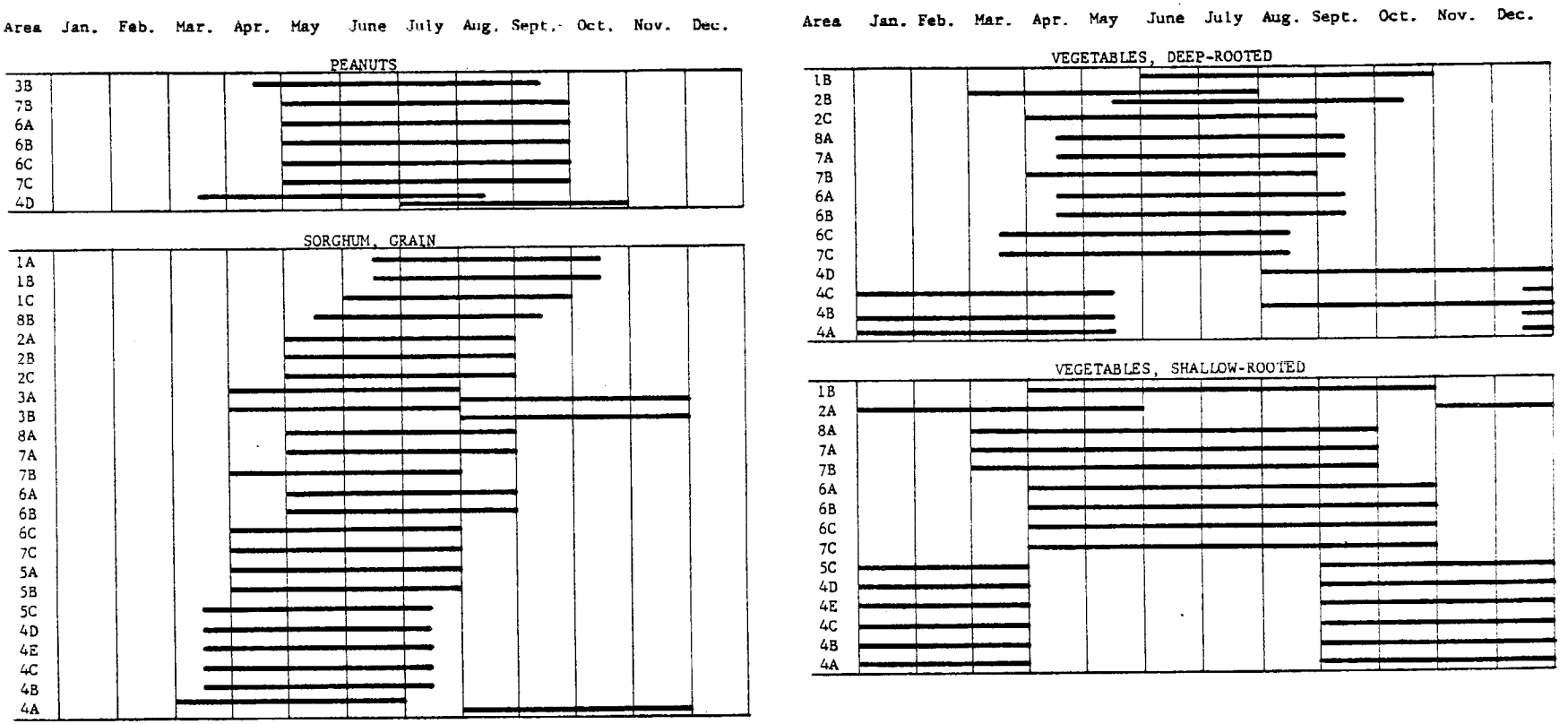


FIGURE 4.-Average planting date and length of growing season of crops, by areas, in Texas



Note.--Alfalfa, a perennial usually planted in September, is omitted from the above chart. The average planting date used for each crop is the first or middle of a month as indicated. In some areas for some crops, two bars indicate two crops yearly.

FIGURE 4. --Continued

APPENDIX B

Tables of Experiment Data and Basic Relations

Table 1

BASIC DATA

UC--CONSUMPTIVE USE; IC--CLIMATIC INDEX; KU--USE COEFFICIENT; values at experiment sites and times

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
ALFALFA: San Fernando Valley, California, 1940													
UC	1.3	1.6	3.1	3.3	6.7	5.4	7.8	4.2	5.6	4.4	3.1	1.3	47.8
IC	2.2	2.7	3.8	4.3	5.9	5.4	7.6	5.9	5.4	4.3	3.8	2.7	54.0
KU	0.59	0.59	0.82	0.77	1.14	1.00	1.03	0.71	1.04	1.02	0.82	0.48	0.89
CORN: Based on grain sorghum at Bushland, Texas, 1956-58, planted on 1st day of a month													
UC						1.3	4.0	6.5	8.4	*2.9			23.1
IC						8.4	8.8	8.0	6.2	5.7÷2			34.2
KU						0.15	0.45	0.81	1.35	1.00			0.68
CORN: Based on grain sorghum at Bushland, Texas, 1956-58, planted on 16th day of month													
UC						*0.4	2.8	4.6	7.3	6.7			21.6
IC						8.4÷2	8.8	8.0	6.2	5.7			32.9
KU						0.09	0.32	0.58	1.18	1.18			0.66
COTTON: Weslaco, Texas, 1958, planted on 1st day of a month, 5½-month season													
UC			0.7	1.2	6.1	5.5	4.5	*.04					18.4
IC			3.1	5.1	5.9	6.6	7.4	7.8÷2					32.0
KU			0.23	0.24	1.03	0.83	0.61	0.10					0.58
COTTON: Weslaco, Texas, 1958, planted on 16th day of a month, 5½-month season													
UC			*0.3	1.3	4.0	7.2	5.1	1.7					19.6
IC			3.1÷2	5.1	5.9	6.6	7.4	7.8					34.3
KU			0.18	0.25	0.68	1.09	0.69	0.22					0.57
COTTON: Weslaco, Texas, 1958, planted on 16th day of a month, 6½-month season													
UC			*0.3	1.3	3.6	6.0	6.4	5.5	3.5				26.6
IC			3.1÷2	5.1	5.9	6.6	7.4	7.8	4.5				38.3
KU			0.18	0.25	0.61	0.91	0.86	0.71	0.77				[illegible]

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
GRAINS, SMALL: Bushland, Texas, 1956-58, planted on 1st day of a month, 8-month season													
UC	1.6	2.4	5.4	7.5	6.4					1.6	1.6	1.5	28.0
IC	2.0	2.3	3.6	5.1	6.9					5.7	2.8	2.5	30.9
KU	0.80	1.04	1.50	1.47	0.93					0.28	0.57	0.60	0.91
GRAINS, SMALL: Bushland, Texas, 1956-58, planted on 16th day of a month, 9-month season													
UC	1.0	1.8	3.9	6.5	7.0	*3.1			*0.7	1.6	1.4	1.1	28.1
IC	2.0	2.3	3.6	5.1	6.9	8.4÷2			6.2÷2	5.7	2.8	2.5	38.2
KU	0.50	0.78	1.08	1.27	1.01	0.74			0.23	0.28	0.50	0.44	0.74
ORCHARDS, CITRUS: Average for oranges and grapefruit, Salt River Valley, Arizona, 1931-54													
UC	1.6	1.7	2.5	3.2	4.2	4.9	5.6	5.6	4.8	3.5	2.4	1.7	41.7
IC	2.3	3.3	5.0	7.1	8.9	9.9	9.2	8.1	5.2	5.0	3.0	2.2	69.2
KU	0.69	0.52	0.50	0.45	0.47	0.49	0.61	0.69	0.92	0.70	0.80	0.77	0.60
Oranges, San Fernando Valley, California, 1940													
UC	1.1	2.2	2.3	4.0	4.4	4.6	4.0	3.4	2.8	2.6	2.0	1.6	35.0
IC	2.2	2.7	3.8	4.3	5.9	5.4	7.6	5.9	5.4	4.3	3.8	2.7	54.0
KU	0.50	0.81	0.61	0.93	0.75	0.85	0.53	0.58	0.52	0.60	0.53	0.59	0.65
ORCHARDS, CITRUS: Average values													
KU	0.60	0.66	0.56	0.69	0.61	0.67	0.57	0.64	0.72	0.65	0.66	0.68	0.62
ORCHARDS, DECIDUOUS FRUIT: San Joaquin-Sacramento Delta, California, 1928													
UC			1.0	2.2	3.8	6.0	6.8	4.8	2.8	0.8			28.2
IC			2.4	4.8	4.3	5.8	7.2	6.7	6.2	3.4			40.8
KU			0.42	0.46	0.88	1.03	0.92	0.72	0.45	0.24			0.69
ORCHARDS, PECAN: San Fernando Valley, California, 1928													
UC			1.5	3.8	5.0	5.9	6.1	5.0	2.8	2.0			32.6
IC			2.6	5.1	4.6	6.1	7.6	7.1	6.6	3.6			43.3
KU			0.58	0.75	1.09	0.97	0.80	0.70	0.42	0.56			0.75

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
PEANUTS: Estimated UC, East Texas, planted on 1st day of a month, 4-month season													
UC					2.1	5.1	6.4	4.3					17.9
IC					5.6	6.6	7.1	6.6					25.9
KU					0.38	0.77	0.90	0.65					0.69
PEANUTS: Estimated UC, East Texas, planted on 1st day of a month, 5-month season													
UC					1.1	2.9	4.3	6.3	3.5				18.1
IC					5.6	6.6	7.1	6.6	5.1				31.0
KU					0.20	0.44	0.61	0.95	0.69				0.58
PEANUTS: Estimated UC, East Texas, planted on 16th day of a month, 5-month season													
UC				*0.4	2.0	3.4	5.5	5.3	*1.3				17.9
IC				4.6÷2	5.6	6.6	7.1	6.6	5.1÷2				30.8
KU				0.15	0.33	0.49	0.80	0.90	0.54				0.58
RICE: Based on data from Rice-Pasture Experiment Stations, Beaumont and Eagle Lake, Texas, 1954													
UC				7.6	6.8	15.0	10.2	6.8	9.6				56.0
IC				4.2	6.8	7.5	6.8	6.8	6.0				38.1
KU				1.80	1.00	2.00	1.50	1.00	1.60				1.47
SORGHUM, GRAIN: Bushland, Texas, 1956-58, planted on 1st day of a month													
UC						3.6	7.4	8.1	3.7				22.8
IC						8.4	8.8	8.0	6.2				31.4
KU						0.43	0.84	1.01	0.60				0.73
SORGHUM, GRAIN: Bushland, Texas, 1956-58, planted on 16th day of a month													
UC						*0.9	5.8	8.6	5.0	*1.1			21.5
IC						8.4÷2	8.8	8.0	6.2	5.7÷2			30.0
KU						0.21	0.66	1.08	0.81	0.38			0.72
VEGETABLES, DEEP-ROOTED: Tomatoes, Sacramento Valley, California, 1933-55, planted on 1st day of a month													
UC						3.0	4.2	7.0	5.1	2.1			21.4
IC						7.8	8.7	7.5	6.5	3.7			34.2
KU						0.38	0.48	0.93	0.78	0.57			0.63

* One-half month.

Table 1--Continued

BASIC DATA

Data	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
VEGETABLES, DEEP-ROOTED: Tomatoes, Sacramento Valley, California, 1933-55, planted on 16th day of a month													
UC					*1.2	3.3	5.7	7.3	4.5	*0.8			22.8
IC					6.1÷2	7.8	8.7	7.5	6.5	3.7÷2			35.4
KU					0.38	0.42	0.66	0.97	0.69	0.43			0.66
VEGETABLES, SHALLOW-ROOTED: San Joaquin Delta, California, 1928, planted on 1st day of a month													
UC				1.2	3.0	6.0	5.4	5.4	3.6	1.8			26.4
IC				4.8	4.3	5.8	7.2	6.7	6.2	3.4			38.4
KU				0.25	0.70	1.03	0.75	0.81	0.58	0.53			0.69

*One-half month.

Table 2

U. S. WEATHER BUREAU First-Order Stations

Texas

Abilene	Dallas	Houston	San Angelo
Amarillo	Del Rio	Laredo	San Antonio
Austin	El Paso	Lubbock	Victoria
Brownsville	Fort Worth	Palestine	Waco
Corpus Christi	Galveston	Port Arthur	Wichita Falls

Arkansas	Louisiana	New Mexico	Oklahoma
Fort Smith	Baton Rouge	Albuquerque	Oklahoma City
Little Rock	Lake Charles	Clayton	Tulsa
Texarkana	Shreveport	Roswell	

Table 3

CLIMATIC-INDEX COEFFICIENTS

Coefficients for monthly distribution of average-annual climatic-index numbers, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	0.03	0.04	0.07	0.10	0.11	0.14	0.13	0.12	0.10	0.07	0.05	0.04	1.00
1B	.03	.05	.08	.10	.11	.14	.13	.13	.09	.07	.04	.03	1.00
1C	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
8B	.03	.04	.07	.09	.11	.14	.14	.13	.10	.07	.05	.03	1.00
2A	.03	.04	.07	.10	.13	.14	.13	.11	.10	.07	.05	.03	1.00
2B	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
2C	.03	.04	.07	.10	.12	.13	.14	.12	.10	.07	.05	.03	1.00
3A	.03	.04	.07	.09	.12	.13	.14	.12	.10	.08	.05	.03	1.00
3B	.04	.04	.07	.09	.11	.13	.13	.12	.10	.08	.05	.04	1.00
8A	.03	.04	.07	.09	.11	.14	.14	.13	.10	.08	.04	.03	1.00
7A	.03	.04	.07	.09	.11	.14	.14	.14	.10	.07	.04	.03	1.00
7B	.03	.04	.07	.09	.11	.13	.14	.14	.10	.08	.04	.03	1.00
6A	.03	.04	.07	.09	.11	.13	.14	.13	.10	.08	.04	.04	1.00
6B	.03	.04	.07	.09	.11	.13	.14	.14	.10	.07	.04	.04	1.00
6C	.03	.04	.07	.09	.11	.13	.14	.13	.10	.08	.04	.04	1.00
7C	.03	.04	.07	.09	.11	.13	.13	.13	.10	.08	.05	.04	1.00
5A	.03	.05	.07	.09	.12	.13	.12	.12	.10	.08	.05	.04	1.00
5B	.03	.04	.06	.09	.11	.14	.13	.13	.10	.08	.05	.04	1.00
5C	.03	.04	.07	.09	.11	.13	.13	.13	.10	.08	.05	.04	1.00
4D	.04	.05	.07	.08	.11	.12	.14	.13	.09	.08	.05	.04	1.00
4E	.04	.05	.07	.09	.11	.12	.13	.13	.09	.08	.05	.04	1.00
4C	.04	.05	.07	.09	.10	.12	.14	.13	.09	.08	.05	.04	1.00
4B	.04	.05	.06	.09	.11	.12	.14	.13	.09	.08	.05	.04	1.00
4A	.04	.05	.07	.09	.11	.12	.14	.12	.09	.08	.05	.04	1.00

Table 4

CLIMATIC-INDEX NUMBERS

Average monthly and annual climatic-index numbers, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	2.0	2.6	4.6	6.5	7.2	9.1	8.4	7.8	6.5	4.6	3.2	2.6	65
1B	2.1	3.5	5.6	7.0	7.7	9.8	9.1	9.1	6.3	4.9	2.8	2.1	70
1C	2.2	2.9	5.1	7.3	8.8	9.5	10.2	8.8	7.3	5.1	3.6	2.2	73
8B	2.0	2.7	4.8	6.1	7.5	9.5	9.5	8.8	6.8	4.8	3.4	2.0	68
2A	2.2	2.9	5.1	7.3	9.5	10.2	9.5	8.0	7.3	5.1	3.6	2.2	73
2B	2.2	2.9	5.0	7.2	8.6	9.4	10.1	8.6	7.2	5.0	3.6	2.2	72
2C	2.2	3.0	5.2	7.4	8.9	9.6	10.4	8.9	7.4	5.2	3.7	2.2	74
3A	2.2	3.0	5.2	6.7	8.9	9.6	10.4	8.9	7.4	5.9	3.7	2.2	74
3B	2.6	2.6	4.6	5.9	7.3	8.6	8.6	7.9	6.6	5.3	3.3	2.6	66
8A	1.9	2.6	4.5	5.8	7.0	9.0	9.0	8.3	6.4	5.1	2.6	1.9	64
7A	1.6	2.2	3.8	5.0	6.0	7.7	7.7	7.7	5.5	3.8	2.2	1.6	55
7B	1.7	2.3	4.0	5.1	6.3	7.4	8.0	8.0	5.7	4.6	2.3	1.7	57
6A	1.5	2.0	3.6	4.6	5.6	6.6	7.1	6.6	5.1	4.1	2.0	2.0	51
6B	1.6	2.1	3.7	4.8	5.8	6.9	7.4	7.4	5.3	3.7	2.1	2.1	53
6C	1.6	2.2	3.8	4.9	5.9	7.0	7.6	7.0	5.4	4.3	2.2	2.2	54
7C	1.6	2.2	3.8	5.0	6.0	7.2	7.2	7.2	5.5	4.4	2.8	2.2	55
5A	1.6	2.6	3.6	4.7	6.2	6.8	6.2	6.2	5.2	4.2	2.6	2.1	52
5B	1.6	2.2	3.2	4.9	5.9	7.6	7.0	7.0	5.4	4.3	2.7	2.2	54
5C	1.6	2.2	3.8	5.0	6.0	7.2	7.2	7.2	5.5	4.4	2.8	2.2	55
4D	2.6	3.3	4.6	5.3	7.3	7.9	9.2	8.6	5.9	5.3	3.3	2.6	66
4E	2.2	2.8	3.9	5.0	6.2	6.7	7.3	7.3	5.0	4.5	2.8	2.2	56
4C	2.4	3.0	4.2	5.4	6.0	7.2	8.4	7.8	5.4	4.8	3.0	2.4	60
4B	3.0	3.8	4.5	6.8	8.2	9.0	10.5	9.8	6.8	6.0	3.8	3.0	75
4A	2.4	3.0	4.2	5.4	6.6	7.2	8.4	7.2	5.4	4.8	3.0	2.4	60

APPENDIX C

Tables of Crop Consumptive Use

Average monthly and annual consumptive use,
depth in inches, by areas, 1946-55

Table 5

ALFALFA

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A	1.2	1.5	3.8	5.0	8.2	9.1	8.7	5.5	6.8	4.7	2.6	1.2	58.3
1B	1.2	2.1	4.6	5.4	8.8	9.8	9.4	6.5	6.6	5.0	2.3	1.0	62.7
1C	1.3	1.7	4.2	5.6	10.0	9.5	10.5	6.2	7.6	5.2	3.0	1.1	65.9
8B	1.2	1.6	3.9	4.7	8.6	9.5	9.8	6.2	7.1	4.9	2.8	1.0	61.3
2A	1.3	1.7	4.2	5.6	10.8	10.2	9.8	5.7	7.6	5.2	3.0	1.1	66.2
2B	1.3	1.7	4.1	5.5	9.8	9.4	10.4	6.1	7.5	5.1	3.0	1.1	65.0
2C	1.3	1.8	4.3	5.7	10.1	9.6	10.7	6.3	7.7	5.3	3.0	1.1	66.9
3A	1.3	1.8	4.3	5.2	10.1	9.6	10.7	6.3	7.7	6.0	3.0	1.1	67.1
3B	1.5	1.5	3.8	4.5	8.3	8.6	8.9	5.6	6.9	5.4	2.7	1.2	58.9
8A	1.1	1.5	3.7	4.5	8.0	9.0	9.3	5.9	6.7	5.2	2.1	.9	57.9
7A	.9	1.3	3.1	3.8	6.8	7.7	7.9	5.5	5.7	3.9	1.8	.8	49.2
7B	1.0	1.4	3.3	3.9	7.2	7.4	8.2	5.7	5.9	4.7	1.9	.8	51.4
6A	.9	1.2	3.0	3.5	6.4	6.6	7.3	4.7	5.3	4.2	1.6	1.0	45.7
6B	.9	1.2	3.0	3.7	6.6	6.9	7.6	5.3	5.5	3.8	1.7	1.0	47.2
6C	.9	1.3	3.1	3.8	6.7	7.0	7.8	5.0	5.6	4.4	1.8	1.1	48.5
7C	.9	1.3	3.1	3.8	6.8	7.2	7.4	5.1	5.7	4.5	2.3	1.1	49.2
5A	.9	1.5	3.0	3.6	7.1	6.8	6.4	4.4	5.4	4.3	2.1	1.0	46.5
5B	.9	1.3	2.6	3.8	6.7	7.6	7.2	5.0	5.6	4.4	2.2	1.1	48.4
5C	.9	1.3	3.1	3.8	6.8	7.2	7.4	5.1	5.7	4.5	2.3	1.1	49.2
4D	1.5	1.9	3.8	4.1	8.3	7.9	9.5	6.1	6.1	5.4	2.7	1.2	58.5
4E	1.3	1.7	3.2	3.8	7.1	6.7	7.5	5.2	5.2	4.6	2.3	1.1	49.7
4C	1.4	1.8	3.4	4.2	6.8	7.2	8.7	5.5	5.6	4.9	2.5	1.2	53.2
4B	1.8	2.2	3.7	5.2	9.3	9.0	10.8	7.0	7.1	6.1	3.1	1.4	66.7
4A	1.4	1.8	3.4	4.2	7.5	7.2	8.7	5.1	5.6	4.9	2.5	1.2	53.5

Note.--PERENNIAL PASTURE: Use 90 percent of monthly amount shown for ALFALFA as estimate of consumptive use.

Table 6

CORN

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1A				*0.3	2.3	5.3	9.9	9.2					27.0
1B				*.3	2.5	5.7	10.7	10.7					29.9
1C				*.3	2.8	5.5	12.0	10.4					31.0
8B				*.3	2.4	5.5	11.2	10.4					29.8
2A				1.1	4.3	8.3	12.8	*4.0					30.5
2B				1.1	3.9	7.6	13.6	*4.3					30.5
2C				1.1	4.0	7.8	14.0	*4.4					31.3
3A				1.0	4.0	7.8	14.0	*4.4					31.2
3B				.9	3.3	7.0	11.6	*4.0					26.8
8A				.9	3.2	7.3	12.2	*4.2					27.8
7A				.8	2.7	6.2	10.4	*3.8					23.9
7B			*0.2	1.6	3.7	8.7	9.4						23.6
6A			*.2	1.5	3.2	7.8	8.4						21.1
6B			*.2	1.5	3.4	8.1	8.7						21.9
6C			*.2	1.6	3.4	8.3	9.0						22.5
7C			*.2	1.6	3.5	8.5	8.5						22.3
5A			*.2	1.5	3.6	8.0	7.3						20.6
5B			*.1	1.6	3.4	9.0	8.3						22.4
5C			.6	2.2	4.9	9.7	*3.6						21.0
4D			.7	2.4	5.9	10.7	*4.6						24.3
4E			.6	2.2	5.0	9.0	*3.6						20.4
4C			.6	2.4	4.9	9.7	*4.2						21.8
4B			.7	3.1	6.6	12.2	*5.2						27.8
4A			.6	2.4	5.3	9.7	*4.2						22.2

* One-half month.

Table 7

COTTON

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A					*0.6	2.3	5.7	8.5	4.5	1.0			22.8
1B					*.7	2.4	6.2	9.9	4.3	1.1			24.6
1C					*.8	2.4	6.9	9.6	5.0	1.1			25.8
8B					1.7	2.3	9.8	7.3	4.1	*.2			25.4
2A				*0.7	2.4	6.2	8.6	6.9	5.2	3.9			33.9
2B				*.6	2.2	5.7	9.2	7.4	5.1	3.8			34.0
2C				*.7	2.2	5.9	9.5	7.7	5.3	4.0			35.3
3A				*.6	2.2	6.5	11.3	6.1	1.6				28.3
3B				*.5	1.8	5.8	9.4	5.5	1.5				24.5
8A					*.6	2.2	6.1	9.0	4.4	1.1			23.4
7A					*.5	1.9	5.2	8.4	3.8	.8			20.6
7B				*.5	1.6	5.0	8.7	5.5	1.3				22.6
6A					1.3	1.6	7.3	5.5	3.1	*.2			19.0
6B					1.3	1.7	7.6	6.1	3.2	*.2			20.1
6C				*.4	1.5	4.8	8.3	4.8	1.2				21.0
7C				*.4	1.5	4.9	7.8	5.0	1.2				20.8
5A				1.1	1.5	7.0	5.1	3.8	*.3				18.8
5B				1.1	1.4	7.8	5.8	4.3	*.3				20.7
5C			*0.3	1.2	4.1	7.8	5.0	1.6					20.0
4D			*.4	1.3	5.0	8.6	6.3	1.9					23.5
4E			*.4	1.2	4.2	7.3	5.0	1.6					19.7
4C			*.4	1.4	4.1	7.8	5.8	1.7					21.2
4B			1.0	1.6	8.4	7.5	6.4	*.5					25.4
4A			1.0	1.3	6.8	6.0	5.1	*.4					20.6

* One-half month

Table 8

GRAINS, SMALL

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A	1.0	2.0	5.0	8.3	7.3	*3.4			*0.7	1.3	1.6	1.1	31.7
1B	1.0	2.7	6.0	8.9	7.8	*3.6			*.7	1.4	1.4	.9	34.4
1C	1.1	2.3	5.5	9.3	8.9	*3.5			*.8	1.4	1.8	1.0	35.6
8B	1.0	2.1	5.2	7.7	7.6	*3.5			*.8	1.3	1.7	.9	31.8
2A	1.8	3.0	7.6	10.7	8.8					1.4	2.1	1.3	36.7
2B	1.8	3.0	7.5	10.6	8.0					1.4	2.1	1.3	35.7
2C	1.8	3.1	7.8	10.9	8.3					1.5	2.1	1.3	36.8
3A	1.8	3.1	7.8	9.8	8.3					1.7	2.1	1.3	35.9
3B	2.1	2.7	6.9	8.7	6.8					1.5	1.9	1.6	32.2
8A	1.5	2.7	6.8	8.5	6.5					1.4	1.5	1.1	30.0
7A	1.3	2.3	5.7	7.4	5.6					1.1	1.3	1.0	25.7
7B	1.4	2.4	6.0	7.5	5.9					1.3	1.3	1.0	26.8
6A	1.2	2.1	5.4	6.8	5.2					1.1	1.1	1.2	24.1
6B	1.3	2.2	5.6	7.1	5.4					1.0	1.2	1.3	25.1
6C	1.3	2.3	5.7	7.2	5.5					1.2	1.3	1.3	25.8
7C	1.3	2.3	5.7	7.4	5.6					1.2	1.6	1.3	26.4
5A	1.3	2.7	5.4	6.9	5.8					1.2	1.5	1.3	26.1
5B	1.3	2.3	4.8	7.2	5.5					1.2	1.5	1.3	25.1
5C	1.3	2.3	5.7	7.4	5.6					1.2	1.6	1.3	26.4
4D	2.1	3.4	6.9	7.8	6.8					1.5	1.9	1.6	32.0
4E	1.8	2.9	5.8	7.4	5.8					1.3	1.6	1.3	27.9
4C	1.9	3.1	6.3	7.9	5.6					1.3	1.7	1.4	29.2
4B	2.4	4.0	6.8	10.0	7.6					1.7	2.2	1.8	36.5
4A	1.9	3.1	6.3	7.9	6.1					1.3	1.7	1.4	29.7

* One-half month

Note.--LEGUMINOUS FERTILIZERS: Use monthly amount shown for SMALL GRAINS for respective periods of growth.

Table 9

ORCHARDS, CITRUS

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
4C	1.4	2.0	2.4	3.7	3.7	4.8	4.8	5.0	3.9	3.1	2.0	1.6	38.4
4B	1.8	2.5	2.5	4.7	5.0	6.0	6.0	6.3	4.9	3.9	2.5	2.0	48.1
4A	1.4	2.0	2.4	3.7	4.0	4.8	4.8	4.6	3.9	3.1	2.0	1.6	38.3

Table 10

ORCHARDS, DECIDUOUS FRUIT

3B	1.9	2.7	6.4	8.9	7.9	5.7	3.0	1.3	37.8
8A	1.9	2.7	6.2	9.3	8.3	6.0	2.9	1.2	38.5
6A	1.5	2.1	4.9	6.8	6.5	4.8	2.3	1.0	29.9
6B	1.6	2.2	5.1	7.1	6.8	5.3	2.4	0.9	31.4

Table 11

ORCHARDS, PECAN

3B	2.7	4.4	8.0	8.3	6.9	5.5	2.8	3.0	41.6
7A	2.2	3.8	6.5	7.5	6.2	5.4	2.3	2.1	36.0
7B	2.3	3.8	6.9	7.2	6.4	5.6	2.4	2.6	37.2
6A	2.1	3.4	6.1	6.4	5.7	4.6	2.1	2.3	32.7
6B	2.1	3.6	6.3	6.7	5.9	5.2	2.2	2.1	34.1
6C	2.2	3.7	6.4	6.8	6.1	4.9	2.3	2.4	34.8
7C	2.2	3.8	6.5	7.0	5.8	5.0	2.3	2.5	35.1

Table 12

PEANUTS

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
3B				*0.4	2.4	4.2	6.9	7.1	*1.8				
7B					1.3	3.3	4.9	7.6	3.9				22.8
6A					1.1	2.9	4.3	6.3	3.5				21.0
6B					1.2	3.0	4.5	7.0	3.7				18.1
6C													19.4
7C					1.2	3.1	4.6	6.6	3.7				
≠4D					1.2	3.2	4.4	6.8	3.8				19.2
≠4D			*0.3	1.7	3.6	6.3	8.3	*2.3					19.4
							3.5	6.6	5.3	3.4			22.5
													18.8

Table 13

RICE

5A				8.5	6.2	13.6	9.3	6.2	8.3				52.1
5B				8.8	5.9	15.2	10.5	7.0	8.6				56.0
5C				9.0	6.0	14.4	10.8	7.2	8.8				56.2

* One-half month.
≠ Two crops yearly.

Table 14

SORGHUM, GRAIN

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1A						*1.0	5.5	8.4	5.3	*0.9			21.1
1B						*1.0	6.0	9.8	5.1	*.9			22.8
1C						4.1	8.6	8.9	4.4				26.0
8B					*0.8	6.3	10.3	7.1	*1.3				25.8
2A					4.1	8.6	9.6	4.8					27.1
2B					3.7	7.9	10.2	5.2					27.0
2C					3.8	8.1	10.5	5.3					27.7
≠3A				2.9	7.5	9.7	6.2						26.3
≠3B				2.5	6.1	8.7	5.2						22.5
8A					3.0	7.6	9.1	5.0					24.7
7A					2.6	6.5	7.8	4.6					21.5
7B				2.2	5.3	7.5	4.8						19.8
6A					2.4	5.5	7.2	4.0					19.1
6B					2.5	5.8	7.5	4.4					20.2
6C				2.1	5.0	7.1	4.6						18.8
7C				2.2	5.0	7.3	4.3						18.8
5A				2.0	5.2	6.9	3.7						17.8
5B				2.1	5.0	7.7	4.2						19.0
5C			*0.4	3.3	6.5	5.8	*1.4						17.4
4D			*.5	3.5	7.9	6.4	*1.7						20.0
4E			*.4	3.3	6.7	5.4	*1.4						17.2
4C			*.4	3.6	6.5	5.8	*1.6						17.9
4B			*.5	4.5	8.9	7.3	*2.0						23.2
≠4A			1.8	4.5	6.7	4.3							17.3

* One-half month.
≠ Two crops yearly.

Table 14--Continued

SORGHUM, GRAIN

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
≠4A								3.1	4.5	4.8	1.8		14.2
≠3A								3.8	6.2	6.0	2.2		18.2
≠3B								3.4	5.5	5.4	2.0		16.3

≠ Two crops yearly.
Note.--SORGHUM, SILAGE AND FORAGE: Use monthly amount shown for GRAIN SORGHUM for respective periods of growth.

Table 15

VEGETABLES, DEEP-ROOTED

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1B						3.7	4.4	8.5	4.9	2.8			24.3
≠2B			1.9	3.5	8.0	7.3	5.8						26.5
≠2B					*1.6	3.9	6.7	8.3	5.0	*1.1			26.6
2C				2.8	4.3	8.9	8.1	5.1					29.2
8A				*1.1	2.9	5.9	8.7	5.7	*1.4				25.7
7A				*1.0	2.5	5.1	7.5	5.3	*1.2				22.6
7B				1.9	3.0	6.9	6.2	4.6					22.6
6A				*.9	2.4	4.4	6.9	4.6	*1.1				20.3
6B				*.9	2.4	4.6	7.2	5.1	*1.1				21.3
6C			*.7	2.1	3.9	6.8	5.2	*1.5					20.2
7C			*.7	2.1	4.0	7.0	5.0	*1.5					20.3
4D								3.3	2.8	4.9	2.6	1.5	15.1

* One-half month.
≠ Two crops yearly.

Table 15--Continued

VEGETABLES, DEEP-ROOTED

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
4C	1.0	2.0	4.1	3.7	*1.3							*0.5	12.6
≠4B								3.7	3.3	5.6	3.0	1.7	17.3
≠4B	1.3	2.5	4.4	4.7	*1.8							*.6	15.3
4A	1.0	2.0	4.1	3.7	*1.4							*.5	12.7

Crops Included

Beans	Chard	Okra	Pumpkin	Tomatoes
Beets	Cucumbers	Peas	Squash	Turnips
Cantaloupe	Eggplant	Peppers	Sweet potatoes	Watermelons
Carrots				

* One-half month.
≠ Two crops yearly.

Table 16

VEGETABLES, SHALLOW-ROOTED

Average monthly and annual consumptive use, depth in inches, by areas, 1946-55

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Season
1B				1.8	5.4	10.1	6.8	7.4	3.7	2.6			37.8
2A	2.3	2.2	4.1	4.2	5.0						0.9	1.5	20.2
8A			1.1	4.1	7.2	6.8	7.3	4.8	3.4				34.7
7A			1.0	3.5	6.2	5.8	6.2	4.5	2.9				30.1
7B			1.0	3.6	6.5	5.6	6.5	4.6	3.0				30.8
6A				1.2	3.9	6.8	5.3	5.3	3.0	2.2			27.7
6B				1.2	4.1	7.1	5.6	6.0	3.1	2.0			29.1
6C				1.2	4.1	7.2	5.7	5.7	3.1	2.3			29.3
7C				1.2	4.2	7.4	5.4	5.8	3.2	2.3			29.5
5C	1.3	1.3	2.0						1.4	3.1	2.9	1.6	13.6
4D	2.1	1.9	2.4						1.5	3.7	3.4	2.0	17.0
4E	1.8	1.6	2.1						1.2	3.2	2.9	1.6	14.4
4C	1.9	1.7	2.2						1.4	3.4	3.1	1.8	15.5
4B	2.4	2.2	2.4						1.7	4.2	3.9	2.2	19.0
4A	1.9	1.7	2.2						1.4	3.4	3.1	1.8	15.5

Crops Included

Brussels sprouts
Cabbage
Cauliflower
Celery
Lettuce
Onions
Radishes
Spinach
Sweet Corn

Area type for Wharton County - 5C

Consumptive use				
	Corn	Cotton	Alfa-alfa	Average
January			0.81	0.81
February			1.17	1.17
March	0.6	0.3		0.45
April	2.2	1.2		1.7
May	4.9	4.1		4.5
June	9.7	7.8		8.75
July	3.6	5.8		4.7
August		1.7		1.7
September			5.13	5.13
October			4.05	4.05
November			2.07	2.07
December			0.99	0.99

Soil	HSG	Crop	Treatment	% Area	CN	Total CN component
BcA	D	Grass		4.50%	80	3.6
BeA	D	Grass		3.10%	80	2.48
Cn	C	Grass		0.30%	74	0.222
Cr	C	Grass		3.20%	74	2.368
EdA	D	Grass		20%	80	15.92
Eh	D	Grass		2.30%	80	1.84
EtA	D	Grass		0.10%	80	0.08
LcA	D	Grass		57.30%	80	45.84
Md	D	Grass		<0.1	N/A	N/A
Me	D	Grass		4.10%	80	3.28
MidB	C	Grass		0.50%	74	0.37
NoA	B	Grass		3.60%	61	2.196
Nr	B	Grass		0.20%	61	0.122
W	D	Water		0.80%	N/A	N/A
				99.90%		78.318

Dacosta - 90%

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.: **0**

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

Month (1) Units →	Avg. Precip. (2) inches	Average Runoff (3) inches	Average Infiltrated Rainfall (4) inches	Evapotrans-piration (5) inches	Required Leaching (6) inches	Total Water Needs (5)+(6) (7) inches	Effluent Needed in Root Zone (7)-(4) (8) inches	Evaporation from Reservoir Surface (9) inches	Effluent to be Applied to Land (8)/K (10) inches	Consumption from Reservoir (9)+(10) (11) inches
January	3.36	1.41	1.95	0.90	0.00	0.90	0.00	0.00	0.00	0.00
February	2.15	0.58	1.57	1.30	0.00	1.30	0.00	0.00	0.00	0.00
March	2.90	1.07	1.82	3.10	0.32	3.42	1.60	0.00	1.88	1.88
April	3.07	1.20	1.87	3.80	0.48	4.28	2.41	0.00	2.84	2.84
May	4.50	2.32	2.18	6.80	1.15	7.95	5.77	0.00	6.79	6.79
June	4.08	1.97	2.10	7.20	1.27	8.47	6.37	0.00	7.49	7.49
July	3.46	1.49	1.97	7.40	1.36	8.76	6.78	0.00	7.98	7.98
August	3.40	1.44	1.96	5.10	0.79	5.89	3.93	0.00	4.62	4.62
September	3.89	1.82	2.07	5.70	0.91	6.61	4.54	0.00	5.34	5.34
October	4.10	1.99	2.11	4.50	0.60	5.10	2.99	0.00	3.52	3.52
November	3.78	1.74	2.04	2.30	0.06	2.36	0.32	0.00	0.38	0.38
December	2.71	0.95	1.77	1.10	0.00	1.10	0.00	0.00	0.00	0.00
Totals	41.41	18.00	23.41	49.20	6.94	56.14	34.71	0.00	40.84	40.84

Crop is: Coastal

CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	5.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate = 3.40 *ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate = *ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis = N/A *ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit = 3.40 *ac-in/ac/month* **OR** *ac-ft/ac/year*

Limiting factor = Click this cell to choose from list.

Gross rate check (from flow, acres) = 0.00 **OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = (*average rainfall* – (0.2*((1000/*CN*) – 10))) ^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall* – *average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019
(6) Required leaching = ← Edit
If: *evapotranspiration* – *average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration* – *average infiltrated rainfall* > 0, *Ce*/(*Cl* – *Ce*)*(*evapotranspiration* – *avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration* + *required leaching*
(8) Effluent needed in root zone = *total water needs* – *average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface* + *effluent needed based on irrigation efficiency*

STORAGE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: Wharton AD1, LLC
Permit No.: 0

The storage calculations are designed to evaluate the storage capacity and surface area of the applicant's storage pond (or multiple ponds). The pond must have enough surface area to evaporate all the flow to the pond under low-net evaporation and corresponding annual rainfall conditions. The pond is considered adequately sized when the adidtional storage required is equal to zero (or "none"). If the additional storage required is greater than zero, then: (1) the pond's storage capacity must be increase, (2) the pond's surface area must be increased, (3) the effluent flow must be reduced, or (4) other approved measures must be taken to ensure that no accumulation occurs during low-net evaporation and corresponding annual rainfall conditions.

Month (12)	a Effluent Received for Application or Storage (13)	b Rainfall Worst Year in Past 25 Year (14)	c Runoff Worst Year in Past 25 Year (15)	Infiltrated Rainfall (14)-(15) (16)	Available Water (13)+(16) (17)	d Net 25 Year Low Evaporation from Regur. Surface (18)	e Storage (19)	f Accumulated Storage (20)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	5.04	2.77	2.27	2.27	0.00	0.00	0.01
February	0.00	3.22	1.31	1.91	1.92	0.00	0.00	0.01
March	0.00	4.34	2.19	2.15	2.16	0.00	-1.49	0
April	0.00	4.60	2.40	2.20	2.20	0.00	-2.45	0
May	0.00	6.76	4.29	2.47	2.47	0.00	-6.45	0
June	0.00	6.12	3.72	2.40	2.41	0.00	-7.14	0
July	0.00	5.20	2.91	2.29	2.29	0.00	-7.61	0
August	0.00	5.10	2.83	2.27	2.28	0.00	-4.25	0
September	0.00	5.84	3.47	2.37	2.37	0.00	-4.98	0
October	0.00	6.15	3.75	2.41	2.41	0.00	-3.16	0
November	0.00	5.67	3.32	2.35	2.35	0.00	-0.01	0
December	0.00	4.07	1.97	2.10	2.11	0.00	0.00	0.00
Totals	0.03	62.12	34.93	27.19	27.23	0.00	—	0.01

← You must manually enter a starting value for accumulated storage. **Click the link for instructions.**
Instructions for setting the accumulated storage start value'

FALSE ← Special case (all positive storage values)

Worst (low) net evap. = -18.96 inches
Corresponding rain = 62.12 inches
Worst-case net year = 2004

Storage required = 22.46 *ac-ft*
Actual storage = *ac-ft*
Additional storage required = 22.46 *ac-ft*
Storage days = 98 *days*

(13) Effluent available for irrigation (assumes design flow is applied to entire acerage unless different flow values are justified).
(14a) Average rainfall distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(14b) Rainfall worst year = (*rainfall distribution* as fraction or %/100)**maximum annual rainfall*
(15) Field runoff worst year = (*rainfall worst year* – (0.2*((1000/*CN*) – 10))) ^2/((*rainfall worst year* + (0.8*((1000/*CN*) – 10))))
(16) Infiltrated rainfall = (rainfall worst year- field runoff worst year)
(17) Available water = (effluent available for land application + infiltrated rainfall check)
(18a) Average net evaporation distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(18b) Net low evaporation from reservoir surface = [(|*low net evaporation*|)*(*net low evaporation avg. dist*)]*[(*pond area*)/(*irrigation area*)]
(19) Storage =
If: (*total water needs – infiltrated rainfall*) < 0, (*effluent available for land application – net low evaporation from reservoir surface*);

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION CHECKLIST

Complete and submit this checklist with the industrial wastewater permit application.

APPLICANT NAME: Wharton AD1, LLC

PERMIT NUMBER (If new, leave blank): WQ00 Click to enter text.

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

	Y	N		Y	N
Administrative Report 1.0	☒	☐	Worksheet 8.0	☐	☐
Administrative Report 1.1	☒	☐	Worksheet 9.0	☐	☐
SPIF	☐	☐	Worksheet 10.0	☐	☐
Core Data Form	☒	☐	Worksheet 11.0	☐	☐
Public Involvement Plan Form	☒	☐	Worksheet 11.1	☐	☐
Plain Language Summary	☒	☐	Worksheet 11.2	☐	☐
Technical Report 1.0	☒	☐	Worksheet 11.3	☐	☐
Worksheet 1.0	☐	☐	Original USGS Map	☒	☐
Worksheet 2.0	☐	☐	Affected Landowners Map	☒	☐
Worksheet 3.0	☒	☐	Landowner Disk or Labels	☐	☐
Worksheet 3.1	☐	☐	Flow Diagram	☒	☐
Worksheet 3.2	☐	☐	Site Drawing	☒	☐
Worksheet 3.3	☐	☐	Original Photographs	☐	☐
Worksheet 4.0	☐	☐	Design Calculations	☐	☐
Worksheet 4.1	☐	☐	Solids Management Plan	☐	☐
Worksheet 5.0	☐	☐	Water Balance	☒	☐
Worksheet 6.0	☐	☐			
Worksheet 7.0	☐	☐			

For TCEQ Use Only

Segment Number _____County _____
Expiration Date _____Region _____
Permit Number _____

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.0

This report is required for all applications for TPDES permits and TLAPs, except applications for oil and gas extraction operations subject to 40 CFR Part 435. Contact the Applications Review and Processing Team at 512-239-4671 with any questions about completing this report.

Applications for oil and gas extraction operations subject to 40 CFR Part 435 must use the Oil and Gas Exploration and Production Administrative Report (TCEQ Form-20893 and 20893-inst[1]).

Item 1. Application Information and Fees (Instructions, Page 26)

a. Complete each field with the requested information, if applicable.

Applicant Name: Wharton AD1, LLC

Permit No.: WQ000Click to enter text.

EPA ID No.: TX0Click to enter text.

Expiration Date: Click to enter text.

b. Check the box next to the appropriate authorization type.

☒ Industrial Wastewater (wastewater and stormwater)

☐ Industrial Stormwater (stormwater only)

c. Check the box next to the appropriate facility status.

☐ Active ☒ Inactive

d. Check the box next to the appropriate permit type.

☐ TPDES Permit ☒ TLAP ☐ TPDES with TLAP component

e. Check the box next to the appropriate application type.

☒ New

☐ Renewal with changes ☐ Renewal without changes

☐ Major amendment with renewal ☐ Major amendment without renewal

☐ Minor amendment without renewal

☐ Minor modification without renewal

f. If applying for an amendment or modification, describe the request: Click to enter text.

For TCEQ Use Only

Segment Number _____County _____

[1] https://www.tceq.texas.gov/publications/search_forms.html

g. Application Fee

EPA Classification	New	Major Amend. (with or without renewal)	Renewal (with or without changes)	Minor Amend. / Minor Mod. (without renewal)
Minor facility not subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☒ $350	☐ $350	☐ $315	☐ $150
Minor facility subject to EPA categorical effluent guidelines (40 CFR Parts 400-471)	☐ $1,250	☐ $1,250	☐ $1,215	☐ $150
Major facility	N/A [2]	☐ $2,050	☐ $2,015	☐ $450

h. Payment Information

Mailed

Check or money order No.: Click to enter text.

Check or money order amt.: Click to enter text.

Named printed on check or money order: Click to enter text.

Epay

Voucher number: Click to enter text.

Copy of voucher attachment: Click to enter text.

Item 2. Applicant Information (Instructions, Pages 26)

a. Customer Number, if applicant is an existing customer: CN000000000

Note: Locate the customer number using the TCEQ's Central Registry Customer Search[3].

b. Legal name of the entity (applicant) applying for this permit: Wharton AD1, LLC

Note: The owner of the facility must apply for the permit. The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Mr. Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

d. Will the applicant have overall financial responsibility for the facility?

☒ Yes ☐ No

[2] All facilities are designated as minors until formally classified as a major by EPA.

[3] https://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 3. Co–applicant Information (Instructions, Page 27)

☒ Check this box if there is no co-applicant.; otherwise, complete the below questions.

a. Legal name of the entity (co-applicant) applying for this permit: Click to enter text.

Note: The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.

b. Customer Number (if applicant is an existing customer): CNClick to enter text.

Note: Locate the customer number using the TCEQ's Central Registry Customer Search.

c. Name and title of the person signing the application. (**Note:** The person must be an executive official that meets signatory requirements in 30 TAC § 305.44.)

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

Title: Click to enter text. Credential: Click to enter text.

d. Will the co-applicant have overall financial responsibility for the facility?

☐ Yes ☐ No

Note: The entity with overall financial responsibility for the facility must apply as a co-applicant, if not the facility owner.

Item 4. Core Data Form (Instructions, Pages 27)

a. Complete one Core Data Form (TCEQ Form 10400) for each customer (applicant and co-applicant(s)) and include as an attachment. If the customer type selected on the Core Data Form is Individual, complete Attachment 1 of the Administrative Report. Attachment: Click to enter text.

Item 5. Application Contact Information (Instructions, Page 27)

Provide names of two individuals who can be contact for additional information about this application. Indicate if the individual can be contact about administrative or technical information, or both.

a. ☒ Administrative Contact . ☒ Technical Contact

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. ☒ Administrative Contact ☒ Technical Contact

Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Managing Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 6. Permit Contact Information (Instructions, Page 28)

Provide two names of individuals that can be contacted throughout the permit term.

a. Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. Prefix: Ms Full Name (Last/First Name): Michael Zhang

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 832-817-9116 Email: michael.zhang@environeerconsulting.com

Attachment: Click to enter text.

Item 7. Billing Contact Information (Instructions, Page 28)

The permittee is responsible for paying the annual fee. The annual fee will be assessed for permits **in effect on September 1 of each year**. The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (form TCEQ-20029).

Provide the complete mailing address where the annual fee invoice should be mailed and the name and phone number of the permittee's representative responsible for payment of the invoice.

Prefix: Mr Full Name (Last/First Name): Stephen Megnia

Title: Development Manager Credential: Click to enter text.

Organization Name: Wharton AD1, LLC

Mailing Address: 133 Boston Post Rd City/State/Zip: Weston, MA, 02493

Phone No: 508.360.2095 Email: smegnia@vanguardrenewable.com

Item 8. DMR/MER Contact Information (Instructions, Page 28)

Provide the name and mailing address of the person delegated to receive and submit DMRs or MERs. **Note:** DMR data must be submitted through the NetDMR system. An electronic reporting account can be established once the facility has obtained the permit number.

Prefix: Mr Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy Bldg 4 City/State/Zip: Houston TX 77023

Phone No: 346-441-9582 Email: Sowmiya.kannappan@environeerconsulting.com

Item 9. Notice Information (Instructions, Pages 28)

a. Individual Publishing the Notices

Prefix: Ms Full Name (Last/First Name): Sowmiya Kannappan

Title: Environment Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Mailing Address: 5000 Gulf Fwy, Bldg 4 City/State/Zip: Houston, TX 77054

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

b. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package (only for NORI, NAPD will be sent via regular mail)

☒ E-mail: sowmiya.kannappan@environeerconsulting.com

☐ Fax: Click to enter text.

☐ Regular Mail (USPS)

Mailing Address: Click to enter text.

City/State/Zip Code: Click to enter text.

c. Contact in the Notice

Prefix: Ms Full Name (Last/First Name): Sowmiya Kannappan

Title: Environmental Consultant Credential: Click to enter text.

Organization Name: Environeer, LLC

Phone No: 346-441-9582 Email: sowmiya.kannappan@environeerconsulting.com

d. Public Viewing Location Information

Note: If the facility or outfall is located in more than one county, provide a public viewing place for each county.

Public building name: Wharton County Library Location within the building: Click to enter text.

Physical Address of Building: 200 W Church St, El Campo, TX 77437

City: El Campo County: Wharton

e. Bilingual Notice Requirements

This information is required for new, major amendment, minor amendment or minor modification, and renewal applications.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine if an alternative language notice(s) is required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

☒ Yes ☐ No

If no, publication of an alternative language notice is not required; skip to Item 8 (Regulated Entity and Permitted Site Information.)

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

   ☒ Yes ☐ No

3. Do the students at these schools attend a bilingual education program at another location?

   ☐ Yes ☒ No

4. Would the school be required to provide a bilingual education program, but the school has waived out of this requirement under 19 TAC §89.1205(g)?

   ☐ Yes ☐ No ☒ N/A

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? Spanish

f. Plain Language Summary Template – Complete the Plain Language Summary (TCEQ Form 20972) and include as an attachment. Attachment: A.C

g. Complete one Public Involvement Plan (PIP) Form (TCEQ Form 20960) for each application for a new permit or major amendment and include as an attachment. Attachment: A.D

Item 10. Regulated Entity and Permitted Site Information (Instructions Page 29)

a. TCEQ issued Regulated Entity Number (RN), if available: RNClick to enter text.

Note: If your business site is part of a larger business site, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search the TCEQ's Central Registry to determine the RN or to see if the larger site may already be registered as a Regulated Entity. If the site is found, provide the assigned RN.

b. Name of project or site (the name known by the community where located): Wharton AD1, LLC

c. Is the location address of the facility in the existing permit the same?

☐ Yes ☐ No ☒ N/A (new permit)

Note: If the facility is located in Bexar, Comal, Hays, Kinney, Medina, Travis, Uvalde, or Williamson County, additional information concerning protection of the Edwards Aquifer may be required.

d. Owner of treatment facility:

Prefix:Mr. Full Name (Last/First Name): Laurance Armour

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: 832-741-7411 Email: lharmour3@gmail.com

e. Ownership of facility: ☐ Public ☒ Private ☐ Both ☐ Federal

f. Owner of land where treatment facility is or will be: Click to enter text.

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years (In some cases, a lease may not suffice - see instructions). Attachment: Click to enter text.

g. Owner of effluent TLAP disposal site (if applicable): Click to enter text.

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

h. Owner of sewage sludge disposal site (if applicable):

Prefix: Click to enter text. Full Name (Last/First Name): Click to enter text.

or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/Zip: Click to enter text.

Phone No: Click to enter text. Email: Click to enter text.

Note: If not the same as the facility owner, attach a long-term lease agreement in effect for at least six years. Attachment: Click to enter text.

Item 11. TDPES Discharge/TLAP Disposal Information (Instructions, Page 31)

a. Is the facility located on or does the treated effluent cross Native American Land?

☐ Yes ☒ No

b. Attach an original full size USGS Topographic Map (or an 8.5"×11" reproduced portion for renewal or amendment applications) with all required information. Check the box next to each item below to confirm it has been included on the map.

☐ One-mile radius

☒ Applicant's property boundaries

☐ Labeled point(s) of discharge

☐ Effluent disposal site boundaries

☐ Sewage sludge disposal site

☐ Three-miles downstream information

☐ Treatment facility boundaries

☐ Highlighted discharge route(s)

☐ All wastewater ponds

☐ New and future construction

Attachment: Click to enter text.

c. Is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: Click to enter text.

d. Are the point(s) of discharge in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new application, provide an accurate location description: The effluent from the biogas plant is applied directly on the land without any treatment.

e. Are the discharge route(s) in the existing permit correct?

☐ Yes ☒ No or New Permit

If no, or a new permit, provide an accurate description of the discharge route: The effluent from the biogas plant is applied directly on the land without any treatment.

f. City nearest the outfall(s): N/A

g. County in which the outfalls(s) is/are located: N/A

h. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If yes, indicate by a check mark if: ☐ Authorization granted ☐ Authorization pending

For new and amendment applications, attach copies of letters that show proof of contact and provide the approval letter upon receipt. Attachment: Click to enter text.

For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge: Click to enter text.

i. For TLAPs, is the location of the effluent disposal site in the existing permit accurate?

☐ Yes No or New Permit ☒ New Permit

If no, or a new application, provide an accurate location description: Site is located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59

j. City nearest the disposal site: Pierce

k. County in which the disposal site is located: Wharton

l. For TLAPs, describe how effluent is/will be routed from the treatment facility to the disposal site: Effluent from the biogas plant is directly applied on the land and no treatment facility is included

m. For TLAPs, identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained: Colorado River

Item 12. Miscellaneous Information (Instructions, Page 33)

a. Did any person formerly employed by the TCEQ represent your company and get paid for service regarding this application?

☐ Yes ☒ No

If yes, list each person: Click to enter text.

b. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Account no.: Click to enter text.

Total amount due: Click to enter text.

c. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Enforcement order no.: Click to enter text.

Amount due: Click to enter text.

Item 13. Signature Page (Instructions, Page 33)

Permit No: WQ000Click to enter text.

Applicant Name: Wharton AD1, LLC

Certification: I, Kim Martin, 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 (typed or printed): Kim Martin

Signatory title: VP of Development

Signature: _____ Date: 3/17/25
(Use blue ink)

Subscribed and Sworn to before me by the said Kim Martin

on this 17th day of March, 2025.

My commission expires on the 4th day of September, 2031.

Noelle P. Fairney
Notary Public

[SEAL]

NOELLE P. FAIRNENY
Notary Public
Commonwealth of Massachusetts
My Commission Expires
September 4, 2031

Middlesex
County, Massachusetts

Note: *If co-applicants are necessary, each entity must submit an original, separate signature page.*

INDUSTRIAL WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.1

The following information is required for new and amendment applications.

Item 1. Affected Landowner Information (Instructions, Page 35)

a. Attach a landowner map or drawing, with scale, as applicable. Check the box next to each item to confirm it has been provided.

☒ The applicant's property boundaries.

☒ The facility site boundaries within the applicant's property boundaries.

☒ The distance the buffer zone falls into adjacent properties and the property boundaries of the landowners located within the buffer zone.

☒ The property boundaries of all landowners surrounding the applicant's property. (Note: if the application is a major amendment for a lignite mine, the map must include the property boundaries of all landowners adjacent to the new facility (ponds).)

☐ The point(s) of discharge and highlighted discharge route(s) clearly shown for one mile downstream.

☐ The property boundaries of the landowners located on both sides of the discharge route for one full stream mile downstream of the point of discharge.

☐ The property boundaries of the landowners along the watercourse for a one-half mile radius from the point of discharge if the point of discharge is into a lake, bay, estuary, or affected by tides.

☐ The boundaries of the effluent disposal site (e.g., irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property.

☐ The property boundaries of all landowners surrounding the applicant's property boundaries where the effluent disposal site is located.

☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners within one-quarter mile of the applicant's property boundaries where the sewage sludge land application site is located.

☐ The property boundaries of landowners within one-half mile in all directions from the applicant's property boundaries where the sewage sludge disposal site (e.g., sludge surface disposal site or sludge monofil) is located.

Attachment: Click to enter text.

b. Check the box next to the format of the landowners list:

☐ Readable/Writeable CD ☐ Four sets of labels

Attachment: Click to enter text.

d. Provide the source of the landowners' names and mailing addresses: Wharton County Central Appraisal District (WCAD)

e. As required by Texas Water Code § 5.115, is any permanent school fund land affected by this application?

☐ Yes ☒ No

If yes, provide the location and foreseeable impacts and effects this application has on the land(s): Click to enter text.

Item 2. Original Photographs (Instructions, Page 37)

Provide original ground level photographs. Check the box next to each of the following items to indicate it is included.

☐ At least one original photograph of the new or expanded treatment unit location.

☐ At least two photographs of the existing/proposed point of discharge and as much area downstream (photo 1) and upstream (photo 2) as can be captured. If the discharge is to an open water body (e.g., lake, bay), the point of discharge should be in the right or left edge of each photograph showing the open water and with as much area on each respective side of the discharge as can be captured.

☐ At least one photograph of the existing/proposed effluent disposal site.

☒ A plot plan or map showing the location and direction of each photograph.

Attachment: Click to enter text.

INDUSTRIAL WASTEWATER PERMIT APPLICATION

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

This form applies to TPDES permit applications only. Complete and attach the Supplemental Permit information Form (SPIF) (TCEQ Form 20971).

Attachment: Click to enter text.

WATER QUALITY PERMIT

PAYMENT SUBMITTAL FORM

Use this form to submit the Application Fee, if mailing the payment. (Instructions, Page 36–37)

- Complete items 1 through 5 below.
- Staple the check or money order in the space provided at the bottom of this document.
- Do not mail this form with the application form.
- Do not mail this form to the same address as the application.
- Do not submit a copy of the application with this form as it could cause duplicate permit entries.

Mail this form and the check or money order to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, Texas 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, Texas 78753

Fee Code: WQP **Permit No:** WQ000Click to enter text.

1. Check or Money Order Number: Click to enter text.
2. Check or Money Order Amount: Click to enter text.
3. Date of Check or Money Order: Click to enter text.
4. Name on Check or Money Order: Click to enter text.
5. APPLICATION INFORMATION

   Name of Project or Site: Click to enter text.

   Physical Address of Project or Site: Click to enter text.

   If the check is for more than one application, attach a list which includes the name of each Project or Site (RE) and Physical Address, exactly as provided on the application.
   Attachment: Click to enter text.

Staple Check or Money Order in This Space

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INDUSTRIAL WASTEWATER PERMIT APPLICATION TECHNICAL REPORT 1.0

The following information **is required** for all applications for a TLAP or an individual TPDES discharge permit.

For **additional information** or clarification on the requested information, please refer to the Instructions for Completing the Industrial Wastewater Permit Application[1] available on the TCEQ website. Please contact the Industrial Permits Team at 512-239-4671 with any questions about this form.

If more than one outfall is included in the application, provide applicable information for each individual outfall. **If an item does not apply to the facility, enter N/A** to indicate that the item has been considered. Include separate reports or additional sheets as **clearly cross–referenced attachments** and provide the attachment number in the space provided for the item the attachment addresses.

NOTE: This application is for an industrial wastewater permit only. Additional authorizations from the TCEQ Waste Permits Division or the TCEQ Air Permits Division may be needed.

Item 1. Facility/Site Information (Instructions, Page 39)

a. Describe the general nature of the business and type(s) of industrial and commercial activities. Include all applicable SIC codes (up to 4).

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. Primary SIC Code = 4924, Primary NAICS Code = 221210

b. Describe all wastewater-generating processes at the facility.

Anaerobic digestion breaks down organic materials like cow manure and food waste in an enclosed environment to produce biogas. Combining manure with food waste enhances biogas production, making the system more efficient. Feedstock from hydrolysis and manure tanks is regularly transferred to digester tanks, where it is mixed, heated, and broken down by microbes in an oxygen-free environment. This process generates biogas, primarily methane, carbon dioxide, hydrogen, and water vapor. The collected biogas undergoes conditioning to produce pipeline-quality natural gas. As new material enters the digester, processed digestate is removed and stored in a lagoon for land application by spreading method.

[1] https://www.tceq.texas.gov/permitting/wastewater/industrial/TPDES_industrial_wastewater_steps.html

c. Provide a list of raw materials, major intermediates, and final products handled at the facility.

Materials List

Raw Materials	Intermediate Products	Final Products
Source-separated Organics	Digestate	Renewable Natural Gas
Packaged waste	Biogas	Liquid fertilizer
Canned liquid		
Liquid organics		
Dilution water		

Attachment: Click to enter text.

d. Attach a facility map (drawn to scale) with the following information:

- Production areas, maintenance areas, materials-handling areas, waste-disposal areas, and water intake structures.
- The location of each unit of the WWTP including the location of wastewater collection sumps, impoundments, outfalls, and sampling points, if significantly different from outfall locations.

Attachment: T.A

e. Is this a new permit application for an existing facility?

☐ Yes ☒ No

If **yes**, provide background discussion: Click to enter text.

f. Is/will the treatment facility/disposal site be located above the 100-year frequency flood level.

☐ Yes ☒ No

List source(s) used to determine 100-year frequency flood plain: Click to enter text.

If **no**, provide the elevation of the 100-year frequency flood plain and describe what protective measures are used/proposed to prevent flooding (including tail water and rainfall run-on controls) of the treatment facility and disposal area: Click to enter text.

Attachment: T.B

g. For **new** or **major amendment** permit applications, will any construction operations result in a discharge of fill material into a water in the state?

☐ Yes ☒ No ☐ N/A (renewal only)

h. If **yes** to Item 1.g, has the applicant applied for a USACE CWA Chapter 404 Dredge and Fill permit?

☐ Yes ☒ No

If **yes**, provide the permit number: Click to enter text.

If **no**, provide an approximate date of application submittal to the USACE: Click to enter text.

Item 2. Treatment System (Instructions, Page 40)

a. List any physical, chemical, or biological treatment process(es) used/proposed to treat wastewater at this facility. Include a description of each treatment process, starting with initial treatment and finishing with the outfall/point of disposal.

The digestate (effluent) produced in anaerobic digesters is distributed using the spreading method without undergoing any additional treatment. The feedstock is processed within the biogas plant, and the resulting digestate is directly applied to agricultural land via spreading, with no intermediate treatment steps.

b. Attach a flow schematic **with a water balance** showing all sources of water and wastewater flow into the facility, wastewater flow into and from each treatment unit, and wastewater flow to each outfall/point of disposal.

Attachment: T.A.1

Item 3. Impoundments (Instructions, Page 40)

Does the facility use or plan to use any wastewater impoundments (e.g., lagoons or ponds?)

☒ Yes ☐ No

If **no**, proceed to Item 4. If **yes**, complete **Item 3.a** for **existing** impoundments and **Items 3.a – 3.e** for **new or proposed** impoundments. **NOTE:** See instructions, Pages 40-42, for additional information on the attachments required by Items 3.a – 3.e.

a. Complete the table with the following information for each existing, new, or proposed impoundment. Attach additional copies of the Impoundment Information table, if needed.

Use Designation: Indicate the use designation for each impoundment as Treatment (**T**), Disposal (**D**), Containment (**C**), or Evaporation (**E**).

Associated Outfall Number: Provide an outfall number if a discharge occurs or will occur.

Liner Type: Indicate the liner type as Compacted clay liner (**C**), In-situ clay liner (**I**), Synthetic/plastic/rubber liner (**S**), or Alternate liner (**A**). **NOTE:** See instructions for further detail on liner specifications. If an alternate liner (A) is selected, include an attachment that provides a description of the alternate liner and any additional technical information necessary for an evaluation.

Leak Detection System: If any leak detection systems are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no.

Groundwater Monitoring Wells and Data: If groundwater monitoring wells are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no. Attach any existing groundwater monitoring data.

Dimensions: Provide the dimensions, freeboard, surface area, storage capacity of the impoundments, and the maximum depth (not including freeboard). For impoundments with irregular shapes, submit surface area instead of length and width.

Compliance with 40 CFR Part 257, Subpart D: If the impoundment is required to be in compliance with 40 CFR Part 257, Subpart D, enter **Y** for yes. Otherwise, enter **N** for no.

Date of Construction: Enter the date construction of the impoundment commenced (mm/dd/yy).

Impoundment Information

Parameter	**Pond #**	**Pond #**	**Pond #**	**Pond #**
Use Designation: (T) (D) (C) or (E)	N/A			
Associated Outfall Number	N/A			
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), Not Including Freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction	TBD			

Attachment: Click to enter text.

The following information (**Items 3.b – 3.e**) is required only for **new or proposed** impoundments.

b. For new or proposed impoundments, attach any available information on the following items. If attached, check **yes** in the appropriate box. Otherwise, check **no** or **not yet designed**.

1. Liner data

☐ Yes ☐ No ☐ Not yet designed

2. Leak detection system or groundwater monitoring data

☐ Yes ☐ No ☐ Not yet designed

3. Groundwater impacts

☐ Yes ☐ No ☐ Not yet designed

NOTE: Item b.3 is required if the bottom of the pond is not above the seasonal high-water table in the shallowest water-bearing zone.

Attachment: Click to enter text.

For TLAP applications: Items 3.c – 3.e are **not required**, continue to Item 4.

c. Attach a USGS map or a color copy of original quality and scale which accurately locates and identifies all known water supply wells and monitor wells within ½-mile of the impoundments.

Attachment: Click to enter text.

d. Attach copies of State Water Well Reports (e.g., driller's logs, completion data, etc.), and data on depths to groundwater for all known water supply wells including a description of how the depths to groundwater were obtained.

Attachment: Click to enter text.

e. Attach information pertaining to the groundwater, soils, geology, pond liner, etc. used to assess the potential for migration of wastes from the impoundments or the potential for contamination of groundwater or surface water.

Attachment: Click to enter text.

Item 4. Outfall/Disposal Method Information (Instructions, Page 42)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge, and for each point of disposal for TLAP operations.

If there are more outfalls/points of disposal at the facility than the spaces provided, copies of pages 6 and/0r numbered accordingly (i.e., page 6a, 6b, etc.) may be used to provide information on the additional outfalls.

For TLAP applications: Indicate the disposal method and each individual irrigation area **I**, evaporation pond **E**, or subsurface drainage system **S** by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for **Outfall** number (e.g. **E1** for evaporation pond 1, **I2** for irrigation area No. 2, etc.).

Outfall Longitude and Latitude

Outfall No.	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
N/A	N/A	N/A

Outfall Location Description

Outfall No.	Location Description
	The distribution of digestate (effluent) from anaerobic digesters is by the spreading method and do not have any outfalls.

Description of Sampling Point(s) (if different from Outfall location)

Outfall No.	Description of sampling point
N/A	N/A

Outfall Flow Information – Permitted and Proposed

Outfall No.	Permitted Daily Avg Flow (MGD)	Permitted Daily Max Flow (MGD)	Proposed Daily Avg Flow (MGD)	Proposed Daily Max Flow (MGD)	Anticipated Discharge Date (mm/dd/yy)
N/A					

Outfall Discharge – Method and Measurement

Outfall No.	Pumped Discharge? Y/N	Gravity Discharge? Y/N	Type of Flow Measurement Device Used
N/A			

Outfall Discharge – Flow Characteristics

Outfall No.	Intermittent Discharge? Y/N	Continuous Discharge? Y/N	Seasonal Discharge? Y/N	Discharge Duration (hrs/day)	Discharge Duration (days/mo)	Discharge Duration (mo/yr)
N/A						

Outfall Wastestream Contributions

Outfall No. T-1

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow
N/A	N/A	N/A

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow
N/A	N/A	N/A

Outfall No. Click to enter text.

Contributing Wastestream	Volume (MGD)	Percent (%) of Total Flow
N/A	N/A	N/A

Attachment: Click to enter text.

Item 5. Blowdown and Once–Through Cooling Water Discharges (Instructions, Page 43)

a. Indicate if the facility currently or proposes to:

☐ Yes ☒ No Use cooling towers that discharge blowdown or other wastestreams

☐ Yes ☒ No Use boilers that discharge blowdown or other wastestreams

☐ Yes ☒ No Discharge once-through cooling water

NOTE: If the facility uses or plans to use cooling towers or once-through cooling water, Item 12 **is required**.

b. If **yes** to any of the above, attach an SDS with the following information for each chemical additive.

- Manufacturers Product Identification Number
- Product use (e.g., biocide, fungicide, corrosion inhibitor, etc.)
- Chemical composition including CASRN for each ingredient
- Classify product as non-persistent, persistent, or bioaccumulative
- Product or active ingredient half-life
- Frequency of product use (e.g., 2 hours/day once every two weeks)
- Product toxicity data specific to fish and aquatic invertebrate organisms
- Concentration of whole product or active ingredient, as appropriate, in wastestream.

In addition to each SDS, attach a summary of the above information for each specific wastestream and the associated chemical additives. Specify which outfalls are affected.

Attachment: Click to enter text.

c. Cooling Towers and Boilers

If the facility currently or proposes to use cooling towers or boilers that discharge blowdown or other wastestreams to the outfall(s), complete the following table.

Cooling Towers and Boilers

Type of Unit	Number of Units	Daily Avg Blowdown (gallons/day)	Daily Max Blowdown (gallons/day)
Cooling Towers			
Boilers			

Item 6. Stormwater Management (Instructions, Page 44)

Will any existing/proposed outfalls discharge stormwater associated with industrial activities, as defined at *40 CFR § 122.26(b)(14)*, commingled with any other wastestream?

☐ Yes ☒ No

If **yes**, briefly describe the industrial processes and activities that occur outdoors or in a manner which may result in exposure of the activities or materials to stormwater: Click to enter text.

Item 7. Domestic Sewage, Sewage Sludge, and Septage Management and Disposal (Instructions, Page 44)

Domestic Sewage - Waste and wastewater from humans or household operations that is discharged to a wastewater collection system or otherwise enters a treatment works.

a. Check the box next to the appropriate method of domestic sewage and domestic sewage sludge treatment or disposal. Complete Worksheet 5.0 or Item 7.b if directed to do so.

☐ Domestic sewage is routed (i.e., connected to or transported to) to a WWTP permitted to receive domestic sewage for treatment, disposal, or both. Complete Item 7.b.

☐ Domestic sewage disposed of by an on-site septic tank and drainfield system. Complete Item 7.b.

☐ Domestic and industrial treatment sludge ARE commingled prior to use or disposal.

☐ Industrial wastewater and domestic sewage are treated separately, and the respective sludge IS NOT commingled prior to sludge use or disposal. Complete Worksheet 5.0.

☐ Facility is a POTW. Complete Worksheet 5.0.

☐ Domestic sewage is not generated on-site.

☐ Other (e.g., portable toilets), specify and Complete Item 7.b: Click to enter text.

b. Provide the name and TCEQ, NPDES, or TPDES Permit No. of the waste-disposal facility which receives the domestic sewage/septage. If hauled by motorized vehicle, provide the name and TCEQ Registration No. of the hauler.

Domestic Sewage Plant/Hauler Name

Plant/Hauler Name	Permit/Registration No.

Item 8. Improvements or Compliance/Enforcement Requirements (Instructions, Page 45)

a. Is the permittee currently required to meet any implementation schedule for compliance or enforcement?

☐ Yes ☒ No

b. Has the permittee completed or planned for any improvements or construction projects?

☐ Yes ☒ No

c. If **yes** to either 8.a **or** 8.b, provide a brief summary of the requirements and a status update: Click to enter text.

Item 9. Toxicity Testing (Instructions, Page 45)

Have any biological tests for acute or chronic toxicity been made on any of the discharges or on a receiving water in relation to the discharge within the last three years?

☐ Yes ☒ No

If **yes**, identify the tests and describe their purposes: Click to enter text.

Additionally, attach a copy of all tests performed which **have not** been submitted to the TCEQ or EPA. **Attachment:** Click to enter text.

Item 10. Off–Site/Third Party Wastes (Instructions, Page 45)

a. Does or will the facility receive wastes from off-site sources for treatment at the facility, disposal on-site via land application, or discharge via a permitted outfall?

☒ Yes ☐ No

If **yes**, provide responses to Items 10.b through 10.d below.

If **no**, proceed to Item 11.

b. Attach the following information to the application:

- List of wastes received (including volumes, characterization, and capability with on-site wastes).
- Identify the sources of wastes received (including the legal name and addresses of the generators).
- Description of the relationship of waste source(s) with the facility's activities.

Attachment: T.H

c. Is or will wastewater from another TCEQ, NPDES, or TPDES permitted facility commingled with this facility's wastewater after final treatment and prior to discharge via the final outfall/point of disposal?

☐ Yes ☒ No

If **yes**, provide the name, address, and TCEQ, NPDES, or TPDES permit number of the contributing facility and a copy of any agreements or contracts relating to this activity.

Attachment: Click to enter text.

d. Is this facility a POTW that accepts/will accept process wastewater from any SIU and has/is required to have an approved pretreatment program under the NPDES/TPDES program?

☐ Yes ☒ No

If **yes**, **Worksheet 6.0** of this application **is required**.

Item 11. Radioactive Materials (Instructions, Page 46)

a. Are/will radioactive materials be mined, used, stored, or processed at this facility?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L.

Radioactive Materials Mined, Used, Stored, or Processed

Radioactive Material Name	Concentration (pCi/L)

b. Does the applicant or anyone at the facility have any knowledge or reason to believe that radioactive materials may be present in the discharge, including naturally occurring radioactive materials in the source waters or on the facility property?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L. Do not include information provided in response to Item 11.a.

Radioactive Materials Present in the Discharge

Radioactive Material Name	Concentration (pCi/L)

Item 12. Cooling Water (Instructions, Page 46)

a. Does the facility use or propose to use water for cooling purposes?

☐ Yes ☒ No

If **no**, stop here. If **yes**, complete Items 12.b thru 12.f.

b. Cooling water is/will be obtained from a groundwater source (e.g., on-site well).

☐ Yes ☐ No

If **yes**, stop here. If **no**, continue.

c. Cooling Water Supplier

1. Provide the name of the owner(s) and operator(s) for the CWIS that supplies or will supply water for cooling purposes to the facility.

Cooling Water Intake Structure(s) Owner(s) and Operator(s)

CWIS ID				
Owner				
Operator				

2. Cooling water is/will be obtained from a Public Water Supplier (PWS)

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the PWS Registration No. and stop here: PWS No. Click to enter text.

3. Cooling water is/will be obtained from a reclaimed water source?

   ☐ Yes ☐ No

   If **no**, continue. If **yes**, provide the Reuse Authorization No. and stop here: Click to enter text.

4. Cooling water is/will be obtained from an Independent Supplier

   ☐ Yes ☐ No

   If **no**, proceed to Item 12.d. If **yes**, provide the actual intake flow of the Independent Supplier's CWIS that is/will be used to provide water for cooling purposes and proceed: Click to enter text.

d. 316(b) General Criteria

1. The CWIS(s) used to provide water for cooling purposes to the facility has or will have a cumulative design intake flow of 2 MGD or greater.

   ☐ Yes ☐ No

2. At least 25% of the total water withdrawn by the CWIS is/will be used at the facility exclusively for cooling purposes on an annual average basis.

   ☐ Yes ☐ No

3. The CWIS(s) withdraw(s)/propose(s) to withdraw water for cooling purposes from surface waters that meet the definition of Waters of the United States in *40 CFR § 122.2*.

   ☐ Yes ☐ No

   If **no**, provide an explanation of how the waterbody does not meet the definition of Waters of the United States in *40 CFR § 122.2*: Click to enter text.

If **yes** to all three questions in Item 12.d, the facility **meets** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA. Proceed to **Item 12.f**.

If **no** to any of the questions in Item 12.d, the facility **does not meet** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA; however, a determination is required based upon BPJ. Proceed to **Item 12.e**.

e. The facility does not meet the minimum requirements to be subject to the fill requirements of Section 316(b) **and uses**/proposes **to use cooling towers**.

   ☐ Yes ☐ No

   If **yes**, stop here. If **no**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ.

f. Oil and Gas Exploration and Production

1. The facility is subject to requirements at 40 CFR Part 435, Subparts A or D.

☐ Yes ☐ No

If **yes**, continue. If **no**, skip to Item 12.g.

2. The facility is an existing facility as defined at 40 CFR § 125.92(k) or a new unit at an existing facility as defined at 40 CFR § 125.92(u).

☐ Yes ☐ No

If **yes**, complete Worksheet 11.0, Items 1.a, 1.b.1-3 and 6, 2.b.1, and 3.a to allow for a determination based upon BPJ. If **no**, skip to Item 12.g.3.

g. Compliance Phase and Track Selection

1. Phase I – New facility subject to 40 CFR Part 125, Subpart I

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection, attach the requested information, and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – AIF greater than 2 MGD, but less than 10 MGD

- Attach information required by *40 CFR §§ 125.86(b)(2)–(4)*.

☐ Track I – AIF greater than 10 MGD

- Attach information required by *40 CFR § 125.86(b)*.

☐ Track II

- Attach information required by *40 CFR § 125.86(c)*.

Attachment: Click to enter text.

2. Phase II – Existing facility subject to 40 CFR Part 125, Subpart J

☐ Yes ☐ No

If **yes**, complete Worksheets 11.0 through 11.3, as applicable.

3. Phase III – New facility subject to 40 CFR Part 125, Subpart N

☐ Yes ☐ No

If **yes**, check the box next to the compliance track selection and provide the requested information.

☐ Track I – Fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – Not a fixed facility

- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Item 2 (except CWIS latitude/longitude under Item 2.a).

☐ Track II – Fixed facility

- Attach information required by 40 CFR § 125.136(c) and complete Worksheet 11.0, Items 2 and 3.

Attachment: Click to enter text.

Item 13. Permit Change Requests (Instructions, Page 48)

This item is only applicable to existing permitted facilities.

a. Is the facility requesting a **major amendment** of an existing permit?

☐ Yes ☒ No

If **yes**, list each request individually and provide the following information: 1) detailed information regarding the scope of each request and 2) a justification for each request. Attach any supplemental information or additional data to support each request.

Click to enter text.

b. Is the facility requesting any **minor amendments** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

c. Is the facility requesting any **minor modifications** to the permit?

☐ Yes ☒ No

If **yes**, list and describe each change individually.

Click to enter text.

Item 14. Laboratory Accreditation (Instructions, Page 49)

All laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification*, which includes the following general exemptions from National Environmental Laboratory Accreditation Program (NELAP) certification requirements:

- The laboratory is an in-house laboratory and is:
  - periodically inspected by the TCEQ; or
  - located in another state and is accredited or inspected by that state; or
  - performing work for another company with a unit located in the same site; or
  - performing pro bono work for a governmental agency or charitable organization.
- The laboratory is accredited under federal law.
- The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.
- The laboratory supplies data for which the TCEQ does not offer accreditation.

The applicant should review *30 TAC Chapter 25* for specific requirements.

The following certification statement shall be signed and submitted with every application. See the *Signature Page* section in the Instructions, for a list of designated representatives who may sign the certification.

CERTIFICATION:

I certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification.*

Printed Name: Click to enter text.

Title: Click to enter text.

Signature: _____

Date: _____

INDUSTRIAL WASTEWATER PERMIT APPLICATION WORKSHEET 3.0: LAND APPLICATION OF EFFLUENT

This worksheet **is required** for all applications for a permit to disposal of wastewater by land application (i.e., TLAP)).

Item 1. Type of Disposal System (Instructions, Page 69)

Check the box next to the type of land disposal requested by this application:

- ☐ Irrigation
- ☐ Evaporation
- ☐ Evapotranspiration beds
- ☐ Drip irrigation system
- ☐ Subsurface application
- ☐ Subsurface soils absorption
- ☒ Surface application
- ☐ Other, specify: Click to enter text.

Item 2. Land Application Area (Instructions, Page 69)

Land Application Area Information

Effluent Application (gallons/day)	Irrigation Acreage (acres)	Describe land use & indicate type(s) of crop(s)	Public Access? (Y/N)
75,000	28,955	Agricultural land and Coastal grazing – Cotton and Corn grain	N

Item 3. Annual Cropping Plan (Instructions, Page 69)

Attach the required cropping plan that includes each of the following:

- Cool and warm season plant species
- Breakdown of acreage and percent of total acreage for each crop
- Crop growing season
- Harvesting method/number of harvests
- Minimum/maximum harvest height
- Crop yield goals
- Soils map
- Nitrogen requirements per crop
- Additional fertilizer requirements
- Supplemental watering requirements
- Crop salt tolerances
- Justification for not removing existing vegetation to be irrigated

Attachment: T.C

Item 4. Well and Map Information (Instructions, Page 70)

a. Check each box to confirm the required information is shown and labeled on the attached USGS map:

☒ The exact boundaries of the land application area

☒ On-site buildings

☐ Waste-disposal or treatment facilities

☐ Effluent storage and tailwater control facilities

☐ Buffer zones

☒ All surface waters in the state onsite and within 500 feet of the property boundaries

☒ All water wells within ½-mile of the disposal site, wastewater ponds, or property boundaries

☐ All springs and seeps onsite and within 500 feet of the property boundaries

Attachment: T.D

b. List and cross reference all water wells located on or within 500 feet of the disposal site, wastewater ponds, or property boundaries in the following table. Attach additional pages as necessary to include all of the wells.

Well and Map Information Table

Well ID	Well Use	Producing? Y/N/U	Open, cased, capped, or plugged?	Proposed Best Management Practice
589679				
261011				
391981				

Attachment: T.D

c. Groundwater monitoring wells or lysimeters are/will be installed around the land application site or wastewater ponds.

☐ Yes ☒ No

If **yes**, provide the existing/proposed location of the monitoring wells or lysimeters on the site map attached for Item 4.a. Additionally, attach information on the depth of the wells or lysimeters, sampling schedule, and monitoring parameters for TCEQ review, possible modification, and approval.

Attachment: Click to enter text.

d. Attach a short groundwater technical report using *30 TAC § 309.20(a)(4)* as guidance.
Attachment:

Item 5. Soil Map and Soil Information (Instructions, Page 71)

Check each box to confirm that the following information is attached:

a. ☒ USDA NRCS Soil Survey Map depicting the area to be used for land application with the locations identified by fields and crops.

b. ☒ Breakdown of acreage and percent of total acreage for each soil type.

c. ☒ Copies of laboratory soil analyses. **Attachment:** T.C

Item 6. Effluent Monitoring Data (Instructions, Page 72)

a. Completion of Table 14 **is required** for all **renewal** and **major amendment** applications. Complete the table with monitoring data for the previous two years for all parameters regulated in the current permit. An additional table has been provided with blank headers for parameters regulated in the current permit which are not listed in Table 14.

Table 14 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre–feet/month)

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre–feet/month)

b. Use this table to provide effluent analysis for parameters regulated in the current permit which are not listed in Table 14.

Additional Parameter Effluent Analysis

Date (mo/yr)							

c. Attach an explanation of all persistent excursions to permitted parameters and corrective actions taken. **Attachment:** Click to enter text.

Item 7. Pollutant Analysis (Instructions, Page 72)

a. Provide the date range of all sampling events conducted to obtain the analytical data submitted with this application (e.g., 05/01/2018-05/30/2018): Click to enter text.

b. ☐ Check the box to confirm all samples were collected no more than 12 months prior to the date of application submittal.

c. Complete Tables 15 and 16.

Table 15 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)
BOD (5-day)				
CBOD (5-day)				
Chemical oxygen demand				
Total organic carbon				
Dissolved oxygen				
Ammonia nitrogen				
Total suspended solids				
Nitrate nitrogen				
Total organic nitrogen				
Total phosphorus				
Oil and grease				
Total residual chlorine				
Total dissolved solids				
Sulfate				
Chloride				
Fluoride				
Total alkalinity (mg/L as CaCO3)				
Temperature (°F)				
pH (standard units)				

Table 16 for Outfall No.: Click to enter text. **Samples are (check one):** ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Aluminum, total					2.5
Antimony, total					5

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Arsenic, total					0.5
Barium, total					3
Beryllium, total					0.5
Cadmium, total					1
Chromium, total					3
Chromium, hexavalent					3
Chromium, trivalent					N/A
Copper, total					2
Cyanide, available					2/10
Lead, total					0.5
Mercury, total					0.005/0.0005
Nickel, total					2
Selenium, total					5
Silver, total					0.5
Thallium, total					0.5
Zinc, total					5.0

Texas Land Application Permit (TLAP)
Admin Package

Report Date: November 18th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

List of Figures..... i
List of Tables..... i
A.A: TCEQ APPLICATION FEE..... 1
A.B: CORE DATA FORMS & LEASE AGREEMENT..... 2
A.C: PLAIN LANGUAGE SUMMARY..... 3
A.D: PUBLIC INVOLVEMENT PLAN..... 4
A.E: 7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE..... 4
A.E.1 7.5-Minute USGS Topographic Quadrangle Map..... 6
A.F: AFFECTED LANDOWNER INFORMATION..... 7
A.F.1 Adjacent Landowners Map..... 7
A.F.2 Landowners List..... 7
A.G: PHOTOGRAPHS..... 8
A.G.1 Photograph Location Map..... 9

List of Figures

Figure A.E.1: 7.5-Minute USGS Topographic Quadrangle Map..... 6
Figure A.F.1: Adjacent Landowners Map..... 7
Figure A.G.1: Photograph Location Map..... 9

List of Tables

Table A.F.1. Adjacent Landowners..... 7

A.A: TCEQ APPLICATION FEE

A.B: CORE DATA FORMS & LEASE AGREEMENT

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions on completing 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.*)

☒ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ 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)*
		RN

SECTION II: Customer Information

4. General Customer Information | **5. Effective Date for Customer Information Updates** (mm/dd/yyyy) 11/20/2024

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

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:*

Wharton AD1, LLC

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID**	**10. DUNS Number** *(if applicable)*
805930283		33-3670329	

11. Type of Customer: ☒ Corporation ☐ Individual Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees
☐ 0-20 ☒ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?
☐ **Yes** ☐ **No**

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*

☒ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ VCP/BSA Applicant ☐ Other:

15. Mailing Address:

133 Boston Post Road, Building 15, 2nd Floor

City	Weston	**State**	MA	**ZIP**	02493	**ZIP + 4**	

16. Country Mailing Information *(if outside USA)*	**17. E-Mail Address** *(if applicable)*
	development@vanguardrenewables.com

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(248) 259-4031		(781) 232-7491

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected, a new permit application is also required.)*

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core 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.)*

Pierce Ranch

23. Street Address of the Regulated Entity: ***(No PO Boxes)***								
	City	Pierce	**State**	TX	**ZIP**	77437	**ZIP + 4**	
24. County	Wharton							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:	Site is located approximately 1.5 miles southeast of the intersection of Pierce West Road and U.S. Highway 59

26. Nearest City	State	Nearest ZIP Code
Pierce	TX	77437

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	29.2165071		28. Longitude (W) In Decimal:	-96.19356185	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	12	55	96	11	39

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)
4924		221210	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Renewable Energy Production

34. Mailing Address:	**133 Boston Post Road, Building 15, 2nd Floor**							
	City	**Weston**	**State**	**MA**	**ZIP**	**02493**	**ZIP + 4**	
35. E-Mail Address:	**development@vanguardrenewables.com**							

36. Telephone Number	37. Extension or Code	38. Fax Number *(if applicable)*
(248) 259-4031		**(781) 232-7491**

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.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:
				TLAP

SECTION IV: Preparer Information

40. Name:	Michael Zhang		**41. Title:**	Managing Consultant
42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**	
(832) -817-9116		( ) -	michael.zhang@environeerconsulting.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:	Wharton AD1, LLC	**Job Title:**	VP of Development
Name *(In Print):*	Kim Martin	**Phone:**	(508-)560–6882
Signature:	Kim Martin (Mar 17, 2025 12:46 EDT)	**Date:**	3/17/2025

ASSIGNMENT AND ASSUMPTION AGREEMENT

This ASSIGNMENT AND ASSUMPTION AGREEMENT (this "Agreement") is entered into as of March 27th, 2025 by VR Development Services LLC ("Assignor") and Wharton AD 1, LLC, a Delaware limited liability company ("Assignee"). The Assignor and Assignee are sometimes referred to herein each as a "Party" and, collectively, as the "Parties."

WHEREAS, the Assignor desires to assign and convey to Assignee, and Assignee desires to assume from Assignor, the Assigned Contracts (each, as defined below), and Assignor has agreed to delegate to Assignee, and Assignee has agreed to assume all of Assignor's rights in and obligations under the Assigned Contracts from the Assignor, as applicable; and

NOW, THEREFORE, in consideration for the mutual covenants and promises herein contained, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. Assignment of Contracts. Assignor hereby grants, bargains, sell, transfers, conveys, assigns, and delivers to Assignee, and Assignee hereby accepts the assignment of all of Assignor's right, title and interest in, to, and under those certain assigned contracts set forth on Schedule A hereto (the "Assigned Contracts").

2. Assumption. Assignee hereby accepts the Assigned Contracts and assumes all of Assignor's right, title and interest in and obligations and liabilities under, and Assignee hereby assumes and agree to perform and discharge the Assignor's obligations under, the Assigned Contracts, as applicable, as of the date hereof, in accordance with the terms set forth herein.

3. Governing Law. THIS AGREEMENT AND THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER AND THE TRANSACTIONS CONTEMPLATED HEREBY SHALL BE GOVERNED BY, ENFORCED AND INTERPRETED IN ACCORDANCE WITH THE LAWS OF THE STATE OF DELAWARE WITHOUT REGARD TO THE LAWS OF THE STATE OF DELAWARE OR ANY OTHER JURISDICTION THAT WOULD CALL FOR THE APPLICATION OF THE SUBSTANTIVE OR PROCEDURAL LAWS OF ANY JURISDICTION OTHER THAN DELAWARE.

4. Further Assurances. Each of the Parties hereby covenants that it will execute, acknowledge and deliver any and all such other and further acts, deeds, assignments, transfers, conveyances, confirmations, powers of attorney and any instruments of further assurance, approvals and consents as may be reasonably required in order to complete, insure and perfect the transfer, conveyance and assignment to Assignee of all the right, title and interest of Assignor in and to the Assigned Contracts hereby granted, bargained, sold, transferred, conveyed or assigned, or intended so to be.

5. Counterparts. This Agreement and any amendment hereto may be executed in any number of counterparts (including facsimile counterparts), all of which together shall constitute a single instrument. Any counterpart or other signature delivered by facsimile or by electronic mail shall be deemed for all purposes as being a good and valid execution and delivery of this Agreement or any amendment hereto by that Party. This Agreement and any amendment hereto may be signed or transmitted by e-mail or a .pdf document or using electronic signature technology (e.g., via DocuSign, AdobeSign or other electronic signature technology), and that such signed electronic record shall be valid and as effective to bind the Party so signing as a paper copy bearing such Party's handwritten signature. The Parties further consent and agree that (a) to the extent a party signs this Agreement or any amendment hereto using electronic signature technology, by clicking "SIGN", such Party is signing this Agreement electronically; and (b) the electronic signatures appearing on this Agreement or any amendment hereto shall be treated, for purposes of validity, enforceability and admissibility, the same as handwritten signatures.

6. Entire Agreement. This Agreement, including all schedules and exhibits hereto and thereto, supersede all prior agreements between the Parties with respect to the subject matter hereof and thereof, and contain the sole and entire agreement between the Parties hereto with respect to the subject matter hereof and thereof.

7. No Assignment; Binding Effect. No Party may transfer or assign all or any part of its rights or obligations under this Agreement without the prior written consent of the other Parties (including by operation of law). Any purported assignment or other disposition by a Party, except as permitted herein, shall be null and void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the respective successors and permitted assigns of each Party.

(Signatures appear on following page)

IN WITNESS WHEREOF, each of Assignee and each Assignor have caused this Assignment and Assumption Agreement to be executed by its respective duly authorized representative on the date first set forth above.

ASSIGNOR:

VR Development Services LLC

By: _____
Kevin Chase (Mar 27, 2025 13:16 MDT)
Name: Kevin Chase
Title: Chief Development Officer

ASSIGNEE:

Wharton AD 1, LLC

By: Victoria Lepore
Name: Victoria Lepore
Title: Authorized Person

SCHEDULE A

ASSIGNED CONTRACTS

1. Ground Lease, by and between VR Development Services LLC and Pierce Ranch GP, dated January 13, 2025.

2. Digester Products Agreement, by and between VR Development Services LLC and Pierce Ranch GP, dated January 13, 2025.

Assignment Agreement_Pierce

Final Audit Report 2025-03-27

Created:	2025-03-27
By:	Stephen Megnia (smegnia@vanguardrenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAA2zDCrnihd272le673JBLX2HKNe7_vicC

"Assignment Agreement_Pierce" History

Document created by Stephen Megnia (smegnia@vanguardrenewables.com)
2025-03-27 - 6:12:31 PM GMT

Document emailed to Kevin Chase (kchase@vanguardrenewables.com) for signature
2025-03-27 - 6:13:02 PM GMT

Email viewed by Kevin Chase (kchase@vanguardrenewables.com)
2025-03-27 - 7:14:07 PM GMT

Document e-signed by Kevin Chase (kchase@vanguardrenewables.com)
Signature Date: 2025-03-27 - 7:16:54 PM GMT - Time Source: server

Document emailed to Victoria Lepore (vlepore@vanguardrenewables.com) for signature
2025-03-27 - 7:16:55 PM GMT

Email viewed by Victoria Lepore (vlepore@vanguardrenewables.com)
2025-03-27 - 7:59:24 PM GMT

Document e-signed by Victoria Lepore (vlepore@vanguardrenewables.com)
Signature Date: 2025-03-27 - 7:59:45 PM GMT - Time Source: server

Agreement completed.
2025-03-27 - 7:59:45 PM GMT

MEMORANDUM OF LEASE

This is a Memorandum of Lease ("Memorandum") made and entered into as of this 24th day of February, 2025, by and between **Pierce Ranch GP** ("Lessor"), located at Post Office Box 538, Pierce, Texas, 77467; and **VR Development Services LLC**, a Massachusetts limited liability company ("Lessee"), located at 133 Boston Post Rd, Building 15, 2nd Floor, Weston, MA 02493, upon the following terms:

1. Lease. The provisions set forth in a written lease between the parties hereto dated January 13th, 2025 (the "Lease") are hereby incorporated by reference into this Memorandum.

2. Leased Area. The Leased Area which is the subject of the Lease is located on a portion of Lessor's Property more particularly described on the attached Exhibit A.

3. Commencement Date of Lease. The Lease commenced January 13th, 2025, as set forth in the Lease.

4. Term. The Term of the Lease is twenty-five (25) years from the Operations Date as defined in the Lease, with three (3) additional automatic renewal periods of five (5) years each unless either party exercises the non-renewal options provided in the Lease.

5. Duplicate Copies. Copies of the originals of the Lease are in the possession of Lessor and Lessee, and reference should be made thereto for a more detailed description thereof.

6. Purpose. It is expressly understood and agreed by all parties that the sole purpose of this Memorandum of Lease is to give record notice of the Lease; it being distinctly understood and agreed that said Lease constitutes the entire lease and agreement between the parties with respect to the Leased Area and is hereby incorporated by reference. The Lease contains and sets forth additional rights, terms, conditions, duties, and obligations not enumerated within this instrument which govern the Lease. This Memorandum is for information purposes only and nothing contained herein may be deemed in any way to modify or vary any of the terms or conditions of the Lease. In the event of any inconsistency between the terms of the Lease and this instrument, the terms of the Lease shall control. The rights and obligations set forth herein shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, representatives, successors, and assigns.

[signature pages follow]

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of Lease pursuant to due authorization on the dates herein acknowledged.

LESSOR:

Pierce Ranch GP

By: _____

Name: Laurance H. Armour, III

Title: General Manager

ACKNOWLEDGMENT

STATE OF Texas)
) SS
COUNTY OF Wharton)

On this 26th day of February, 2025, before me appeared Laurance H. Armour, III to me personally known, who, being by me duly sworn did say that he or she is the person of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in Pierce, TX, the day and year last above written.

_____
Notary Public Signature

My Commission expires 05-05-2025

VELDA VONDERAU
NOTARY PUBLIC
STATE OF TEXAS
ID # 761496-8
My Comm. Expires 05-05-2025

LESSEE:

VR Development Services LLC

By: Kevin Chase
Name: _____ Feb 28, 2025
Title: Chief Development Officer

ACKNOWLEDGMENT

STATE OF _____)
) SS
COUNTY OF _____)

On this ___ day of _____, 20___, before me appeared _____ to me personally known, who, being by me duly sworn did say that he or she is the _____ of _____, and acknowledged said Agreement to be a free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand, and affixed my notarial seal, at my office in _____, the day and year last above written.

_____
Notary Public Signature

My Commission expires _____

Pierce Ranch Lease Memo

Final Audit Report 2025-02-28

Created:	2025-02-28
By:	Stephen Megnia (smegnia@vanguardrenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAcrt8WX5POxI_PZtyZmcR6SqUQdY7Mhss

"Pierce Ranch Lease Memo" History

Document created by Stephen Megnia (smegnia@vanguardrenewables.com)
2025-02-28 - 6:36:36 PM GMT

Document emailed to Kevin Chase (kchase@vanguardrenewables.com) for signature
2025-02-28 - 6:37:09 PM GMT

Email viewed by Kevin Chase (kchase@vanguardrenewables.com)
2025-02-28 - 6:39:53 PM GMT

Document e-signed by Kevin Chase (kchase@vanguardrenewables.com)
Signature Date: 2025-02-28 - 6:40:14 PM GMT - Time Source: server

Agreement completed.
2025-02-28 - 6:40:14 PM GMT

EXHIBIT A

Leased Area



EXHIBIT "A"

The SURFACE rights in those certain tracts or parcels of land and premises lying and situated in Wharton County, Texas, and being a portion of the property commonly known as the "Pierce Ranch" and including those areas of the "Pierce Ranch" known as the "Convict Farm" and part of the "B U Ranch", more specifically described as follows:

TRACT A:

Survey	Sur. No.	Abst. No.	Acres
Convict Farm:			
Edw. Gallagher 1/4 League		23	1,040.27
Robt. Kuykendall League as described in Deed from Louise K. Hutchins to Lacy W. Armour, et al., dated February 10, 1956, recorded in Volume 287, Page 234, Wharton County Deed Records LESS AND EXCEPT 115.964 acres conveyed to the State of Texas in Deed recorded in Volume 350, Page 53, Wharton County Deed Records for highway purposes		39	944.136

TRACT B:

A portion of those lands commonly known and referred to as "the B.U. Ranch" of Pierce Estate or Pierce Ranch, located in Wharton County, Texas, (including a tract of 97.5 acres out of the Henry Griffith Survey, conveyed by J.W. Kubela, et al, to Lacy W. Armour, et al, by deed dated January 20, 1949, recorded in Vol. 218, Page 323 of the Deed Records of Wharton County, Texas), and which Ranch includes the following surveys, or the parts thereof described below:

B.U. Ranch Land North of Railroad:			
Henry Griffith League		25	1,080.00
W.C.R.R. Co. (incl. out lots)	73	368	310.95
W.C.R.R. Co.	71	389	35.62
I. & G.N.R.R. Co. (incl. out lots)	39	405	138.00
F.L. Jones & G.R. Lyons	70	448	11.12
J.S. MacNamara (W.C.R.R. Co.)	72	451	320.00
J. Telfner (H&T.C.R.R.Co.) (incl. out lots)	2	453	3.00
Day Land & Cattle Co.	1	675	126.92
Day Land & Cattle Co.	2	678	3.60
B.U. Ranch Land South of Railroad:			
John Caldwell League		10	2,746.00
Henry Griffith League		25	279.50
Wm. Pettus League		51	2,820.00
Thomas Westall League		65	4,428.40
E.T.R.R. Co.	109	108	263.75
E.T.R.R. Co.	43	115	18.50
E.T.R.R. Co.	1	138	341.50
E.T.R.R. Co.	19	147	26.50
E.T.R.R. Co.	21	148	272.00
G.& B.N. Co.	2	157	640.00
G.& B.N. Co.	4	158	640.00
Chas. Howard League		181	4,428.00

H.T. & B.R.R. Co.	1	194	640.00
I. & G.N.R.R. Co.	33	218	72.00
I. & G.N.R.R. Co.	38	221	640.00
I. & G.N.R.R. Co.	37	222	32.95
I. & G.N.R.R. Co.	35	224	193.00
I. & G.N.R.R. Co.	34	230	556.50
W.F. York		397	65.20
I. & G.N.R.R. Co. (incl. out lots)	39	405	433.43
Abram Kincheloe		412	160.00
H.E.& W.T.R.R.Co.	1	418	320.00
H.E.& W.T.R.R.Co.	7	441	534.00
I.R.R. Co.	11	447	320.00
J. Telefener	2	453	28.20
J. Telefener	12	454	320.00
John McMaster	2	468	320.00
L.P. Ogden	108	537	.50
L.P. Ogden	110	538	569.50
Mark Weiss	20	558	573.50
Joseph Hyland	2	626	410.00
A.H. Pierce	1	640	640.00
A.H. Pierce	3	641	640.00
A.H. Pierce	8	642	640.00
Day Land & Cattle Co.	1	675	21.00
Day Land & Cattle Co.	2	678	356.80
Day Land & Cattle Co.	3	679	318.00
J.M. Swisher	1	693	166.80
K.R. Ferris		856	640.00
A.P. Borden	15	877	129.88
A.P. Borden	14	878	240.11
A.P. Borden	19	894	382.50
A.P. Borden	18	895	93.44
A.P. Borden		921	85.98
W.W. King		948	193.60
Joshua Parker League		49	24.00
Joshua Parker League		49	386.00

Canals:

Henry Griffith League		25	35.55
R. Kuykendall League		39	5.00
Henry Griffith League		25	12.50

LESS AND EXCEPT 84.81 acres (described as First Tract through Sixth Tract), any interest in 3 acres, lands, canals, easements, etc. (described as Seventh Tract) and 187.4 acres [described as Ninth Tract, parcel (b)] conveyed by Laurance H. Armour, Jr., Trustee, et. al. to Blue Creek Ranch Company, recorded in Volume 696, Page 612, Wharton County Deed Records.

TRACT C:

Pumping Plant tract and pumping plant, together with canal tracts and easements connecting to and used in connection with the B.U. Ranch in Wharton County, Texas, above described, said pumping plant tract and canal and easements consisting of:

PARCEL 1 - 52 acre tract:

52 acres of land, more or less, in the Robt. Kuykendall League, Abstract 39, Wharton County, Texas, being a strip of land 300 feet in width off the West side of that certain tract of 1,060.1 acres, more or less, in the Robt. Kuykendall League which 1,060.1 acre tract is part of what is referred to as the "Convict Farm" tract of the Pierce Ranch or Pierce Estate, said 52 acres being described by metes and bounds as follows:

BEGINNING at the Southwest corner of the aforesaid "Convict Farm", which is also the Southwest corner of the said 1,060.1 acre tract, being in the intersection of the West line of said tract with the North right-of-way line of the road known as the "Rancho Grande Road";

THENCE North 20 deg. East with the West line of said "Convict Farm" tract, 7,500 feet to the Northwest corner of the 52 acre tract herein described, and being the Southwest corner of a 36 acre tract hereinafter described next below;

THENCE South 70 deg. East, crossing the Pierce Ranch Main Canal, 300 feet to the Northeast corner of this tract, being the lower Southeast corner of said 36 acre tract described below;

THENCE 20 deg. West parallel to and 300 feet from the above mentioned West line of said "Convict Farm" tract, 7,500 feet to the intersection with the North line of the above mentioned Rancho Grande Road;

THENCE North 70 deg. West with the North line of said Rancho Grande Road 300 feet to the place of beginning, containing 52 acres of land, more or less.

PARCEL 2 - Pumping Plant Tract:

36 acres of land, more or less, in the Robt. Kuykendall League, Abstract 39, Wharton County, Texas, and being a part of the above referred to 1,060.1 acre tract, and also part of what is referred to as the "Convict Farm", said 36 acres being described by metes and bounds as follows:

BEGINNING at the Northwest corner of the above described 52 acre tract, being the 300 foot wide Main Canal tract, such beginning point being in the West line of said "Convict Farm" tract;

THENCE South 70 deg. East crossing the Pierce Ranch Main Canal 300 feet to corner, being the Northeast corner of said 52 acre Main Canal tract described above;

THENCE North 48 deg. 06 min. East crossing a lateral canal 688 feet to a point for corner, said corner being 15 feet out at right angles from the center of the Northwest borrow ditch of said lateral canal;

THENCE North 86 deg. 18 min. East parallel to and 15 feet from the center of said Northwest borrow ditch of said lateral canal, 810 feet to point for corner, said point being in a projection of the East yard fence line of the farthest South house of a row of houses on this 36 acre tract;

THENCE North 30 deg. 06 min. East at 491 feet pass the Southeast corner of said East yard fence, and continuing with the said East yard fence in all 639 feet (with the total distance of this call being 639 feet) to fence post for corner, being the Northeast corner of said yard fence and also the Northeast corner of this 36 acre tract;

THENCE North 58 deg. 46 min. West with the fence forming the back yard enclosures of said row of houses at 938 feet pass the top bluff bank of the Colorado River, and continuing on said call to said River;

THENCE Southwesterly up said Colorado River, following the meanders, to its intersection with the first above mentioned West line of said "Convict Farm" tract, same being the Northwest corner of the aforesaid 1,060.01 acre tract;

THENCE South 20 deg. West with the West line of said 1,060.1 acre tract, and also with the West line of the above referred to "Convict Farm" to the place of beginning, containing 36 acres of land, more or less.

PARCEL 3 - Canal:

5 acre tract off the West side of Tract 1 of the subdivision of the Robt. Kuykendall League, Abstract 39, in Wharton County, Texas, which 5 acres was reserved in deed dated December 16, 1927, executed by J.F. Hutchins, et al Executors, to N.A. Bowers, recorded in Vol. 79, Page 427 of the Deed Records of Wharton County, Texas.

PARCEL 4 - Canal:

Two tracts of land containing 17.16 acres and 18.39 acres, respectively, out of the Henry Griffith League, Wharton County, Texas, conveyed by J.B. Ferguson to Pierce Estates, Incorporated, by deed dated February 5, 1943, recorded in Vol. 163, Page 285 of the Deed Records of Wharton County, Texas.

PARCEL 5 - Canal:

Canal easement located in the Henry Griffith League, Wharton County, Texas, reserved in deed dated November 23, 1905, executed by A.P. Borden, et al, to Valentine Heil, recorded in Vol. 14, Page 177 of the Deed Records of Wharton County, Texas, and which easement is located in the Henry Griffith League, Wharton County, Texas.

PARCEL 6 - Canal:

Canal Easement conveyed by Blue Creek Ranch Company to J.F. Hutchins by deed dated December 15, 1936, filed for record in the office of the County Clerk of Wharton County, Texas, on January 27, 1956, which deed covers 7.5 acres out of the F.C. McReynolds Survey No. 6, Wharton County, Texas.

TRACT D: (Canal)

A 200' strip of land being 100' on either side of the center line of that portion of an existing canal that runs approximately parallel to U.S. Highway 59 and a 100' strip of land being 50' on either side of the center line of that portion of an existing canal that runs approximately perpendicular to U.S. Highway 59. This TRACT D canal is located between the Southwest end of the 17.16 acre canal described as TRACT C Parcel (4) above and the northwest end of the 18.39 acre canal described as TRACT C Parcel (4) above and connects the 17.16 acre canal to the 18.39 acre canal. This TRACT D canal is shown on the Plat attached hereto as Exhibit "B", Page 1. It is in the Henry Griffith League on the B.U. Ranch North of the Railroad.

TRACT E: (Canal)

A 100' strip of land being 50' on either side of the center line of an existing canal located on that portion of B.U. Ranch lying South of the railroad and northwesterly of a line (herein called "DIVISION LINE") described as follows:

A line across the Pierce Ranch from the Southwest corner of the O.B. Ranch Co. 675.134 acre tract, in the Joshua Parker 1/2 League, Abstract No. 49 Wharton County, Texas (Volume 755, Page 281, Wharton County Deed Records) to the northeast line of the Pierce West Line Road, same being the southwest line of the Pierce Ranch and being more particularly described by metes and bounds as follows:

BEGINNING at an iron rod set at the southwest corner of the aforementioned O.B. Ranch Co. 675.134 acre tract;

THENCE S 61 deg. 24' 03" W 2575.21 feet to an iron rod set for an angle point;

THENCE S 61 deg. 24' 21" W 2550.91 feet to an iron rod set for a corner;

THENCE S 30 deg. 33' 42" E 570.81 feet to an iron rod set for a corner;

THENCE S 61 deg. 11' 31" W 2268.25 feet to an iron rod set for an angle point;

THENCE S 40 deg. 32' 26" W 1520.34 feet to an iron rod set for an angle point;

THENCE S 39 deg. 57' 12" W 2607.83 feet to an iron rod set for an angle point;

THENCE S 47 deg. 39' 40" W 6241.35 feet to an iron rod set in the east line of Pierce West Line Road, same being the west line of the Lacy W. Armour Estate.

The canal is located between the southeast end of the 18.39 acre canal tract described under TRACT C Parcel (4) above and the "DIVISION LINE" and connects the 18.39 acre canal to the canal system on TRACT B southeast of the "DIVISION LINE". The herein described canal tract is shown on the Plat attached hereto as Exhibit "B", Page 1, and is designated thereon as TRACT E.

TRACT F: (Road Easement)

A 60' strip of land being 30' on either side of the center line of an existing gravel road designated and known as the Pierce Ranch Main Ranch Road (a/k/a Texaco Road) beginning at the point where said road enters the Pierce Ranch Southeast of the Town of Pierce at the Southeast line of the Southern Pacific Railroad which parallels old U.S. Highway 59, in I & G N RR Co. Survey No. 39, Abstract 405, said point being N. 55 deg. 30' E. a distance of 3,185.22' from an iron rod set in the southeast line of Pierce West Line Road (County Road 421) at its intersection with the Southern Pacific Railroad; thence, in a Southeasterly direction across said survey, and, thence, across I & G N RR Survey No. 38, Abstract 221; A. P. Borden Survey, Abstract 895; J. Telfner Survey, Abstract 454, Galv. & Braz. Nav. Co. Survey No. 4, Abstract 158, to a point in the H.T. & B. R.R. Survey No. 1, Abstract 194 where said road intersects with the "Division Line" described above, which point is located approximately S. 61 deg. 24' 03', 7394.37' from the beginning point of the "Division Line", as more particularly shown on plat attached hereto as Exhibit "B".

TRACT G:

The following lots in the town of Pierce City, Wharton County, Texas, according to the map or plat thereof, which is recorded in Vol. P, Page 289, of the Deed Records of Wharton County, Texas:

Classification - City or Town Lots:

Block	Lots
1 (All)	1 to 16 inclusive
2	1 to 4 inclusive and 9 to 12 inclusive
3 (All)	1 to 16 inclusive
5 (All)	1 to 16 inclusive
6 (All)	1 to 16 inclusive
7	4 through 16, inclusive

8 (All)	1 to 16 inclusive
9 (All)	1 to 16 inclusive
10 (All)	1 to 16 inclusive
11 (All)	1 to 16 inclusive
12	2 to 8 inclusive and 11 to 16 inclusive
13	1 to 8 inclusive and 10 to 16 inclusive
14	1 to 8 inclusive and 10 to 16 inclusive
15 (All)	1 to 16 inclusive
16 (All)	1 to 16 inclusive
17 (All)	1 to 12 inclusive
18 (All)	1 to 12 inclusive
19 (All)	1 to 12 inclusive
22	3 to 6 inclusive and 10 to 12 inclusive
23 (All)	1 to 12 inclusive
24 (All)	1 to 12 inclusive
25 (All)	1 to 12 inclusive
26 (All)	1 to 12 inclusive
27 (All)	1 to 12 inclusive
28	1 to 5 inclusive and 8 to 10 inclusive
29 (All)	1 to 10 inclusive
30 (All)	1 to 12 inclusive
31 (All)	1 to 12 inclusive
32 (All)	1 to 12 inclusive
33 (All)	1 to 12 inclusive
34 (All)	1 to 12 inclusive
35 (All)	1 to 10 inclusive
36 (All)	1 to 12 inclusive
37 (All)	1 to 12 inclusive
38 (All)	1 to 10 inclusive
39 (All)	1 to 12 inclusive
40 (All)	1 to 12 inclusive
41 (All)	1 to 12 inclusive
42 (All)	1 to 12 inclusive
44 (All)	1 to 12 inclusive
45 (All)	1 to 12 inclusive
47 (All)	1 to 12 inclusive
48 (All)	1 to 12 inclusive
49 (All)	1 to 12 inclusive
50 (All)	1 to 12 inclusive
51 (All)	1 to 10 inclusive
52 (All)	1 to 12 inclusive
53 (All)	1 to 12 inclusive
54	4 to 10 inclusive
55 (All)	1 to 12 inclusive
56 (All)	1 to 12 inclusive
58 (All)	1 to 12 inclusive
59 (All)	1 to 12 inclusive
60 (All)	1 to 12 inclusive
61 (All)	1 to 12 inclusive
62 (All)	1 to 12 inclusive
63 (All)	1 to 12 inclusive
64 (All)	1 to 12 inclusive

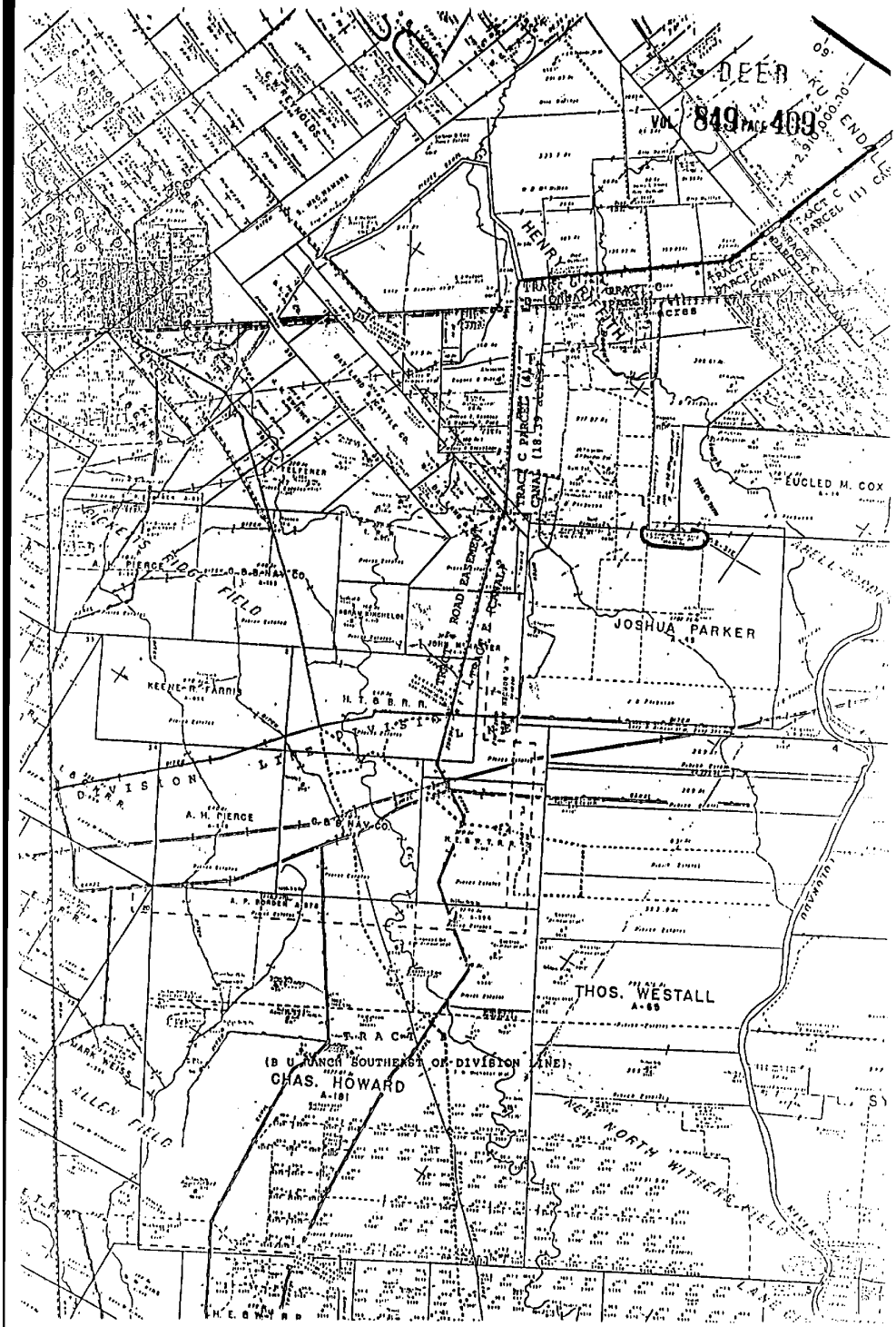


EXHIBIT B
PAGE 1

RECORDER'S MEMORANDUM
AT THE TIME OF RECORDATION, THIS INSTRUMENT WAS FOUND TO BE INADEQUATE FOR THE BEST PHOTOGRAPHIC REPRODUCTION BECAUSE OF ILLEGIBILITY, CARBON OR PHOTO COPY, DISCOLORED PAPER, ETC.

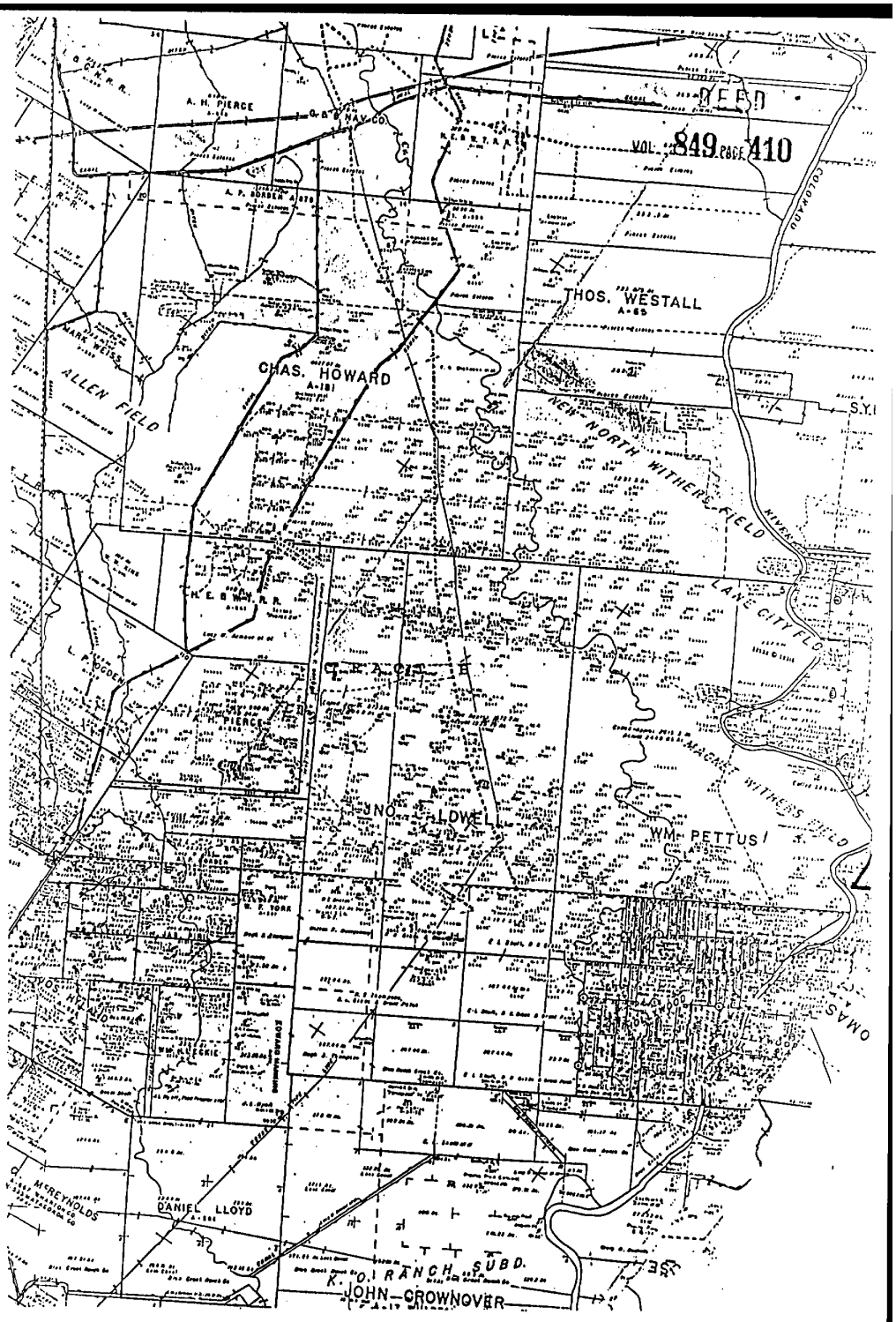


EXHIBIT B
PAGE 2

RECORDER'S MEMORANDUM

AT THE TIME OF RECORDATION, THIS INSTRUMENT WAS FOUND TO BE INADEQUATE FOR THE BEST PHOTOGRAPHIC REPRODUCTION BECAUSE OF ILLEGIBILITY, CARBON OR PHOTO COPY, DISCOLORED PAPER, ETC.

DEED

VOL 849 PAGE 411

STATE OF TEXAS COUNTY OF WHARTON

I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the volume and page of the named records of Wharton County, Texas as stamped hereon by me on

JAN 25 1991

COUNTY CLERK, Wharton County, Texas

BY _____ Deputy

FILED FOR RECORD
at 9:00 o'clock A M

JAN 24 1991

DELFIN MAREK
COUNTY CLERK, WHARTON CO., TEXAS
By Bernice Lucas

Od $31.00
Hutcheson & Grundy
Attn: Harriet H. Learnell
3300 Citicorp Center
1200 Smith St.
Houston, Tx.
77002-4579

122429

A.C: PLAIN LANGUAGE SUMMARY

TLAP Application

The following summary is *provided for this pending water quality permit application being reviewed by the Texas Commission on Environmental Quality as required by 30 Texas Administrative Code Chapter 39. The information provided in this summary may change during the technical review of the application and are not federal enforceable representations of the permit application.*

Wharton AD1, LLC develops, builds, owns, and operates anaerobic digesters to produce renewable energy and other agricultural by-products such as liquid fertilizer and soil amendments. The facility will be located at the coordinates (29.2165071, -96.19356185), near the City of Pierce, Wharton County, Texas, 77437.

Anaerobic digestion is a process in which organic materials, such as cow manure and food waste, are broken down by microorganisms in an oxygen-free environment to produce biogas. By combining food waste with manure, a smaller volume of manure can generate sufficient biogas to make the system efficient. The digester tanks regularly receive material from both the hydrolysis and manure tanks. The material transferred from the hydrolysis tanks will contain a mix of feedstock. Once in the digester, the mixture is homogenized using mixers. Inside the digester, the blend of manure and food waste is heated and remains in the tank for several days. During this time, microbes break down the organic material in an anaerobic environment, producing biogas, which consists of methane, carbon dioxide, hydrogen, and water vapor. The biogas collected in the digester's headspace is then routed through a gas conditioning and upgrading system to remove impurities, resulting in pipeline-quality natural gas. The effluent from the digesters, known as digestate, must be regularly removed as the digester tanks have limited capacity. As more organic waste is added, the processed material is extracted throughout the day to maintain tank volume. This digestate is a nutrient-rich liquid that is stored in an on-site earthen lagoon for future land application by spreading.

Spanish Translation

El siguiente resumen se proporciona para esta solicitud de permiso de calidad del agua pendiente que está siendo revisada por la Comisión de Calidad Ambiental de Texas, según lo exige el Capítulo 39 del Título 30 del Código Administrativo de Texas. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no son representaciones federales exigibles de la solicitud de permiso.

Wharton AD1, LLC desarrolla, construye, posee y opera digestores anaeróbicos en granjas lecheras para producir energía renovable y otros subproductos agrícolas como fertilizantes líquidos y enmiendas del suelo. La instalación estará ubicada en las coordenadas (29.2165071, -96.19356185), cerca de la ciudad de Pierce, condado de Wharton, Texas, 77437.

La digestión anaeróbica es un proceso en el que los microorganismos descomponen materiales orgánicos, como el estiércol de vaca y los desechos de alimentos, en un ambiente libre de oxígeno para producir biogás. Al combinar los desechos de alimentos con estiércol, un volumen menor de estiércol puede generar suficiente biogás para que el sistema sea eficiente. Los tanques digestores reciben regularmente material tanto de los tanques de hidrólisis como de estiércol. El material transferido desde los tanques de hidrólisis contendrá una mezcla de materia prima. Una vez en el digestor, la mezcla se homogeneiza mediante mezcladores. Dentro del digestor, la mezcla de estiércol y restos de comida se calienta y permanece en el tanque durante varios días. Durante este tiempo, los microbios descomponen el material orgánico en un ambiente anaeróbico, produciendo biogás, que consiste en metano, dióxido de carbono, hidrógeno y vapor de agua. Luego, el biogás recolectado en el espacio de cabeza del digestor se conduce a través de un sistema de acondicionamiento y mejora de gas para eliminar las impurezas, lo que da como resultado gas natural con calidad de tubería. El efluente de los digestores, conocido como digestato, debe eliminarse periódicamente ya que los tanques de los digestores tienen una capacidad limitada. A medida que se agregan más desechos orgánicos, el material procesado se extrae durante el día para mantener el volumen del tanque. Este digestato puede procesarse aún más en un sistema de manejo de nutrientes, lo que da como resultado un líquido rico en nutrientes que se almacena en una laguna de tierra en el sitio para su futura aplicación en la tierra mediante esparcimiento.

PUBLIC INVOLVEMENT PLAN

Texas Commission on Environmental Quality

Public Involvement Plan Form for Permit and Registration Applications

The Public Involvement Plan is intended to provide applicants and the agency with information about how public outreach will be accomplished for certain types of applications in certain geographical areas of the state. It is intended to apply to new activities; major changes at existing plants, facilities, and processes; and to activities which are likely to have significant interest from the public. This preliminary screening is designed to identify applications that will benefit from an initial assessment of the need for enhanced public outreach.

All applicable sections of this form should be completed and submitted with the permit or registration application. For instructions on how to complete this form, see TCEQ-20960-inst.

Section 1. Preliminary Screening

☒ New Permit or Registration Application

☐ New Activity – modification, registration, amendment, facility, etc. (see instructions)

If neither of the above boxes are checked, completion of the form is not required and does not need to be submitted.

Section 2. Secondary Screening

☒ Requires public notice,

☐ Considered to have significant public interest, **and**

☐ Located within any of the following geographical locations:

- Austin
- Dallas
- Fort Worth
- Houston
- San Antonio
- West Texas
- Texas Panhandle
- Along the Texas/Mexico Border
- Other geographical locations should be decided on a case-by-case basis

If all the above boxes are not checked, a Public Involvement Plan is not necessary. Stop after Section 2 and submit the form.

☐ Public Involvement Plan not applicable to this application. Provide **brief** explanation.

Section 3. Application Information

Type of Application (check all that apply):

Air ☐ Initial ☐ Federal ☐ Amendment ☐ Standard Permit ☐ Title V

Waste ☐ Municipal Solid Waste ☐ Industrial and Hazardous Waste ☐ Scrap Tire
☐ Radioactive Material Licensing ☐ Underground Injection Control

Water Quality

☐ Texas Pollutant Discharge Elimination System (TPDES)

☒ Texas Land Application Permit (TLAP)

☐ State Only Concentrated Animal Feeding Operation (CAFO)

☐ Water Treatment Plant Residuals Disposal Permit

☐ Class B Biosolids Land Application Permit

☐ Domestic Septage Land Application Registration

Water Rights New Permit

☐ New Appropriation of Water

☐ New or existing reservoir

Amendment to an Existing Water Right

☐ Add a New Appropriation of Water

☐ Add a New or Existing Reservoir

☐ Major Amendment that could affect other water rights or the environment

Section 4. Plain Language Summary

Provide a brief description of planned activities.

Wharton AD1, LLC develops and operates anaerobic digesters to convert cow manure and food waste into renewable energy and agricultural by-products. The facility near Pierce, Texas, will use anaerobic digestion to break down organic materials in an oxygen-free environment, producing biogas. This biogas, primarily methane, is purified into pipeline-quality natural gas. The remaining digestate is processed into nutrient-rich liquid fertilizer and soil amendments. The liquid by-product is stored in a lagoon for future land application on farms.

Section 5. Community and Demographic Information

Community information can be found using EPA's EJ Screen, U.S. Census Bureau information, or generally available demographic tools.

Information gathered in this section can assist with the determination of whether alternative language notice is necessary. Please provide the following information.

Pierce

(City)

Wharton

(County)

(Census Tract)

Please indicate which of these three is the level used for gathering the following information.

☒ City ☐ County ☒ Census Tract

(a) Percent of people over 25 years of age who at least graduated from high school

60.0%

(b) Per capita income for population near the specified location

$35,139 (Household Income)

(c) Percent of minority population and percent of population by race within the specified location

27.9%

(d) Percent of Linguistically Isolated Households by language within the specified location

N/A

(e) Languages commonly spoken in area by percentage

N/A

(f) Community and/or Stakeholder Groups

N/A

(g) Historic public interest or involvement

N/A

Section 6. Planned Public Outreach Activities

(a) Is this application subject to the public participation requirements of Title 30 Texas Administrative Code (30 TAC) Chapter 39?

☐ Yes ☐ No

(b) If yes, do you intend at this time to provide public outreach other than what is required by rule?

☐ Yes ☐ No

If Yes, please describe.

Wharton AD1, LLC plans to host a series of community conversations to both engag

If you answered "yes" that this application is subject to 30 TAC Chapter 39, answering the remaining questions in Section 6 is not required.

(c) Will you provide notice of this application in alternative languages?

☐ Yes ☐ No

Please refer to Section 5. If more than 5% of the population potentially affected by your application is Limited English Proficient, then you are required to provide notice in the alternative language.

If yes, how will you provide notice in alternative languages?

☐ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

(d) Is there an opportunity for some type of public meeting, including after notice?

☐ Yes ☐ No

(e) If a public meeting is held, will a translator be provided if requested?

☐ Yes ☐ No

(f) Hard copies of the application will be available at the following (check all that apply):

☐ TCEQ Regional Office ☐ TCEQ Central Office
☐ Public Place (specify)

Section 7. Voluntary Submittal

For applicants voluntarily providing this Public Involvement Plan, who are not subject to formal public participation requirements.

Will you provide notice of this application, including notice in alternative languages?

☐ Yes ☐ No

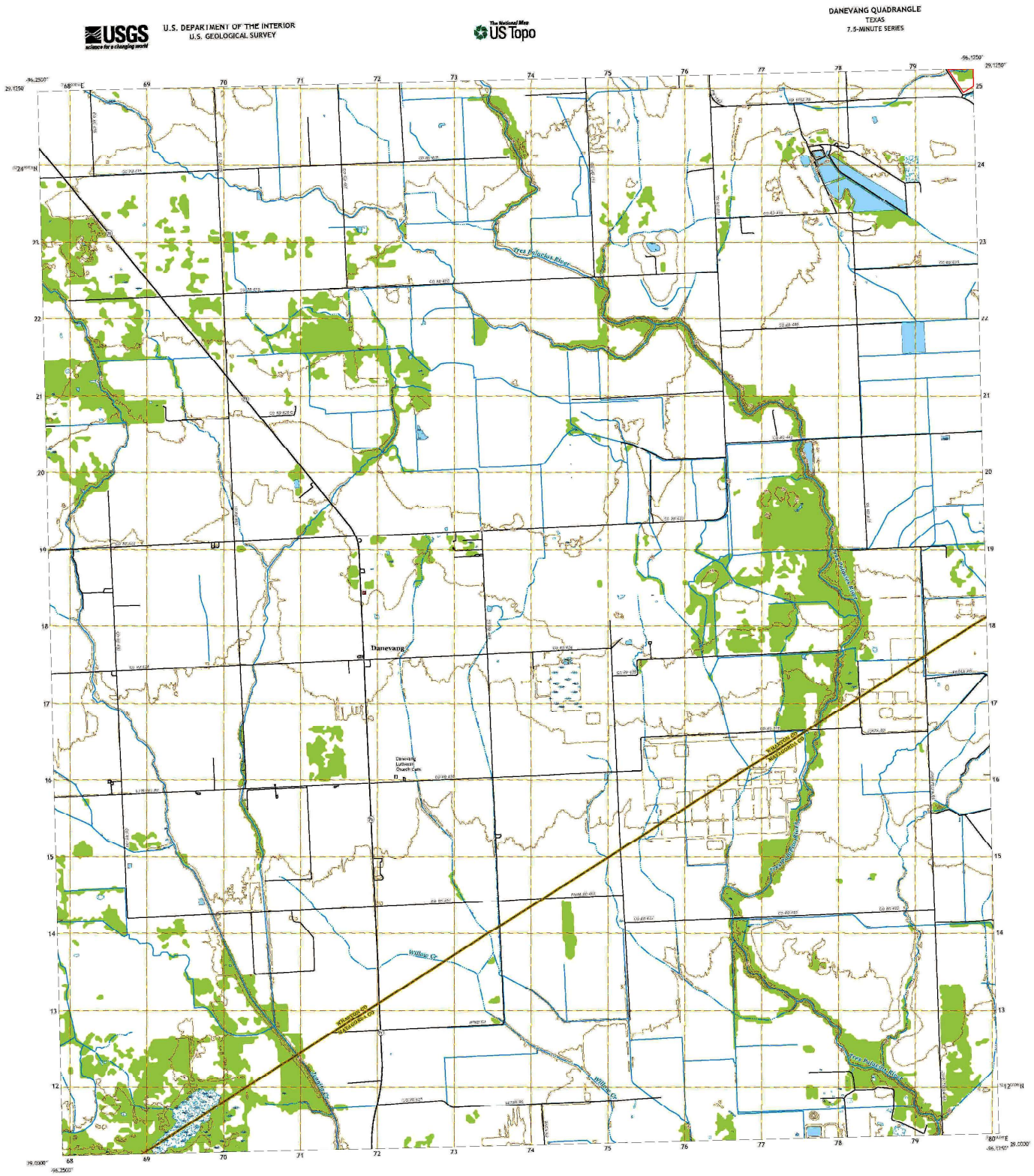
What types of notice will be provided?

☒ Publish in alternative language newspaper
☐ Posted on Commissioner's Integrated Database Website
☐ Mailed by TCEQ's Office of the Chief Clerk
☐ Other (specify)

7.5-MINUTE USGS TOPOGRAPHIC QUADRANGLE MAP

7.5-Minute USGS Topographic Quadrangle Map

Figure A.E.l, 7.5-Minute USGS Topographic Quadrangle Map, is an original 7.5-Minute USGS Topographic Map of the Pierce, Texas Quadrangle. This map shows the major highways, county roads, water bodies, and elevation lines near the property.

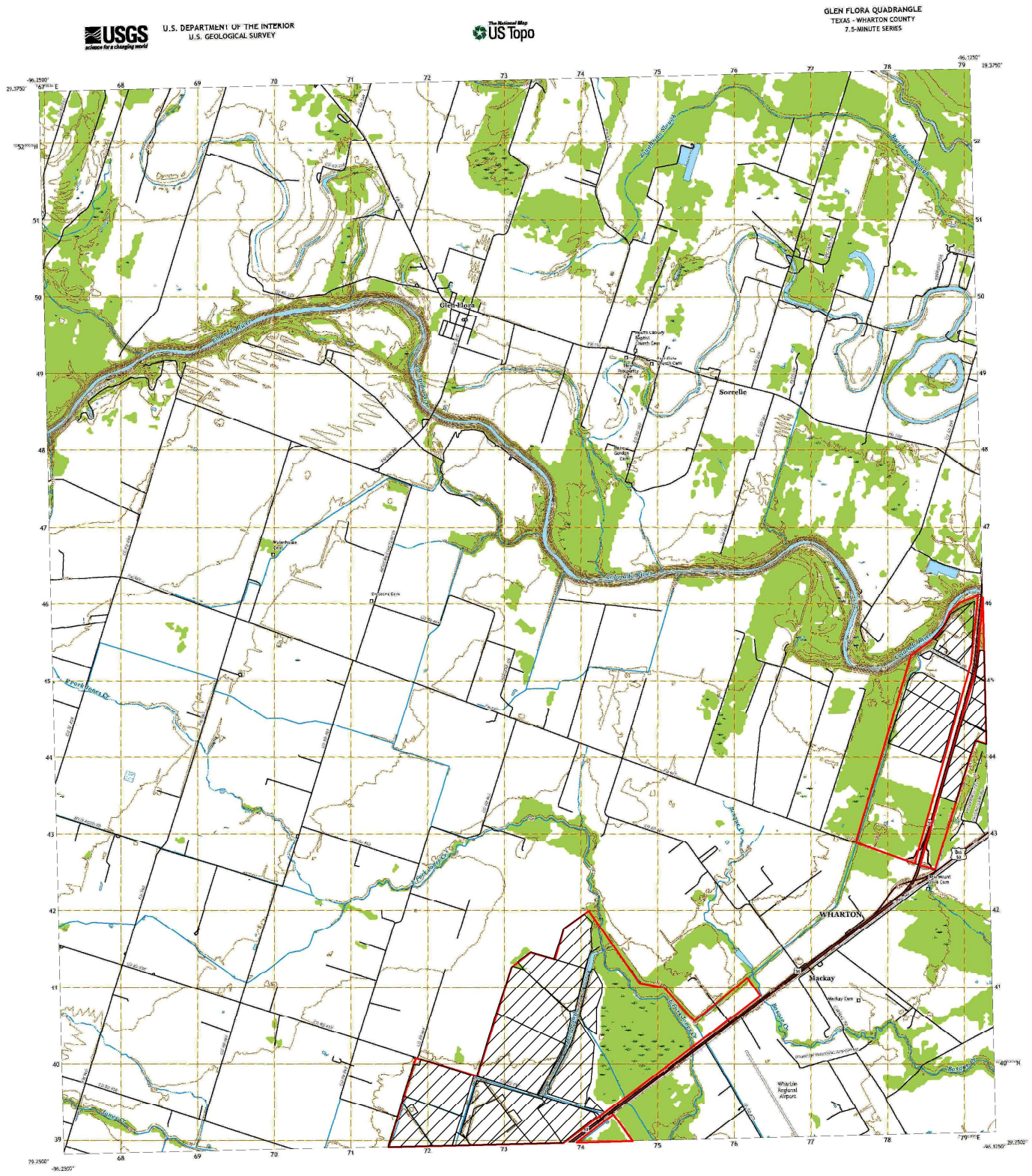


Biogas Plant

Solar Plant

Land Management Unit

Property Boundary

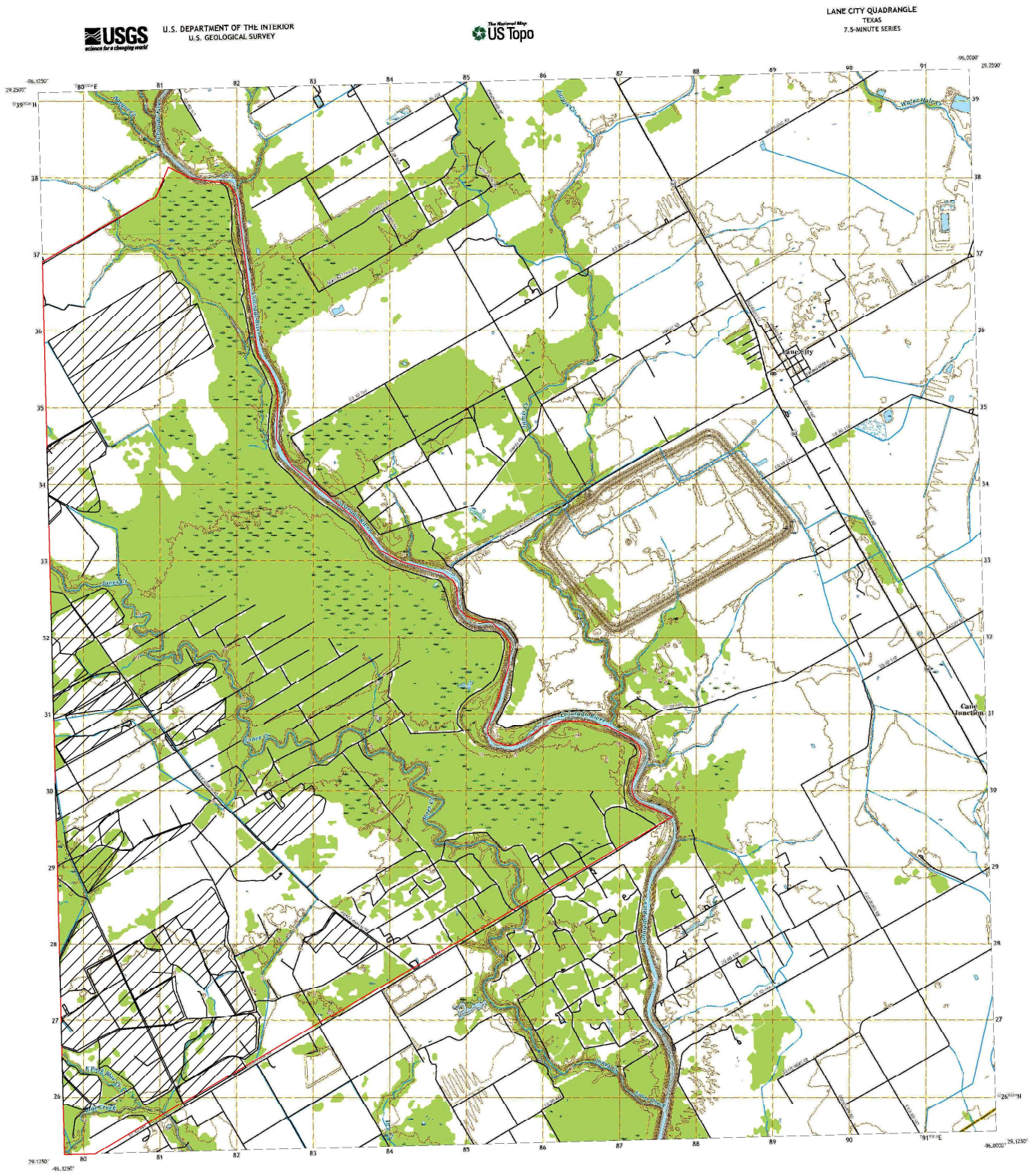


Biogas Plant

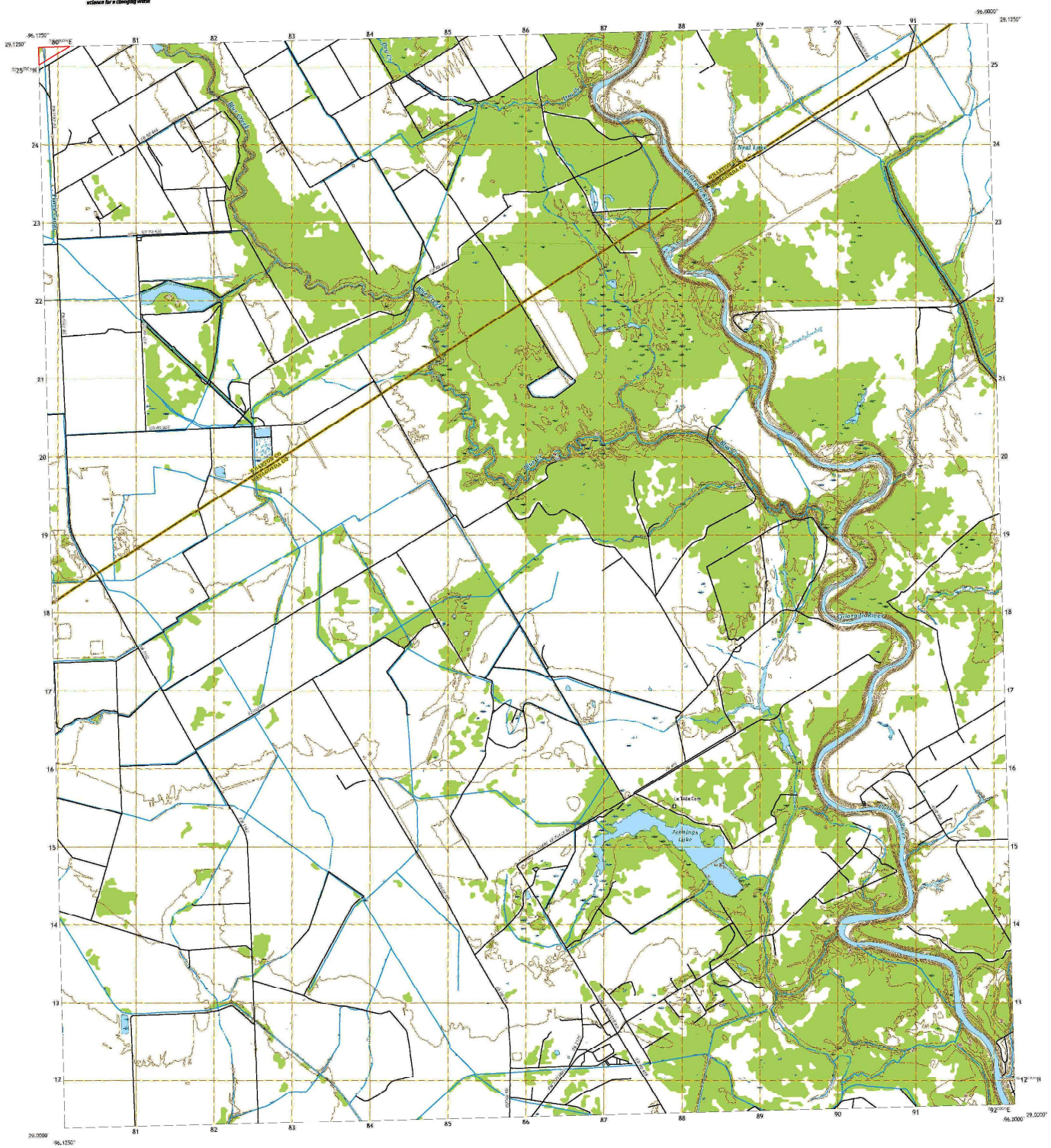
Solar Plant

Land Management Unit

Property Boundary



- Biogas Plant
- Solar Plant
- Land Management Unit
- Property Boundary

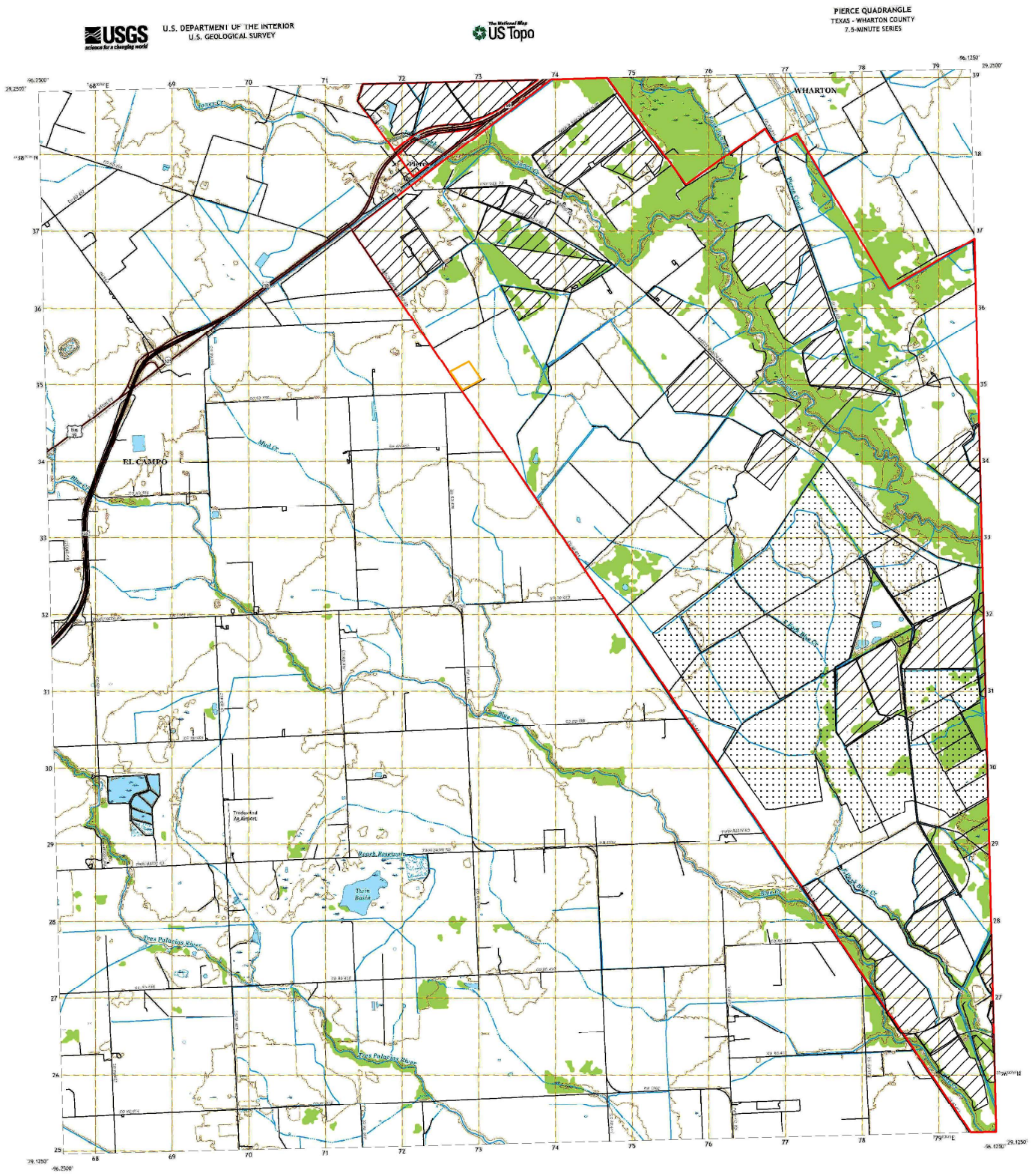


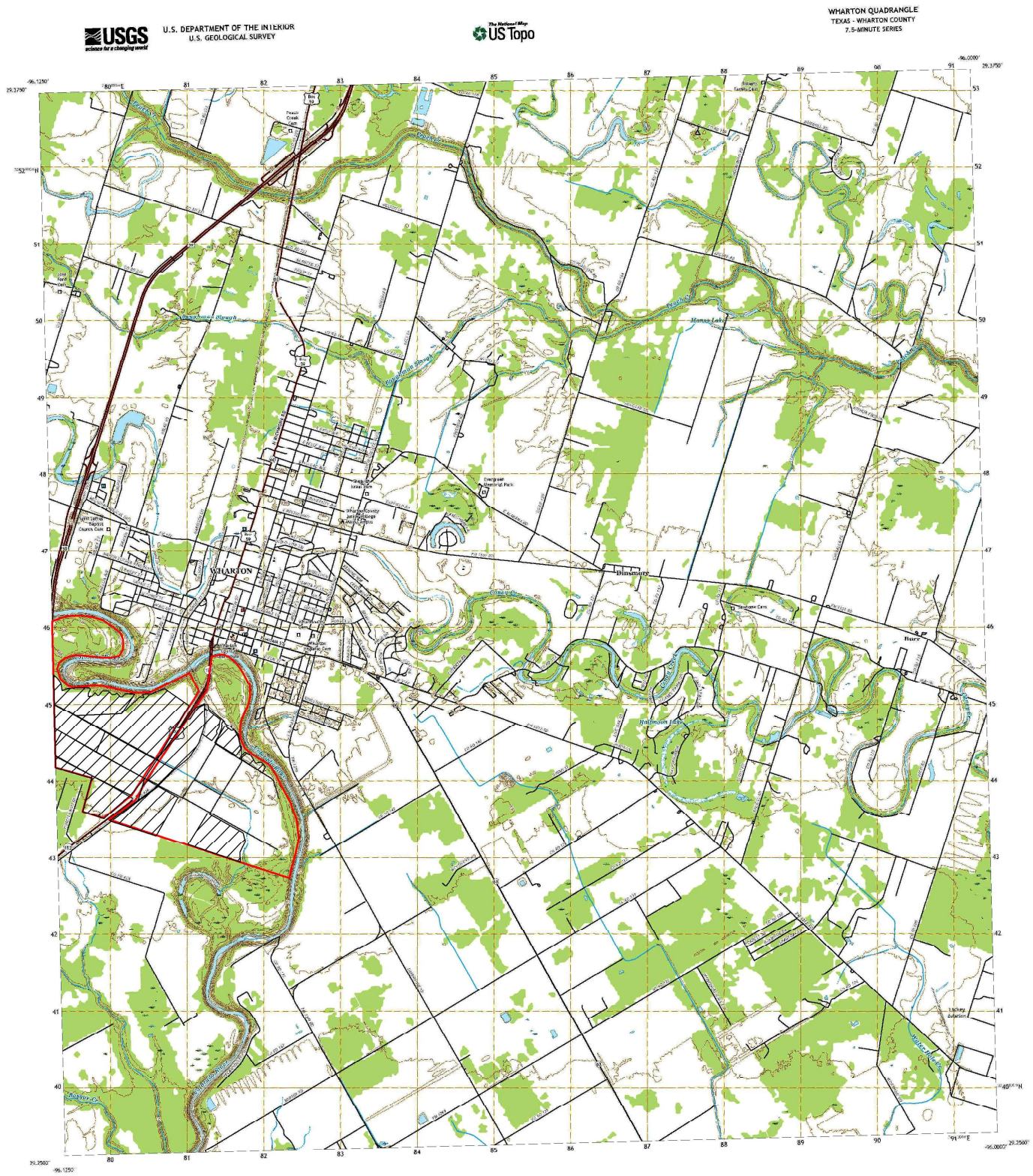
Biogas Plant

Solar Plant

Land Management Unit

Property Boundary


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
The National Map
US Topo
PIERCE QUADRANGLE
TEXAS - WHARTON COUNTY
7.5-MINUTE SERIES
WHARTON
EL CAMPO
Mud Cr
Blue Cr
Trib
Trib
Trib



Biogas Plant

Solar Plant

Land Management Unit

Property Boundary

A.F: AFFECTED LANDOWNER INFORMATION

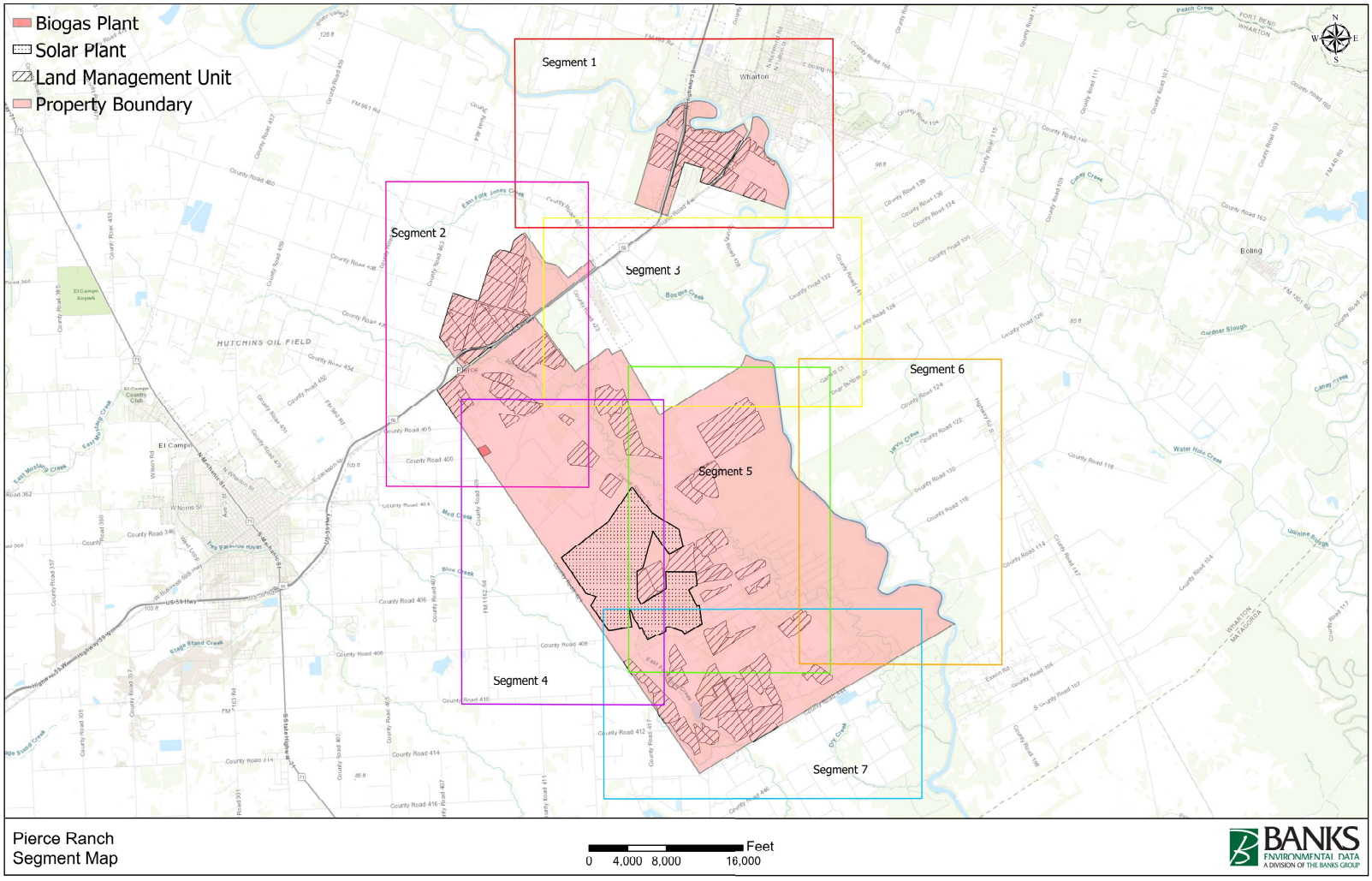
A.F.1 Adjacent Landowners Map

Figure A.F.1 shows the information required in item 1.a. of the Industrial Administrative Report 1.1. Property boundaries were obtained from the Wharton County Appraisal District Interactive Map as of November 2024. The tracts identified on the map correspond to Table A.F. l, below.

A.F.2 Landowners List

The landowner names and addresses in Table A.F.1 were obtained from the Wharton Appraisal District Property Search web databases, retrieved 11/2024.

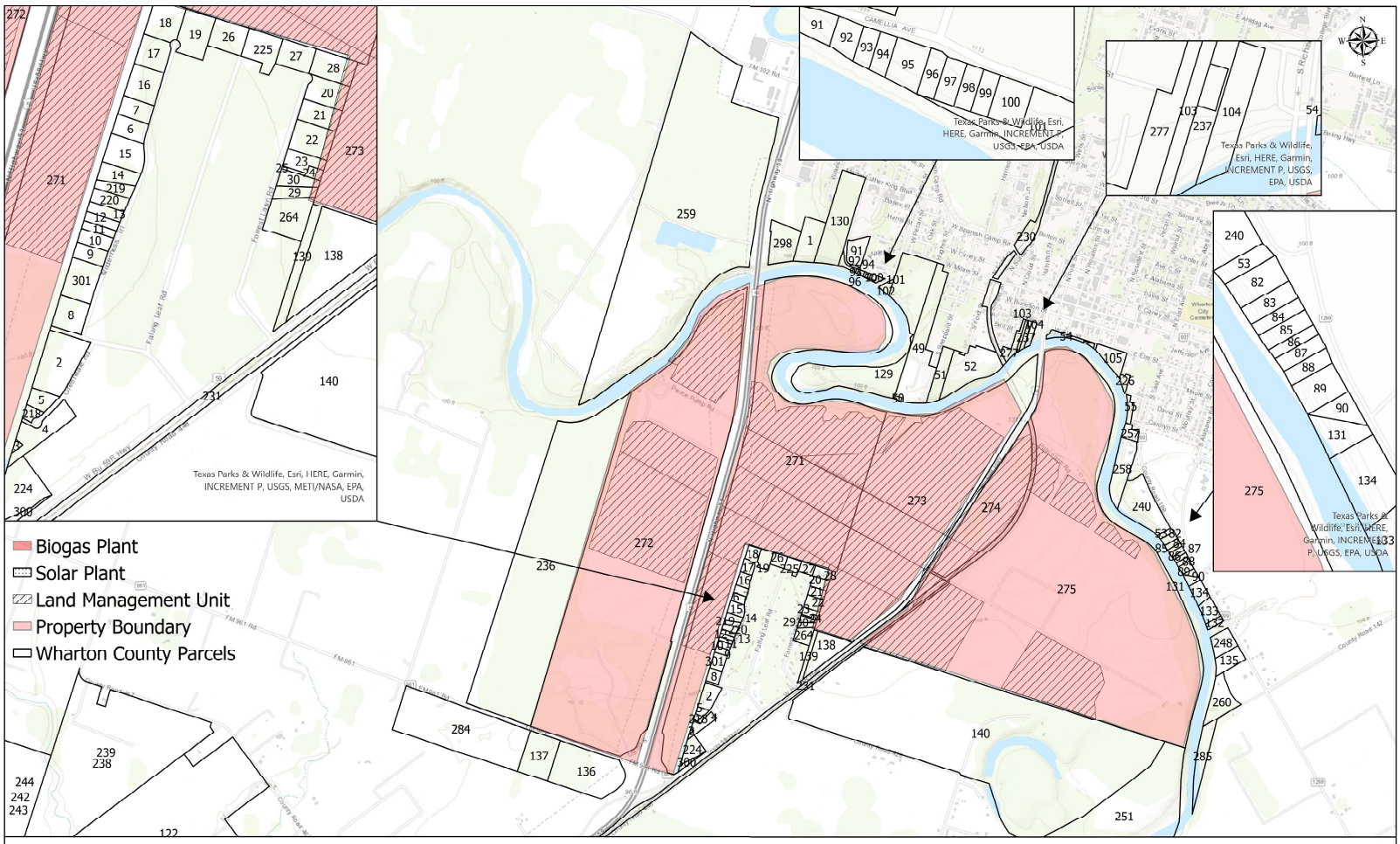
Table 1. Adjacent Landowners



Pierce Ranch
Segment Map

0 4,000 8,000 16,000 Feet

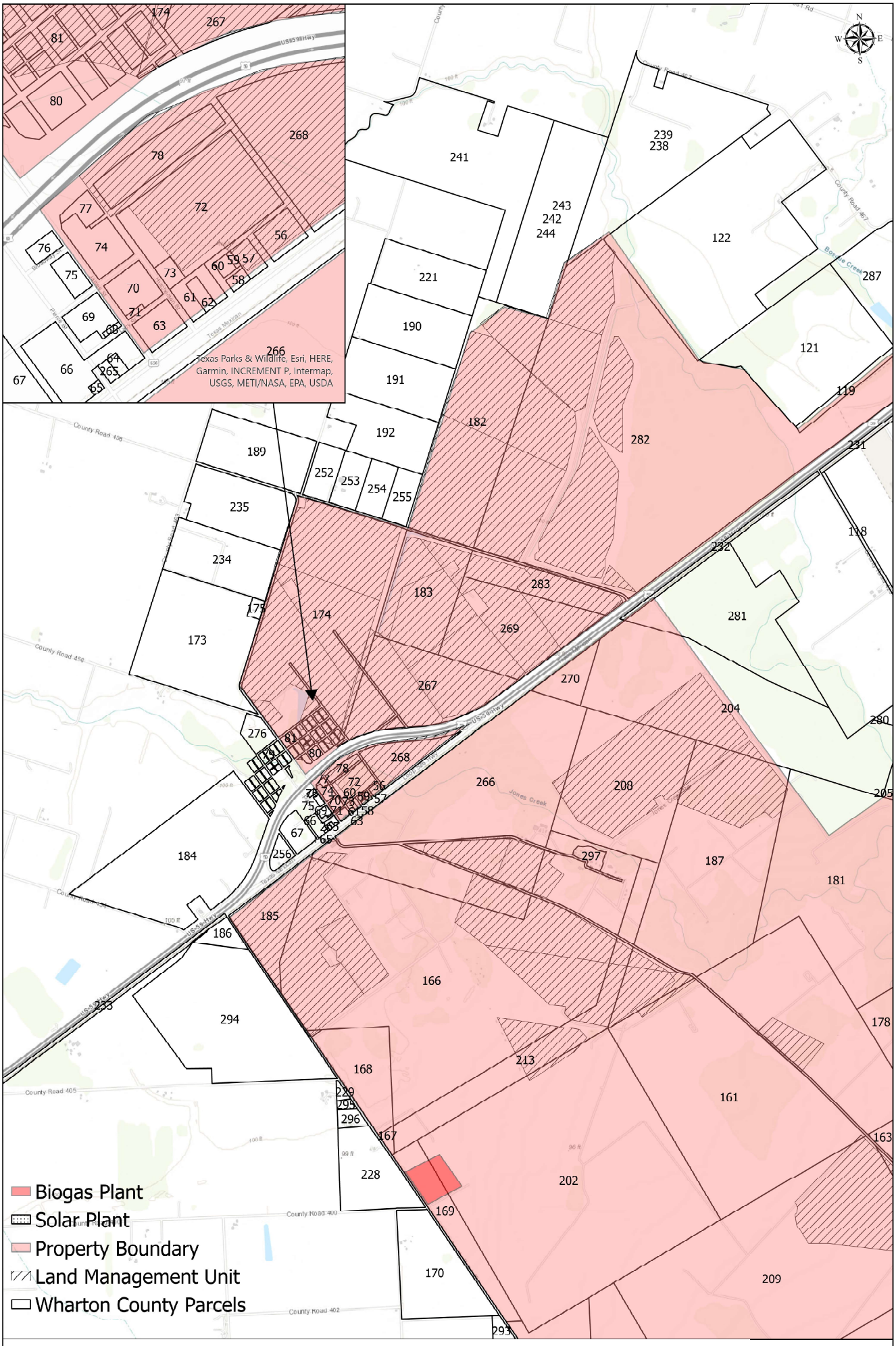
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 1

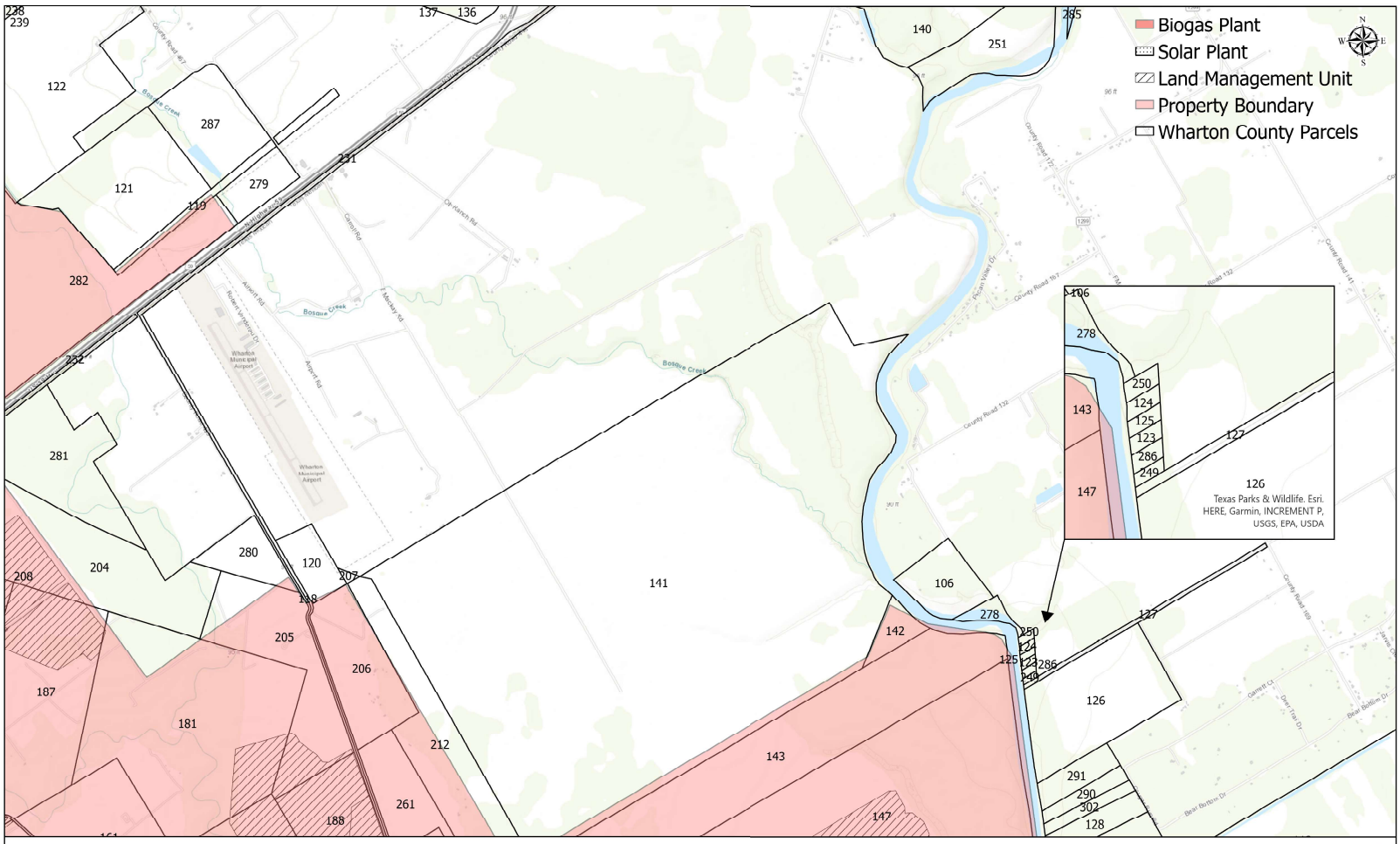
0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 2

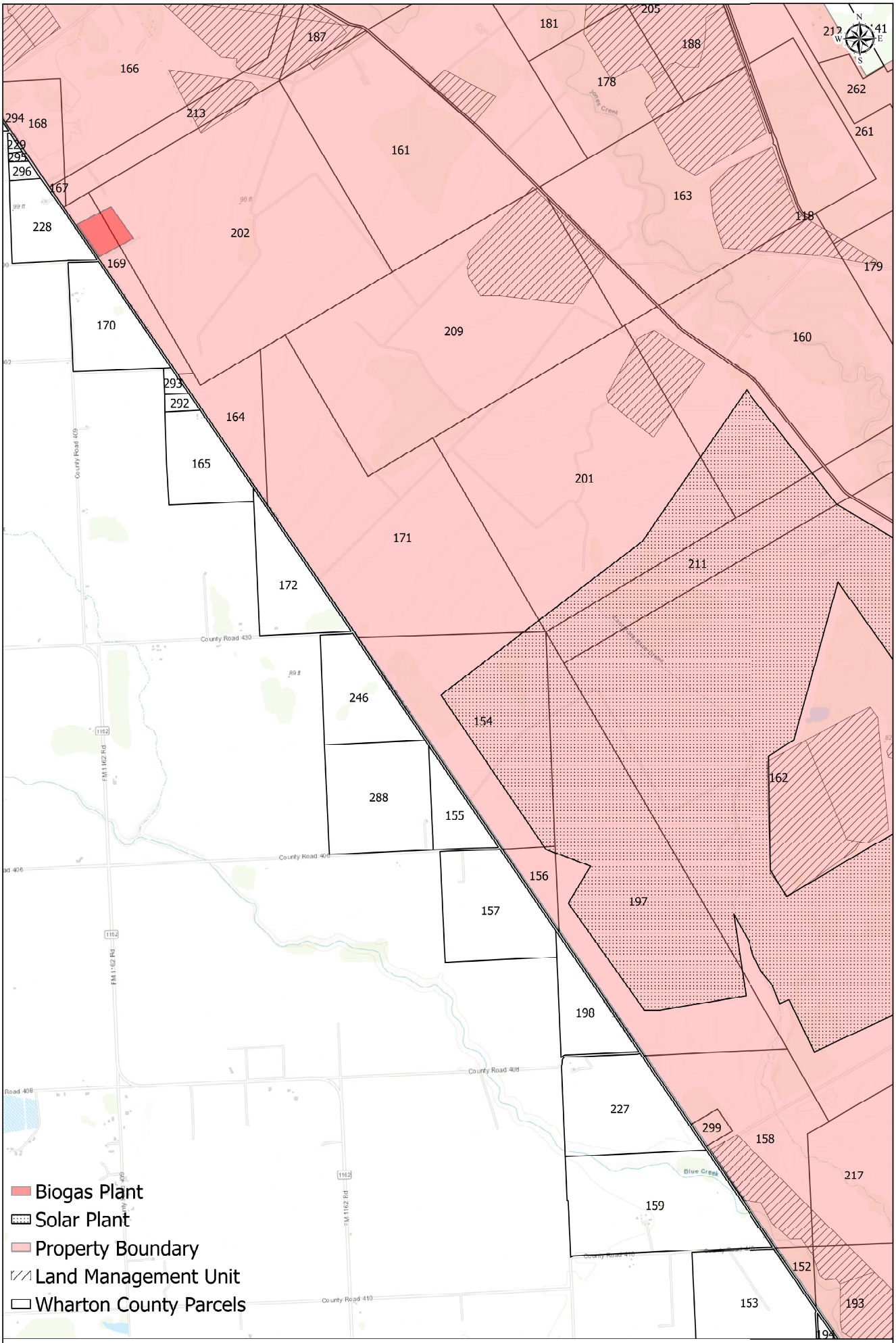
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

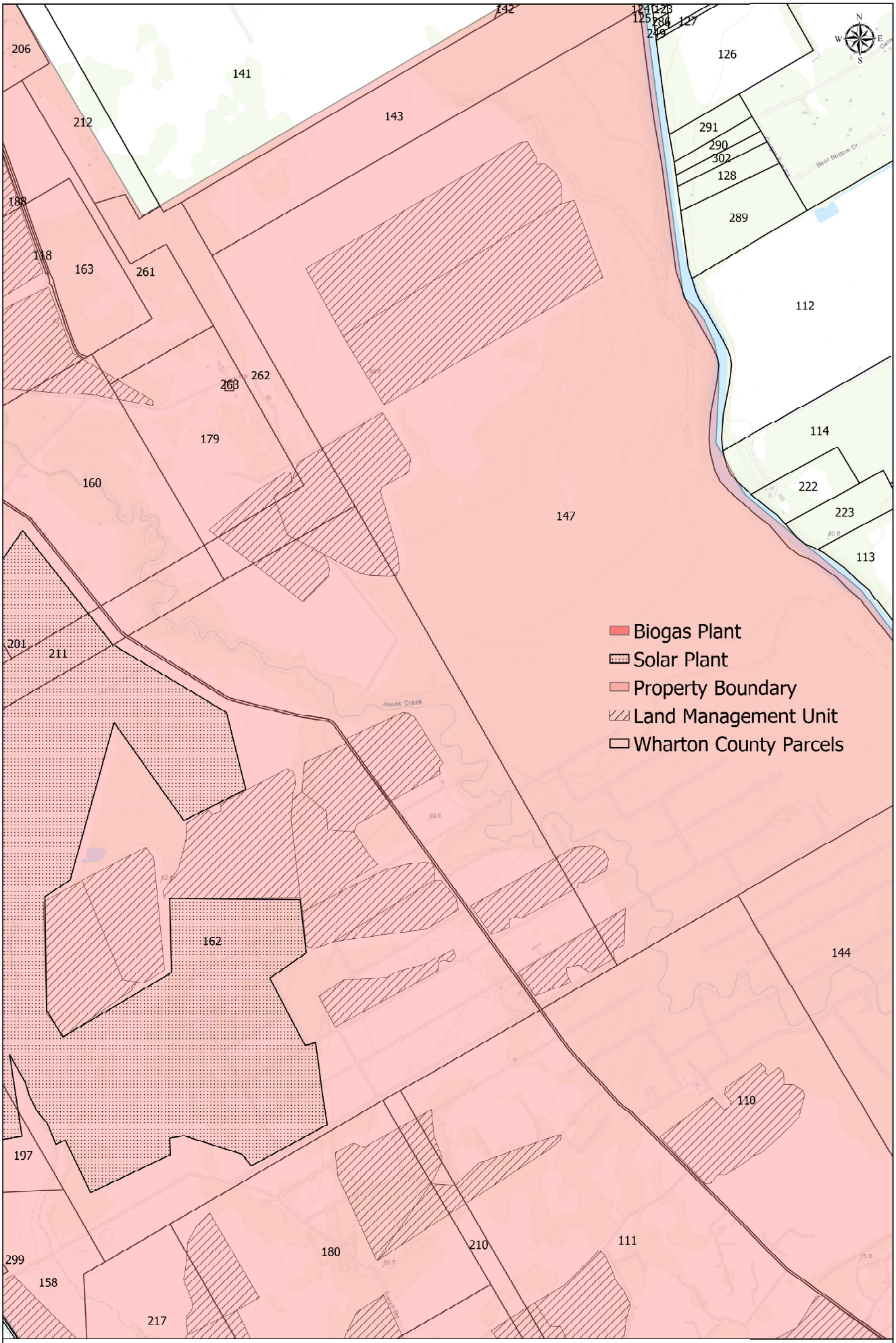


Affected Landowners Map
Segment 3

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

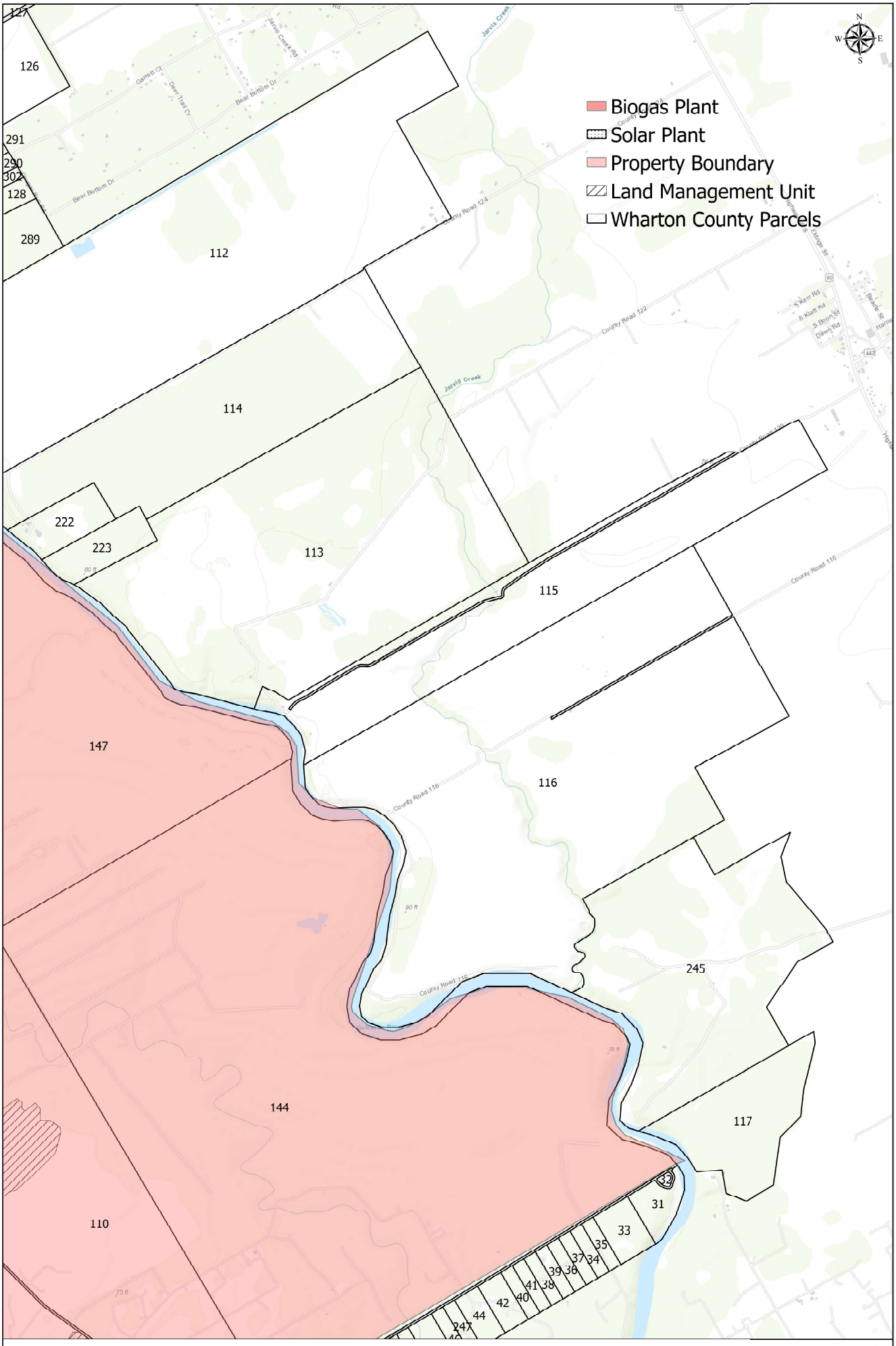

Biogas Plant
Solar Plant
Property Boundary
Land Management Unit
Wharton County Parcels
Affected Landowners Map
Segment 4
0 1,000 2,000 4,000 Feet
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 5

0 1,000 2,000 4,000 Feet

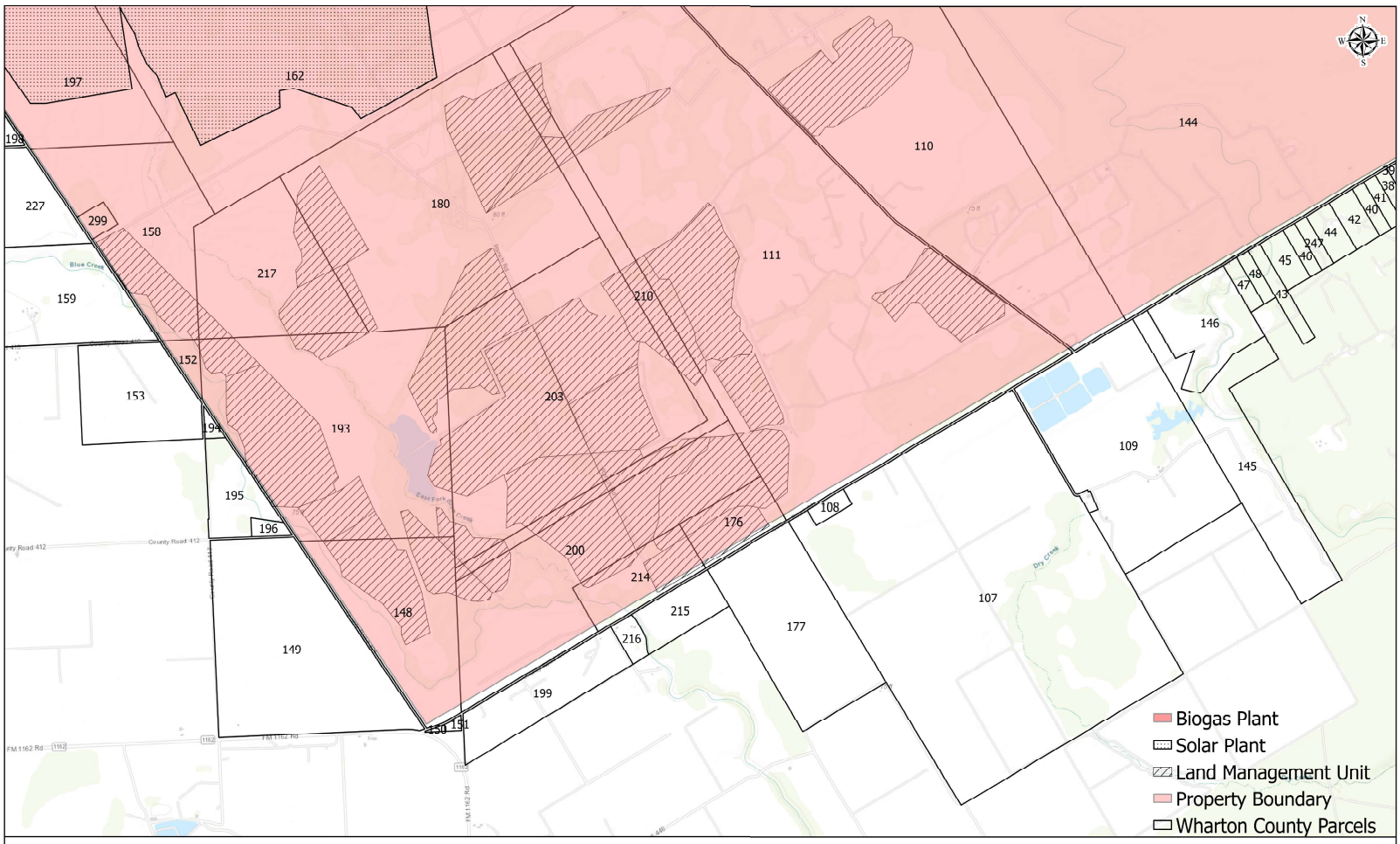
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 6

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Affected Landowners Map
Segment 7

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
1	Wharton	15961	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
2	Wharton	17158	BECKER ALVIE D ETUX LAURA J	174 GREENDALE RD	WHARTON	TX	77488
3	Wharton	17159	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
4	Wharton	17160	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
5	Wharton	17161	LEO ENTERPRISES INC	272 GREENDALE RD	WHARTON	TX	77488
6	Wharton	17166	DORNAK KEITH A	719 WILDERNESS TRL	WHARTON	TX	77488
7	Wharton	17167	PEREZ ANTHONY SR	223 SHIMEK	EL CAMPO	TX	77437
8	Wharton	17168	MCDOUGALL RUSSELL ETUX NANETTE	353 WILDERNESS TRL	WHARTON	TX	77488
9	Wharton	17170	KING LINDA	439 Wilderness Trl	Wharton	TX	77488
10	Wharton	17172	SODERQUIST MICHELLE JANSKY	477 WILDERNESS TRAIL	WHARTON	TX	77488
11	Wharton	17173	CORTES ROLANDO & MARTINEZ ESMERALDA	614 MURPHY	WHARTON	TX	77488
12	Wharton	17174	DEITERICH FRANCES LIFE ESTATE	529 WILDERNESS TRL	WHARTON	TX	77488
13	Wharton	17175	DEITERICH FRANCES LIFE ESTATE	529 WILDERNESS TRL	WHARTON	TX	77488
14	Wharton	17181	ESCAMILLA CHRISSIE M	593 WILDERNESS TRL	WHARTON	TX	77488
15	Wharton	17182	NJOKU LASANDRA	950 BOROS DRIVE	HOUSTON	TX	77024
16	Wharton	17183	CASAREZ ANTONIO	1605 AMBER	EL CAMPO	TX	77437
17	Wharton	17184	SALEM ABDEL	10001 Six Pines Dr	The Woodlands	TX	77380
18	Wharton	17185	ANZALDUA PAUL D	899 WILDERNESS TRAIL	WHARTON	TX	77488
19	Wharton	17202	OKEWUNMI JOHN & KIM	PO BOX 118	ROSHARON	TX	77583
20	Wharton	17207	BOYD CARL A III & KAILA N	586 FORREST LAWN	WHARTON	TX	77488
21	Wharton	17214	SMITH ANTHONY A	552 FORREST LAWN	WHARTON	TX	77488
22	Wharton	17216	Palacios Richard JR & Yvonna	522 Forrest Lawn	Wharton	TX	77488
23	Wharton	17222	WHARTON COUNTY	PO BOX 189	WHARTON	TX	77488
24	Wharton	17223	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
25	Wharton	17223	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
26	Wharton	17227	TRUJILLO SONIA	1502 ENCLAVE PKWY APT 205	HOUSTON	TX	77077
27	Wharton	17228	HOFFMANN PAUL LIFE EST	595 FORREST LAWN	WHARTON	TX	77488
28	Wharton	17229	PALACIOS GILBERT	594 FORREST LAWN RD	WHARTON	TX	77488
29	Wharton	17232	GUERRERO JESUS A ETUX ODETTE	304 OAK POND DR	MANVEL	TX	77578
30	Wharton	17233	WHARTON COUNTY	100 S FULTON ST STE 100	WHARTON	TX	77488
31	Wharton	17320	LCRA	PO BOX 220	AUSTIN	TX	78767

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
32	Wharton	17320	LCRA	PO BOX 220	AUSTIN	TX	78767
33	Wharton	17323	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
34	Wharton	17325	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
35	Wharton	17327	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
36	Wharton	17329	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
37	Wharton	17331	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
38	Wharton	17333	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
39	Wharton	17335	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
40	Wharton	17337	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
41	Wharton	17339	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
42	Wharton	17341	CAPLIN LLC	4017 MOUNTAIN SHADOW PLACE	RAPID CITY	SD	57702
43	Wharton	17347	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
44	Wharton	17359	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
45	Wharton	17361	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
46	Wharton	17363	HANCOCK JOE BRUCE ETAL	PO BOX 190	EL CAMPO	TX	77437
47	Wharton	17364	LABELLE PROPERTIES LTD	PO BOX 3111	BEAUMONT	TX	77704
48	Wharton	17366	HANCOCK R H LANDS	PO BOX 4125	HORSESHOE BAY	TX	78657
49	Wharton	18520	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
50	Wharton	18526	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
51	Wharton	18588	City of Wharton	120 E. Caney	Wharton	TX	77488
52	Wharton	18589	City of Wharton	120 E. Caney	Wharton	TX	77488
53	Wharton	18696	GARCIA EVA RODRIGUEZ	PO BOX 785	WHARTON	TX	77488
54	Wharton	18699	WHARTON CITY OF	PO BOX 311507	NEW BRAUNFELS	TX	78131
55	Wharton	20858	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
56	Wharton	22167	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
57	Wharton	22168	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
58	Wharton	22169	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
59	Wharton	22170	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
60	Wharton	22171	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
61	Wharton	22172	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
62	Wharton	22173	BAUER COLLEEN	5587 BRIGHT TIMBER LANDING DR	SPRING	TX	77386
63	Wharton	22174	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
64	Wharton	22175	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
65	Wharton	22176	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
66	Wharton	22177	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
67	Wharton	22178	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
68	Wharton	22183	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
69	Wharton	22184	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
70	Wharton	22187	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
71	Wharton	22188	GODSEY W R & WF	2127 SPUR TRL	GRAPEVINE	TX	76051
72	Wharton	22189	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
73	Wharton	22190	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
74	Wharton	22191	PIERCE STATION ANTIQUES LLC	PO BOX 501	PIERCE	TX	77467
75	Wharton	22193	TEXAS STATE OF		AUSTIN	TX	78768
76	Wharton	22204	TEXAS STATE OF		AUSTIN	TX	78768
77	Wharton	22207	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
78	Wharton	22210	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
79	Wharton	22218	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
80	Wharton	22223	ACADEMY SQUARE (PIERCE)		PIERCE	TX	77467
81	Wharton	22224	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
82	Wharton	22826	MEHRENS NANCY KAINER & MEHRENS DAVID RAY	1316 FM 1299	WHARTON	TX	77488
83	Wharton	22829	MEHRENS NANCY KAINER	1316 FM 1299	WHARTON	TX	77488
84	Wharton	22830	MATHEWS DARREN R ETUX KIMBERLY D	1318 FM 1299	WHARTON	TX	77488
85	Wharton	22831	Bruton Nelson	1400 FM 1299 RD	Wharton	TX	77488
86	Wharton	22832	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
87	Wharton	22833	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
88	Wharton	22834	ROSENBERG CARPET CENTER INC	PO BOX 731	ROSENBERG	TX	77471
89	Wharton	22835	JURASEK RUSSELL A ETUX JACQUELIN	1500 FM 1299	WHARTON	TX	77488
90	Wharton	22837	MAYNARD RANDALL C	2100 FM 1299 RD	WHARTON	TX	77488
91	Wharton	23653	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
92	Wharton	23702	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
93	Wharton	23703	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
94	Wharton	23704	WHARTON CITY	120 E CANEY	WHARTON	TX	77488

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
95	Wharton	23705	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
96	Wharton	23706	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
97	Wharton	23707	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
98	Wharton	23708	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
99	Wharton	23709	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
100	Wharton	23710	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
101	Wharton	23711	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
102	Wharton	23712	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
103	Wharton	26694	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
104	Wharton	26697	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
105	Wharton	26755	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
106	Wharton	28404	VOULGARIS MICHAEL D	404 PRICE DR	WHARTON	TX	77488
107	Wharton	28644	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
108	Wharton	28648	HEIMANN GARY W	2172 CR 444 RD	EL CAMPO	TX	77437
109	Wharton	28650	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
110	Wharton	28657	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
111	Wharton	28658	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
112	Wharton	28664	KOSCLSKSIE BARBARA B ETAL	PO BOX 331	BROOKSHIRE	TX	77423
113	Wharton	28676	HAWES BARBARA LOUISE TRUST DATED 8-17-81	PO BOX 686	WHARTON	TX	77488
114	Wharton	28705	KOSCLSKIE BARBARA B ETAL	PO BOX 331	BROOKSHIRE	TX	77423
115	Wharton	28716	LCRA	PO BOX 220	AUSTIN	TX	78767
116	Wharton	28750	LCRA	PO BOX 220	AUSTIN	TX	78767
117	Wharton	28775	SCHMIDT RICHARD E	PO BOX 784	EL CAMPO	TX	77437
118	Wharton	29621	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
119	Wharton	29621	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
120	Wharton	29637	BEARD LONNIE F FAMILY TRUST	2106 NANCY LOU	EL CAMPO	TX	77437
121	Wharton	29671	KRESTA KEITH A & SARA	2394 FM 961 RD	WHARTON	TX	77488
122	Wharton	29688	MCMILLAN BARBARA A & MCMILLAN SHERRY L	2622 HAVERHILL DR	HOUSTON	TX	77008
123	Wharton	30295	MCELVEEN JOAN	3983 FM 1735	MT PLEASANT	TX	75455

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
124	Wharton	30305	JOINES JON ETUX BLANCHE; JOINES CLINT J	1628 CR 235	WHARTON	TX	77488
125	Wharton	30308	DUSEK DOUGLAS ETUX LORRAINE	PO BOX 733	WHARTON	TX	77488
126	Wharton	30315	WHARTON TURF GRASS INC	PO BOX 1029	WHARTON	TX	77488
127	Wharton	30316	WHARTON TURF GRASS INC	PO BOX 1029	WHARTON	TX	77488
128	Wharton	30319	Brown Douglas I	6570 Cougar Crossing	Wharton	TX	77488
129	Wharton	31204	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
130	Wharton	31245	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
131	Wharton	31735	CENTERPOINT ENERGY HOUSTON ELECTRIC	PO BOX 1475	HOUSTON	TX	77251
132	Wharton	31737	MAYNARD RANDALL	2100 FM 1299 RD	WHARTON	TX	77488
133	Wharton	31738	TEXAS STATE OF		AUSTIN	TX	78768
134	Wharton	31741	HOUSTON PIPE LINE CO	PO BOX 660164	DALLAS	TX	75266
135	Wharton	31835	DUSEK DOUGLAS ETUX LORRAINE	PO BOX 733	WHARTON	TX	77488
136	Wharton	32244	BOWERS N A EST	5426 CANDLE CREST	HOUSTON	TX	77091
137	Wharton	32247	BOWERS N A EST	5426 CANDLE CREST DR	HOUSTON	TX	77091
138	Wharton	32896	DAVIS CHARLES A JR	PO BOX 1029	WHARTON	TX	77488
139	Wharton	32897	WHARTON COUNTY EASEMENTS	309 E MILAM #600	WHARTON	TX	77488
140	Wharton	32908	HORTON JM RANCH LLC	11744 SKENE WAY	HOUSTON	TX	77024
141	Wharton	33103	BOETTCHER & QUIREY	PO BOX 384	EAST BERNARD	TX	77435
142	Wharton	33107	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
143	Wharton	33108	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
144	Wharton	33243	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
145	Wharton	33244	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
146	Wharton	33245	BUCKEYE HAMILTON M3 MANAGEMENT LP	7 INWOOD CIR	BAY CITY	TX	77414
147	Wharton	35151	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
148	Wharton	36126	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
149	Wharton	36128	SCHOENFIELD GARY & JEANETTE	3181 CR 405 RD	EL CAMPO	TX	77437
150	Wharton	36129	KNIPLING RICHARD F	PO BOX 309	RICHMOND	TX	77469
151	Wharton	36130	WILLIS BROTHERS	PO BOX 271	EL CAMPO	TX	77437
152	Wharton	36213	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
153	Wharton	36214	STAVINOHA ELSIE FAMILY TRUST	PO BOX 1145	EL CAMPO	TX	77437
154	Wharton	36542	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
155	Wharton	36545	ZALMAN JASON A ETUX TISHA M	191 WESTMOOR RD	EL CAMPO	TX	77437
156	Wharton	36839	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
157	Wharton	36841	SHAFER FAMILY FARMS LLC	PO BOX 7602	HORSESHOE BAY	TX	78657
158	Wharton	36850	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
159	Wharton	36856	COX PATSY R FAMILY LTD PTRNSHIP	1509 MICHAEL	EL CAMPO	TX	77437
160	Wharton	37000	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
161	Wharton	37003	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
162	Wharton	37108	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
163	Wharton	37286	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
164	Wharton	37624	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
165	Wharton	37626	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
166	Wharton	37684	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
167	Wharton	37701	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
168	Wharton	37725	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
169	Wharton	37725	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
170	Wharton	37729	HACKER WILLIAM	305 CR 409 RD	EL CAMPO	TX	77437
171	Wharton	37881	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
172	Wharton	37884	ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP	191 WESTMOOR RD	EL CAMPO	TX	77437
173	Wharton	40462	ROD MARVIN J	118 DOGWOOD	LAKE JACKSON	TX	77566
174	Wharton	40463	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
175	Wharton	40465	THOMPSON KEVIN DALE & WF	623 CR 465 RD	EL CAMPO	TX	77437
176	Wharton	40701	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
177	Wharton	40702	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
178	Wharton	40809	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
179	Wharton	40999	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
180	Wharton	41076	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
181	Wharton	41110	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
182	Wharton	41142	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
183	Wharton	41143	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
184	Wharton	41166	WILBECK M P LLC	205 SILVER SADDLE DR	ANGLETON	TX	77515

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
185	Wharton	41178	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
186	Wharton	41179	Z & B PTNRSHIP	1306 AVE K	EL CAMPO	TX	77437
187	Wharton	41181	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
188	Wharton	41325	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
189	Wharton	41548	SWANSON LINDA S	15214 FALL PLACE DR	SAN ANTONIO	TX	78247
190	Wharton	41550	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
191	Wharton	41552	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
192	Wharton	41554	MAREK MELVIN E TRUST	9005 FM 1301	BOLING	TX	77420
193	Wharton	42473	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
194	Wharton	42474	STAVINOHA ELSIE FAMILY TRUST	PO BOX 1145	EL CAMPO	TX	77437
195	Wharton	42476	GANGL JAMES ALLEN	4154 FM 1163 RD	EL CAMPO	TX	77437
196	Wharton	42478	GANGL JAMES ALLEN	4154 FM 1163 RD	EL CAMPO	TX	77437
197	Wharton	42833	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
198	Wharton	42834	SHAFER FAMILY FARMS LLC	PO BOX 7602	HORSESHOE BAY	TX	78657
199	Wharton	43495	KOPECKY ANNA J EST	8427 TAVENOR LN	HOUSTON	TX	77075
200	Wharton	43508	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
201	Wharton	43589	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
202	Wharton	43591	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
203	Wharton	43592	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
204	Wharton	43866	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
205	Wharton	43869	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
206	Wharton	43869	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
207	Wharton	43870	BEARD LONNIE F FAMILY TRUST	2106 NANCY LOU	EL CAMPO	TX	77437
208	Wharton	43942	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
209	Wharton	44320	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
210	Wharton	44361	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
211	Wharton	44362	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
212	Wharton	44394	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
213	Wharton	44396	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
214	Wharton	44462	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
215	Wharton	44463	BLUE CREEK REAL PROPERTIES LLC	1375 ENCLAVE PKWY	HOUSTON	TX	77077
216	Wharton	44465	BARTA WALTER	11726 MIGHTY REDWOOD DR	HOUSTON	TX	77059
217	Wharton	44523	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
218	Wharton	50230	BOEDEKER RONALD D ETUX SHARON H	120 CR 133 RD	WHARTON	TX	77488
219	Wharton	50516	KOEHN KENNETH & ALICE	559 WILDERNESS TRL	WHARTON	TX	77488
220	Wharton	50517	KOEHN KENNETH & ALICE	559 WILDERNESS TRL	WHARTON	TX	77488
221	Wharton	50669	DESIGN SUPERVISION ANALYSIS INC	5201 GARY RD	COLLEGE STATION	TX	77845
222	Wharton	51465	PRATKA MARK C ETUX KAY	PO BOX 1596	EL CAMPO	TX	77437
223	Wharton	51466	PRATKA MARK C ETUX KAY	PO BOX 1596	EL CAMPO	TX	77437
224	Wharton	51670	DEITERICH FRANCES M	529 WILDERNESS TRL	WHARTON	TX	77488
225	Wharton	52260	GARCIA HIGNIO ETAL	2800 CR 463	EL CAMPO	TX	77437
226	Wharton	52351	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
227	Wharton	52878	POPP CEDRIC E	4612 CR 410 RD	EL CAMPO	TX	77437
228	Wharton	55331	BARTOS VLASTA KOCUREK	PO BOX 542	EL CAMPO	TX	77437
229	Wharton	55332	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
230	Wharton	55352	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
231	Wharton	55353	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
232	Wharton	55354	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
233	Wharton	55356	KANSAS CITY SOUTHERN	PO BOX 219335	KANSAS CITY	MO	64121
234	Wharton	55485	ROD MARVIN J	118 DOGWOOD	LAKE JACKSON	TX	77566
235	Wharton	55487	HANSEN AUDREY A	7431 FM 1095	PALACIOS	TX	77465
236	Wharton	56184	PENDRAY JANE K THORNBURG	1448 CR 428 RD	WHARTON	TX	77488
237	Wharton	56956	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
238	Wharton	59209	F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP	415 FM 2817 RD	WHARTON	TX	77488
239	Wharton	59209	F & D GAVRANOVIC FARMS FAMILY LIMITED PARTNERSHIP	415 FM 2817 RD	WHARTON	TX	77488
240	Wharton	59308	JURASEK RUSSELL A ETUX JACQUELIN	1500 FM 1299	WHARTON	TX	77488
241	Wharton	60121	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
242	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
243	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
244	Wharton	60124	WILBECK GARY L FAMILY TRUST	2902 WILLOW CREEK DR	EL CAMPO	TX	77437
245	Wharton	60566	D C V K LTD PRTNSHIP	580 MAXIM DR	BOLING	TX	77420
246	Wharton	60806	ZALMAN JOE A JR EST 2000 FAMILY LTD PRTNSHIP	191 WESTMOOR RD	EL CAMPO	TX	77437

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
247	Wharton	61231	STUCKENSCHNEIDER TAMMY, HUNN EVELYN AND JETT ERVIN	PO BOX 67	MARTINSBURG	MO	65264
248	Wharton	61558	KAINER KATHRYN LIFE EST	411 AVE J	EL CAMPO	TX	77437
249	Wharton	61691	CJJ RETIREMENT LLC	1110 SUNSET ROAD	ROSHARON	TX	77583
250	Wharton	62297	JOINES JON ETUX BLANCHE	1628 CR 235	WHARTON	TX	77488
251	Wharton	62436	HORTON JM RANCH LLC	11744 SKENE WAY	HOUSTON	TX	77024
252	Wharton	62494	MAREK TRAVIS L	821 CR 123 RD	WHARTON	TX	77488
253	Wharton	62495	MAREK TERENCE D	3079 W EMBERS CT	BRYAN	TX	77808
254	Wharton	62496	MAREK THOMAS E	283 DELLA	EL CAMPO	TX	77437
255	Wharton	62497	WHEELER DEBRA G	5 TORRINGTON CT	AUSTIN	TX	78738
256	Wharton	62932	SCHULZ THERESA & GOTTFRIED O	2299 LONE STAR DR APT 515	SUGAR LAND	TX	77479
257	Wharton	62995	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
258	Wharton	62995	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
259	Wharton	68875	RUST LLOYD FAMILY LMT PRNSHP & RUST TM FAMILY LLC	PO BOX 1027	WHARTON	TX	77488
260	Wharton	69231	RACHUNEK KENNETH G	2123 FM 1299 RD	WHARTON	TX	77488
261	Wharton	69264	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
262	Wharton	69265	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
263	Wharton	69588	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
264	Wharton	70014	OTTO DIANNE	801 PECAN ST	WHARTON	TX	77488
265	Wharton	70201	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
266	Wharton	71262	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
267	Wharton	71263	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
268	Wharton	71264	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
269	Wharton	71265	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
270	Wharton	71266	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
271	Wharton	71267	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
272	Wharton	71268	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
273	Wharton	71269	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
274	Wharton	71270	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
275	Wharton	71271	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
276	Wharton	71875	MEZA RAFAEL & SUSANA	379 CR 456	EL CAMPO	TX	77437
277	Wharton	71959	WHARTON CITY	120 E CANEY	WHARTON	TX	77488

Map ID	County	PID	Owner Name	Mail Address	Mail City	Mail State	Mail Zip
278	Wharton	72487	RACHUNEK TIMOTHY J & LAURIANNE ETAL	710 CR 128	WHARTON	TX	77488
279	Wharton	72914	ATTAWAY KIP RAY	24703 HARBOR TERRACE LN	RICHMOND	TX	77406
280	Wharton	72926	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
281	Wharton	72927	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
282	Wharton	72928	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
283	Wharton	72929	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
284	Wharton	72936	MATULA JULIUS & MARY FAMILY TRUST	674 CR 428 RD	WHARTON	TX	77488
285	Wharton	73712	HAWES HUGH R IV & CHRISTOPHER T TRUST	PO BOX 538	PIERCE	TX	77467
286	Wharton	73754	KAINER KATHRYN LIFE EST	411 AVE J	EL CAMPO	TX	77437
287	Wharton	74196	GAVRANOVIC F & D FARMS FLP	415 FM 2817 RD	WHARTON	TX	77488
288	Wharton	74283	BACCAM TOM N	19014 TEBROC CT	HOUSTON	TX	77094
289	Wharton	75617	J & D RIVER VIEW RANCH LLC	8003 ASH VALLEY DR	SPRING	TX	77379
290	Wharton	75852	BROWN DAVID OTIS & MARY JANE LIFE ESTATE	6420 COUGAR CROSSING	WHARTON	TX	77488
291	Wharton	75853	BROWN DAVID OTIS & MARY JANE LIFE ESTATE	6420 COUGAR CROSSING	WHARTON	TX	77488
292	Wharton	77755	JOHNSON CLINE III & CHRISTINE	854 County Road 402	El Campo	TX	77437
293	Wharton	77756	KOCUREK JOSEPH A & DANA	2440 CR 421	EL CAMPO	TX	77437
294	Wharton	77970	Z & B PTNRSHIP	1306 AVE K	EL CAMPO	TX	77437
295	Wharton	78574	KOCUREK PHILIP ETUX BRAND LAURA	1104 COUNTY ROAD 421	EL CAMPO	TX	77437
296	Wharton	78575	KOCUREK JOSEPH JOHN	1098 CR 421	EL CAMPO	TX	77437
297	Wharton	78611	PIERCE RANCH GP	PO BOX 538	PIERCE	TX	77467
298	Wharton	78776	WHARTON CITY	120 E CANEY	WHARTON	TX	77488
299	Wharton	79625	AEP TEXAS INC	PO BOX 16428	COLUMBUS	OH	43216
300	Wharton	80627	STATE OF TEXAS	125 E 11TH ST	AUSTIN	TX	78701
301	Wharton	17169	CONFIDENTIAL OWNER	399 WILDERNESS TRL	WHARTON	TX	77488
302	Wharton	81398	Brown Douglas I	6570 COUGAR CROSSING	WHARTON	TX	77488

PHOTOGRAPH

Photograph Location Map

The Photograph Location Map shows the location of each photograph and the direction the camera was facing when the photograph was taken.

Photograph Location Map



Pierce, Texas Wharton County Wharton AD1, LLC	Photograph Location Map	ENVIROENGINEER ENGINEERING CONSULTING

Texas Land Application Permit (TLAP)
Technical Package

Prepared on: December 17th, 2024
Prepared for: Wharton AD1, LLC
Prepared by: Environeer, LLC

Kim Martin (Mar 3, 2025 14:34 EST)

Mar 3, 2025

Table of Contents

LIST OF FIGURES…….....i
LIST OF TABLES……i
T.A: FACILITY MAPS……1
T.B: FLOODPLAIN INFORMATION……8
T.C: AGRONOMIC MANAGEMENT PLAN……..11
T.D: WATER WELL INFORMATION……..13
T.E: GROUNDWATER TECHNICAL REPORT……..16
T.F: SOILS INFORMATION……18
T.G: ENGINEERING REPORT……19
T.H: OFF-SITE WASTES……..22
T.I: POLLUTANT ANALYSIS DATA……...……...23

LIST OF FIGURES

Figure T.A.1: Process Flow Diagram……...2
Figure T.A.2: Vicinity Map……..3
Figure T.A.3: 7.5 Minute USGS Map……..4
Figure T.A.4: Site Map……5
Figure T.A.5: Production Area Map……...10
Figure T.B.1: FEMA Floodplain Map……12
Figure T.D.1: Water Well Map……...15
Figure T.E.1: Geologic Atlas Map……17
Figure T.G.1: Water Balance Calculations……22
Figure T.G.2: Storage Calculations……23

LIST OF TABLES

Table T.D.1: Well and Map Information Table……..16

T.A: FACILITY MAPS

T.A.1 Process Flow Diagram

Figure 1, Process Flow Diagram, provides an overall schematic of the plant processes at the site.

T.A.2 Vicinity Map

Figure 2, Vicinity Map, is a general highway map showing the property and several adjacent properties in the area. The facility's location is depicted on the map.

T.A.3 7.5 Minute USGS Map

Figure 3, entitled 7.5 Minute USGS Map, is a seamless, high-quality copy of the 7.5 Minute USGS quadrangle map [Pierce TX quadrangle) that shows the boundary of the land owned, operated, or controlled by the facility and used as part of the application; and all springs, lakes, or ponds located on-site and within 1 mile of the property boundary.

T.A.4 Site Map

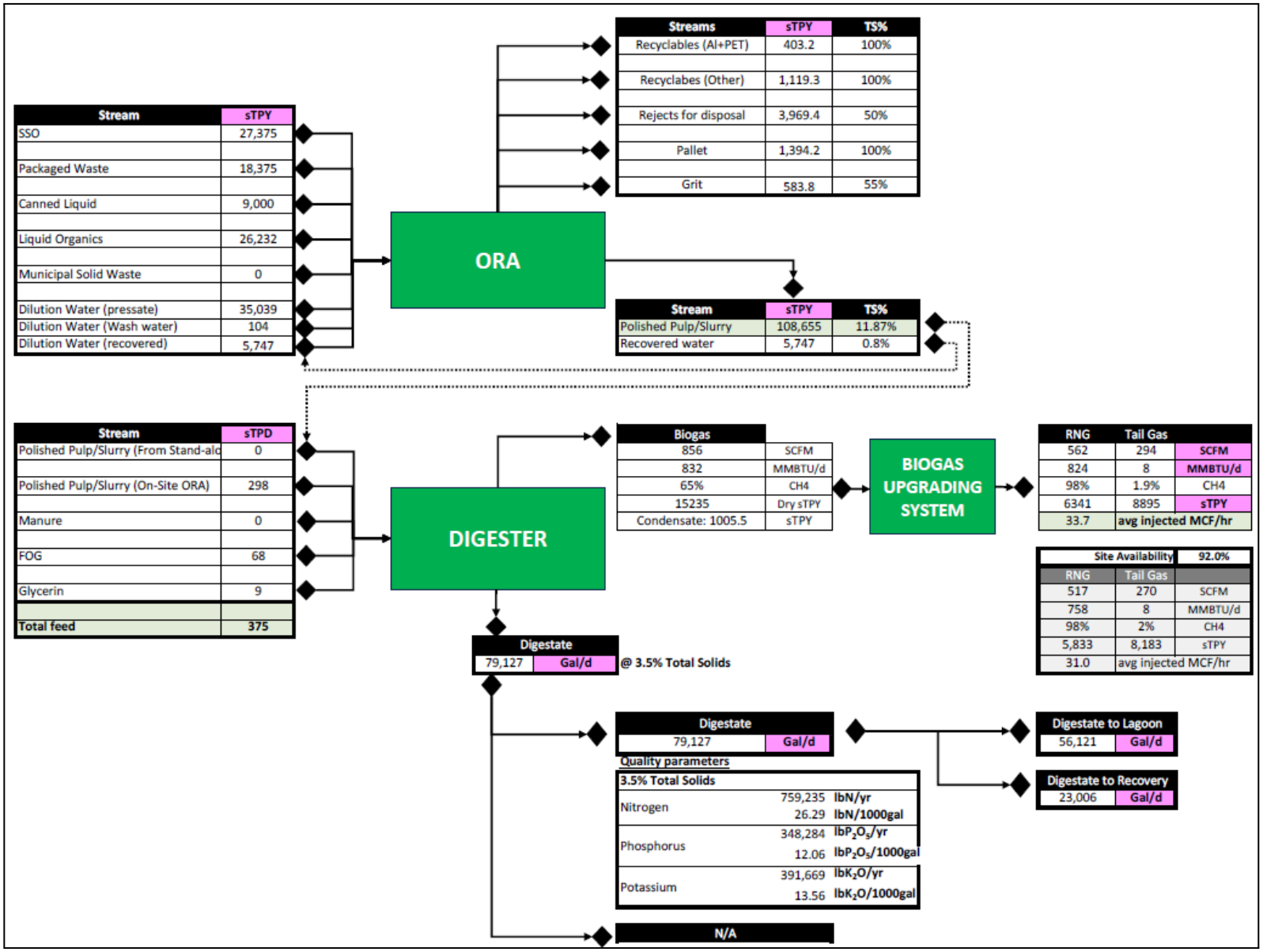
Figure 4, Site Map, is a scaled drawing of the entire property to be permitted showing the locations of the following:

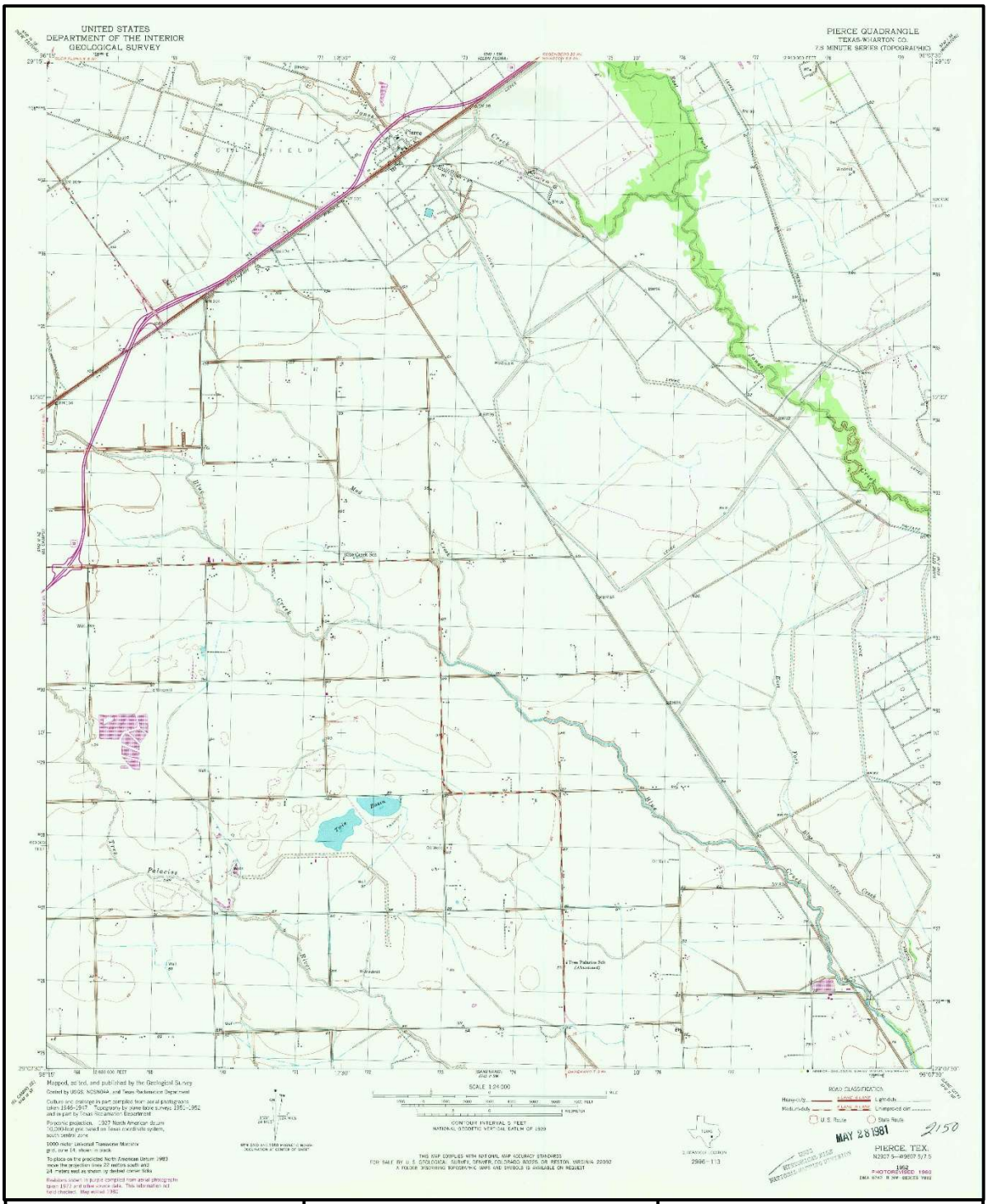
- Digesters
- Hydrolysis tanks
- Heat exchangers
- Transformers
- Containers
- Tank locations
- Loading and off-loading area

T.A.5 Production Area Map

Figure 5, Production Area Map, is a scaled drawing of the production area showing the locations of the digester tanks, organics receiving building, separator & nutrient management building, digestate storage pond, buffer tanks and RNG building

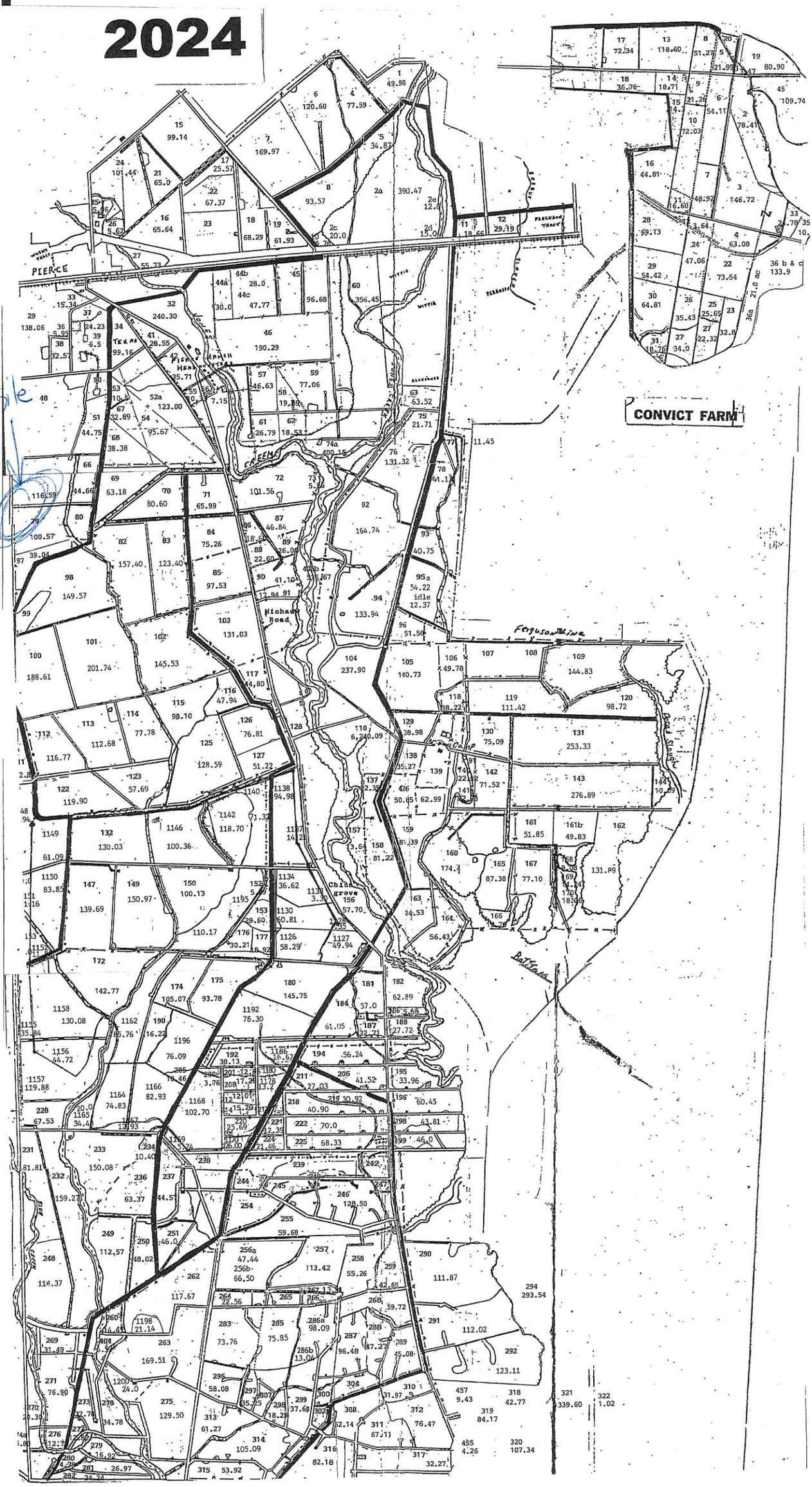
FigT.A.1PROCESS FLOW DIAGRAM

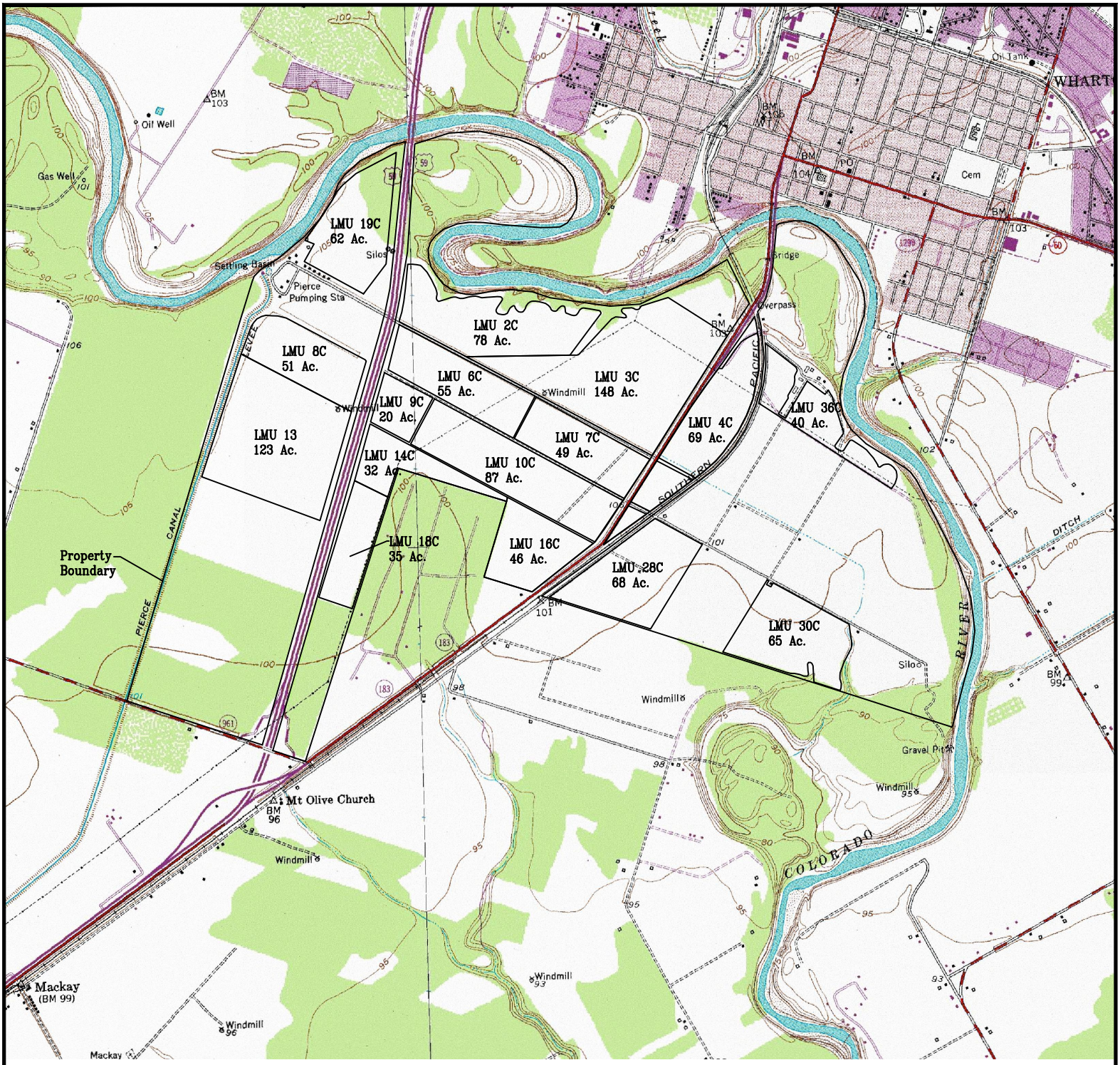




Pierce Ranch, GP Pierce, TX Wharton County	Vicinity Map Pg: 2	ENVIRONEER ENGINEERING CONSULTING

2024


PIERCE
CONVICT FARM
Richard Road
Ferguson Mine
China grove
Battleship



Map Generated 12/17/2024

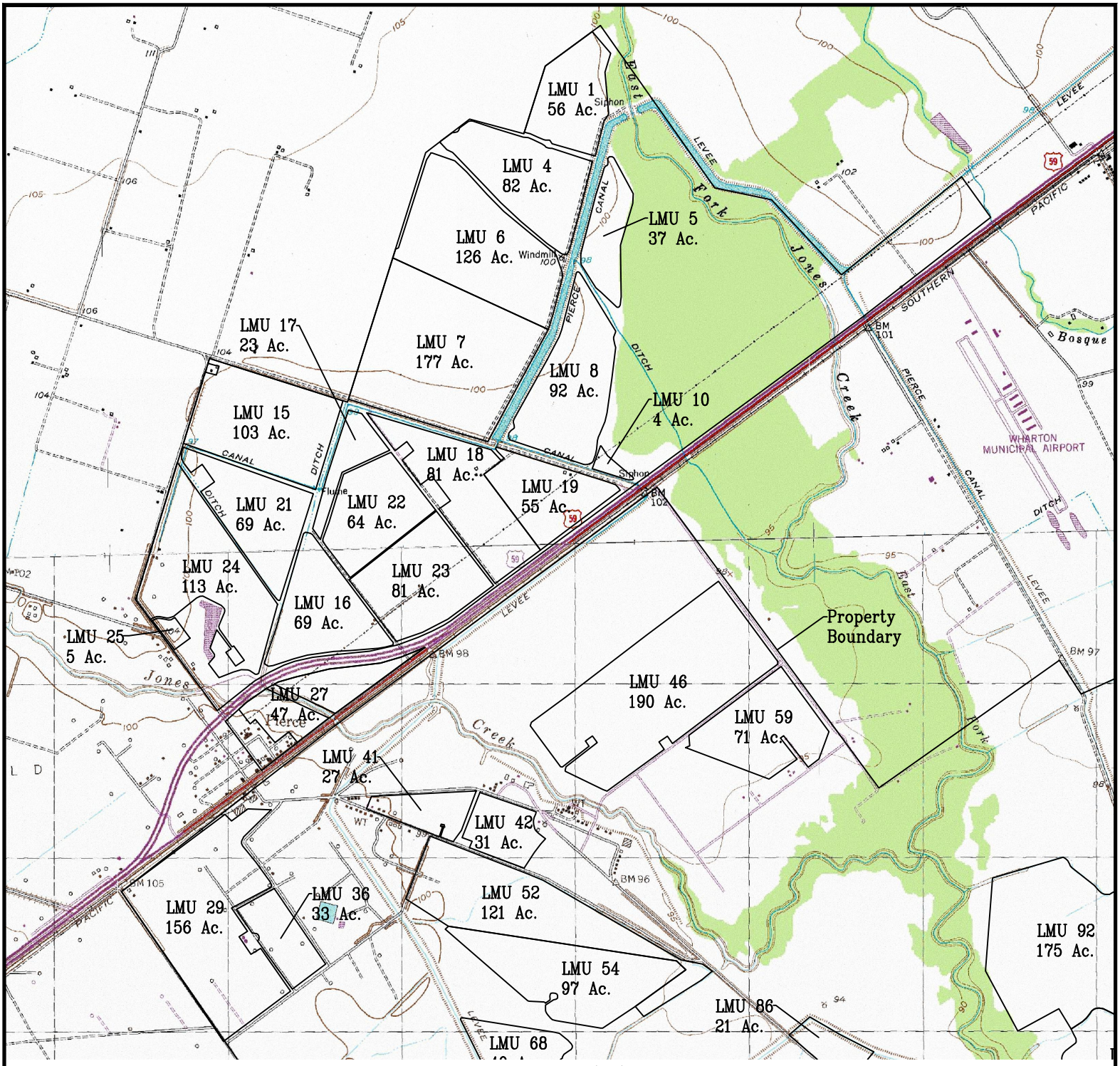
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map A Pg: 2	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

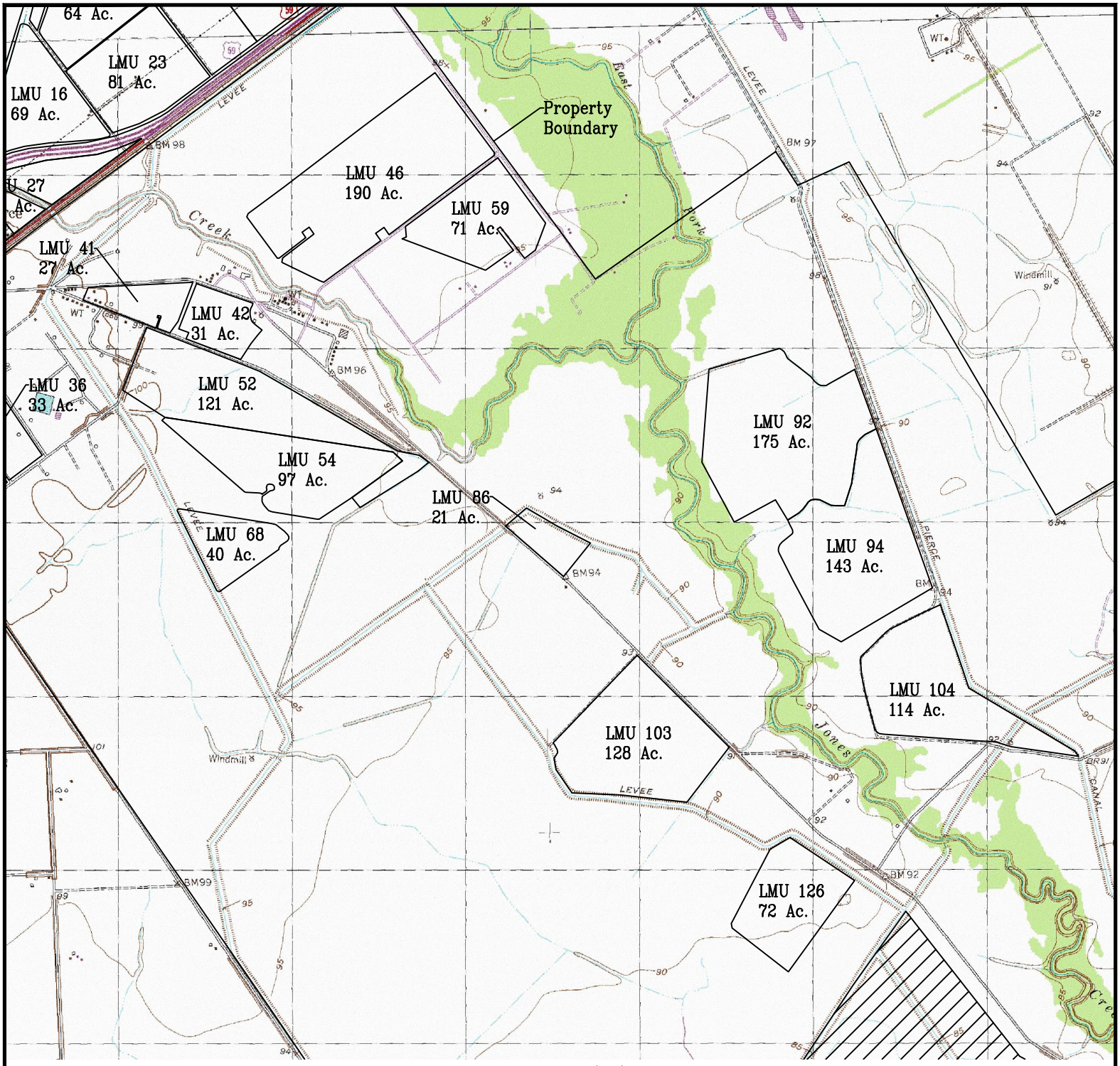
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map B Pg: 3	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

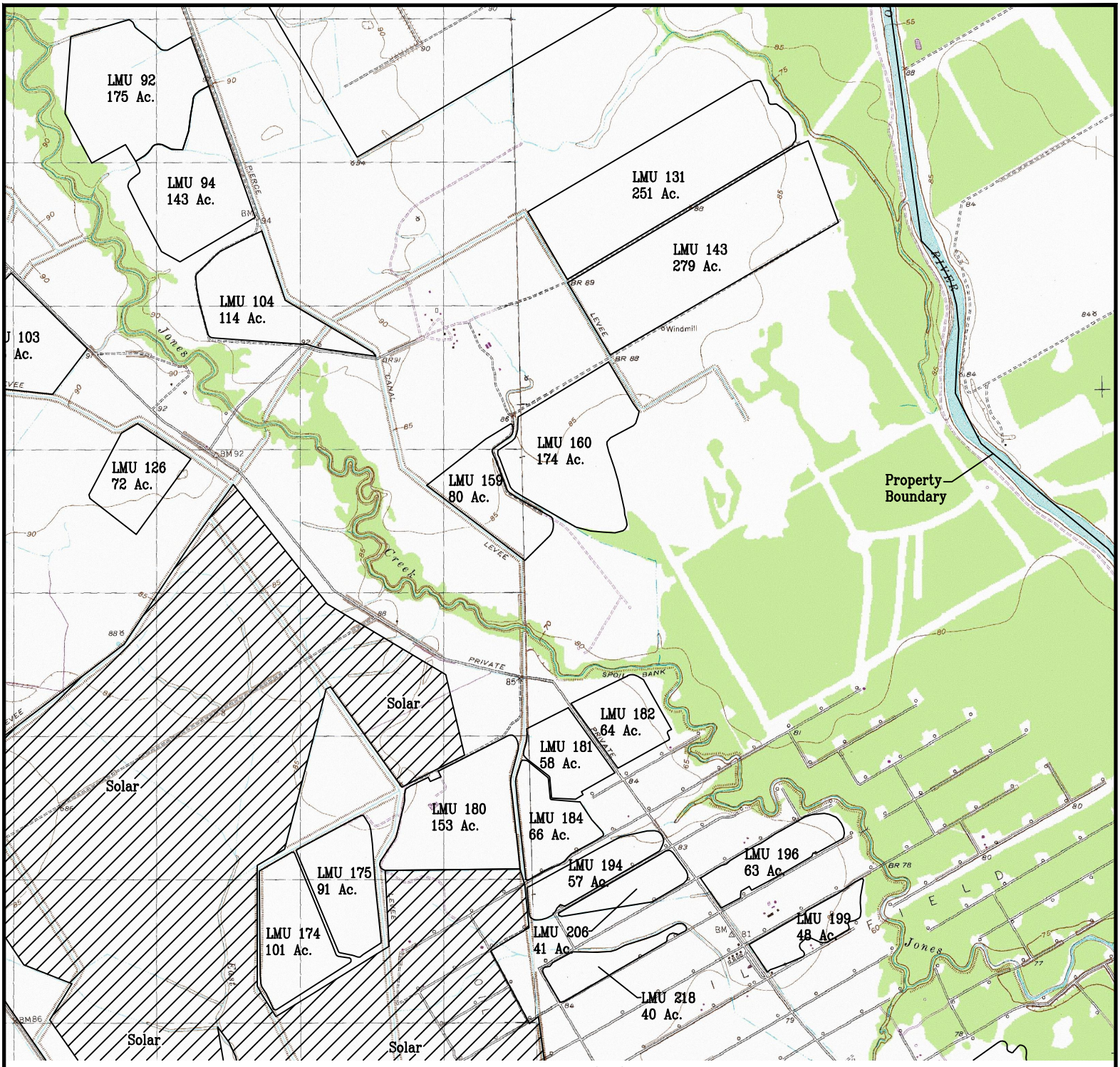
N
W E
S

1320' 0 1320' 2640'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map C Pg: 4	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

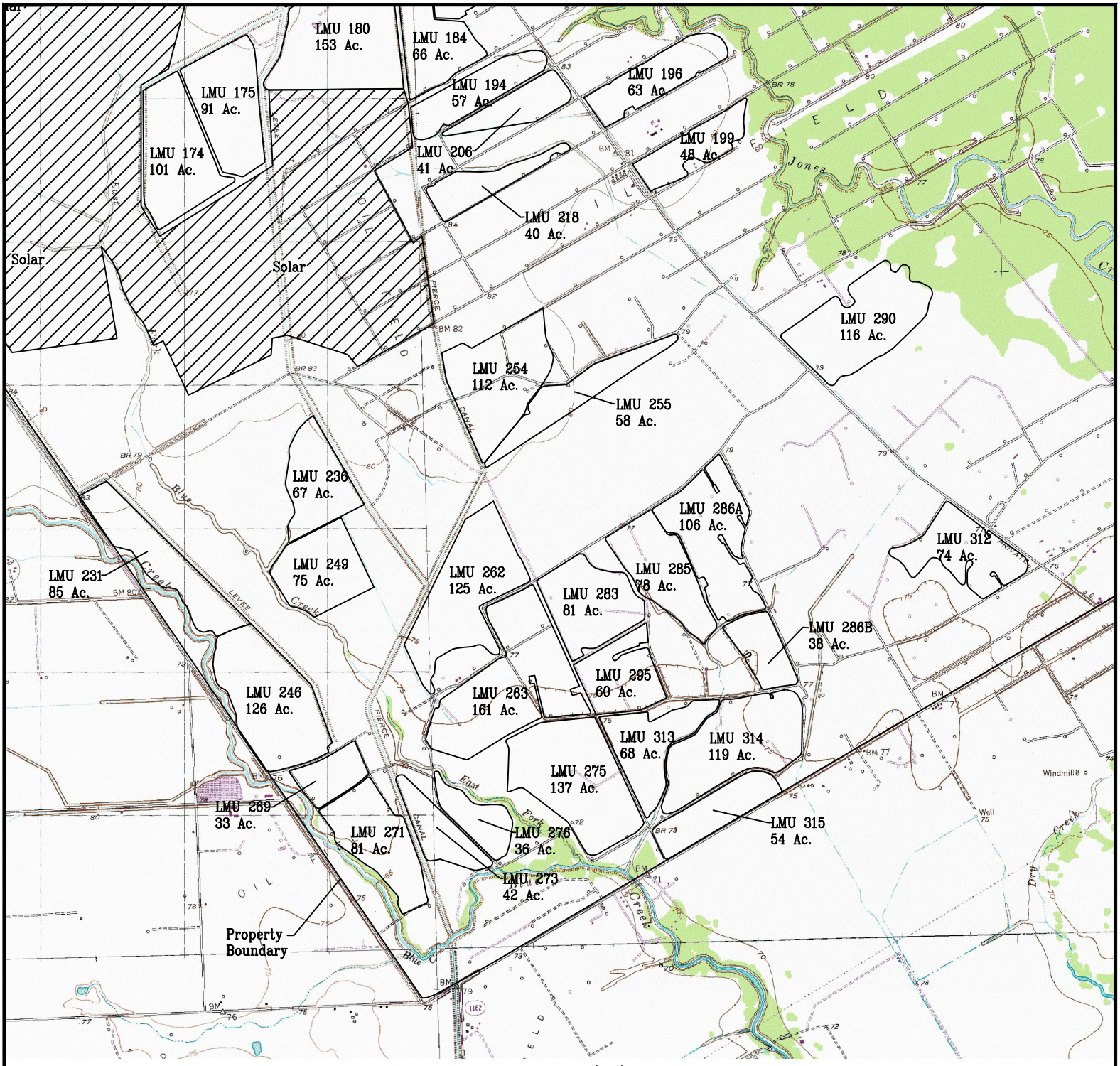
S

1600' 0 1600' 3200'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map D Pg: 5	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

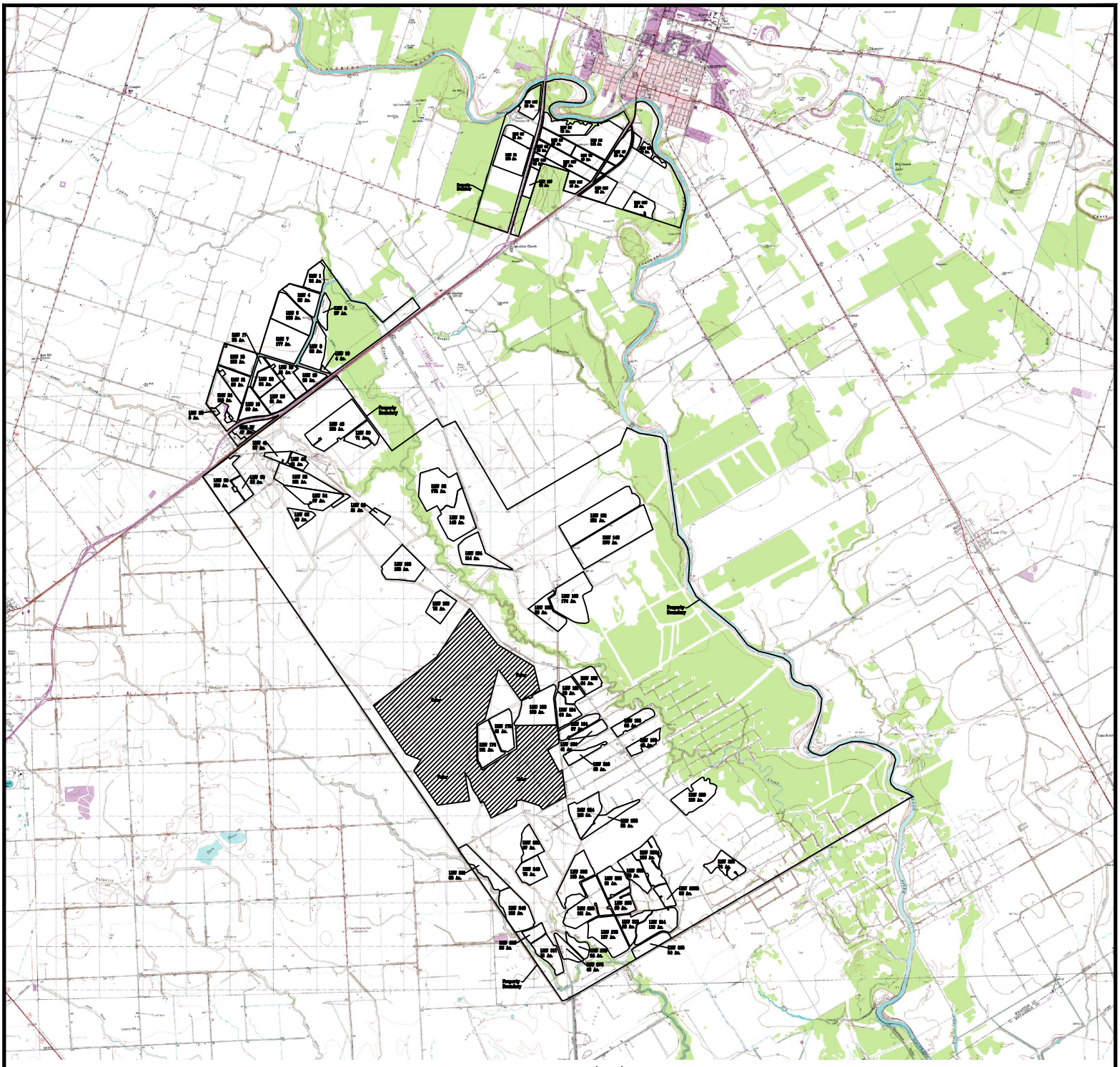
S

1600' 0 1600' 3200'

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Site Map E Pg: 6	ENVIRONEER ENGINEERING CONSULTING



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Production Area Map Pg: 7	ENVIRONEER ENGINEERING CONSULTING

T.B. FLOODPLAIN INFORMATION

FEMA Floodplain Map

Figure 6, FEMA Floodplain Map, shows the production areas and waste disposal areas overlain on a copy of the FEMA map panels for this area of Wharton County.

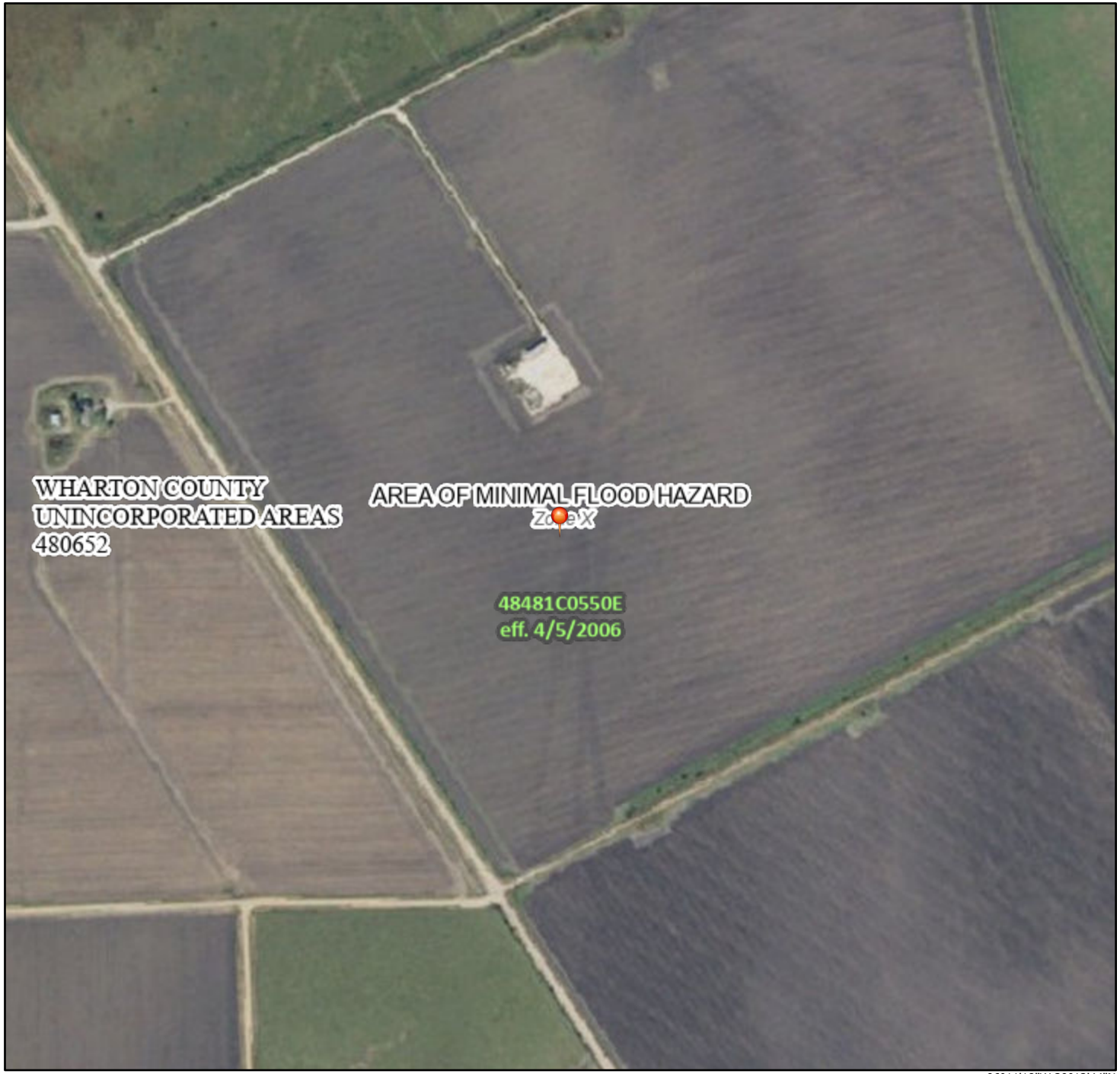
Protective Measures

According to the FEMA map for Wharton County, the production area and waste disposal areas are not located in a 100-year floodplain and are in an area of minimal flood hazard.

National Flood Hazard Layer FIRMette

FEMA

96°11'56"W 29°13'15"N



96°11'18"W 29°12'44"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Pg: 9 *Basemap Imagery Source: USGS National Map 2023*

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/16/2024 at 8:31 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

T.C. AGRONOMIC MANAGEMENT PLAN

TABLE OF CONTENTS

List of Figures

Figure 1: Land Application Map 3

List of Tables

Table 1: Estimated Soil Properties
Table 2: Nutrient Budgets

Attachment A - Permitted Crops for Growing 3

AGRONOMIC MANAGEMENT PLAN

Purpose

This document is in support of the Wharton AD1, LLC land application of wastes as prescribed by the Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). It is the purpose of this Agronomic Management Plan (AMP) to illustrate the beneficial use of the effluent from the proposed facility. All effluent application is managed in a manner that ensures environmental stability and maximum crop production.

This plan is updated on an annual basis to address current soil and waste analysis, climatic data, previous water demands, and proposed crop water usage for the next plan year. Application rate calculations will be developed and maintained on-site for use by the operator to determine application timing and rates.

Background

Wharton AD1, LLC is applying for a TLAP authorization through the TCEQ to beneficially irrigate effluent from the renewable energy facility located near Pierce, Wharton County, Texas. The treated effluent generated is 0.075 MGD. Effluent from the storage pond is land applied on 28,955 acres of irrigated farmland.

General Objectives of AMP

- Present information about the effluent, soils, and crops.
- Present information about crop rotations and yield goals to illustrate the appropriateness of the selected crops for use with this project.
- A description of effluent usage for land application. This will include information pertaining to actual application rates of effluent to meet the crop hydraulic/nutrient demands and maximize crop yield goals.
- An estimation of the annual loading of nutrients supplied by the effluent.
- An overview of wastewater/nutrient storage needed in the soil profile and a pre-plant scenario to serve as a starter fertilizer.
- Monitoring soil profiles to ensure no saturated soils are present within 3 feet of the surface.

Overview

The digestate is transferred to the storage lagoon at an average of 0.075 MGD. It is then distributed to high-production farmland that has been typically planted with corn grain and cotton. These crops are intensively managed for maximum production. The stated crop yield goals will be provided by data from the NRCS or from historical data obtained from the farmer.

Management practices are in place and used by the landowner to ensure maximized crop production. High residue crops are utilized, and deep tillage is necessary to maximize the ability of the soils to store and retain water, allowing for maximum root penetration.

All solids produced from this facility will be recycled/disposed of under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). Land application of solid wastes will occur at agronomic rates.

Site Features

The renewable energy facility, associated infrastructure, and irrigation tracts are located in Wharton County, Texas, immediately south of Pierce, Texas. This area is located in south Texas, roughly 65 miles southwest of Houston down the US Highway 59-South.

The regional climate is classified as subtropical humid, with warm summers and mild winters. The growing season averages 268 days. The average annual rainfall is 42 inches and generally occurs during the warm season months of May, June, July, and August.

The optimum yields can only be achieved through supplemental irrigation of the crops due to low rainfall and high evaporative rates. Most cropping systems will require preseason irrigation with growing season application depending upon stored water to produce the maximum yield goals. These are standard operational production practices in this area. To achieve optimum production, the permittee requests preseason irrigation up to 30 days before crop planting. This will allow the facility to manage application events to build up a moisture and nutrient profile in the soil prior to planting. This management tool would reduce the need to use groundwater for pre-water and the costs associated with pre-plant starter fertilizers.

Soils

According to information in the Wharton Soil Survey, soils of the property tract and the surrounding area consist of Dacosta sandy clay loam, Bernard-Edna complex, Edna loam, Lake Charles clay and Bernard loam series. The physical and hydrological properties of these soils are illustrated in Table l below. More soil information can be found in supporting documentation.

Table 1: Estimated Soil Properties

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Total for Area of Interest		**23,766.8**	**100.0%**

As depicted in Table l, the map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. When calculating the application rates of specific irrigation areas, care will be taken to ensure that these limitations are considered. Specifically, application rates per application event will be decreased with an increase in the total number of events to ensure that the nutrient and water demands of the crops are met.

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 Wharton County, Texas



February 14, 2025

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map (Pierce Ranch Boundary).....9
Legend.....10
Map Unit Legend (Pierce Ranch Boundary).....11
Map Unit Descriptions (Pierce Ranch Boundary).....11
Wharton County, Texas.....14
BcA—Dacosta sandy clay loam, 0 to 1 percent slopes.....14
BeA—Bernard-Edna complex, 0 to 1 percent slopes.....15
Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded.....18
Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes.....19
EdA—Edna loam, 0 to 1 percent slopes.....21
Eh—Edna silty clay, 0 to 1 percent slopes, overwash.....23
EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes.....24
LcA—Lake Charles clay, 0 to 1 percent slopes.....26
Md—Bernard loam, 0 to 1 percent slopes.....28
Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded.....29
MidB—Midfield loam, 0 to 2 percent slopes.....31
NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded.....33
Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes.....34
W—Water.....37
References.....38

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.

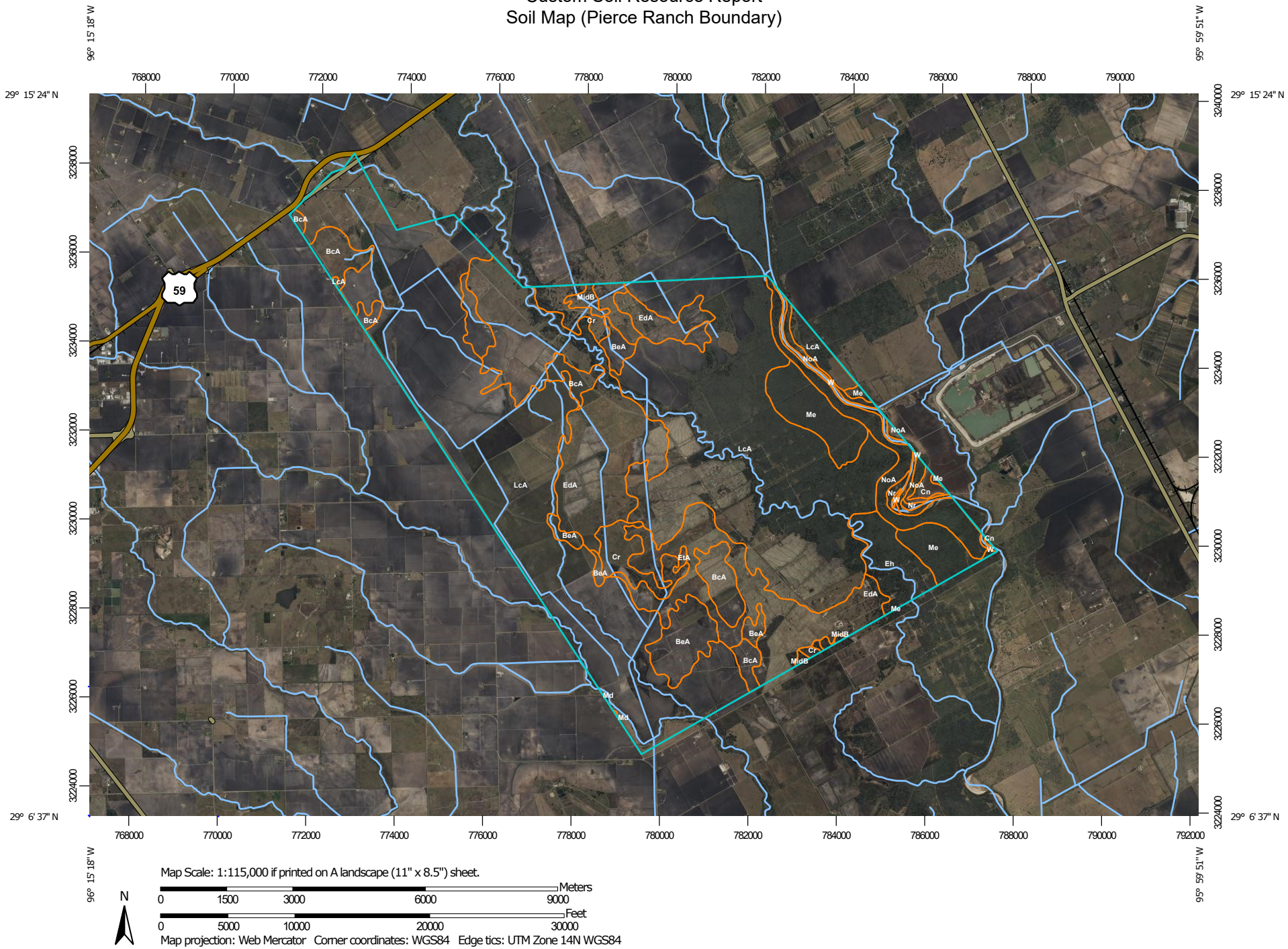
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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.

Custom Soil Resource Report
Soil Map (Pierce Ranch Boundary)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wharton County, Texas
Survey Area Data: Version 20, Aug 30, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 13, 2022—Mar 20, 2022

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.

Map Unit Legend (Pierce Ranch Boundary)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Dacosta sandy clay loam, 0 to 1 percent slopes	1,080.8	4.5%
BeA	Bernard-Edna complex, 0 to 1 percent slopes	739.2	3.1%
Cn	Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded	69.1	0.3%
Cr	Tidehaven fine sandy loam, 0 to 1 percent slopes	771.9	3.2%
EdA	Edna loam, 0 to 1 percent slopes	4,728.3	19.9%
Eh	Edna silty clay, 0 to 1 percent slopes, overwash	550.9	2.3%
EtA	Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	20.4	0.1%
LcA	Lake Charles clay, 0 to 1 percent slopes	13,627.1	57.3%
Md	Bernard loam, 0 to 1 percent slopes	1.2	0.0%
Me	Brazoria clay, 0 to 1 percent slopes, rarely flooded	965.2	4.1%
MidB	Midfield loam, 0 to 2 percent slopes	107.8	0.5%
NoA	Norwood loam, 0 to 1 percent slopes, rarely flooded	856.6	3.6%
Nr	Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes	59.1	0.2%
W	Water	188.0	0.8%
Totals for Area of Interest		**23,766.8**	**100.0%**

Map Unit Descriptions (Pierce Ranch Boundary)

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.

Wharton County, Texas

BcA—Dacosta sandy clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c1
Elevation: 10 to 220 feet
Mean annual precipitation: 30 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dacosta and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dacosta

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: sandy clay loam
Bt1 - 10 to 22 inches: sandy clay loam
Bt2 - 22 to 43 inches: clay
Btk - 43 to 74 inches: sandy clay
2BCt - 74 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Minor Components

Laewest

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY526TX - Southern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Telferner

Percent of map unit: 1 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

BeA—Bernard-Edna complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cg
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 60 percent
Edna and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 6 inches: clay loam
Bt - 6 to 31 inches: clay
Btk1 - 31 to 50 inches: clay
Btk2 - 50 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.9 to 2.4 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Microfeatures of landform position: Pimple mounds
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 4 to 10 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
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: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Verland

Percent of map unit: 10 percent
Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Lake charles

Percent of map unit: 5 percent
Landform: Flats
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Leton

Percent of map unit: 2 percent
Landform: Meandering channels
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Cn—Clemville silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2syc1
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Clemville

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 12 inches: silty clay loam
Bw - 12 to 30 inches: silt loam
Ab - 30 to 50 inches: silty clay
Bb - 50 to 80 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Norwood

Percent of map unit: 10 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Cr—Tidehaven fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2x3y9
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F

Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Tidehaven

Setting

Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 18 inches: fine sandy loam
Bt1 - 18 to 42 inches: clay
Bt2 - 42 to 61 inches: clay loam
2Btk - 61 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 3 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Midfield

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Edna

Percent of map unit: 1 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY542TX - Sandy Loam
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

EdA—Edna loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3cc
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: loam
Bt1 - 9 to 38 inches: clay
Bt2 - 38 to 50 inches: clay
Btk - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner

Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex

Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Eh—Edna silty clay, 0 to 1 percent slopes, overwash

Map Unit Setting

National map unit symbol: 2v3cf
Elevation: 10 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Edna, overwash, and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna, Overwash

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 11 inches: silty clay
A - 11 to 19 inches: fine sandy loam
Bt1 - 19 to 30 inches: clay loam
Bt2 - 30 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (1.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Minor Components

Bernard
Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Cieno
Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Telferner
Percent of map unit: 3 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

EtA—Edna-Cieno frequently ponded complex, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2vv5p
Elevation: 80 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 69 to 71 degrees F
Frost-free period: 280 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Edna and similar soils: 70 percent
Cieno and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edna

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 10 inches: loam
Bt1 - 10 to 20 inches: clay
Bt2 - 20 to 60 inches: clay
Btk - 60 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 2 to 7 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Description of Cieno

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Early pleistocene loamy fluviomarine deposits derived from sedimentary rock

Typical profile

A - 0 to 7 inches: loam
E/B - 7 to 27 inches: sandy clay loam
Btg1 - 27 to 48 inches: clay loam
Btg2 - 48 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 6.0
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Minor Components

Bernard

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Telferner

Percent of map unit: 5 percent
Landform: Meander scars
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

LcA—Lake Charles clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v3c4
Elevation: 20 to 100 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 270 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lake charles and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lake Charles

Setting

Landform: Backswamps
Landform position (three-dimensional): Talf
Microfeatures of landform position: Gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 11 inches: clay
Bss - 11 to 53 inches: clay
Bkss1 - 53 to 69 inches: clay
Bkss2 - 69 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.5 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Bernard

Percent of map unit: 6 percent
Landform: Meander scars
Landform position (three-dimensional): Talf, rise
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Edna

Percent of map unit: 3 percent
Landform: Meander scars
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY528TX - Claypan Prairie
Hydric soil rating: No

Cieno, hydric

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Md—Bernard loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: djdp
Elevation: 10 to 150 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 68 to 70 degrees F
Frost-free period: 260 to 300 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bernard and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 52 inches: clay
H3 - 52 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY740TX - Northern Blackland
Hydric soil rating: No

Minor Components

Cieno

Percent of map unit: 5 percent
Landform: Depressions
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Me—Brazoria clay, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2v39c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Brazoria and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brazoria

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 6 inches: clay
Bss1 - 6 to 35 inches: clay
Bss2 - 35 to 57 inches: clay
Bkss - 57 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 11 percent
Maximum salinity: Nonsaline to slightly saline (0.9 to 6.8 mmhos/cm)
Sodium adsorption ratio, maximum: 16.0
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Minor Components

Pledger

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 3 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Norwood

Percent of map unit: 1 percent
Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

MidB—Midfield loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x3y8
Elevation: 10 to 150 feet
Mean annual precipitation: 43 to 49 inches
Mean annual air temperature: 67 to 69 degrees F
Frost-free period: 270 to 285 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Midfield

Setting

Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 5 inches: loam
Bt1 - 5 to 32 inches: clay loam
Bt2 - 32 to 40 inches: silty clay
2Btk - 40 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Minor Components

Tidehaven

Percent of map unit: 10 percent
Landform: Ridges
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Texana

Percent of map unit: 3 percent
Landform: Ridges
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY535TX - Southern Loamy Prairie
Hydric soil rating: No

Cieno

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY537TX - Lowland
Hydric soil rating: Yes

Fordtran

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R150AY543TX - Sandy Prairie
Hydric soil rating: No

NoA—Norwood loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2vv3c
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Norwood and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam
Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
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: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Brazoria

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Asa

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

Nr—Mohat rarely flooded-Norwood frequently flooded complex, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2vv3g
Elevation: 0 to 170 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 67 to 71 degrees F
Frost-free period: 271 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Mohat and similar soils: 50 percent
Norwood and similar soils: 40 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mohat

Setting

Landform: Bars
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 8 inches: loam
Bw1 - 8 to 29 inches: very fine sandy loam
Bw2 - 29 to 48 inches: loam
Bw3 - 48 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: 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: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Description of Norwood

Setting

Landform: Natural levees
Landform position (three-dimensional): Rise, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock over clayey alluvium derived from igneous, metamorphic and sedimentary rock over loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 10 inches: loam
Bw1 - 10 to 28 inches: silt loam
Bw2 - 28 to 44 inches: silt loam
BC - 44 to 49 inches: silty clay loam

Ab - 49 to 53 inches: clay
Bwb - 53 to 80 inches: very fine sandy loam

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Minor Components

Asa

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY534TX - Loamy Bottomland
Hydric soil rating: No

Brazoria

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: No

Churnabog

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R150AY527TX - Clayey Bottomland
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 100 percent

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

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

SOIL ANALYSIS REPORT

CLIENT:	
6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23283	285	0 - 6	7.5		0.11	Lo	1.4	2.7	5	10	141	5	9	3393	558	85	1.4	113	52	2.0	
23284	286A	0 - 6	7.8		0.13	Lo	1.6	2.7	5	9	182	6	11	4782	761	79	1.3	95	83	2.0	
23285	286B	0 - 6	8.0		0.14	Lo	0.9	2.3	4	5	159	6	11	3872	479	44	1.4	80	68	2.1	
23286	290	0 - 6	7.6		0.16	No	1.5	3.6	6	3	228	7	13	4975	1090	103	0.6	110	55	2.1	
23287	295	0 - 6	7.6		0.19	Lo	1.3	7.3	13	4	188	4	7	5522	668	38	0.6	71	50	1.5	
23288	312	0 - 6	7.4		0.11	No	0.9	3.2	6	16	123	9	16	2532	367	35	1.8	164	36	1.8	
23289	313	0 - 6	7.4		0.15	Lo	1.6	6.6	12	11	174	5	9	4614	664	60	1.2	90	59	1.8	
23290	314	0 - 6	6.6		0.14	No	1.5	7.1	13	5	140	4	7	3526	648	74	1.3	98	70	1.6	
23291	315	0 - 6	6.3		0.15	No	1.5	6.3	11	5	144	5	9	3660	726	33	0.9	110	81	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23283	285	0 - 6	11/20/24																		
23284	286A	0 - 6	11/20/24																		
23285	286B	0 - 6	11/20/24																		
23286	290	0 - 6	11/20/24																		
23287	295	0 - 6	11/20/24																		
23288	312	0 - 6	11/20/24																		
23289	313	0 - 6	11/20/24																		
23290	314	0 - 6	11/20/24																		
23291	315	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23283 - 23291
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23283	285																
23284	286A																
23285	286B																
23286	290																
23287	295																
23288	312																
23289	313																
23290	314																
23291	315																

Cation Exchange Capacity

Lab Number	CEC	%H	%K	%Ca	%Mg	%Na
23283	22	0	2	76	21	2
23284	31	0	2	77	20	1
23285	24	0	2	81	17	1
23286	35	0	2	71	26	1
23287	31	0	2	80	18	1
23288	16	0	2	78	19	1
23289	29	0	2	79	19	1
23290	24	0	2	74	23	1
23291	25	0	1	74	24	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23283, 23284, 23285, 23286, 23287, 23288, 23289, 23290, 23291
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23283					
23284					
23285					
23286					
23287					
23288					
23289					
23290					
23291					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/19/24
Date Shipped: 11/22/24

Project Manager: Norman Mullin

484

Lab Use	Sample ID/Description	Depth	Crop	YG	Test Requested
23228	1 2 Convict	0 to 6			TCEQ Complete
23229	2 3 Convict	0 to 6			
23230	3 4 Convict	0 to 6			
23231	4 6 Convict	0 to 6			
23232	5 7 Convict	0 to 6			
23233	6 8 Convict	0 to 6			
23234	7 9 Convict	0 to 6			
23235	8 10 Convict	0 to 6			
23236	9 14 Convict	0 to 6			
23237	10 16 Convict	0 to 6			
23238	11 18 Convict	0 to 6			
23239	12 19 Convict	0 to 6			
23240	13 30 Convict	0 to 6			
23241	14 36 Convict	0 to 6			
	15	0 to 6			
	16	0 to 6			
	17	0 to 6			
	18	0 to 6			
	19	0 to 6			
	20	0 to 6			
	21	0 to 6			
	22	0 to 6			
	23	0 to 6			
	24	0 to 6			
	25	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/22 9am	Date/Time:
Received By:	Received By: Kaitlyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23203	1	0 - 6	6.7		0.14	No	1.6	2.1	4	35	218	5	9	4153	669	52	0.8	132	66	2.0	
23204	4	0 - 6	6.1		0.13	No	1.7	3.4	6	27	204	5	9	3693	560	42	0.6	171	74	2.1	
23205	5	0 - 6	7.7		0.18	No	1.6	3.1	6	7	236	9	16	4638	868	97	0.6	117	72	2.3	
23206	6	0 - 6	6.3		0.16	No	1.7	9.8	18	19	199	6	11	4083	652	43	0.5	108	64	1.9	
23207	7	0 - 6	6.9		0.15	No	1.8	3.5	6	20	274	8	14	5272	864	65	0.6	110	64	2.0	
23208	8	0 - 6	7.4		0.22	Lo	1.9	7.1	13	16	290	13	23	5936	1094	117	0.8	128	83	2.1	
23209	10	0 - 6	6.4		0.18	No	2.8	1.5	3	4	305	8	14	4633	775	52	0.9	127	34	2.2	
23210	13	0 - 6	8.2		0.28	Hi	1.7	5.8	10	11	320	7	13	7967	437	39	0.8	78	73	2.4	
23211	15	0 - 6	6.7		0.22	No	1.7	6.5	12	10	257	8	14	5013	980	89	0.8	126	62	2.2	
23212	16	0 - 6	6.6		0.27	No	2.1	11.6	21	6	280	7	13	4652	1210	94	1.0	130	70	2.1	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23203	1	0 - 6	11/20/24																		
23204	4	0 - 6	11/20/24																		
23205	5	0 - 6	11/20/24																		
23206	6	0 - 6	11/20/24																		
23207	7	0 - 6	11/20/24																		
23208	8	0 - 6	11/20/24																		
23209	10	0 - 6	11/20/24																		
23210	13	0 - 6	11/20/24																		
23211	15	0 - 6	11/20/24																		
23212	16	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23203	1																
23204	4																
23205	5																
23206	6																
23207	7																
23208	8																
23209	10																
23210	13																
23211	15																
23212	16																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
27	0	2	77	21	1
24	0	2	77	20	1
31	0	2	74	23	1
27	0	2	77	20	1
33	0	2	79	22	1
35	0	2	71	26	1
31	0	3	76	21	1
30	0	3	84	12	1
34	0	2	73	24	1
34	0	2	67	29	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23203, 23204, 23205, 23206, 23207, 23208, 23209, 23210, 23211, 23212
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23210
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23203 - 23212
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23203					
23204					
23205					
23206					
23207					
23208					
23209					
23210					
23211					
23212					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23233	8 CONVICT	0 - 6	8.3		0.25	Hi	1.7	10.2	18	22	376	9	16	7383	414	32	1.4	68	80	2.5	
23234	9 CONVICT	0 - 6	8.3		0.18	Hi	1.6	5.1	9	20	240	6	11	6721	263	30	0.7	67	90	2.1	
23235	10 CONVICT	0 - 6	7.4		0.15	Lo	1.5	2.7	5	29	182	3	5	4592	371	21	0.5	94	53	1.9	
23236	14 CONVICT	0 - 6	8.4		0.18	Hi	1.8	3.7	7	23	313	10	18	7342	363	28	1.6	77	76	3.0	
23237	16 CONVICT	0 - 6	7.4		0.13	Lo	1.5	1.8	3	28	235	4	7	5551	480	28	0.5	100	45	2.1	
23238	18 CONVICT	0 - 6	8.4		0.24	Hi	1.2	2.9	5	10	194	6	11	6525	279	23	0.5	70	70	2.3	
23239	19 CONVICT	0 - 6	8.2		0.30	Hi	3.3	2.5	5	14	463	10	18	6856	322	27	2.2	70	24	2.8	
23240	30 CONVICT	0 - 6	8.2		0.27	Hi	2.4	3.4	6	6	261	6	11	7543	328	24	0.9	72	58	2.3	
23241	36 CONVICT	0 - 6	8.2		0.32	Hi	1.9	5.9	11	14	336	11	20	7762	385	24	0.9	65	64	2.3	
23242	52	0 - 6	7.1		0.17	No	3.4	2.1	4	3	209	6	11	3485	434	40	1.6	42	11	0.7	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23233	8 CONVICT	0 - 6	11/19/24																		
23234	9 CONVICT	0 - 6	11/19/24																		
23235	10 CONVICT	0 - 6	11/19/24																		
23236	14 CONVICT	0 - 6	11/19/24																		
23237	16 CONVICT	0 - 6	11/19/24																		
23238	18 CONVICT	0 - 6	11/19/24																		
23239	19 CONVICT	0 - 6	11/19/24																		
23240	30 CONVICT	0 - 6	11/19/24																		
23241	36 CONVICT	0 - 6	11/19/24																		
23242	52	0 - 6	11/20/24																		

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: Amy Meier
Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23233	8 CONVICT																	30	0	3	85	12	0
23234	9 CONVICT																	28	0	2	89	8	0
23235	10 CONVICT																	27	0	2	86	12	0
23236	14 CONVICT																	29	0	3	86	10	0
23237	16 CONVICT																	30	0	2	84	13	0
23238	18 CONVICT																	28	0	2	90	8	0
23239	19 CONVICT																	29	0	4	86	9	0
23240	30 CONVICT																	29	0	2	88	10	0
23241	36 CONVICT																	29	0	3	86	11	0
23242	52																	22	0	2	80	17	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23233, 23234, 23235, 23236, 23237, 23238, 23239, 23240, 23241, 23242
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23233, 23234, 23236, 23238, 23239, 23240, 23241
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23233 - 23242
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23233					
23234					
23235					
23236					
23237					
23238					
23239					
23240					
23241					
23242					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23213	17	0 - 6	7.2		0.20	No	1.7	4.9	9	43	292	8	14	5779	720	42	0.9	144	65	2.3	
23214	18	0 - 6	6.7		0.21	No	1.7	6.7	12	8	298	9	16	4801	1260	106	0.6	119	73	2.1	
23215	19	0 - 6	6.6		0.22	No	1.7	6.8	12	10	262	8	14	5017	1172	104	0.9	121	69	2.6	
23216	21	0 - 6	6.8		0.21	No	1.9	7.1	13	10	277	6	11	4795	1013	68	0.6	127	69	1.9	
23217	22	0 - 6	8.1		0.31	Hi	1.9	7.0	13	23	388	8	14	8045	371	28	0.9	82	83	2.9	
23218	23	0 - 6	6.4		0.26	No	3.1	4.7	8	5	258	8	14	4526	1123	121	0.6	176	77	1.9	
23219	24	0 - 6	7.4		0.25	Lo	2.1	4.5	8	14	320	11	20	6609	1046	66	0.7	94	62	1.5	
23220	25	0 - 6	7.0		0.22	No	1.7	6.2	11	13	306	8	14	4721	1036	174	0.6	111	65	1.9	
23221	27	0 - 6	8.1		0.25	Hi	2.6	4.8	9	8	323	6	11	7785	323	33	0.9	85	62	2.7	
23222	28	0 - 6	8.0		0.20	Lo	1.7	2.6	5	22	207	9	16	6182	422	31	0.5	91	40	2.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23213	17	0 - 6	11/20/24																		
23214	18	0 - 6	11/20/24																		
23215	19	0 - 6	11/20/24																		
23216	21	0 - 6	11/20/24																		
23217	22	0 - 6	11/20/24																		
23218	23	0 - 6	11/20/24																		
23219	24	0 - 6	11/20/24																		
23220	25	0 - 6	11/20/24																		
23221	27	0 - 6	11/20/24																		
23222	28	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
23213	17																
23214	18																
23215	19																
23216	21																
23217	22																
23218	23																
23219	24																
23220	25																
23221	27																
23222	28																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
32	0	2	90	19	1
36	0	2	67	29	1
36	0	2	70	27	1
33	0	2	72	25	1
29	0	3	86	11	0
33	0	2	68	28	2
35	0	2	72	25	1
34	0	2	70	26	2
29	0	3	87	9	1
29	0	2	86	12	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23213, 23214, 23215, 23216, 23217, 23218, 23219, 23220, 23221, 23222
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23217, 23221
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23213 - 23222
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23213					
23214					
23215					
23216					
23217					
23218					
23219					
23220					
23221					
23222					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20 - 11/21/24
Date Shipped: 11/22/24

284

Lab Use		Sample ID/Description	Depth	Crop	YG	Test Requested
23242	1	52	0 to 6			
23243	2	54	0 to 6			
23244	3	59	0 to 6			
23245	4	68	0 to 6			
23246	5	86	0 to 6			
23247	6	92	0 to 6			
23248	7	94	0 to 6			
23249	8	103	0 to 6			
23250	9	104	0 to 6			
23251	10	126	0 to 6			
23252	11	131	0 to 6			
23253	12	143	0 to 6			
23254	13	159	0 to 6			
23255	14	160	0 to 6			
23256	15	174	0 to 6			
23257	16	175	0 to 6			
23258	17	180	0 to 6			
23259	18	181	0 to 6			
23260	19	182	0 to 6			
23261	20	184	0 to 6			
23262	21	194	0 to 6			
23263	22	196	0 to 6			
23264	23	199	0 to 6			
23265	24	206	0 to 6			
23266	25	218	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/25 9am	Date/Time:
Received By:	Received By: Katelyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23243	54	0 - 6	7.0		0.22	No	2.9	3.7	7	7	238	10	18	3648	609	71	1.1	124	33	2.3	
23244	59	0 - 6	7.3		0.20	No	2.5	<1.0	<2	4	207	6	11	3632	726	74	0.7	124	42	1.9	
23245	68	0 - 6	6.0		0.14	No	3.6	6.9	12	9	305	9	16	2993	580	49	2.2	178	42	2.1	
23246	86	0 - 6	6.4		0.17	No	1.9	22.1	40	22	178	8	14	3400	532	53	1.5	144	79	2.4	
23247	92	0 - 6	6.4		0.15	No	1.7	11.6	21	18	199	9	16	2908	637	63	1.9	184	70	2.2	
23248	94	0 - 6	6.6		0.08	No	1.0	4.0	7	12	117	6	11	1756	422	46	1.9	216	32	1.3	
23249	103	0 - 6	5.9		0.07	No	1.7	1.1	<2	5	63	6	11	1008	235	49	0.8	264	40	1.0	
23250	104	0 - 6	5.6		0.07	No	1.2	2.3	4	6	82	5	9	624	161	36	0.9	288	27	0.8	
23251	126	0 - 6	6.8		0.09	No	1.3	2.6	5	6	100	5	9	1832	359	47	1.0	152	62	1.4	
23252	131	0 - 6	7.4		0.14	No	1.7	2.3	4	12	221	6	11	4500	953	92	1.0	111	69	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23243	54	0 - 6	11/20/24																		
23244	59	0 - 6	11/20/24																		
23245	68	0 - 6	11/20/24																		
23246	86	0 - 6	11/20/24																		
23247	92	0 - 6	11/20/24																		
23248	94	0 - 6	11/20/24																		
23249	103	0 - 6	11/20/24																		
23250	104	0 - 6	11/20/24																		
23251	126	0 - 6	11/20/24																		
23252	131	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23243 - 23252
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23243	54																	24	0	3	75	21	1
23244	59																	25	0	2	72	24	1
23245	68																	21	0	4	72	23	1
23246	86																	22	0	2	77	20	1
23247	92																	21	0	2	70	26	1
23248	94																	13	0	2	69	27	2
23249	103																	7	0	2	68	27	3
23250	104																	5	0	4	65	28	3
23251	126																	13	0	2	73	24	2
23252	131																	31	0	2	72	25	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23243, 23244, 23245, 23246, 23247, 23248, 23249, 23250, 23251, 23252
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23243					
23244					
23245					
23246					
23247					
23248					
23249					
23250					
23251					
23252					

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: Amy Meier, Data Review Coordinator

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 SAMPLE CHAIN OF CUSTODY RECORD

Enviro-Ag Engineering, Inc.
3404 Airway Blvd, Amarillo, TX 79118
Tel. 806-353-6123 Fax 806-353-4132

Project Manager: Norman

Producer/Facility: VR Pierce Ranch
Facilty ID #:
County: Wharton
Date Sampled: 11/20-11/21/24
Date Shipped: 11/22/24

384

Lab Use		Sample ID/Description	Depth	Crop	YG	Test Requested
23267	1	231	0 to 6			
23268	2	236	0 to 6			
23269	3	246	0 to 6			
23270	4	248	0 to 6			
23271	5	249	0 to 6			
23272	6	254	0 to 6			
23273	7	255	0 to 6			
23274	8	262	0 to 6			
23275	9	263	0 to 6			
23276	10	269	0 to 6			
23277	11	271	0 to 6			
23278	12	273	0 to 6			
23279	13	275	0 to 6			
23280	14	276	0 to 6			
23281	15	278	0 to 6			
23282	16	283	0 to 6			
23283	17	285	0 to 6			
23284	18	286a	0 to 6			
23285	19	286b	0 to 6			
23286	20	290	0 to 6			
23287	21	295	0 to 6			
23288	22	312	0 to 6			
23289	23	313	0 to 6			
23290	24	314	0 to 6			
23291	25	315	0 to 6			

Relinquished By:	Relinquished By:	Relinquished By:
Company:	Company:	Company:
Date/Time:	Date/Time: 11/25 8am	Date/Time:
Received By:	Received By: Katelyn	Received By:
Company:	Company:	Company:

Comments:

SOIL ANALYSIS REPORT

CLIENT: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23223	29	0 - 6	8.1		0.21	Hi	1.8	4.5	8	21	248	6	11	7040	303	24	0.6	79	60	2.1	
23224	36	0 - 6	6.9		0.21	No	4.1	1.6	3	8	334	9	16	4684	793	88	1.5	111	60	1.8	
23225	41	0 - 6	6.8		0.18	No	4.2	3.2	6	5	322	9	16	4688	820	100	1.7	138	39	2.2	
23226	42	0 - 6	7.0		0.16	No	2.5	7.5	14	18	164	7	13	3909	593	62	1.2	129	41	1.6	
23227	46	0 - 6	6.6		0.10	No	2.7	1.1	<2	4	203	9	16	3227	911	88	0.6	122	26	1.4	
23228	2 CONVICT	0 - 6	8.1		0.33	Hi	2.0	10.3	19	13	358	7	13	8209	417	31	0.8	77	70	3.1	
23229	3 CONVICT	0 - 6	8.1		0.28	Hi	1.8	5.6	10	11	285	6	11	7826	491	34	0.6	72	53	2.3	
23230	4 CONVICT	0 - 6	7.3		0.14	Lo	2.7	<1.0	<2	5	180	4	7	5867	373	32	0.6	103	31	2.7	
23231	6 CONVICT	0 - 6	8.2		0.21	Hi	1.8	4.6	8	22	324	7	13	7513	478	38	0.8	91	84	2.7	
23232	7 CONVICT	0 - 6	7.7		0.18	Lo	1.7	5.8	10	28	260	6	11	5874	511	31	0.8	112	76	3.0	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23223	29	0 - 6	11/20/24																		
23224	36	0 - 6	11/20/24																		
23225	41	0 - 6	11/20/24																		
23226	42	0 - 6	11/20/24																		
23227	46	0 - 6	11/20/24																		
23228	2 CONVICT	0 - 6	11/19/24																		
23229	3 CONVICT	0 - 6	11/19/24																		
23230	4 CONVICT	0 - 6	11/19/24																		
23231	6 CONVICT	0 - 6	11/19/24																		
23232	7 CONVICT	0 - 6	11/19/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity CEC	%H	%K	%Ca	%Mg	%Na
23223	29																	28	0	2	88	9	0
23224	36																	31	0	3	75	21	1
23225	41																	32	0	3	74	22	1
23226	42																	25	0	2	78	20	1
23227	46																	25	0	2	66	31	2
23228	2 CONVICT																	30	0	3	85	12	0
23229	3 CONVICT																	30	0	2	83	14	0
23230	4 CONVICT																	29	0	2	87	11	0
23231	6 CONVICT																	30	0	3	83	13	1
23232	7 CONVICT																	30	0	2	83	14	0

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23223, 23224, 23225, 23226, 23227, 23228, 23229, 23230, 23231, 23232
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 23223, 23228, 23229, 23231
The CEC value calculated by cation summation has been adjusted to compensate for the presence of excess lime (reactive carbonates).

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23223 - 23232
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23223					
23224					
23225					
23226					
23227					
23228					
23229					
23230					
23231					
23232					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23253	143	0 - 6	6.6		0.17	No	2.0	3.8	7	12	249	8	14	4276	917	70	1.9	123	94	2.1	
23254	159	0 - 6	6.7		0.14	No	1.7	2.5	5	17	207	8	14	3566	830	82	1.4	158	89	2.4	
23255	160	0 - 6	7.3		0.17	No	1.6	3.7	7	8	191	9	16	3152	654	126	1.0	115	91	2.2	
23256	174	0 - 6	6.9		0.16	No	1.0	10.3	19	23	156	10	18	1759	394	53	0.7	288	22	1.7	
23257	175	0 - 6	7.2		0.11	No	0.8	2.3	4	18	109	9	16	1353	276	52	0.9	219	17	1.2	
23258	180	0 - 6	7.2		0.16	No	1.5	6.2	11	9	178	10	18	2735	481	53	0.9	151	70	1.9	
23259	181	0 - 6	7.0		0.10	No	1.3	4.3	8	7	147	6	11	3507	814	79	0.5	110	68	2.1	
23260	182	0 - 6	7.7		0.16	No	1.0	3.0	5	8	183	5	9	4517	857	75	0.4	90	41	1.7	
23261	184	0 - 6	7.3		0.13	No	1.0	4.2	8	5	139	6	11	3151	628	69	0.6	101	69	2.1	
23262	194	0 - 6	7.9		0.22	Lo	1.3	3.0	5	6	198	6	11	4841	716	76	1.0	101	92	2.3	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23253	143	0 - 6	11/20/24																		
23254	159	0 - 6	11/20/24																		
23255	160	0 - 6	11/20/24																		
23256	174	0 - 6	11/20/24																		
23257	175	0 - 6	11/20/24																		
23258	180	0 - 6	11/20/24																		
23259	181	0 - 6	11/20/24																		
23260	182	0 - 6	11/20/24																		
23261	184	0 - 6	11/20/24																		
23262	194	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23253 - 23262
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
				6.0	6.5	7.0											
23253	143																
23254	159																
23255	160																
23256	174																
23257	175																
23258	180																
23259	181																
23260	182																
23261	184																
23262	194																

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na
30	0	2	71	26	1
26	0	2	70	27	1
22	0	2	71	24	2
13	0	3	69	26	2
10	0	3	71	24	2
18	0	2	74	22	1
25	0	2	70	27	1
31	0	2	74	23	1
22	0	2	73	24	1
31	0	2	78	19	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23253, 23254, 23255, 23256, 23257, 23258, 23259, 23260, 23261, 23262
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23253					
23254					
23255					
23256					
23257					
23258					
23259					
23260					
23261					
23262					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23263	196	0 - 6	7.9		0.20	No	1.5	2.3	4	9	273	6	11	5717	1095	111	0.7	108	85	2.3	
23264	199	0 - 6	7.5		0.18	No	1.7	2.4	4	8	235	7	13	5093	978	92	0.7	105	87	2.3	
23265	206	0 - 6	7.6		0.16	No	1.2	1.6	3	6	210	7	13	4763	875	96	0.8	104	75	2.3	
23266	218	0 - 6	7.2		0.15	No	1.4	2.5	5	6	207	7	13	4067	879	89	1.0	118	95	2.6	
23267	231	0 - 6	6.4		0.16	No	1.6	4.9	9	20	224	7	13	3751	1018	69	0.8	130	55	2.0	
23268	236	0 - 6	7.4		0.16	No	1.4	3.7	7	20	172	8	14	3348	689	57	1.7	113	104	2.3	
23269	246	0 - 6	6.9		0.14	No	1.2	2.7	5	6	118	8	14	2517	501	60	1.5	136	60	1.9	
23270	248	0 - 6	6.4		0.13	No	1.5	1.1	<2	25	186	6	11	3289	836	56	0.8	131	42	1.9	
23271	249	0 - 6	6.6		0.16	No	1.5	9.2	17	12	182	6	11	3642	659	46	1.1	95	73	2.0	
23272	254	0 - 6	6.3		0.13	No	2.1	2.0	4	5	121	9	16	1614	307	145	1.0	296	13	1.4	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23263	196	0 - 6	11/20/24																		
23264	199	0 - 6	11/20/24																		
23265	206	0 - 6	11/20/24																		
23266	218	0 - 6	11/20/24																		
23267	231	0 - 6	11/20/24																		
23268	236	0 - 6	11/20/24																		
23269	246	0 - 6	11/20/24																		
23270	248	0 - 6	11/20/24																		
23271	249	0 - 6	11/20/24																		
23272	254	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23263 - 23272
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23263	196																	35	0	2	81	26	1
23264	199																	34	0	2	75	24	1
23265	206																	32	0	2	74	23	1
23266	218																	29	0	2	71	26	1
23267	231																	28	0	2	67	30	1
23268	236																	23	0	2	72	25	1
23269	246																	17	0	2	73	24	2
23270	248																	24	0	2	68	29	1
23271	249																	24	0	2	75	23	1
23272	254																	12	0	3	70	22	5

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23263, 23264, 23265, 23266, 23267, 23268, 23269, 23270, 23271, 23272
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23263					
23264					
23265					
23266					
23267					
23268					
23269					
23270					
23271					
23272					

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

METHOD USED:			1:2 Soil-Water		1:2 Soil-Water	XSL(i)	LOI(r)	Cd Reduction		Mehlich 3 ICP	Ammonium Acetate						Mehlich 3 ICP				
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	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
23273	255	0 - 6	6.8		0.09	No	1.3	2.0	4	6	126	6	11	2238	453	49	1.5	147	57	1.7	
23274	262	0 - 6	7.2		0.14	No	1.4	7.0	13	9	170	7	13	3742	596	81	1.6	108	66	1.8	
23275	263	0 - 6	7.2		0.09	No	1.1	4.0	7	6	148	5	9	2910	558	76	0.9	129	54	2.1	
23276	269	0 - 6	7.4		0.19	Lo	1.6	4.1	7	21	274	10	18	4655	893	234	1.0	130	70	1.9	
23277	271	0 - 6	6.7		0.11	No	1.5	8.0	14	30	236	7	13	3740	865	53	0.9	155	58	2.0	
23278	273	0 - 6	6.8		0.15	No	1.4	8.7	16	11	190	7	13	3563	879	53	0.9	108	74	1.9	
23279	275	0 - 6	7.3		0.11	No	1.3	8.8	16	11	165	5	9	3786	633	55	0.9	114	69	2.0	
23280	276	0 - 6	6.6		0.09	No	1.5	3.4	6	18	224	7	13	3608	947	66	0.7	139	74	1.7	
23281	278	0 - 6	6.4		0.18	No	1.7	14.3	26	15	195	8	14	3558	863	53	0.8	119	67	2.1	
23282	283	0 - 6	7.3		0.10	No	1.2	4.0	7	6	145	5	9	3827	613	39	0.7	96	63	1.9	

METHOD USED:																					
Lab Number	Sample ID	Sample Depth	Date Sampled																		
23273	255	0 - 6	11/20/24																		
23274	262	0 - 6	11/20/24																		
23275	263	0 - 6	11/20/24																		
23276	269	0 - 6	11/20/24																		
23277	271	0 - 6	11/20/24																		
23278	273	0 - 6	11/20/24																		
23279	275	0 - 6	11/20/24																		
23280	276	0 - 6	11/20/24																		
23281	278	0 - 6	11/20/24																		
23282	283	0 - 6	11/20/24																		

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: Amy Meier, Data Review Coordinator

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: 6224	ENVIRO-AG ENGINEERING INC 3404 AIRWAY BLVD AMARILLO, TX 79118

servi tech
www.servitech.com

6921 S. Bell
Amarillo, TX 79109
800.557.7509
806.677.0093
Fax 806.677.0329

LAB NO:	23273 - 23282
INVOICE NO:	173751
DATE RECEIVED:	11/22/2024
DATE REPORTED:	11/26/2024

SOIL ANALYSIS RESULTS FOR: VR PIERCE RANCH **FIELD ID:** NORMAN MULLIN

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	Cation Exchange Capacity					
				6.0	6.5	7.0												CEC	%H	%K	%Ca	%Mg	%Na
23273	255																	16	0	2	72	24	1
23274	262																	24	0	2	76	20	1
23275	263																	20	0	2	73	23	2
23276	269																	32	0	2	72	23	3
23277	271																	27	0	2	70	27	1
23278	273																	26	0	2	69	28	1
23279	275																	25	0	2	76	21	1
23280	276																	27	0	2	67	29	1
23281	278																	26	0	2	69	28	1
23282	283																	25	0	2	77	21	1

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 23273, 23274, 23275, 23276, 23277, 23278, 23279, 23280, 23281, 23282
Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number	EAE-FacilityID	EAE-ProjectManager	EAE-FieldID	EAE-SampleSubmissionID	Comments
23273					
23274					
23275					
23276					
23277					
23278					
23279					
23280					
23281					
23282					

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: Amy Meier, Data Review Coordinator

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.

ENVIRO-AG ENGINEERING, INC.
EAE
AMARILLO - STEPHENVILLE- ARTESIA

Corporate Office:
3404 Airway Blvd.
Amarillo TX 79118

Central Texas:
9855 FM 847
Dublin TX 76446

New Mexico:
110 East Mill Road
Artesia NM 88210

MEMORANDUM

February 28, 2025

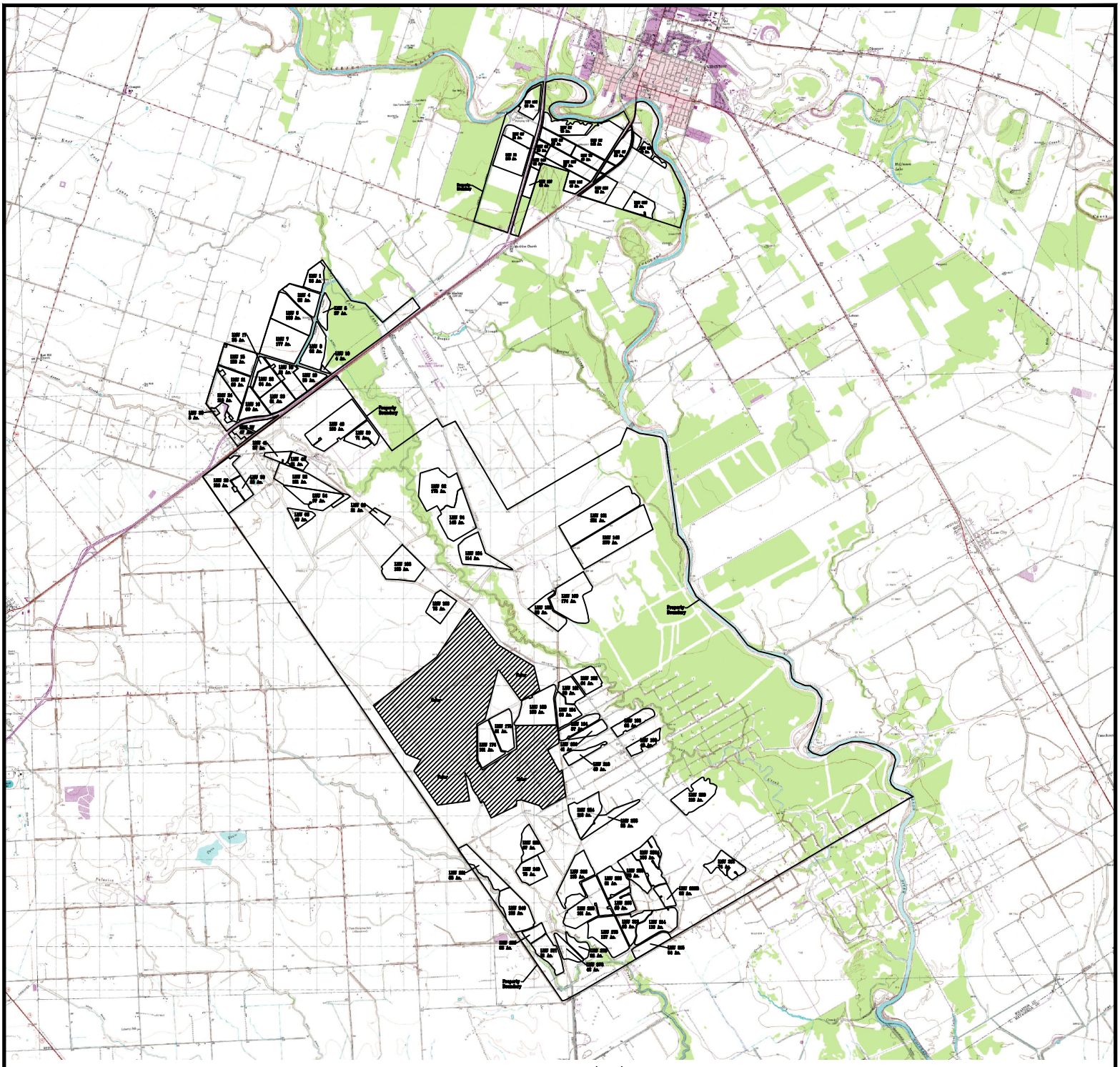
Via Email

To: Mr. Stephen Megina, Vanguard Renewables

From: Norman Mullin, P.E.

Subject: Pierce Ranch, Wharton County, Texas

Attached are the maps of the fields we sampled, the associated laboratory analysis, and the tabular summary of the nutrient budgets. There are approximately 250 fields depicted on the map provided by the Owner. The Owner identified specific fields he wanted sampled that included the two major soil textures (sandy clay and clay). We sampled those fields along with adjacent fields to ensure we captured the current nutrient loading in those areas for both cultivated and improved grass pastures. We sampled 89 fields comprising 7,373 gross acres which is a representation of the two major soil types and cropping schemes (corn, cotton, and grass) across the entire geographic area of the ranch. For permitting purposes, sampling the entirety of the fields would not be beneficial and cost prohibitive for permitting purposes. The laboratory data indicates very little residual levels of nitrogen and phosphorous in the top 6-inches. The nutrient budgets used county averages for yields and the TCEQ "S" tables for nutrient uptake. Since these fields have not been previously utilized for TCEQ regulated waste application, the results provided should remain similar for the following crop years with similar yields.



Map Generated 12/17/2024

N

W E

S

1 Mile 0 1 Mile 2 Miles

SCALE AS SHOWN

Source: USDA–NRCS. Geospatial Data Gateway. Available at: http://datagateway.nrcs.usda.gov/. Digital Raster Graphic County Mosaic by NRCS – Accessed December 2023.

Pierce Ranch, GP Pierce, TX Wharton County	Land Application Map Pg: 4	ENVIRONEER ENGINEERING CONSULTING

Effluent Characteristics

Effluent Storage

The effluent from the digestion tanks is pumped to an earthen storage lagoon and it is later removed from the lagoon are hauled off-site for proper disposal or beneficial use under 30 TAC 335.6 (Subchapter A: Industrial Solid Waste and Municipal Hazardous Waste). If the facility chooses to apply effluent from digestate, then before the land application, the facility will implement an NMP per the Texas NRCS Practice Standard Code 590. The NMP will be updated annually to incorporate the most recent manure, wastewater, and soil analysis.

Effluent Quality

For the purposes of this plan, the Total Nitrogen content of the effluent to be land applied is 713 lb./ac-in TKN and Total Phosphorus is 328 lb./ac-in as P2O5, based on similar projects. Based on the geographical location of the facility and farm practices, the permittee estimates 80% of the total nitrogen is available after volatilization and mineralization.

Effluent Quantity

The average annual amount of effluent available for spreading is projected to be 20.5 million gallons (62.86 ac-ft/yr.).

Annual Cropping Plan

Crop Selection

It is the goal of Wharton AD1, LLC to grow any of the permitted crops listed in Attachment A. Table 2 illustrates the amount of effluent to be applied is based upon the most limiting nutrient, nitrogen. The total ac-in was derived based upon a crop rotation that depicts the acreages planted to various permitted crops. These crops will be rotated to ensure that nutrient/salts and the hydraulic requirements of the plant are managed properly.

The following formula will be utilized to determine the annual application rates based upon the most limiting nutrient content of effluent, nutrients in the soil, and crop requirements.

Total nutrient required by crop *((lb.lac)- Soil Test (lb.lac)) I ((lb.* per *Ac-in* of *Nut. in Effl* x *0.80)) = Annual Application* Rate *(Ac-in)*

In the event that the effluent from the digestate is land applied to an application field, the facility will deduct any applied nutrient from the solids and or fertilizer application against the planned effluent application rates.

Other Crop Inputs

Supplemental fertilizers may be needed to achieve yield goals, but determinations will be made annually on a field-by-field basis using soil test results. Based on the effluent pH, EC and sodium content, soil amendments such as elemental sulfur, gypsum or other inputs may be used to help manage soil pH and salinity.

Wharton AD1, LLC
Pierce Ranch
Attachment 1 - Nutrient Management Budget
Table 1 Generated 12/18/2024

			Columns													
			A	B	D	E	G		H	I	J	K	L	M		
Field ID w/Acreage	Planned Crop Rotation	Projected Yield bu/ac or tons/ac (1)	Crop N Requirement rate lb/Ac (1)	Crop P2O5 Requirement Rate lb/Ac (1)	0-6" Soil N Residual lb/Ac (2)	0-6" Soil P Residual ppm (2)	Remainder Crop N required lb/Ac (3)	Manure Source (4)	Wastewater N lb/Ac-in (4a)	Adjusted Plant Available N lb/ Ac-in (5)	Maximum Ac-In/Ac of Wastewater to apply	Wastewater P2O5 lb per Ac-in (4a)	Recommended Ac-In/Ac to apply	P205 Applied at N Rate lb/Ac (6)	Acre-Feet of Wastewater Applied	Gallons of Wastewater Applied
1 (56 acres)	Corn Grain	120 bu/ac	144	105	3	35	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	1.2	375,366.42
4 (82 acres)	Corn Grain	120 bu/ac	144	105	6	27	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.7	537,949.14
5 (37 acres)	Corn Grain	120 bu/ac	144	105	6	7	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	0.7	242,733.15
6 (126 acres)	Corn Grain	120 bu/ac	144	105	18	19	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	2.3	754,726.10
7 (177 acres)	Corn Grain	120 bu/ac	144	105	6	20	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	3.6	1,161,182.90
8 (92 acres)	Corn Grain	120 bu/ac	144	105	13	16	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.8	572,937.70
10 (4 acres)	Coastal Grazing	1 au/3ac	160	70	3	4	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.1	23,180.39
13 (123 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.4	783,534.62
15 (103 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	2.0	646,337.62
16 (69 acres)	Corn Grain	120 bu/ac	144	105	21	6	123	Digestate	714	571.20	0.22	328.00	0.22	70.63	1.2	403,461.86
17 (23acres)	Corn Grain	120 bu/ac	144	105	9	43	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.5	147,608.00
18 (81 acres)	Corn Grain	120 bu/ac	144	105	12	8	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.6	508,284.93
19 (55 acres)	Corn Grain	120 bu/ac	144	105	12	10	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	1.1	345,131.74
21 (69 acres)	Corn Grain	120 bu/ac	144	105	13	10	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.3	429,703.28
22 (64 acres)	Corn Grain	120 bu/ac	144	105	13	24	131	Digestate	714	571.20	0.23	328.00	0.23	75.22	1.2	398,565.36
23 (81 acres)	Coastal Grazing	1 au/3ac	160	70	8	5	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.4	469,402.82
24 (113 acres)	Corn Grain	120 bu/ac	144	105	8	14	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	2.2	730,576.39
25 (5 acres)	Corn Grain	120 bu/ac	144	105	11	13	133	Digestate	714	571.20	0.23	328.00	0.23	76.37	0.1	31,613.31
27 (47 acres)	Coastal Grazing	1 au/3ac	160	70	9	8	151	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.8	272,369.54
28 (68 acres)	Corn Grain	120 bu/ac	144	105	5	22	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.4	449,336.81
29 (156 acres)	Coastal Grazing	1 au/3ac	160	70	8	21	152	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.8	904,035.06
36 (33 acres)	Coastal Grazing	1 au/3ac	160	70	3	8	157	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	191,238.19
41 (27 acres)	Coastal Grazing	1 au/3ac	160	70	6	5	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.5	156,467.61
42 (31 acres)	Coastal Grazing	1 au/3ac	160	70	14	18	146	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.6	179,647.99
46 (190 acres)	Coastal Grazing	1 au/3ac	160	70	2	4	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	3.4	1,101,068.34
2C (78 acres)	Corn Grain	120 bu/ac	144	105	19	13	125	Digestate	714	571.20	0.22	328.00	0.22	71.78	1.4	463,503.37
3C (148 acres)	Corn Grain	120 bu/ac	144	105	10	11	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	2.9	942,789.62
4C (69 acres)	Corn Grain	120 bu/ac	144	105	2	5	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.4	465,785.23
6C (55 acres)	Corn Grain	120 bu/ac	144	105	8	22	136	Digestate	714	571.20	0.24	328.00	0.24	78.10	1.1	355,590.28
7C (49 acres)	Corn Grain	120 bu/ac	144	105	10	28	134	Digestate	714	571.20	0.23	328.00	0.23	76.95	1.0	312,139.81
8C (51 acres)	Corn Grain	120 bu/ac	144	105	18	22	126	Digestate	714	571.20	0.22	328.00	0.22	72.35	0.9	305,484.38
9C (20 acres)	Corn Grain	120 bu/ac	144	105	9	20	135	Digestate	714	571.20	0.24	328.00	0.24	77.52	0.4	128,354.78
10C (87 acres)	Corn Grain	120 bu/ac	144	105	5	29	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	1.8	574,886.80
14C (32 acres)	Corn Grain	120 bu/ac	144	105	7	23	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	0.6	208,410.13
16C (46 acres)	Corn Grain	120 bu/ac	144	105	3	28	141	Digestate	714	571.20	0.25	328.00	0.25	80.97	0.9	308,336.70
18C (35 acres)	Corn Grain	120 bu/ac	144	105	5	10	139	Digestate	714	571.20	0.24	328.00	0.24	79.82	0.7	231,276.30
19C (62 acres)	Coastal Grazing	1 au/3ac	160	70	5	14	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.1	359,295.99
30C (65 acres)	Corn Grain	120 bu/ac	144	105	6	6	138	Digestate	714	571.20	0.24	328.00	0.24	79.24	1.3	426,423.10
36C (40 acres)	Coastal Grazing	1 au/3ac	160	70	11	14	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.7	231,803.86
52 (121 acres)	Coastal Grazing	1 au/3ac	160	70	4	3	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.2	701,206.68
54 (97 acres)	Corn Grain	120 bu/ac	144	105	7	7	137	Digestate	714	571.20	0.24	328.00	0.24	78.67	1.9	631,743.21
59 (71 acres)	Corn Grain	120 bu/ac	144	105	2	4	142	Digestate	714	571.20	0.25	328.00	0.25	81.54	1.5	479,286.25
68 (40 acres)	Corn Grain	120 bu/ac	144	105	12	9	132	Digestate	714	571.20	0.23	328.00	0.23	75.80	0.8	251,004.90

86 (21 acres)	Coastal Grazing	1 au/3ac	160	70	40	22	120	Digestate	714	571.20	0.21	328.00	0.21	70.00	0.4	121,697.03
92 (175 acres)	Cotton	2 bales/ac	100	105	21	18	79	Digestate	714	571.20	0.14	328.00	0.14	45.36	2.0	657,224.01
94 (143 acres)	Coastal Grazing	1 au/3ac	160	70	7	12	153	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.5	828,698.81
103 (128 acres)	Coastal Grazing	1 au/3ac	160	70	2	5	158	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.3	741,772.36
104 (114 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.0	660,641.01
126 (72 acres)	Coastal Grazing	1 au/3ac	160	70	5	6	155	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	417,246.95
131 (251 acres)	Cotton	2 bales/ac	100	105	4	12	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	3.5	1,145,495.10
143 (279 acres)	Cotton	2 bales/ac	100	105	7	12	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	3.8	1,233,489.43
159 (80 acres)	Cotton	2 bales/ac	100	105	5	17	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	361,294.93
160 (174 acres)	Cotton	2 bales/ac	100	105	7	8	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.4	769,272.98
174 (101 acres)	Coastal Grazing	1 au/3ac	160	70	19	23	141	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.8	585,304.75
175 (91 acres)	Coastal Grazing	1 au/3ac	160	70	4	18	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.6	527,353.79
180 (153 acres)	Coastal Grazing	1 au/3ac	160	70	11	9	149	Digestate	714	571.20	0.21	328.00	0.21	70.00	2.7	886,649.77
181 (58 acres)	Cotton	2 bales/ac	100	105	8	7	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.8	253,667.08
182 (64 acres)	Cotton	2 bales/ac	100	105	5	8	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.9	289,035.95
184 (66 acres)	Cotton	2 bales/ac	100	105	8	5	92	Digestate	714	571.20	0.16	328.00	0.16	52.83	0.9	288,655.64
194 (57 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.8	257,422.64
196 (63 acres)	Cotton	2 bales/ac	100	105	4	9	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.9	287,514.71
199 (48 acres)	Cotton	2 bales/ac	100	105	4	8	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.7	219,058.82
206 (41 acres)	Cotton	2 bales/ac	100	105	3	6	97	Digestate	714	571.20	0.17	328.00	0.17	55.70	0.6	189,061.84
218 (40 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	0.6	180,647.47
231 (85 acres)	Cotton	2 bales/ac	100	105	9	10	91	Digestate	714	571.20	0.16	328.00	0.16	52.25	1.1	367,712.67
236 (67 acres)	Cotton	2 bales/ac	100	105	7	20	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	0.9	296,214.31
246 (128 acres)	Cotton	2 bales/ac	100	105	5	6	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.8	578,071.90
249 (75 acres)	Cotton	2 bales/ac	100	105	17	12	83	Digestate	714	571.20	0.15	328.00	0.15	47.66	0.9	295,929.07
254 (112 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	1.6	511,137.25
255 (58 acres)	Coastal Grazing	1 au/3ac	160	70	4	6	156	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.0	336,115.60
262 (125 acres)	Cotton	2 bales/ac	100	105	13	9	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.6	516,984.53
263 (161 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	2.2	711,798.56
271 (81 acres)	Cotton	2 bales/ac	100	105	14	30	86	Digestate	714	571.20	0.15	328.00	0.15	49.38	1.0	331,155.33
273 (42 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	0.5	167,716.91
275 (137 acres)	Cotton	2 bales/ac	100	105	16	11	84	Digestate	714	571.20	0.15	328.00	0.15	48.24	1.7	547,076.59
276 (36 acres)	Cotton	2 bales/ac	100	105	6	18	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	0.5	160,871.32
283 (81 acres)	Cotton	2 bales/ac	100	105	7	6	93	Digestate	714	571.20	0.16	328.00	0.16	53.40	1.1	358,109.83
285 (78 acres)	Cotton	2 bales/ac	100	105	5	10	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.1	352,262.56
286A (106 acres)	Cotton	2 bales/ac	100	105	5	9	95	Digestate	714	571.20	0.17	328.00	0.17	54.55	1.5	478,715.79
286B (38 acres)	Cotton	2 bales/ac	100	105	4	5	96	Digestate	714	571.20	0.17	328.00	0.17	55.13	0.5	173,421.57
290 (116 acres)	Cotton	2 bales/ac	100	105	6	3	94	Digestate	714	571.20	0.16	328.00	0.16	53.98	1.6	518,363.15
295 (69 acres)	Cotton	2 bales/ac	100	105	13	4	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	0.9	285,375.46
312 (74 acres)	Coastal Grazing	1 au/3ac	160	70	6	16	154	Digestate	714	571.20	0.21	328.00	0.21	70.00	1.3	428,837.14
313 (68 acres)	Cotton	2 bales/ac	100	105	12	11	88	Digestate	714	571.20	0.15	328.00	0.15	50.53	0.9	284,472.22
314 (119 acres)	Cotton	2 bales/ac	100	105	13	5	87	Digestate	714	571.20	0.15	328.00	0.15	49.96	1.5	492,169.27
315 (54 acres)	Cotton	2 bales/ac	100	105	11	5	89	Digestate	714	571.20	0.16	328.00	0.16	51.11	0.7	228,471.51
7,207															**118.20**	**38,539,149**

Notes:

(1) From NRCS 590-633 software alternative crops.
(2) Taken from annual soil test results from November 2024. It is assumed that residual N will be utilized with the first crop rotation. The facility will conduct soil sampling every year for verification, and the budgets will be updated to reflect the latest soil analysis.
(3) Column A- Column D = Remainder Crop N Required. Negative value indicates residual is higher than requirement. No wastewater application planned.
(4) The source shown is the primary for wastewater source, however, wastewater from any other lagoon structure can also be pumped to the field. The max rate as indicated by the Phophorous Index Rating shall no be exceeded by any sources.
(4a) Wastewater N and P from site specific analysis.
(5) Availability of N is estimated utilizing 80%.
(6) Illustrates P205 applied at the Nitrogen application rate.

Application Methods & Timing

Land Application Methods

The effluent from the digestate will be applied to the land using the spreading technique. This method ensures uniform distribution of nutrients across the application area, facilitating efficient nutrient absorption by the soil and crops. The spreading technique helps in optimizing the utilization of nitrogen, phosphorus, and potassium present in the effluent while minimizing nutrient runoff and environmental impact.

Soil Moisture Monitoring

Soil moisture monitoring is crucial for solid digestate land application, ensuring proper absorption and preventing runoff. The most important aspect of moisture management is accurately evaluating and maintaining optimal soil conditions. In application fields, soil moisture is assessed using the feel and appearance method, following USDA guidelines. This method provides a quick, practical evaluation of moisture levels before digestate spreading. Proper monitoring helps maintain soil health, nutrient efficiency, and environmental sustainability.

Operation and Maintenance

Procedures

The land application systems should be operated by the TLAP and with the following Best Management Practices (BMPs):

- Effluent application will not occur when the ground is frozen, saturated within 3 feet of the surface or during rainfall events unless necessary to prevent imminent overflow of the storage pond.
- Effluent application will not exceed maximum crop nutrient requirements.
- Effluent application will not occur to fallow lands except pre-watering as described in the previous section. Application to dormant perennial or winter crops shall be limited to the planned rate shown in the NMP.
- Records of the amount of effluent applied, the crops grown, the planting and harvest dates, and crop yields are maintained for each field.
- Personnel whose job responsibilities require the handling, or land application of digestate should be trained to ensure proper procedures are followed and appropriate records are kept.

Monitoring

Monitoring should occur before and after effluent spreading to ensure proper nutrient application and prevent over-application. No puddling, runoff, or soil erosion should occur. A visual inspection should be performed during and after spreading to detect any signs of surface accumulation or runoff. Corrective actions include, but are not limited to:

- Cease effluent spreading if soil becomes saturated.
- Adjust application rates and timing to match soil absorption capacity.

Monitoring of soil moisture, rainfall, and crop ET should occur at a minimum of weekly during the growing season.

As part of monitoring, annual soil tests will be reviewed. The following best management practices (BMPs) may be utilized to minimize nutrient leaching:

- Apply effluent before planting and after harvesting to enhance nutrient availability.
- Time applications to align with crop nutrient uptake during the growing season.
- Use conventional nitrogen fertilizers in conjunction with effluent application to optimize plant uptake.
- Retain crop residues to enhance soil organic matter and moisture retention.
- Adjust application schedules based on weather, soil moisture levels, and crop needs.
- Incorporate organic amendments to improve soil structure and prevent excessive nutrient leaching.
- Implement cover cropping or double cropping to enhance nutrient retention.
- Use nitrification inhibitors to minimize nitrogen losses, especially during high leaching periods.

Soil samples will be collected from each field before and after application, following TLAP guidelines. Effluent samples will also be collected as specified in TLAP to verify nutrient levels and ensure compliance with application limits.

System Maintenance

The effluent spreading system should be operated and maintained in accordance with manufacturer recommendations to ensure long-term reliability and efficiency. Proper operation and maintenance help prevent equipment failure, ensure uniform application, and minimize environmental risks. The spreading equipment, tanks, pipelines, and distribution components should be inspected regularly to maintain functionality.

All measuring devices, valves, spreaders, distribution nozzles, and mechanical components should be checked periodically, with worn or damaged parts repaired or replaced as needed. Nozzles and spreaders must be properly aligned, in good condition, and operated at the planned

application rate to ensure even distribution and prevent excessive accumulation in localized areas.

Maintain all pumps, piping, spreader attachments, and electrical or mechanical components as per manufacturer guidelines. Regularly clean screens and filters to avoid blockages that could affect application rates. Protect equipment from rodents, insects, heat, flooding, lightning, and power failures to avoid operational disruptions. Ensure all electrical connections are secure and replace worn-out wiring or fittings when first noticed. Periodically check for leaks and unintended discharge points. Display bilingual operating instructions and safety warnings as necessary. During non-operational periods, drain and secure pipelines, valves, and movable equipment to prevent damage.

Pollution hazards to groundwater and surface water can be minimized by following proper effluent spreading management. Runoff and deep percolation should be controlled by applying effluent only when soil moisture conditions allow for proper absorption. Avoid spills of agricultural chemicals, fuels, and lubricants near application sites to prevent contamination. Regularly review and adjust application schedules based on soil conditions, weather forecasts, and nutrient management plans to ensure safe and efficient effluent use.

8.0 **REFERENCES**

Information used to develop this plan was obtained, in part, from the following sources:

EPA 430-B-20-001 Project Development Handbook - A Handbook for Developing Anaerobic Digestion/Biogas Systems on Farms in the United States - 3rd Edition

Maas and Grattan. 1999. Agricultural drainage water management in arid and semi-arid areas. FAO Irrigation and Drainage Paper 61, Annex l. Crop salt tolerance data. Retrieved December 2022. http://www.fao.org/docrep/005/y4263e/y4263e0e.htm

Texas A&M Agrilife Extension. Retrieved 2023. Using Animal Manure and Wastewater for Crops and Pastures. https://agrilifeextension.tamu.edu/library/farming/

Texas Almanac. Retrieved May 2023. Texas Temperature, Freeze, Growing Season and Precipitation Records by County. https://texasalmanac.com/sites/default/tiles/images/olmanac-feature/countyweaf her A.pdt

USDA - NRCS Web Soil Survey, Wharton County, accessed May 2023.

USDA- NRCS (2012/2013 TLAP Permit List). Texas Waste Utilization and Nutrient Management 590- 633 Plan. Version 5, S Tables.

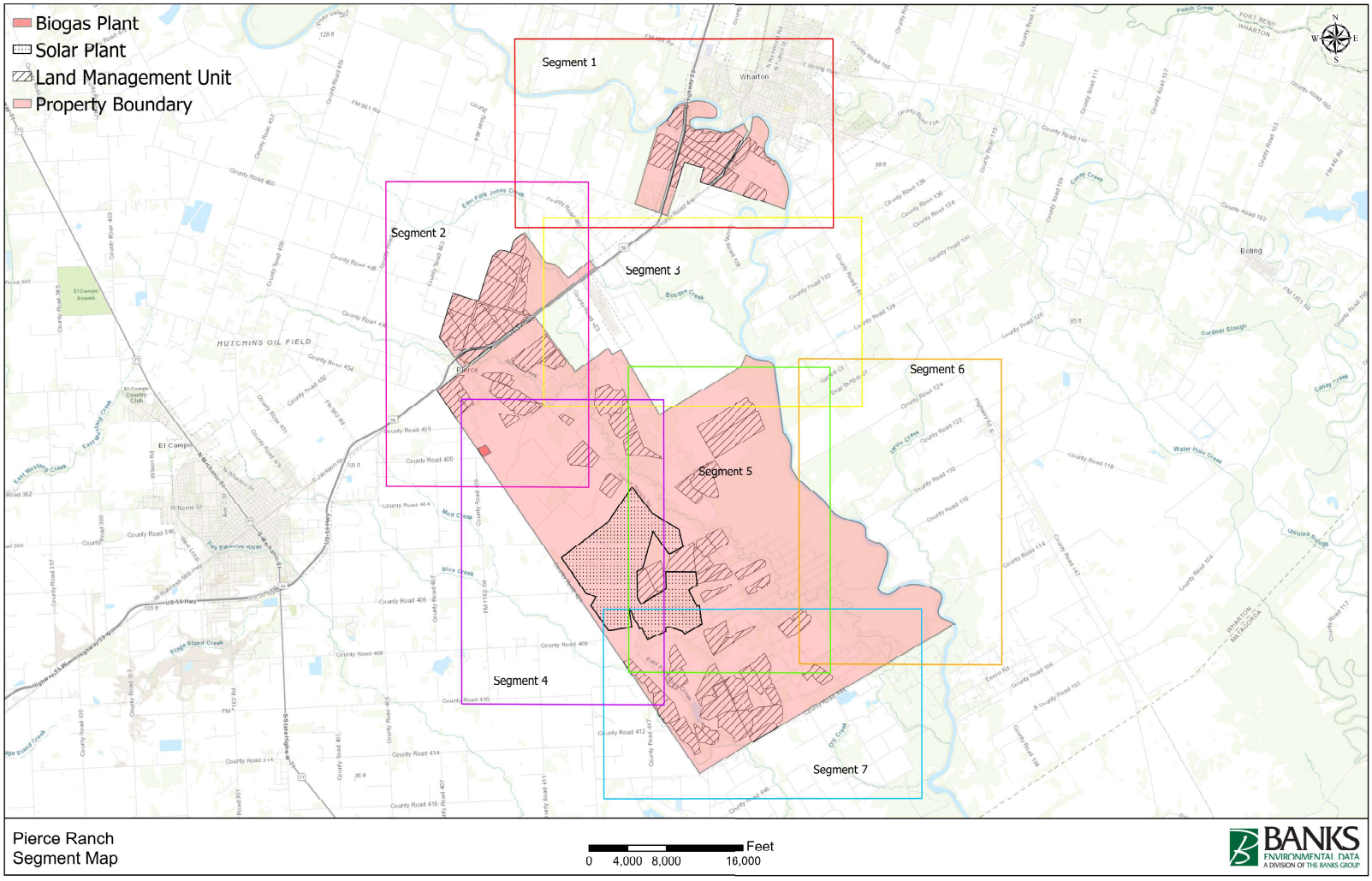
T.D.WATER WELL INFORMATION

Water Well Map

Figure 7, the Water Well Map, shows the locations of water wells within 1 mile of the property boundary. Water wells within the fields or adjacent to fields will be protected with 150-ft buffers.

Water Well Information

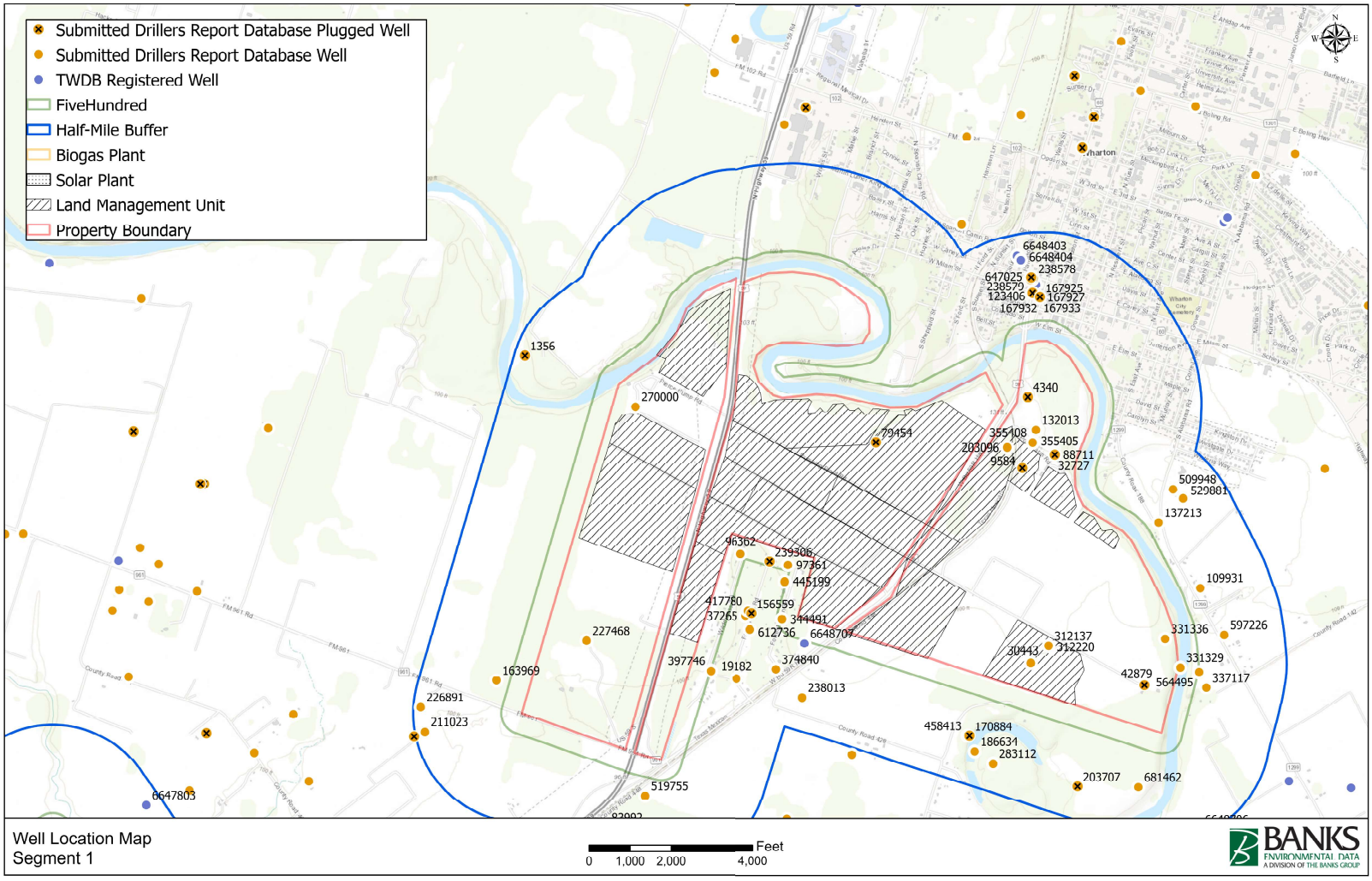
Water well data was obtained from a variety of sources, including on-site inspections, research, a database research firm in Toronto, ON-Canada, and the Texas Water Development Board (TWDB) WIID online database. The information provided by Environmental Risk Information Services (ERIS) was obtained from a variety of public sources. ERIS does not ensure and makes no warranty or representation as to the accuracy, reliability, quality, or errors occurring from data conversion or the interpretation of their report. The TWDB WIID database includes data from the TWDB Groundwater Database and Submitted Driller's Reports. ERIS and TWDB wells are shown on maps and in Table T.E. l if the location could be verified on-site or using the well log or district database information. Well information is provided in Worksheet 3-Section 4 of the Technical Report.

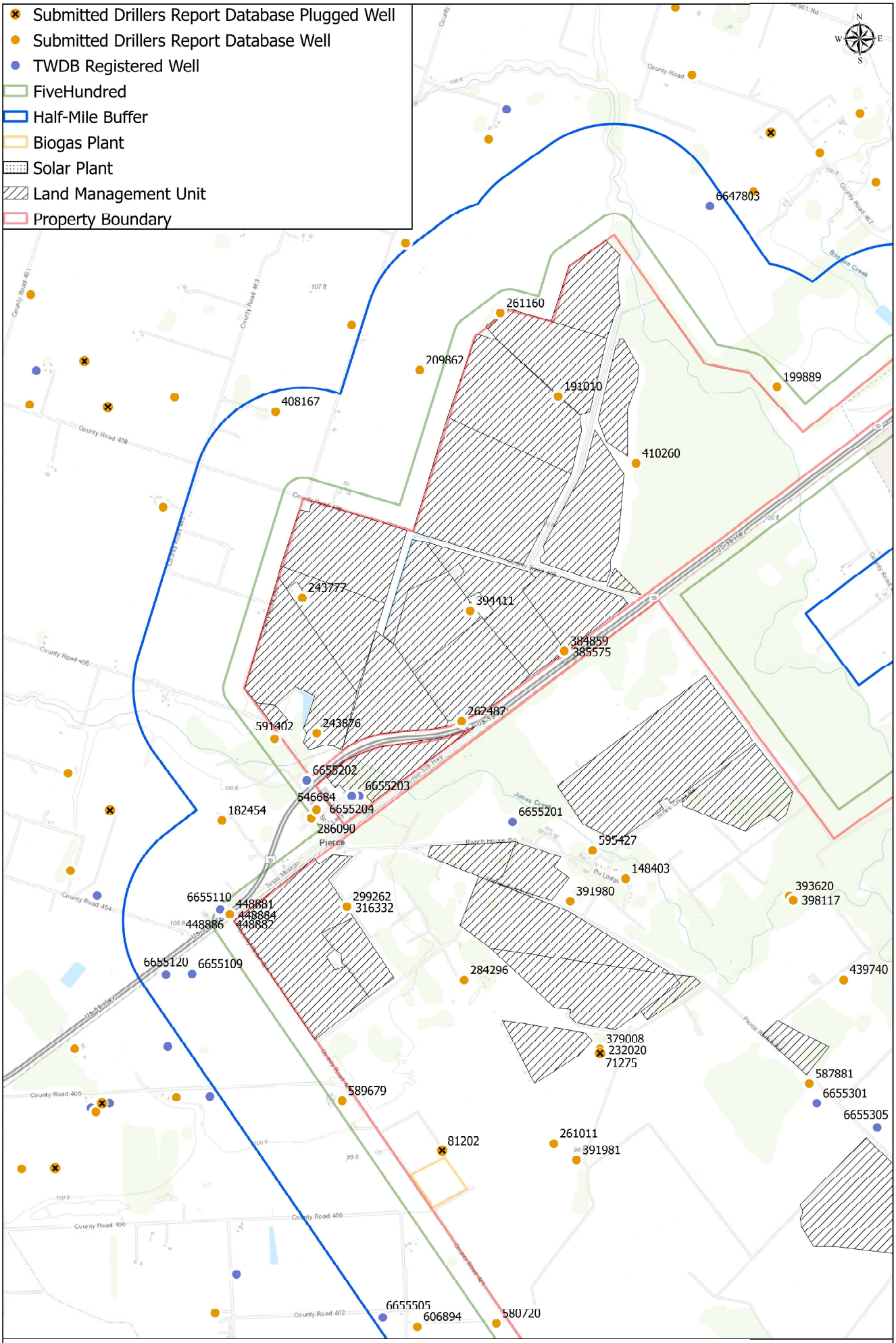


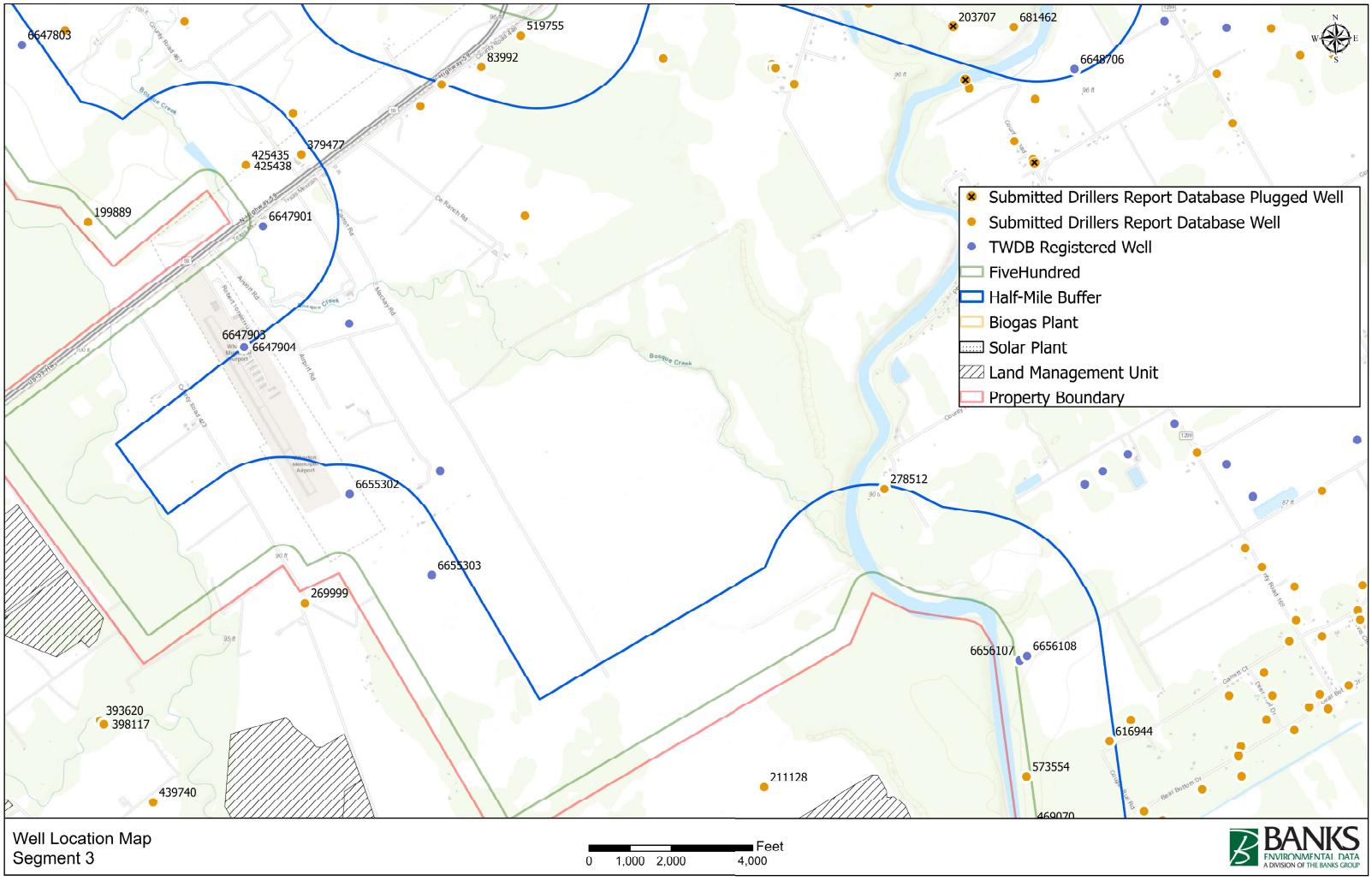
Pierce Ranch
Segment Map

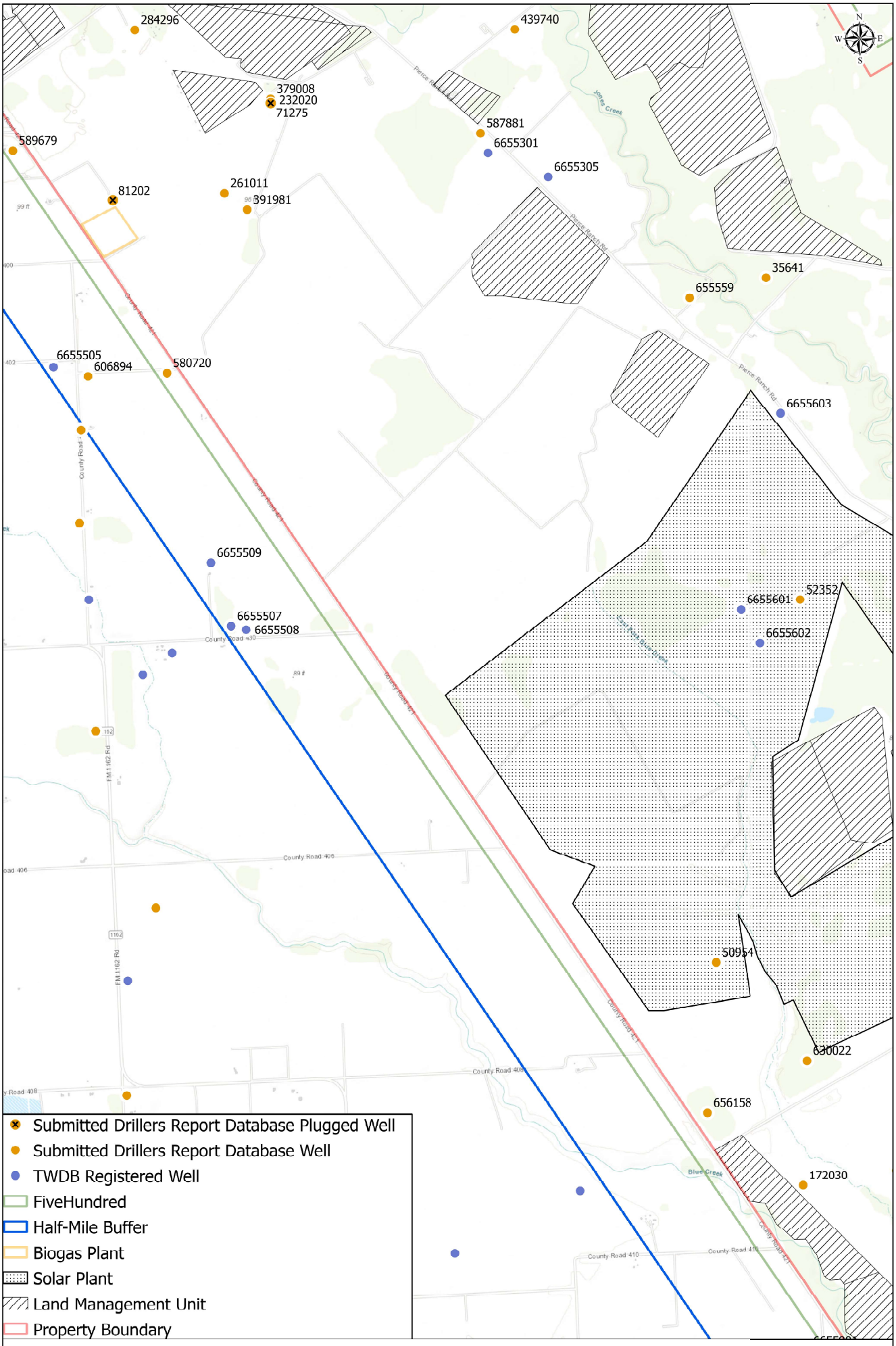
0 4,000 8,000 16,000 Feet

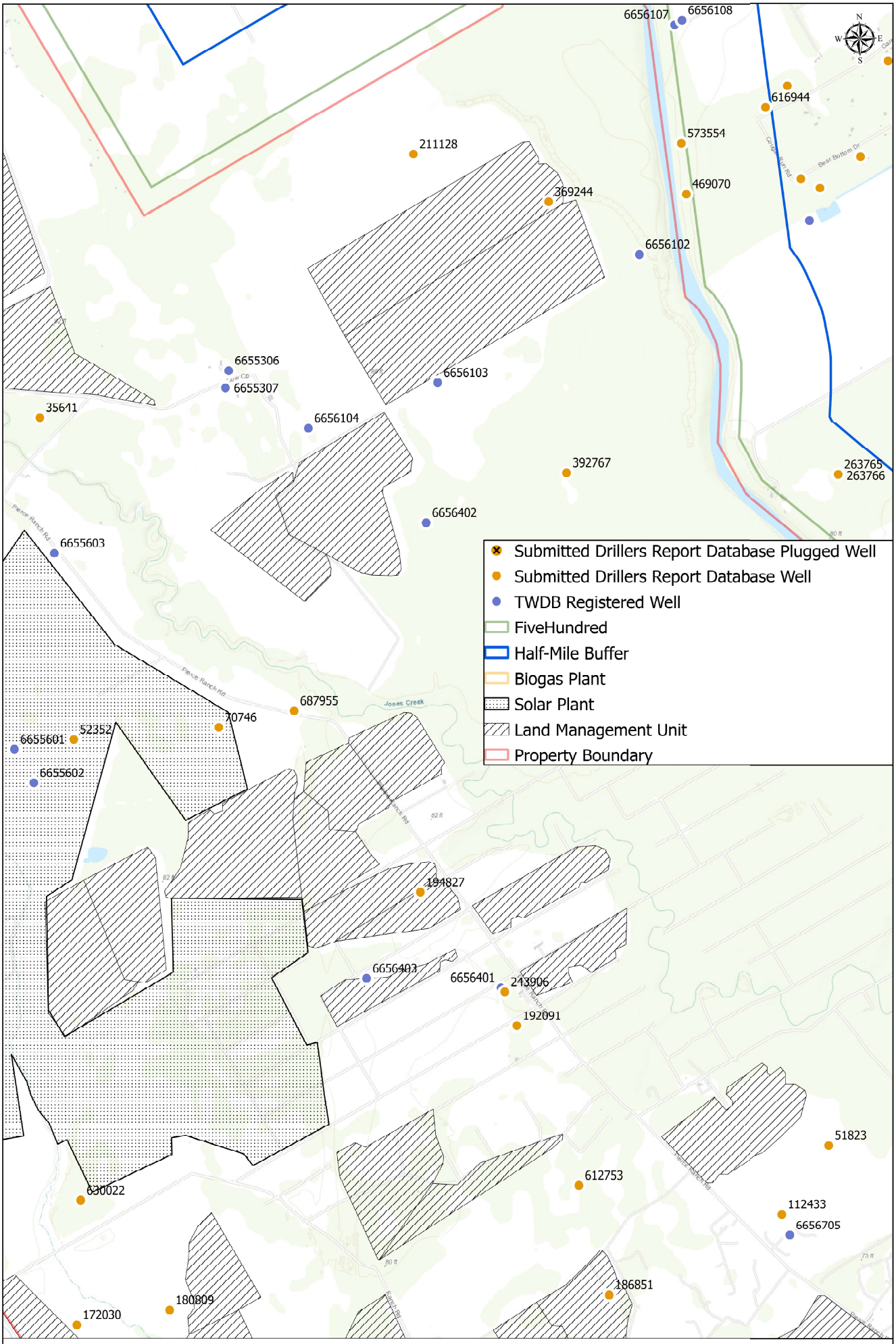
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
N
W
E
S
Wharton
6648403
6648404
238578
647025
238579
167925
123406
167927
167932
167933
1356
270000
4340
132013
79454
355408
355405
203096
88711
9584
32727
509948
529081
137213
96362
239306
97361
445199
109931
417780
156559
37265
344491
227468
612736
664870
312137
312220
30443
331336
597226
331329
42879
564495
337117
397746
19182
374840
163969
238013
226891
211023
458413
170884
186634
283112
203707
681462
6647803
519755
Well Location Map
Segment 1
Feet
0
1,000
2,000
4,000
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
6647803
261160
209862
199889
191010
408167
410260
243777
391111
384859
385575
262487
591402
243876
6655202
6655203
546684
6655204
182454
286090
Pierce
6655201
595427
148403
391980
393620
398117
6655110
448881
448884
448882
448886
299262
316332
6655120
6655109
284296
439740
379008
232020
71275
587881
6655301
6655305
589679
81202
261011
391981
6655505
606894
580720
County Road 458
County Road 436
County Road 454
County Road 405
County Road 400
County Road 402
US-59 Hwy
Jones Creek
Bu Lodge
Pierce Rd
Bayside Creek
Well Location Map
Segment 2
Feet
0
1,000
2,000
4,000
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


6647803
519755
83992
203707
681462
6648706
425435
425438
379477
199889
6647901
6647903
6647904
6655302
6655303
269999
278512
6656107
6656108
616944
573554
211128
393620
398117
439740
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 3
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

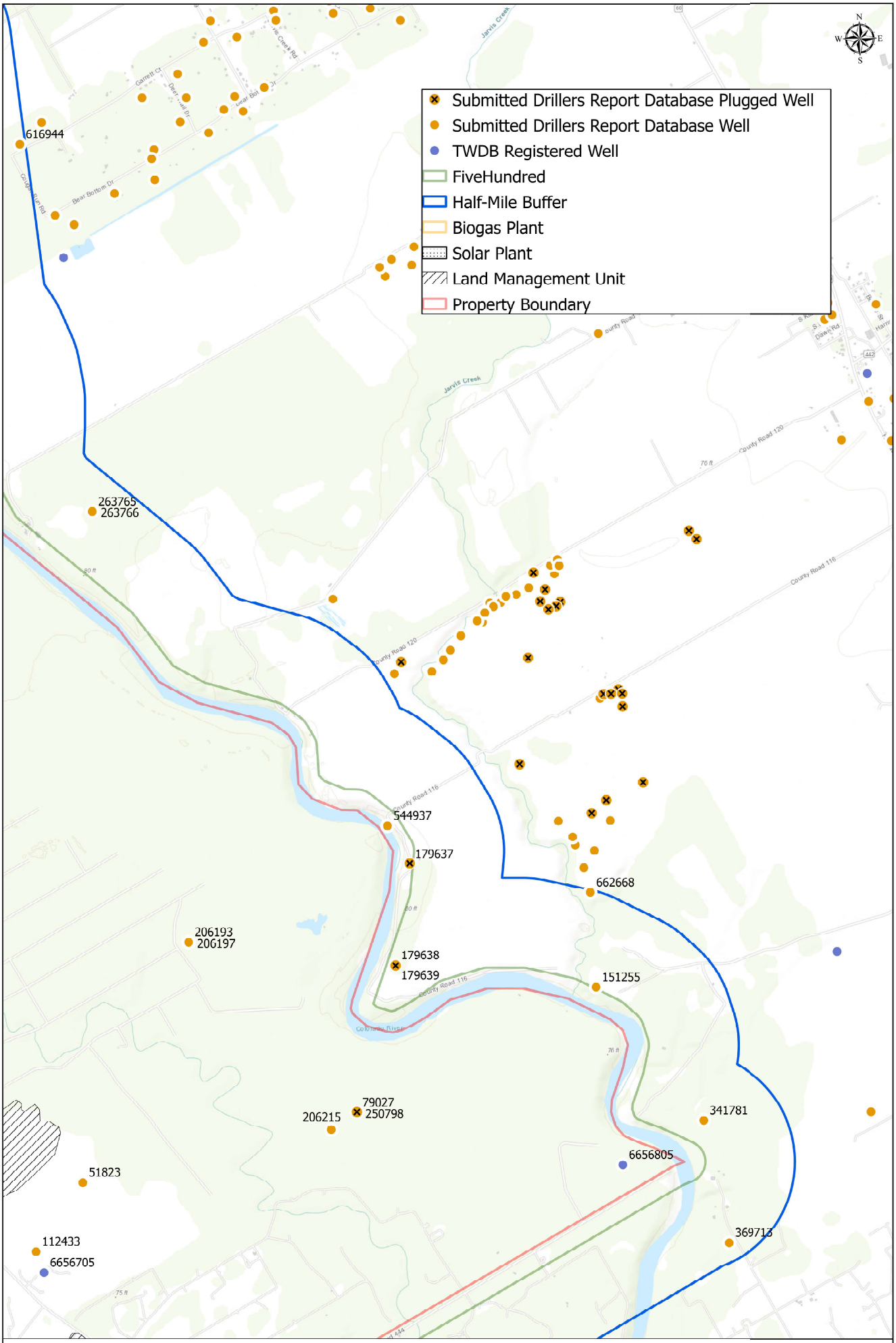

284296
439740
379008
232020
71275
587881
6655301
589679
6655305
81202
261011
391981
35641
655559
6655505
606894
580720
6655603
6655509
6655507
6655508
6655601
52352
6655602
50954
630022
656158
172030
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 4
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Well Location Map
Segment 5

0 1,000 2,000 4,000 Feet

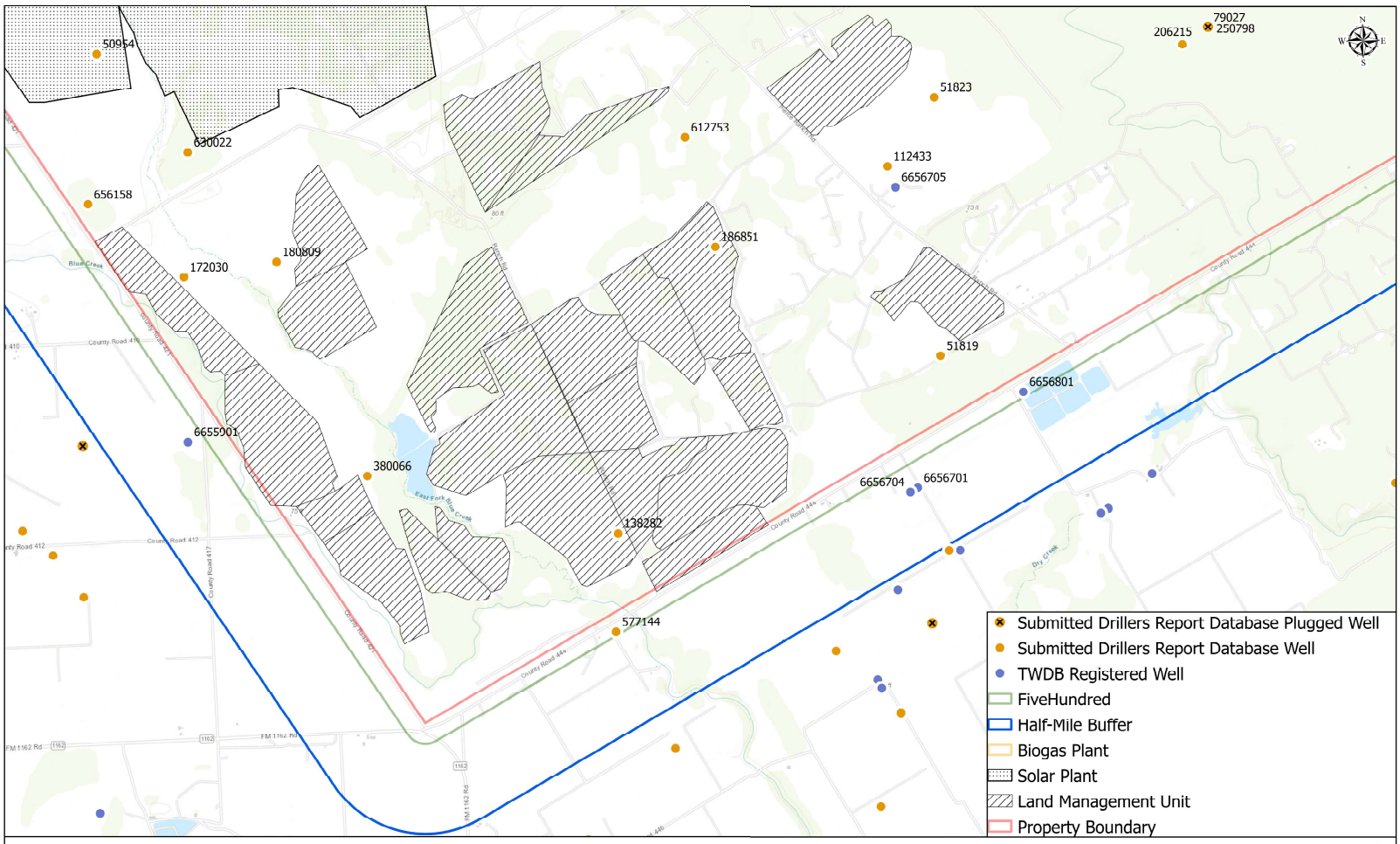
BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



Well Location Map
Segment 6

0 1,000 2,000 4,000 Feet

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP


50954
630022
656158
172030
180809
617753
186851
51823
112433
6656705
206215
79027
250798
51819
6656801
6655901
380066
6656704
6656701
138282
577144
County Road 416
County Road 417
County Road 412
County Road 44a
FM 1162 Rd
Blue Creek
East Fork Big Creek
Dry Creek
Submitted Drillers Report Database Plugged Well
Submitted Drillers Report Database Well
TWDB Registered Well
FiveHundred
Half-Mile Buffer
Biogas Plant
Solar Plant
Land Management Unit
Property Boundary
Well Location Map
Segment 7
0 1,000 2,000 4,000
Feet
BANKS
ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

T.E. GROUNDWATER TECHNICAL REPORT

Purpose

The purpose of this section is to provide information on the geologic features and groundwater resources at the Wharton AD1, LLC facility located near Pierce, Texas.

Geologic Atlas Map

Figure 8, Geologic Atlas Map, shows the geologic formations located at the property.

Geomorphologic/Geologic Features

The following information is from a report from the Texas Board of Water Engineers discussing soil and groundwater conditions in Wharton County.

Wharton County has around 30,000 acres of land irrigated in the early 20th century for the county's rice production. The wells used to irrigate the rice are mostly located in the western part of the county, ranging in depth from 150 to 500 feet. Periodic measurements show that the net water level in Wharton County has stayed relatively constant since 1934.

Aquifer Information

The Gulf Coast Aquifer includes several aquifers, such as the Jasper, Evangeline, and Chicot, composed of sand, silt, clay, and gravel layers. The total sand thickness of the aquifer ranges from 700 feet in the southern regions to 1,300 feet in the northern regions, with an average freshwater-saturated thickness of about 1,000 feet.

Water quality varies depending on depth and location. It tends to be good in the central and northeastern areas, where total dissolved solids are less than 500 milligrams per liter. However, it becomes more saline toward the south, with concentrations of total dissolved solids typically ranging from 1,000 to over 10,000 milligrams per liter. In these southern areas, aquifer productivity also decreases. Higher salinity levels along the central and eastern Gulf Coast are often linked to saltwater intrusion caused by groundwater pumping, brine migration due to oil field activities, or the natural flow of brine from salt domes into the aquifer.

The aquifer is used for municipal, industrial, and irrigation purposes. In counties such as Harris, Galveston, Fort Bend, Jasper, and Wharton, significant water level declines of up to 350 feet have resulted in land subsidence.

References

"Texas Water Development Board." Gulf Coast Aquifer | Texas Water Development Board, (TWDB)

www.twdb.texas.gov/groundwater/aquifer/majors/gulf-coast.asp. Accessed 17 Dec. 2024.

TEXAS WATER WELL REPORT

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167* *El Campo TX 77437*
Project No:	
Order No:	*25012900355*
Requested by:	*Environeer Engineering Consulting*
Date Completed:	*January 30, 2025*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Table of Contents.....2
Executive Summary.....3
Executive Summary: Report Summary.....4
Executive Summary: Site Report Summary - Project Property.....5
Executive Summary: Site Report Summary - Surrounding Properties.....6
Map.....7
Aerial.....10
Detail Report.....12
Appendix: Database Descriptions.....21
Definitions.....23

Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as database review of environmental records.

License for use of information in Report: No page of this report can be used without this cover page, this notice and the project property identifier. The information in Report(s) may not be modified or re-sold.

Your Liability for misuse: Using this Service and/or its reports in a manner contrary to this Notice or your agreement will be in breach of copyright and contract and ERIS may obtain damages for such mis-use, including damages caused to third parties, and gives ERIS the right to terminate your account, rescind your license to any previous reports and to bar you from future use of the Service.

No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by ERIS Information Inc. ("ERIS") using various sources of information, including information provided by Federal and State government departments. The report applies only to the address and up to the date specified on the cover of this report, and any alterations or deviation from this description will require a new report. This report and the data contained herein does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein and does not constitute a legal opinion nor medical advice. Although ERIS has endeavored to present you with information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

Trademark and Copyright: You may not use the ERIS trademarks or attribute any work to ERIS other than as outlined above. This Service and Report (s) are protected by copyright owned by ERIS Information Inc. Copyright in data used in the Service or Report(s) (the "Data") is owned by ERIS or its licensors. The Service, Report(s) and Data may not be copied or reproduced in whole or in any substantial part without prior written consent of ERIS.

Executive Summary

Property Information:

Project Property:	*Pierce Ranch Site* *29.215278, -96.194167 El Campo TX 77437*
Project No:	
Coordinates:	
Latitude:	*29.215278*
Longitude:	*-96.194167*
UTM Northing:	*3,235,122.77*
UTM Easting:	*772,831.34*
UTM Zone:	*14R*
Target Property Geometry:	*POLYGON*
County/Parish Covered:	*Wharton (TX)*
Zipcode(s) Covered:	*El Campo TX: 77437*
State(s) Covered:	*TX*

Executive Summary: Report Summary

Database	Searched	Project Property	Within 0.50mi	Total
Federal				
FED USGS	Y	0	0	0
State				
TCEQ WELL LOGS	Y	0	**2**	**2**
SDRW WELLS	Y	0	**2**	**2**
GWDB	Y	0	**1**	**1**
WW FORT BEND	Y	0	0	0
WW HIGH PLAINS	Y	0	0	0
WW HARRIS GAL	Y	0	0	0
WUD	Y	0	0	0
Total:		0	**5**	**5**

**** PO – Property Only***

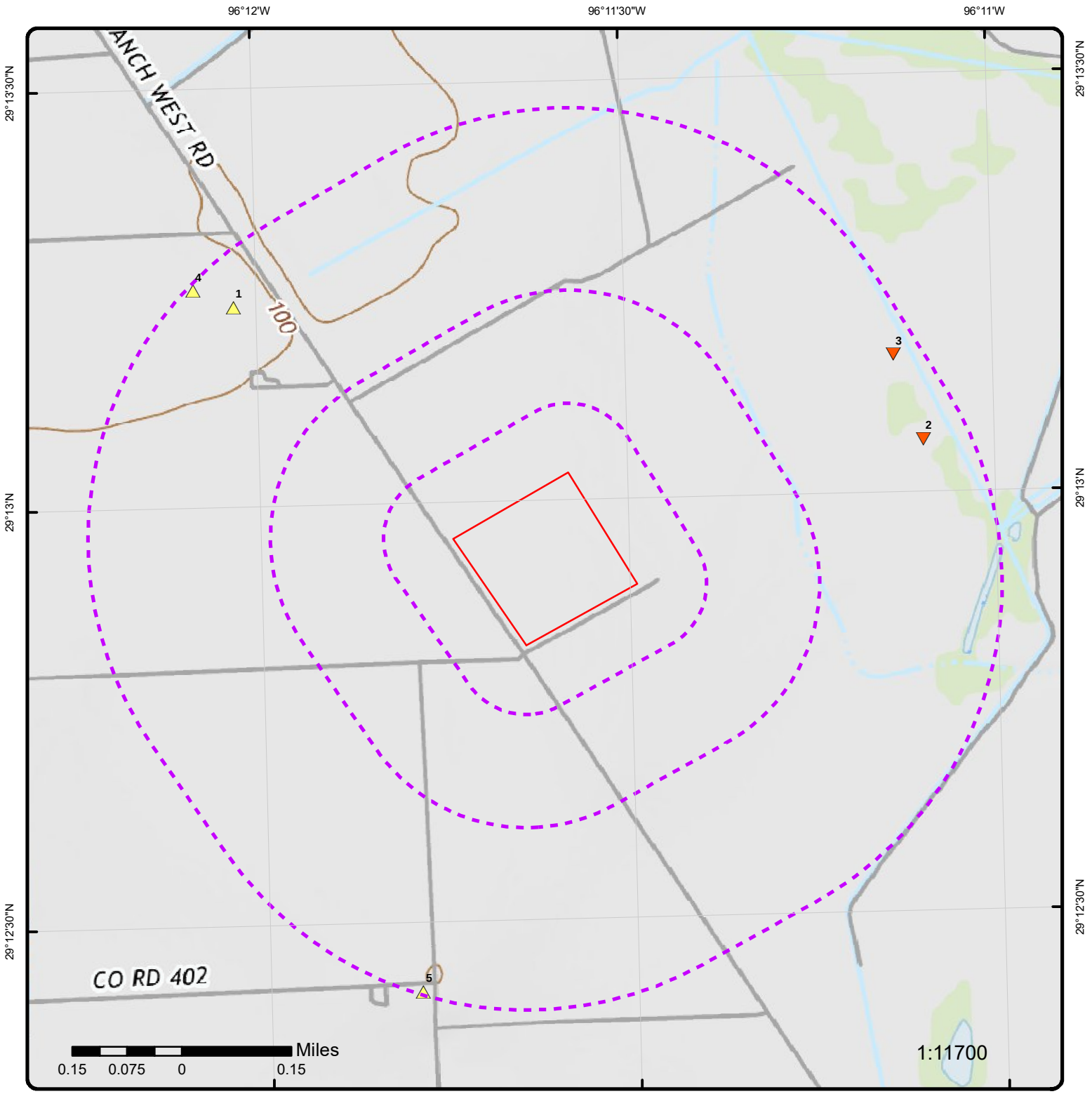
Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Page Number
1	SDRW WELLS	Philip Kocurek	1104 Cr 421 El Camop TX 77437 ***Track NO:*** *589679*	NW	0.44 / 2,307.69	12
2	SDRW WELLS	Pierce Ranch	East of CR 421 and CR 400 Intersection Pierce TX 77467 ***Track NO:*** *261011*	ENE	0.44 / 2,322.58	13
3	TCEQ WELL LOGS	PIERCE RANCH	TX ***Grid No | Owners Name:*** *66-55-2E | PIERCE RANCH*	ENE	0.46 / 2,449.98	14
4	TCEQ WELL LOGS	FLOYD WATZ	TX ***Grid No | Owners Name:*** *66-55-2J | FLOYD WATZ*	NW	0.49 / 2,599.05	16
5	GWDB	John Boyd	TX ***State Well No | Owner Name:*** *6655505 | John Boyd*	SSW	0.50 / 2,616.31	18



Map: 0.5 Mile Radius
Order Number: 25012900355
Address: 29.215278, -96.194167, El Campo, TX

ERIS

Plotted Water Wells

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Eris Areas with Higher Elevation
- Eris Areas with Same Elevation
- Eris Areas with Lower Elevation
- Eris Areas with Unknown Elevation



Aerial **Year: 2022**

Order Number: 25012900355

Address: 29.215278, -96.194167, El Campo, TX

© ERIS Information Inc.

Source: ESRI World Imagery

Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
1	1 of 1	NW	0.44 / 2,307.69	Philip Kocurek 1104 Cr 421 El Camop TX 77437	SDRW WELLS

Track NO: 589679
Date Submitted: 2021-11-23
Owner Name: Philip Kocurek
Owner Address: 1104 Cr 421
Owner Address2:
Owner City: El Camop
Owner State: TX
Owner Zip: 77437
County: Wharton
Type of Work: New Well
Typ of Wrk Oth Descr:
Proposed Use: Domestic
Prop Use Oth Descr:
Latitude: 29.2209
Longitude: -96.2007
Drilling Date Started: 2021-09-09
Drilling Date Completed: 2021-09-11
Chemical Analysis: No
Company Name: Kight Water Well Service
Company Address: 1073 COUNTY ROAD 479
CompanyAddress2:
Company City: EL CAMPO
Company State: TX
Company Zip: 77437
Company Country:
Data Source: Full SDR Database; SDRDB Well Location (Map)
Report Link: https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=589679&Type=SDR-Well

Well Borehole Information

Top Depth: 0
Bottom Depth: 366

Top Depth:
Bottom Depth: 366.0

Well Levels

Measurement: 62
Measurement Date: 2021-09-12

Well Strata

Water Type:

Good

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
2	1 of 1	ENE	0.44 / 2,322.58	Pierce Ranch East of CR 421 and CR 400 Intersection Pierce TX 77467	SDRW WELLS

Track NO: 261011
Date Submitted: 2011-07-29
Owner Name: Pierce Ranch
Owner Address: P.O. Box 538
Owner Address2:
Owner City: Pierce
Owner State: TX
Owner Zip: 77467
County: Wharton
Type of Work: New Well
Typ of Wrk Oth Descr:
Proposed Use: Irrigation
Prop Use Oth Descr:
Latitude: 29.217778
Longitude: -96.185
Drilling Date Started: 2011-06-27
Drilling Date Completed: 2011-07-06
Chemical Analysis: No
Company Name: Weisinger Incorporated
Company Address: 2200 East Davis
CompanyAddress2:
Company City: Conroe
Company State: TX
Company Zip: 77301
Company Country:
Data Source: Full SDR Database; SDRDB Well Location (Map)
Report Link: https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=261011&Type=SDR-Well

Well Borehole Information

Top Depth: 0
Bottom Depth: 710

Top Depth: 0
Bottom Depth: 8

Top Depth:
Bottom Depth: 710.0

Well Levels

Measurement: 82
Measurement Date: 2011-07-20

Well Strata

Water Type:

Fresh

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
3	1 of 1	ENE	0.46 / 2,449.98	PIERCE RANCH TX	TCEQ WELL LOGS

Grid No:	66-55-2E
Date Drilled:	11/08/1972
Owners Name:	PIERCE RANCH
County:	WHARTON
Water Usage:	DOMESTIC
Static Level:	44
Depth Drilled:	196
Latitude:	
Longtiude:	

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-45-5
Located on map XSS
Received: 2-2-73
Jilda

1) OWNER:
Person having well drilled Pierce Ranch (Name) Address Pierce (Street or RFD) Tex (City) (State)
Landowner Same (Name) Address (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Wharton 5 miles in NE (N.E., S.W., etc.) direction from El Campo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
See MAP ON 66-45-5B
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor League J. Talfener
Block 516 Survey
Abstract No. A-453
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check): New Well ✓ Deepening; Reconditioning; Plugging
4) PROPOSED USE (Check): Domestic ✓ Industrial; Municipal; Irrigation; Test Well; Other
5) TYPE OF WELL (Check): Rotary ✓ Driven; Dug; Cable; Jetted; Bored

6) WELL LOG:
Diameter of hole 7 in. Depth drilled 196 ft. Depth of completed well 196 ft. Date drilled 1-8-73
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Top Soil
5	28	Clay R
28	55	Sand
55	122	Clay R
122	138	Sand + G
138	146	Clay W
146	158	Sand
158	170	Clay R
170	196	Sand + G

(Use reverse side if necessary)

9) Casing: Type: Old; New ✓ Steel; Plastic ✓; Other
Cemented from ft. to ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4	0	194	SCH 40

10) SCREEN: Type PVC
Perforated; Slotted ✓

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
4	194	196	014

7) COMPLETION (Check): Straight wall; Gravel packed; Other; Under reamed; Open Hole

8) WATER LEVEL:
Static level 44 ft. below land surface Date
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc., ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes No If yes, by whom?
Yield: gpm with ft. drawdown after hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? Yes No
Did any strata contain undesirable water? Yes No
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Praytor (Type or Print) Water Well Drillers Registration No. 407
ADDRESS P.O. Box 63 (Street or RFD) El Campo (City) Tex (State)
(Signed) W. C. Praytor (Water Well Driller) Praytor Drilling (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-6

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
4	1 of 1	NW	0.49 / 2,599.05	FLOYD WATZ TX	TCEQ WELL LOGS

Grid No:	66-55-2J
Date Drilled:	03/15/1977
Owners Name:	FLOYD WATZ
County:	WHARTON
Water Usage:	RENT
Static Level:	37
Depth Drilled:	75
Latitude:	
Longtiude:	

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 66-55-2J
Located on map 1 of 5
Received: 7-1-77
dlc

1) OWNER:
Person having well drilled: Floyd Watt (Name) — Address: Rt 1 (Street or RFD) — El Campo (City) — Tex (State)
Landowner: Same (Name) — Address: (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County: Wharton, 3½ miles in E (N.E., S.W., etc.) direction from El Campo (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*
map on 66-63-39
North
(Use reverse side if necessary)

or Give legal location with distances and directions from adjacent sections or survey lines.
Labor _____ League _____
Block _____ Survey _____
Abstract No. _____
(NW¼ NE¼ SW¼ SE¼) of Section _____

3) TYPE OF WORK (Check): New Well ✓ Deepening / Reconditioning / Plugging
4) PROPOSED USE (Check): Domestic / Industrial / Municipal / Irrigation / Test Well / Other Rent
5) TYPE OF WELL (Check): Rotary ✓ Driven / Dug / Cable / Jetted / Bored

6) WELL LOG:
Diameter of hole 4½ in. Depth drilled 75 ft. Depth of completed well 75 ft. Date drilled 3-15-77
All measurements made from 0 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	5	Topsoil
5	49	Clay R
49	75	Sand

9) Casing:
Type: Old / New / Steel / Plastic / Other
Cemented from _____ ft. to _____ ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
7	0	69	Sch 40

10) SCREEN:
Type PA
Perforated / Slotted ✓

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size
2	69	75	.010

(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall ✓ / Gravel packed / Other
Under reamed / Open Hole

8) WATER LEVEL:
Static level 37 ft. below land surface Date _____
Artesian pressure _____ lbs. per square inch Date _____
Depth to pump bowls, cylinder, jet, etc., _____ ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes / No If yes, by whom? _____
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.
Bailer test _____ gpm with _____ ft. drawdown after _____ hrs.
Artesian flow _____ gpm
Temperature of water _____

12) WATER QUALITY:
Was a chemical analysis made? Yes / No
Did any strata contain undesirable water? Yes / No
Type of water? Good depth of strata 36

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME W. C. Praytor (Type or Print) — Water Well Drillers Registration No. 407
ADDRESS P.O. Box (Street or RFD) — El Campo (City) — Tex (State)
(Signed) W. C. Praytor (Water Well Driller) — Praytor Drlg. Co. (Company Name)

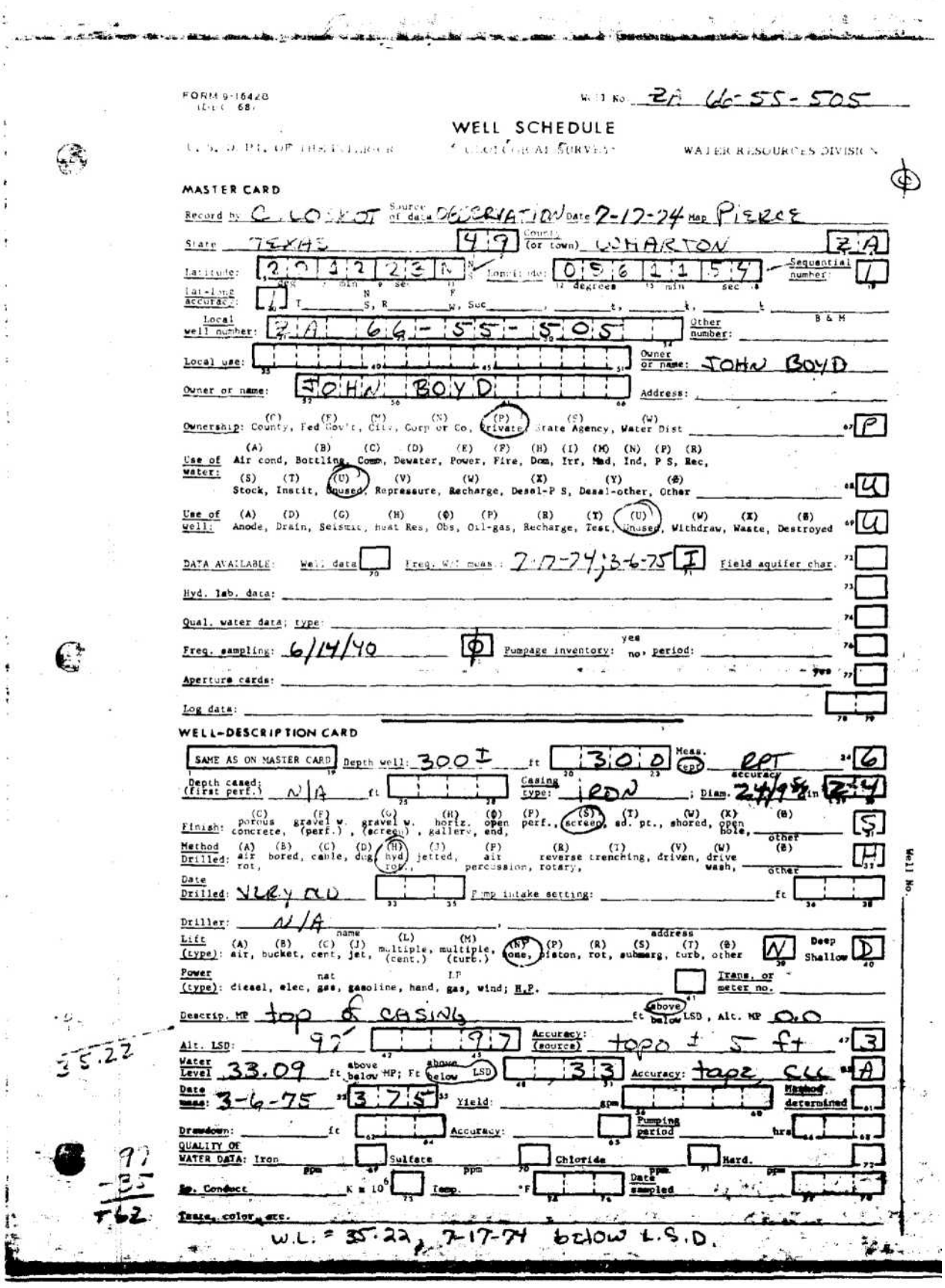
Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-8

Map Key	Number of Records	Direction	Distance (mi/ft)	Site	DB
5	1 of 1	SSW	0.50 / 2,616.31	John Boyd TX	GWDB

Well Rep Track No:	
State Well No:	6655505
Owner Name:	John Boyd
Drilling Start Dt:	
Drilling Month:	
Drilling Day:	
Drilling Year:	
Well Depth:	300
Well Usage:	Unused
Water Level Status:	
Latitude:	29.2066670
Longitude:	-96.1980560
Data Source:	Groundwater Database (GWDB) Reports; GIS shapefile of GWDB well locations
Well Info Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=6655505&Type=GWDB
Document Link:	https://www3.twdb.texas.gov/apps/waterdatainteractive//GetScannedImage.aspx?Num=6655505&Cnty=Wharton



FORM 9-1642B
(REV. 68)

Well No. 2A 66-55-505

WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

MASTER CARD

Record by C. LOVOI Source of data DESCRIPTION Date 7-17-74 Map PIERCE

State TEXAS 49 County (or town) WHARTON ZA

Latitude: 29 23 23 N Longitude: 096 11 54 Sequential number: 1

Lat-long accuracy: 1 T ____ S, R ____ W, Sec ____, ____, ____, ____

Local well number: ZA 66-55-505 Other number: ____ B & M

Local use: ____ Owner or name: JOHN BOYD

Owner or name: JOHN BOYD Address: ____

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist P

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Ind, (N) P S, (P) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Y) Desal-other, (@) Other U

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (@) Destroyed U

DATA AVAILABLE: Well data ____ Freq. WL meas.: 7-17-74; 3-6-75 I Field aquifer char. ____

Hyd. lab. data: ____

Qual. water data; type: ____

Freq. sampling: 6/14/40 Pumpage inventory: yes / no, period: ____

Aperture cards: ____

Log data: ____

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 300 I ft 310 Meas. rpt accuracy 6

Depth cased; (first perf.) N/A ft Casing type: RDW ; Diam. 24/9 5/8 in 2-4

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (Ø) open end, (P) perf., (S) screen, (T) sd. pt., (W) shored, (X) open hole, (@) other S

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (@) other H

Date Drilled: VERY OLD Pump intake setting: ____ ft

Driller: N/A name address

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple, (cent.), (M) multiple, (turb.), (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (@) other N Deep / Shallow D

Power (type): diesel, elec, gas, gasoline, hand, gas, wind; nat H.P. LP Trans. or meter no. ____

Descrip. MP top of CASING ft above / below LSD, Alt. MP 0.0

Alt. LSD: 97 917 Accuracy (source): topo ± 5 ft 3

Water Level 33.09 ft above / below MP; Ft above / below LSD 33 Accuracy: topo SLL A

Date meas: 3-6-75 375 Yield: ____ gpm Method determined ____

Drawdown: ____ ft Accuracy: ____ Pumping period ____ hrs

QUALITY OF WATER DATA: Iron ____ ppm Sulfate ____ ppm Chloride ____ ppm Hard. ____ ppm

Sp. Conduct ____ K x 10^6 Temp. ____ °F Date sampled ____

Tests, color, etc. W.L. = 35.22, 7-17-74 below L.S.D.

35.22

97
-35
T62

Well No.

Well No. 24 66-55-505

Latitude-longitude 29 d 12 m 23 s 96 d 11 m 54 s

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD | Physiographic Province: COASTAL PLAIN | 03 | Section:

F | Drainage Basin: | 521 | Subbasin:

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, (L) swamp, (O) offshore, (P) pediment, (S) hillside, (T) terrace, (U) undulating, (V) valley flat | F

MAJOR AQUIFER: ____ system, ____ series | J | ____ aquifer, formation, group | S

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

MINOR AQUIFER: ____ system, ____ series | ____ aquifer, formation, group

Lithology: | Origin: | Aquifer Thickness: ft

Length of well open to: ft | Depth to top of: ft

Intervals Screened:

Depth to consolidated rock: ft | Source of data:

Depth to basement: ft | Source of data:

Surficial material: | Infiltration characteristics:

Coefficient Trans: gpd/Ft | Coefficient Storage:

Coefficient Perm: gpd/ft^2; Spec cap: gpm/ft; Number of geologic cards:

40' - 24" CSG

MEASURED ~32" CSG - WELL MAY HAVE BEEN REWORKED

WELL NO.

GPO 865-801

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update.

Federal

Wells from NWIS: FED USGS

The U.S. Geological Survey's (USGS) National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This select NWIS Wells dataset contains specific Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well, Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern. Applicable NWIS database information is obtained through the Water Quality Data Portal (WQP). The WQP is a cooperative service sponsored by the USGS, the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC).

Government Publication Date: Mar 11, 2024

State

Well Log Reports from Plotted Water Wells: TCEQ WELL LOGS

Locations of TCEQ Water Wells as derived from well logs in the Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer, which includes unnumbered water wells and those plotted to 2.5 minute grid locations (2-3 miles). In this collection of Well Log Reports, locations have been manually verified.

Government Publication Date: Jul 26, 2022

Select Wells from SDR: SDRW WELLS

Locations of wells from the Submitted Drillers Report (SDR) Database with select proposed usage: Domestic, Fracking Supply, Industrial, Irrigation, Other, Public Supply, Rig Supply, Stock, Unknown. SDR is populated from the online Texas Well Report Submission and Retrieval System (TWRSRS), a cooperative Texas Department of Licensing and Regulation (TDLR) and Texas Water Development Board (TWDB) application requiring registered water-well drillers to submit reports. Excludes SDR records with the following proposed usage: Closed-Loop Geothermal, De-watering, Environmental Soil Boring, Extraction, Injection, Monitor, Test Well.

Government Publication Date: Sep 24, 2024

Groundwater Database: GWDB

The Texas Water Development Board (TWDB) Groundwater Database (GWDB) contains information on selected water wells, springs, oil/gas tests (that were originally intended to be or were converted to water wells), water levels and water quality.

Government Publication Date: Apr 12, 2024

Fort Bend Subsidence District Water Wells: WW FORT BEND

List of water wells in the Fort Bend Subsidence District, boundaries of which are defined as all the territory within Fort Bend County. The Fort Bend Subsidence District was created by the Texas Legislature in 1989 as a conservation and reclamation district to control land subsidence and manage groundwater resources through regulation, conservation, and coordination with suppliers of alternative water sources to assure an adequate quantity and quality of water for the future. The District's purpose is to provide for the regulation of the withdrawal of groundwater within the District to prevent subsidence that contributes to flooding, inundation or overflow of areas within the District, including rising waters resulting from storms or hurricanes.

Government Publication Date: Sep 23, 2024

High Plains Water Wells: WW HIGH PLAINS

Inventory of water wells in the High Plains Underground Water Conservation District No. 1 (HPUWCD), which was created in 1951. As a political subdivision of Texas, HPUWCD is charged with protecting, preserving and conserving aquifers within the District's 16-county service area.

Government Publication Date: Apr 14, 2024

Harris Galveston Subsidence District Water Wells: WW HARRIS GAL

List of water wells in the Harris-Galveston Subsidence District (HGSD). The HGSD was created by the 64th Texas Legislature as an underground water conservation district in 1975 to provide regulation of groundwater withdrawal to control subsidence.

Government Publication Date: Sep 23, 2024

Water Utility Database: WUD

The Water Utility Database is defined as a collection of data from Texas Water Districts, Public Drinking Water Systems and Water and Sewer Utilities who submit information to the TCEQ. This database is an integrated database designed and developed to replace over 160 stand alone legacy systems representing over 5 million records of the former Texas Water Commission and the Texas Department of Health.

Government Publication Date: Oct 1, 2020

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

T.F. SOILS INFORMATION

Soil Features

Soil mapping units included in this section for the production area and waste disposal areas were taken from the electronic Web Soil Survey for Wharton County. Soil descriptions are included in the supporting documentation and were taken from the most current version of the soil information database for Wharton County as obtained on February 7th, 2025.

T.G. ENGINEERING REPORT

Purpose

This report is prepared as part of the application for Wharton AD1, LLC. for a Texas Land Application Permit (TLAP) through the Texas Commission on Environmental Quality (TCEQ). Water balance models have been developed to illustrate the hydraulic and nutrient demands of the planned crops.

Background

Wharton AD1, LLC. is applying for a new Industrial Water Quality TLAP Permit No. WQ0000000000 to dispose of digestate (effluent) from two onsite anaerobic digesters. The entire process will generate an average of 75,000 gallons per day (GPO) of effluent for land application.

Water Balance Calculations

Figure 9, Water Balance Calculations, is designed to evaluate the maximum application rate (hydraulic loading rate) for the land application area, estimates the inflows and withdrawals from the direct rainfall, process-generated wastewater, evaporation, and irrigation withdrawal based on crop demand.

Storage Calculations

Figure 10, Storage Calculations, is designed to evaluate the storage capacity and surface area of the storage ponds.

Figure T.G.1

WATER BALANCE CALCULATIONS

WATER BALANCE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: **Wharton AD1, LLC**
Permit No.:

TWDB Data Quadrangle: **811**

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed application rate must not must not exceed the maximum calculated application rate or the maximum application rate based on agronomic analyis.

(1) Month	(2) Avg Rain	(3) Avg Runoff	(4) Avg Infilt Rainfall	(5) Evapo-trans.	(6) Required Leach	(7) Total Water Needs	(8) Effluent Needed in Root Zone	(9a) Raw Net Evap. from Reservoir	(9b) Reservoir Net Evap. (as inches on plot acres)	(10) Effluent Needed Based on Irrigation Efficiency	(11) Reservoir Consumtion (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.41	1.95	0.81	0.00	0.81	0.00	-1.03	0.00	0.00	0.00
February	2.15	0.58	1.57	1.17	0.00	1.17	0.00	0.11	0.00	0.00	0.00
March	2.90	1.07	1.82	0.45	0.00	0.45	0.00	0.67	0.00	0.00	0.00
April	3.07	1.20	1.87	1.7	0.00	1.70	0.00	1.34	0.00	0.00	0.00
May	4.50	2.32	2.18	4.5	0.58	5.08	2.90	0.40	0.00	3.41	3.41
June	4.08	1.97	2.10	8.75	1.66	10.41	8.31	1.66	0.00	9.77	9.77
July	3.46	1.49	1.97	4.7	0.68	5.38	3.41	2.67	0.00	4.01	4.01
August	3.40	1.44	1.96	1.7	0.00	1.70	0.00	2.87	0.00	0.00	0.00
September	3.89	1.82	2.07	5.13	0.77	5.90	3.83	1.11	0.00	4.50	4.50
October	4.10	1.99	2.11	4.05	0.49	4.54	2.43	0.07	0.00	2.85	2.85
November	3.78	1.74	2.04	2.07	0.01	2.08	0.03	-0.82	0.00	0.04	0.04
December	2.71	0.95	1.77	0.99	0.00	0.99	0.00	-0.63	0.00	0.00	0.00
Totals	41.41	18.00	23.41	36.02	4.18	40.20	20.90	8.41	0.00	24.59	24.59

Crop is	Coastal	
CN	78.32	*dimensionless*
Ce	1.00	*mmhos/cm*
Cl	5.00	*mmhos/cm*
Pond area	5.00	*acres*
Irrigation area	28955.00	*acres*
Irrigation Efficiency, *K*	0.85	*dimensionless*
Design Flow	0.075	*MGD*

Maximum calculated application rate =	2.05	*ac-in/ac/month* **OR** *ac-ft/ac/year*
Applicant's proposed application rate =		*ac-in/ac/month* **OR** *ac-ft/ac/year*
Maximum rate from agronomic analysis =	N/A	*ac-in/ac/month* **OR** *ac-ft/ac/year*

Recommended rate for permit = 2.05 *ac-in/ac/month* **OR** *ac-ft/ac/year*

Limiting factor = Click this cell to choose from list.

Gross rate check (from flow, acres) = 0.00 **OK**

(2) Average rainfall – Data source: Texas Water Development Board (see Quadrangle above)
(3) Average runoff = ⟦(*average rainfall* – (0.2*((1000/*CN*) – 10)))⟧^2/((*average rainfall* + (0.8*((1000/*CN*) – 10))))
(4) Average infiltrated rainfall = (*average rainfall – average runoff*)
(5) Evapotranspiration – Data Source: Borelli, Bulletin 6019
(6) Required leaching = ← Edit
If: *evapotranspiration – average infiltrated rainfall* ≤ 0, then 0;
If: *evapotranspiration – average infiltrated rainfall* > 0, *Ce* /(*Cl – Ce*)*(*evapotranspiration – avg infiltrated rainfall*)
(7) Total water needs = *evapotranspiration + required leaching*
(8) Effluent needed in root zone = *total water needs – average infiltrated rainfall*
(9a) Net evaporation – Data source: Texas Water Development Board (see Quadrangle above)
(9b) Raw net evaporation from reservoir surface = (*net evaporation from reservoir*)*((*pond area*)/(*irrigation area*))
(10) Effluent needed based on irrigation efficiency = (*effluent needed in root zone*)/(*irrigation efficiency*)
(11) Consumption from reservoir = *net evaporation from reservoir surface + effluent needed based on irrigation efficiency*

Figure T.G.2
STORAGE CALCULATIONS

STORAGE CALCULATIONS, all units in inches (unless otherwise specified)

Permittee: Wharton AD1, LLC
Permit No.: 0

The storage calculations are designed to evaluate the storage capacity and surface area of the applicant's storage pond (or multiple ponds). The pond must have enough surface area to evaporate all the flow to the pond under low-net evaporation and corresponding annual rainfall conditions. The pond is considered adequately sized when the adidtional storage required is equal to zero (or "none"). If the additional storage required is greater than zero, then:
(1) the pond's storage capacity must be increase, (2) the pond's surface area must be increased, (3) the effluent flow must be reduced, or (4) other approved measures must be taken to ensure that no accumulation occurs during low-net evaporation and corresponding annual rainfall conditions.

(12)	(13)	(14a)	(14b)	(15)	(16)	(17)	(18a)	(18b)	(19)	(20)
Month	Effluent Available (as inches on plot acres)	Average Rainfall Distrib. (%)	Rain Worst Year	Field Runoff Worst Year	Infiltrated Rain	Avail Water	Average Net Evap. Distrib. (%)	Low Net Evap. from Reservoir Surface	Effluent to Storage (as inches on plot acres)	Accum Storage (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	8.11%	5.04	2.77	2.27	2.27	-12.28%	0.00	0.00	-
February	0.00	5.19%	3.22	1.31	1.91	1.92	1.31%	0.00	0.00	-
March	0.00	6.99%	4.34	2.19	2.15	2.16	7.99%	0.00	0.00	0.01
April	0.00	7.41%	4.60	2.40	2.20	2.20	15.96%	0.00	0.00	0.01
May	0.00	10.88%	6.76	4.29	2.47	2.47	4.77%	0.00	-3.07	-
June	0.00	9.85%	6.12	3.72	2.40	2.41	19.77%	0.00	-9.42	-
July	0.00	8.37%	5.20	2.91	2.29	2.29	31.68%	0.00	-3.64	-
August	0.00	8.22%	5.10	2.83	2.27	2.28	34.09%	0.00	0.00	-
September	0.00	9.40%	5.84	3.47	2.37	2.37	13.18%	0.00	-4.14	-
October	0.00	9.91%	6.15	3.75	2.41	2.41	0.78%	0.00	-2.50	-
November	0.00	9.13%	5.67	3.32	2.35	2.35	-9.76%	0.00	0.00	-
December	0.00	6.55%	4.07	1.97	2.10	2.11	-7.50%	0.00	0.00	-
Totals	0.03	100%	62.12	34.93	27.19	27.23	100%	0.00	—	-

Worst (low) net evap. =	-18.96 inches	Storage required =	29.87 *ac-ft*
Corresponding rain =	62.12 inches	Actual storage =	*ac-ft*
Worst-case net year =	2004	Additional storage required =	29.87 *ac-ft*
		Storage days =	130 *days*

(13) Effluent available for irrigation (assumes design flow is applied to entire acerage unless different flow values are justified).
(14a) Average rainfall distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(14b) Rainfall worst year = (*rainfall distribution* as fraction or %/100*) *maximum annual rainfall*
(15) Field runoff worst year = ⟦(*rainfall worst year* – (0.2*((1000/*CN*) – 10)))⟧^2/((*rainfall worst year* + (0.8*((1000/*CN*) – 10))))
(16) Infiltrated rainfall = (rainfall worst year- field runoff worst year)
(17) Available water = (effluent available for land application + infiltrated rainfall check)
(18) (18a) Average net evaporation distribution - Data source: Texas Water Development Board (see Quadrangle in Water Balance Calculations above)
(18b) Net low evaporation from reservoir surface = [(|*low net evaporation*|)*(*net low evaporation avg. dist*)]* [(*pond area*)/(*irrigation area*)]
(19) Storage =
If: (*total water needs – infiltrated rainfall*) < 0, (*effluent available for land application – net low evaporation from reservoir surface*);
If: (*total water needs – infiltrated rainfall*) ≥ 0,
(effluent available for land application – net low evaporation from reservoir surface) * [(total water needs – infiltrated rainfall)/ (irrigation efficiency)]
(20) Accumulated storage =
If: *net low evaporation from reservoir surface + storage* ≤ 0, 0
If: *net low evaporation from reservoir surface + storage* > 0, enter value

T.H. OFF-SITE WASTES:

Volume and Type of Incoming Feedstock

Wharton AD1, LLC estimates a capacity to digest approximately 121,872 tons of feed stock per year; approximately 80,000 tons per year ("tpy") would originate from source separated organics, packaged waste, canned liquid and liquid organics and approximately 40,000 tpy would consist of dilution water (pressate, wash water and recovered). These wastes are to be acquired from multiple sources from Greater Houston Area. The total volume and percent of each source will fluctuate based on availability and needs of the digester. A summary of the proposed waste categories is as follows:

Category 1: Source-separated Organics (SSO)

Description: Source-Separated Organics (SSO) serve as a feedstock for biogas plants, providing high-energy organic material for anaerobic digestion (AD). The process breaks down food waste, yard waste, and soiled paper in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (nutrient-rich fertilizer).

Anticipated Quantity: 75 (tpd) (27,375 tpy)

Category 2: Packaged Waste

Description: Before material is brought on-site, the material must meet quality standards and haulers must provide a manifest for each truck. The waste undergoes depackaging to separate the organic fraction from non-biodegradable materials. The organic content is then fed into an anaerobic digestion (AD) system, where it decomposes in oxygen-free conditions, producing biogas (methane-rich fuel) and digestate (fertilizer).

Anticipated Quantity: 50 tpd (18,375 tpy)

Category 3: Canned liquid

Description: Canned liquid waste, like expired beverages and dairy, serves as a high-energy feedstock for biogas plants after depackaging. Rich in sugars, fats, and proteins, it enhances biogas production while reducing landfill waste. The process generates biogas for energy and digestate for fertilizer, promoting sustainability.

Anticipated Quantity: 25 tpd (9,000 tpy)

Category 4: Liquid Organics

Description: Liquid organics, such as food processing waste, dairy waste, and expired beverages, serve as an efficient feedstock for biogas plants. High in sugars, fats, and proteins, they accelerate anaerobic digestion, boosting biogas production and energy recovery.

Anticipated Quantity: 72 tpd (26,232 tpy)

Category 5: Other

Description: Dilution water, including pressate, wash water, and recovered water, enhances biogas production by optimizing feedstock consistency in anaerobic digestion. Pressate provides soluble organics, wash water adds biodegradable residues, and recovered water improves digestion efficiency. Their use increases methane yield, stabilizes the process, and supports resource recovery.

Anticipated Quantity: 112 tpd (40,890 tpy)

T.I. POLLUTANT ANALYSIS DATA

Pollutant analysis data is not available. Once the facility is in operation, samples will be collected and submitted to the TCEQ to meet the permit requirements.

PERMIT NO. WQ0005487000

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. Box 13087
Austin, Texas 78711-3087

PERMIT TO DISPOSE OF WASTES
under provisions of
Chapter 26 of the Texas Water Code

I. NAME OF PERMITTEE

A. Name: Wharton AD 1, LLC
B. Address: 133 Boston Post Road, Building 15, Floor 2
Weston, Massachusetts 02493

II. NATURE OF BUSINESS PRODUCING WASTE

Wharton AD 1, LLC, which proposes to operate Pierce Ranch, a biogas production facility utilizing anaerobic digestion to produce renewable natural gas and other agricultural by-product such as liquid fertilizer. (SIC 4924)

III. GENERAL DESCRIPTION AND LOCATION OF WASTE DISPOSAL SYSTEM

Description: Anaerobic digestion is a process by which organic material, such as animal manure and food waste, is broken down by microbes in an enclosed environment to produce biogas. The facility will accept food waste (i.e., restaurant food, expired foods, etc.) and cow manure to produce renewable natural gas and other agricultural by product such as liquid fertilizer. There will be two anaerobic digesters at the facility. Feed to the digesters will be food waste slurry. Manure will be transferred into the anaerobic digester (AD) tank by tanker trucks as needed to maintain gas production. Food waste will be sent to a hydrolysis tank prior to being introduced to the digesters. The heated digester will include mixing to homogenize the waste. Biogas will be collected from the digesters. Liquid digestate is the effluent discharged from the digesters. Liquid digestate will be stored in the onsite lagoon with a storage capacity of 34.2 acre-feet prior to land application on 28,955 acres of corn, Bermuda grass, and cotton.

Location: The facility will be located approximately 1.5 miles southeast of the intersection of Pierce West Road and United States (U.S.) Highway 59, near the City of Pierce, in Wharton County, Texas 77437 and the diposal areas will be located across multiple tracts in a north, northeast, and southeast direction from the facility.

Drainage Basin: The facility and disposal site will be located in the drainage area of Colorado River Below La Grange in Segment No. 1402 of the Colorado River Basin. No discharge of pollutants into water in the state is authorized by this permit.

This permit shall expire at midnight five years from the date of permit issuance.

ISSUED DATE:

_____
For the Commission

IV. CONDITIONS OF THE PERMIT

Character: Process wastewater is disposed via irrigation on 28,955 acres of corn, Bermuda grass, and cotton.

Volume: The volume of wastewater routed from the digesters to the storage lagoon shall not exceed a daily average flow of 0.075 million gallons per day (MGD).

Quality: The wastewater shall be monitored for the following parameters at the on-site storage lagoon, prior to being pumped to the land application area.

Parameter	Daily Average, mg/L	Daily Maximum, mg/L	Frequency	Sample Type
Flow [1]	0.075 MGD	Report, MGD	1/day	Meter
Flow [2]	Report, MGD	Report, MGD	1/day	Mater
Biochemical Oxygen Demand, 5-day (BOD_5)	N/A	Report	1/week	Grab
Total Suspended Solids	N/A	Report	1/week	Grab
Oil and Grease (as HEM) [3]	N/A	Report	1/week	Grab
Fecal Coliform	N/A	Report, cfu/100 mL [4]	1/week	Grab
Nitrate-Nitrogen	N/A	Report	1/6 months	Grab
Ammonia Nitrogen	N/A	Report	1/6 months	Grab
Total Organic Nitrogen	N/A	Report	1/6 months	Grab
Total Kjeldahl Nitrogen (TKN)	N/A	Report	1/6 months	Grab
Total Phosphorus	N/A	Report	1/6 months	Grab
Electrical Conductivity	N/A	Report, mmhos/cm	1/6 months	Grab
pH, Standard Units (SU)	6.0 SU, min	9.0 SU	1/day	Grab

Application Rate

Application rate shall not exceed the following level of effluent routed to the irrigation fields.

Hydraulic loading rate: 0.023 acre-feet per acre irrigated per year (ac-ft/ac/yr). See Special Provision H.

Organic loading rate: 100 lbs/acre/day [measured as BOD_5]. See Special Provision I.

Results from the analyses must be retained on site for five years and available for inspection by authorized representatives of the Texas Commission on Environmental Quality (TCEQ). This data must be submitted to the TCEQ Enforcement Division (MC 224), Industrial Permits Team (MC 148), and Region 12 Office during the month of September of each calendar year.

V. SPECIAL PROVISIONS:

A. For the purpose of Part IV of this permit, the following definitions shall apply:

1. Grab sample quality – the quality determined by measuring the concentration in milligrams per liter, parts per million, or other appropriate units of measurement in a single grab sample of the defined waste.

[1] Flow should be measured after the digesters prior to entering the storage lagoon.

[2] Flow should be measured at the on-site storage lagoon, as it is being pumped to the land application area.

[3] Oil and Grease (as HEM) means total recoverable oil and grease measured as n-hexane extractable material.

[4] Colony forming units (cfu) per 100 mL or most probable number (MPN) per 100 mL.

2. Total Kjeldahl Nitrogen (TKN) is defined as the total of ammonia-nitrogen and total organic nitrogen.

3. Manure – Feces and/or urine excreted by livestock. Manure includes litter, bedding, compost, feed, and other raw materials commingled with feces and/or urine. Manure may exist in solid, semi-solid or slurry form.

4. Digestate – Nutrient-rich liquid. For the purpose of this permit, digestate is anything that has less than 4 percent of solid content.

5. Nuisance – Any discharge of air contaminant(s), including but not limited to odors, of sufficient concentration and duration that are or may tend to be injurious to or which adversely affects humans health or welfare, animal life, vegetation, or property.

B. This permit does not authorize the disposal of domestic wastewater. All domestic wastewater must be disposed of in an approved manner, such as routing to an approved on-site septic tank and drainfield system or to an authorized third party for treatment and disposal.

C. There shall be no disposal of manure, litter, or stormwater on the 28,955 acres.

D. Readily accessible sampling points and flow measuring devices shall be provided by the permittee.

E. The permittee shall provide adequate maintenance of the storage and irrigation facilities to ensure that the facilities are in working condition. The storage or irrigation facilities shall not be removed from service without prior notification to the Executive Director of the TCEQ.

F. This permit does not authorize the discharge of any pollutants from the irrigation site. The wastewater disposal system shall be designed and operated to prevent:

1. Discharge from the irrigated property.
2. Recharge of groundwater resources which supply or may potentially supply domestic wastewater.
3. The occurrence of nuisance conditions.

G. Unauthorized stormwater drainage shall be prevented from entering all ponds and from running onto the irrigation tracts.

H. The permittee is responsible for providing equipment to determine application rates and maintaining accurate records of the volume of effluent applied. These records shall be made available for review by TCEQ and shall be maintained on-site for at least three years.

I. The organic loading rate shall be calculated as a mass loading (measure as BOD_5). The loading shall be calculated each time the effluent is sampled for this parameter. The mass shall be determined by the most recent effluent concentration determined prior to irrigation multiplied by the volume of effluent applied and multiplied by the conversion factor 8.345.

For example:

$$Effluent\ BOD_5, \frac{mg}{L} \times volume\ of\ effluent\ applied, MGD \times 8.345 = BOD_5, lbs/day$$

The daily loading is determined by dividing the mass (lbs/day) applied in a day to the irrigated area by the number of acres irrigated that day.

J. The permittee shall use cultural practices to promote and maintain the health and propagation of the corn, Bermuda grass, and cotton and avoid plant lodging. The permittee shall harvest the crops (cut and remove it from the fields) at least once during the year. Harvesting and mowing dates shall be recorded in a logbook kept on-site to be made available to TCEQ personnel upon request.

K. The physical condition of the land application fields shall be monitored on a weekly basis. Any area with problems such as surface runoff, surficial erosion, or stressed or damaged vegetation, etc., shall be recorded in a field log kept on-site. Corrective measures shall be implemented within 24-hours of discovery.

L. Irrigation practices shall be designed and managed to prevent ponding of effluent or contamination of ground and surface waters and to prevent the occurrence of nuisance conditions in the area. To promote effluent and nutrient uptake by the crop, and to prevent pathways for effluent surfacing, corn, Bermuda grass, and cotton shall be established and well maintained in the irrigation area throughout the year. Tailwater control facilities shall be provided as necessary to prevent the discharge of any effluent from the irrigated land.

M. For any area where effluent is stored, the permittee shall erect adequate signs stating that the irrigation water is from a non-potable water supply. Signs shall consist of a red slash superimposed over the international symbol for drinking water accompanied by the message "DO NOT DRINK THE WATER" in both English and Spanish.

N. Effluent must be applied by a method and under conditions that prevent runoff beyond the active application area, infiltration beyond the rooting zone, and that protect the quality of the surface water, groundwater, and the soils in the unsaturated zone. In addition, the following conditions must be met:

    1. Effluent application shall not be irrigated in the EtA soil group within the land management units (LMUs) 254 and 255. The permittee shall maintain a map/drawing of these prohibited areas on-site and make available to TCEQ upon request.

    2. Effluent application shall not be irrigated during the winter months (December to March) or when the ground water table is shallow, soil is saturated, frozen or when it is raining. Additionally, no effluent may be applied within twenty-four (24) hours after a measured rainfall of 0.5 inch or greater, or to any field containing standing water.

    3. Effluent shall not be land applied during any time when precipitation occurs, which is the deposit on the land of rain, mist, hail, sleet, or snow that falls on the ground under the action of gravitational force. In addition, effluent shall not be land applied during periods in which surface soils are saturated, or when pooling of water is evident in the land application unit.

    4. Effluent must not be applied to any areas having a slope in excess of 10%.

    5. Where runoff from the active application area is evident, the operator must cease further effluent application until the condition is corrected.

O. Within 90 days of permit issuance and prior to any wastewater application, the permittee shall obtain representative soil samples from the root zones of the land application area receiving wastewater. Composite sampling techniques shall be used. Each composite sample shall represent no more than 80 acres with no less than 10 to 15 subsamples representing each composite sample. Subsamples shall be composited by like sampling depth, type of crop

and soil type for analysis and reporting. Soil types are soils that have like topsoil or plow layer textures. These soils shall be sampled individually from 6 to 18 inches and 18 to 30 inches below ground level. Soil samples shall be analyzed within 30 days of sample collection. The permittee must provide analyses for the following constituents.

- pH [2:1 (volume/volume) water/soil mixture;
- electrical conductivity [2:1 (volume/volume) water/soil mixture];
- sodium adsorption ratio (SAR not to exceed 10) from a water saturated paste and its constituent parameters (water soluble Sodium (Na), Calcium (Ca), and Magnesium (Mg) reported in mg/L);
- TKN;
- Total nitrogen (organic nitrogen + nitrate-nitrogen + ammonium nitrogen);
- Nitrate-nitrogen (from a 1 N KCL soil extract);
- Potassium;
- Phosphorus;
- Calcium;
- Magnesium;
- Sulfur; and
- Sodium.

The analyses shall be sent to the TCEQ for review to the Water Quality Assessment Team (MC 150).

P. The permittee shall submit an Agronomic Management Plan (AMP). The plan shall be sent for review/revisions and approval within 90 days of permit issuance to the Water Quality Assessment Team (MC 150) and TCEQ Region 12 Office (MC R12). This plan shall include the following information:

1. A description of the land application process and all best management practices (BMPs) utilized to address surface runoff potential and shallow water tables,
2. A cropping plan that details the cover crops to be utilized on each field,
3. A USDA NRCS soils map showing each field that receives irrigation, and
4. A description that illustrates monitoring and management of nutrient constituents within the effluent and soils, as well as the long term management goals to address potential buildup of constituents.

The plan shall be updated and submitted to the TCEQ Region 12 Office (MC R12) and the Water Quality Assessment Team (MC 150) by November 30th of each year.

Q. Application of effluent shall occur only during months with actively growing vegetation as defined in the approved AMP. Pre-watering of no more than 2 inches/acre/year shall be allowed to the fields of intended use no more than 30 days prior to crop planning.

R. The permittee shall maintain monthly records of wastewater application of each irrigation site. These records shall contain the following information:

1. Month
2. Number of acres of each crop
3. Total monthly irrigation flow to each field (gallons/month)
4. Irrigation application rate in each field (acre-feet/acre/year).

The permittee shall summarize the records by month and submit them as part of the AMP to the TCEQ Region 12 (MC R12) and the Water Quality Assessment Team (MC 150) by November 30th of each year.

S. Soil Salinity Testing Plan

The permittee shall obtain representative soil samples from the root zones of each individual field or land application area receiving wastewater. Composite sampling techniques shall be used. Each composite sample shall represent no more than 80 acres with no less than 10 to 15 subsamples representing each composite sample. Subsamples shall be composited by like sampling depth, type of crop and soil type for analysis and reporting. Soil types are soils that have like topsoil or plow layer textures. These soils shall be sampled individually each quarter from 0 to 6 inches and 6 to 12 inches. The permittee shall sample soils within the quarter that ends in September 30th, December 31st, March 31st, and June 30th of each year. Soil samples shall be analyzed within 30 days of sample collection. Soil samples shall be analyzed within 30 days of sample collection.

Samples shall be analyzed quarterly according to the following table:

Parameter	**Method**	**Minimum Analytical Level (MAL)**	**Reporting units**
Water-soluble: Sodium (Na) Calcium (Ca) Magnesium (Mg)	Obtained from the SAR water saturated paste extract	1 (Na) 1 (Ca) 1 (Mg)	Water soluble constituents are reported in mg/L
Sodium Adsorption Ratio (SAR)	$SAR = \frac{Na}{\sqrt{\frac{(Ca + Mg)}{2}}}$		Express concentrations of Na, Ca and Mg in the water saturated paste extract in milliequivalents/liter (meq/L) to calculate the SAR. The SAR value is unit less. **If the SAR is greater than 10, amendments (e.g., gypsum) shall be added to the soil to adjust the SAR to less than 10.**
Amendment addition, e.g., gypsum			Report in short tons/acre in the year effected

A copy of this soil testing plan shall be provided to the analytical laboratory prior to sample analysis. The permittee shall include the following in the plan:

1. The results of the current quarterly soil sample analyses with copies of the laboratory reports;
2. The average SAR of the 0-12 inch depth during the last two consecutive years;
3. A map depicting the areas that have received wastewater within the permanent land application fields; and
4. A map and report detailing where and how much gypsum has been added to a field within the last 2 years, if applicable

The plan shall be submitted to the TCEQ, Water Quality Assessment Team (MC 150) and Industrial Permits Team (MC 148) of the Water Quality Division no later than September 30th, December 31st, March 31st, and June 30th of each year.

T. The permittee shall develop a written plan for investigation of elevated soil salinity and sodium adsorption ratios (SAR) within the irrigation tracts. The plan shall include detailed information regarding past, present, and further management of soils, wastewater quality, and crops. Analytical results of historical wastewater and soil monitoring shall be incorporated in the investigation as appropriate. The plan shall be submitted to the Water Quality Assessment Team (MC 150) of the Water Quality Division within 90 days following the date of permit issuance. Approval for implementation of the plan shall be obtained from the Water Quality Assessment Team and shall be initiated within 60 days of receiving the approval. This permit may be reopened to include additional requirements or limitations based upon a review of the information that is submitted.

U. Soil Testing Plan

The permittee shall obtain representative soil samples from the root zones of the land application area receiving wastewater. Composite sampling techniques shall be used. Each composite sample shall represent no more than 80 acres with no less than 10 to 15 subsamples representing each composite sample. Subsamples shall be composited by like sampling depth, type of crop and soil type for analysis and reporting. Soil types are soils that have like topsoil or plow layer textures. These soils shall be sampled individually from 0 to 6 inches, 6 to 18 inches, and 18 to 30 inches below ground level. The permittee shall sample soils in December to February of each year. Soil samples shall be analyzed within 30 days of sample collection.

Parameter	**Method**	**Minimum Analytical Level (MAL)**	**Reporting units**
pH	2:1 (v/v) water to soil mixture		Reported to 0.1 pH units after calibration of pH meter
Electrical Conductivity	Obtained from the SAR water saturated paste extract if SAR is required	0.01	dS/m (same as mmho/cm)

Parameter	Method	Minimum Analytical Level (MAL)	Reporting units
Nitrate-nitrogen, ammonium nitrogen	From a 1 N KCl soil extract	1	mg/kg (dry weight basis)
Total Kjeldahl Nitrogen (TKN)	For determination of Organic plus Ammonium Nitrogen. Procedures that use Mercury (Hg) are not acceptable.	20	mg/kg (dry weight basis)
Total Nitrogen	= TKN plus Nitrate-nitrogen		mg/kg (dry weight basis)
Plant-available: Phosphorus	Mehlich III with inductively coupled plasma	1 (P)	mg/kg (dry weight basis)
Plant-available: Potassium (K) Calcium (Ca) Magnesium (Mg) Sodium (Na) Sulfur (S)	May be determined in the same Mehlich III extract with inductively coupled plasma	5 (K) 10 (Ca) 5 (Mg) 10 (Na) 1 (S)	mg/kg (dry weight basis)
Water-soluble: Sodium (Na) Calcium (Ca) Magnesium (Mg)	Obtained from the SAR water saturated paste extract	1 (Na) 1 (Ca) 1 (Mg)	Water soluble constituents are reported in mg/L
Sodium Adsorption Ratio (SAR)	$SAR = \frac{Na}{\sqrt{\frac{(Ca + Mg)}{2}}}$		Express concentrations of Na, Ca and Mg in the water saturated paste extract in milliequivalents/liter (meq/L) to calculate the SAR. The SAR value is unit less. If the SAR is greater than 10, amendments

Parameter	Method	Minimum Analytical Level (MAL)	Reporting units
			(e.g., gypsum) shall be added to the soil to adjust the SAR to less than 10.
Amendment addition, e.g., gypsum			Report in short tons/acre in the year effected
Oil and Grease	EPA approved Hexane extractable method for solids		Mg/kg (dry weight basis) Analyze within 28 days of sample collection and presevation

A copy of this soil testing plan shall be provided to the analytical laboratory prior to sample analysis. The permittee shall submit the results of the annual soil sample analyses with copies of the laboratory reports and a map depicting the areas that have received wastewater within the permanent land application fields to the TCEQ Region 12 Office (MC R12), Water Quality Assessment Team (MC 150), and to the Enforcement Division (MC 224), no later than the end of September of each sampling year. If wastewater is not applied in a particular year, the permittee shall notify the same TCEQ offices and indicate that wastewater has not been applied on the approved land irrigation site(s) during that year.

V. The wastewater irrigation field and wastewater pond shall be located a minimum horizontal distance of 150 feet from private water wells; and a minimum horizontal distance of 500 feet from public water supply wells, spring, or other similar sources of public drinking water. All abandoned and unusable wells shall be plugged according to 16 TAC Chapter 76.

W. Vegetative buffer strips of no less than 100 feet shall be maintained between the wastewater application area and surface water in the state, as defined by Texas Water Code Section 26.001.

X. Pond Requirements

A wastewater pond must comply with the following requirements. A *wastewater pond (or lagoon)* is an earthen structure used to evaporate, hold, store, or treat water that contains a *waste* or *pollutant* or that would cause *pollution* upon *discharge* as those terms are defined in Texas Water Code § 26.001, but does not include a pond that contains only *stormwater*.

1. A wastewater pond **subject to 40 CFR Part 257, Subpart D** (related to coal combustion residuals) must comply with those requirements in lieu of the requirements in 2 through 7 of POND REQUIREMENTS.
2. An **existing** wastewater pond must be maintained to meet or exceed the original approved design and liner requirements; or, in the absence of original approved requirements, must be maintained to prevent unauthorized discharge of wastewater into or adjacent to water in the state. The permittee shall maintain copies of all liner construction and testing documents at the facility or in a reasonably accessible location and make the information available to the executive director upon request.

3. A **new** wastewater pond constructed after the issuance date of this permit must be lined in compliance with one of the following requirements if it will contain process wastewater as defined in 40 CFR §122.2. The executive director will review ponds that will contain only non-process wastewater on a case-by case basis to determine whether the pond must be lined. If a pond will contain only non-process wastewater, the owner shall notify the Industrial Permits Team (MC 148) to obtain a written determination at least 90 days before the pond is placed into service and copy the TCEQ Compliance Monitoring Team (MC-224). The permittee must submit all information about the proposed pond contents that is reasonably necessary for the executive director to make a determination. If the executive director determines that a pond does not need to be lined, then the pond is exempt from 3a through 3c and 4 through 7 of POND REQUIREMENTS.

   A wastewater pond that only contains domestic wastewater must comply with the design requirements in 30 TAC Chapter 217 and 30 TAC §309.13(d) in lieu of items 3a through 3c of this subparagraph.

   a. Soil liner: The soil liner must contain clay-rich soil material (at least 30% of the liner material passing through a #200 mesh sieve, liquid limit greater than or equal to 30, and plasticity index greater than or equal to 15) that completely covers the sides and bottom of the pond. The liner must be at least 3.0 feet thick. The liner material must be compacted in lifts of no more than 8 inches to 95% standard proctor density at the optimum moisture content in accordance with ASTM D698 to achieve a permeability less than or equal to 1×10^{-7} (≤ 0.0000001) cm/sec. For in-situ soil material that meets the permeability requirement, the material must be scarified at least 8 inches deep and then re-compacted to finished grade.

   b. Synthetic membrane: The liner must be a synthetic membrane liner at least 40 mils in thickness that completely covers the sides and the bottom of the pond. The liner material used must be compatible with the wastewater and be resistant to degradation (e.g., from ultraviolet light, chemical reactions, wave action, erosion, etc.). The liner material must be installed and maintained in accordance with the manufacturer's guidelines. A wastewater pond with a synthetic membrane liner must include an underdrain with a leak detection and collection system.

   c. Alternate liner: The permittee shall submit plans signed and sealed by a Texas-licensed professional engineer for any other equivalently-protective pond lining method to the TCEQ Industrial Permits Team (MC-148) and copy the TCEQ Compliance Monitoring Team (MC-224).

4. For a pond that must be lined according to subparagraph 3 (including ponds with in-situ soil liners), the permittee shall provide certification, signed and sealed by a Texas-licensed professional engineer, stating that the completed pond lining and any required underdrain with leak detection and collection system for the pond meet the requirements in subparagraph 3a - 3c before using the pond. The certification shall include the following minimum details about the pond lining system: (1) pond liner type (in-situ soil, amended in-situ soil, imported soil, synthetic membrane, or alternative), (2) materials used, (3) thickness of materials, and (4) either permeability test results or a leak detection and collection system description, as applicable.

   The certification must be provided to the TCEQ Water Quality Assessment Team (MC-150), Industrial Permits Team (MC-148), Compliance Monitoring Team (MC-224), and Regional Office. A copy of the liner certification and construction details (i.e., as-built drawings, construction QA/QC documentation, and post construction testing) must be kept on-site or in a reasonably accessible location (in either hardcopy or digital format) until the pond is closed.

5. Protection and maintenance requirements for a pond subject to subparagraph 2 or 3 (including ponds with in-situ soil liners).
   a. The permittee shall maintain a liner to prevent the unauthorized discharge of wastewater into or adjacent to water in the state.
   b. A liner must be protected from damage caused by animals. Fences or other protective devices or measures may be used to satisfy this requirement.
   c. The permittee shall maintain the structural integrity of the liner and shall keep the liner and embankment free of woody vegetation, animal burrows, and excessive erosion.
   d. The permittee shall inspect each pond liner and each leak detection system at least once per month. Evidence of damage or unauthorized discharge must be evaluated by a Texas-licensed professional engineer or Texas-licensed professional geoscientist within 30 days. The permittee is not required to drain an operating pond or to inspect below the waterline during these routine inspections.
      i. A Texas-licensed professional engineer or Texas-licensed professional geoscientist must evaluate damage to a pond liner, including evidence of an unauthorized discharge without visible damage.
      ii. Pond liner damage must be repaired at the recommendation of a Texas-licensed professional engineer or Texas-licensed professional geoscientist. If the damage is significant or could result in unauthorized discharge, then the repair must be documented and certified by a Texas-licensed professional engineer. Within 60 days after a repair is completed, liner certification must be provided to the TCEQ Water Quality Assessment Team (MC-150), Compliance Monitoring Team (MC-224), and TCEQ Regional Office. A copy of the liner certification must be maintained at the facility or in a reasonably accessible location and made available to the executive director upon request.
      iii. A release determination and subsequent corrective action will be based on 40 CFR Part 257 or the Texas Risk Reduction Program (30 TAC Chapter 350), as applicable. If evidence indicates that an unauthorized discharge occurred, including evidence that the actual permeability exceeds the design permeability, the matter may also be referred to the TCEQ Enforcement Division to ensure the protection of the public and the environment.

6. For a pond subject to subparagraph 2 or 3 (including ponds with in-situ soil liners), the permittee shall have a Texas-licensed professional engineer perform an evaluation of each pond that requires a liner at least once every five years. The evaluation must include: (1) a physical inspection of the pond liner to check for structural integrity, damage, and evidence of leaking; (2) a review of the liner documentation for the pond; and (3) a review of all documentation related to liner repair and maintenance performed since the last evaluation. For the purposes of this evaluation, evidence of leaking also includes evidence that the actual permeability exceeds the design permeability. The permittee is not required to drain an operating pond or to inspect below the waterline during the evaluation. A copy of the engineer's evaluation report must be maintained at the facility or in a reasonably accessible location and made available to the executive director upon request.

7. For a pond subject to subparagraph 2 or 3 (including ponds with in-situ soil liners), the permittee shall maintain at least 2.0 feet of freeboard in the pond except when:
    a. the freeboard requirement temporarily cannot be maintained due to a large storm event that requires the additional retention capacity to be used for a limited period of time;
    b. the freeboard requirement temporarily cannot be maintained due to upset plant conditions that require the additional retention capacity to be used for treatment for a limited period of time; or
    c. the pond was not required to have at least 2.0 feet of freeboard according to the requirements at the time of construction.

Y. The permittee must prevent public health nuisances. The permittee must prevent debris from blowing or running off-site. To prevent nuisance conditions from occurring, the permittee shall minimize offensive odors through the digesters, temporary storage of manure prior to introduction into the digester, or application of effluent.

Z. The permittee must ensure that all necessary authorizations are obtained from the TCEQ Air Permits Division for the digester operation.

AA. Wastewater routed from the storage pond to the land application area must be sampled and analyzed for those parameters listed in Tables 1 and 2 of Attachment A of this permit. The permittee shall provide at least four separate analytical results obtained from four grab or composite samples collected at a frequency of once per week for a period of four weeks from the wastewater stream. Indicate by checking the box whether the samples are composites or grabs. Analytical testing must be completed within 60 days of commencing irrigation. Results of the analytical testing must be submitted within 90 days of commencing irrigation to the Industrial Permits Team (MC 148), Water Quality Assessment Team (MC 150), TCEQ Region 12 Office (MC R12), and the Compliance Monitoring Team (MC 224). Based on a technical review of the submitted analytical results, an amendment may be initiated by TCEQ staff to include additional effluent limitations, monitoring requirements, or both.

ATTACHMENT A

Table 1.Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutant	**Sample 1 (mg/L)**	**Sample 2 (mg/L)**	**Sample 3 (mg/L)**	**Sample 4 (mg/L)**
BOD (5-day)				
CBOD (5-day)				
Chemical oxygen demand				
Total organic carbon				
Dissolved oxygen				
Ammonia nitrogen				
Total suspended solids				
Nitrate nitrogen				
Total organic nitrogen				
Total phosphorus				
Oil and grease				
Total residual chlorine				
Total dissolved solids				
Sulfate				
Chloride				
Fluoride				
Total alkalinity (mg/L as CaCO3)				
Temperature (°F)				
pH (standard units)				

Table 2.Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Aluminum, total					2.5
Antimony, total					5
Arsenic, total					0.5
Barium, total					3
Beryllium, total					0.5
Cadmium, total					1
Chromium, total					3
Chromium, hexavalent					3
Chromium, trivalent					N/A
Copper, total					2
Cyanide, available					2/10
Lead, total					0.5
Mercury, total					0.005/0.0005
Nickel, total					2
Selenium, total					5
Silver, total					0.5
Thallium, total					0.5
Zinc, total					5.0

VI. STANDARD PERMIT CONDITIONS

This permit is granted in accordance with the Texas Water Code and the rules and other Orders of the Commission and the laws of the State of Texas.

DEFINITIONS

All definitions in Section (§) 26.001 of the Texas Water Code and Title 30 of the Texas Administrative Code (30 TAC) Chapter 305 shall apply to this permit and are incorporated by reference. Some specific definitions of words or phrases used in this permit are as follows:

1. Flow Measurements
    a. Daily average flow - the arithmetic average of all determinations of the daily flow within a period of one calendar month. The daily average flow determination shall consist of determinations made on at least four separate days. If instantaneous measurements are used to determine the daily flow, the determination shall be the arithmetic average of all instantaneous measurements taken during that month. Daily average flow determination for intermittent discharges shall consist of a minimum of three flow determinations on days of discharge.
    b. Annual average flow - the arithmetic average of all daily flow determinations taken within the preceding 12 consecutive calendar months. The annual average flow determination shall consist of daily flow volume determinations made by a totalizing meter, charted on a chart recorder and limited to major domestic wastewater discharge facilities with a 1 million gallons per day or greater permitted flow.
    c. Instantaneous flow - the measured flow during the minimum time required to interpret the flow measuring device.
2. Concentration Measurements
    a. Daily average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar month, consisting of at least four separate representative measurements.
        i. For domestic wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values in the previous four consecutive month period consisting of at least four measurements shall be utilized as the daily average concentration.
        ii. For all other wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values taken during the month shall be utilized as the daily average concentration.
    b. 7-day average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar week, Sunday through Saturday.
    c. Daily maximum concentration - the maximum concentration measured on a single day, by the sample type specified in the permit, within a period of one calendar month.
3. Sample Type
    a. Composite sample - For domestic wastewater, a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9(a). For industrial wastewater, a composite sample is a sample made up of a

minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9(c).

b. Grab sample - an individual sample collected in less than 15 minutes.

4. Treatment Facility (facility) - wastewater facilities used in the conveyance, storage, treatment, recycling, reclamation or disposal of domestic sewage, industrial wastes, agricultural wastes, recreational wastes, or other wastes including sludge handling or disposal facilities under the jurisdiction of the Commission.

5. The term “sewage sludge” is defined as solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in 30 TAC Chapter 312. This includes the solids which have not been classified as hazardous waste separated from wastewater by unit processes.

6. Bypass - the intentional diversion of a waste stream from any portion of a treatment facility.

MONITORING REQUIREMENTS

1. Monitoring Requirements

Monitoring results shall be collected at the intervals specified in the permit. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall conduct effluent sampling in accordance with 30 TAC §§319.4 - 319.12.

As provided by state law, the permittee is subject to administrative, civil and criminal penalties, as applicable, for negligently or knowingly violating the Texas Water Code, Chapters 26, 27, and 28, and Texas Health and Safety Code, Chapter 361, including but not limited to knowingly making any false statement, representation, or certification on any report, record or other document submitted or required to be maintained under this permit, including monitoring reports, records or reports of compliance or noncompliance, or falsifying, tampering with or knowingly rendering inaccurate any monitoring device or method required by this permit or violating any other requirement imposed by state or federal regulations.

2. Test Procedures

a. Unless otherwise specified in this permit, test procedures for the analysis of pollutants shall comply with procedures specified in 30 TAC §§319.11 - 319.12. Measurements, tests and calculations shall be accurately accomplished in a representative manner.

b. All laboratory tests submitted to demonstrate compliance with this permit must meet the requirements of 30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification.

3. Records of Results

a. Monitoring samples and measurements shall be taken at times and in a manner so as to be representative of the monitored activity.

b. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years, monitoring and reporting records, including strip charts and records of calibration and maintenance, copies of all records required by this permit, and records of all data used to complete the application for this permit-shall be retained at the facility site, or shall be readily available for review by a TCEQ representative for a period of three years from the date of the record or sample

measurement, report, or application. This period shall be extended at the request of the Executive Director.

c. Records of monitoring activities shall include the following:

i. date, time and place of sample or measurement;
ii. identity of individual who collected the sample or made the measurement.
iii. date and time of analysis;
iv. identity of the individual and laboratory who performed the analysis;
v. the technique or method of analysis; and
vi. the results of the analysis or measurement and quality assurance/quality control records.

The period during which records are required to be kept shall be automatically extended to the date of the final disposition of any administrative or judicial enforcement action that may be instituted against the permittee.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit using approved analytical methods as specified above, all results of such monitoring shall be included in determining compliance with permit requirements.

5. Calibration of Instruments

All automatic flow measuring or recording devices and all totalizing meters for measuring flows shall be accurately calibrated by a trained person at plant start-up and as often thereafter as necessary to ensure accuracy, but not less often than annually unless authorized by the Executive Director for a longer period. Such person shall verify in writing that the device is operating properly and giving accurate results. Copies of the verification shall be retained at the facility site and shall be readily available for review by a TCEQ representative for a period of three years.

6. Compliance Schedule Reports

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date to the Regional Office and the Enforcement Division (MC 224).

7. Noncompliance Notification

a. In accordance with 30 TAC §305.125(9), any noncompliance which may endanger human health or safety, or the environment shall be reported by the permittee to the TCEQ. Report of such information shall be provided orally or by facsimile transmission (FAX) to the Regional Office within 24 hours of becoming aware of the noncompliance. A written submission of such information shall also be provided by the permittee to the Regional Office and the Enforcement Division (MC 224) within five working days of becoming aware of the noncompliance. The written submission shall contain a description of the noncompliance and its cause; the potential danger to human health or safety, or the environment; the period of noncompliance, including exact dates and times; if the noncompliance has not been corrected, the time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance, and to mitigate its adverse effects.

b. The following violations shall be reported under Monitoring and Reporting Requirement 7.a.:

i. unauthorized discharges as defined in Permit Condition 2(g).
ii. any unanticipated bypass which exceeds any effluent limitation in the permit.

c. In addition to the above, any effluent violation which deviates from the permitted effluent limitation by more than 40% shall be reported by the permittee in writing to the Regional Office and the Enforcement Division (MC 224) within 5 working days of becoming aware of the noncompliance.

d. Any noncompliance other than that specified in this section, or any required information not submitted or submitted incorrectly, shall be reported to the Enforcement Division (MC 224) as promptly as possible.

8. In accordance with the procedures described in 30 TAC §§35.301 - 35.303 (relating to Water Quality Emergency and Temporary Orders) if the permittee knows in advance of the need for a bypass, it shall submit prior notice by applying for such authorization.

9. Changes in Discharges of Toxic Substances

All existing manufacturing, commercial, mining, and silvicultural permittees shall notify the Regional Office, orally or by facsimile transmission within 24 hours, and both the Regional Office and the Enforcement Division (MC 224) in writing within five (5) working days, after becoming aware of or having reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant listed at 40 CFR Part 122, Appendix D, Tables II and III (excluding Total Phenols) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. one hundred micrograms per liter (100 µg/L);
ii. two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
iii. five (5) times the maximum concentration value reported for that pollutant in the permit application; or
iv. the level established by the TCEQ.

b. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. five hundred micrograms per liter (500 µg/L);
ii. one milligram per liter (1 mg/L) for antimony;
iii. ten (10) times the maximum concentration value reported for that pollutant in the permit application; or
iv. the level established by the TCEQ.

10. Signatories to Reports

All reports and other information requested by the Executive Director shall be signed by the person and in the manner required by 30 TAC §305.128 (relating to Signatories to Reports).

PERMIT CONDITIONS

1. General
    a. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in an application or in any report to the Executive Director, it shall promptly submit such facts or information.
    b. This permit is granted on the basis of the information supplied and representations made by the permittee during action on an application, and relying upon the accuracy and completeness of that information and those representations. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked, in whole or in part, in accordance with 30 TAC Chapter 305, Subchapter D, during its term for good cause including, but not limited to, the following:
        i. violation of any terms or conditions of this permit;
        ii. obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or
        iii. a change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
    c. The permittee shall furnish to the Executive Director, upon request and within a reasonable time, any information to determine whether cause exists for amending, revoking, suspending or terminating the permit. The permittee shall also furnish to the Executive Director, upon request, copies of records required to be kept by the permit.
2. Compliance
    a. Acceptance of the permit by the person to whom it is issued constitutes acknowledgment and agreement that such person will comply with all the terms and conditions embodied in the permit, and the rules and other orders of the Commission.
    b. The permittee has a duty to comply with all conditions of the permit. Failure to comply with any permit condition constitutes a violation of the permit and the Texas Water Code or the Texas Health and Safety Code, and is grounds for enforcement action, for permit amendment, revocation or suspension, or for denial of a permit renewal application or an application for a permit for another facility.
    c. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.
    d. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal or other permit violation which has a reasonable likelihood of adversely affecting human health or the environment.
    e. Authorization from the Commission is required before beginning any change in the permitted facility or activity that may result in noncompliance with any permit requirements.
    f. A permit may be amended, suspended and reissued, or revoked for cause in accordance with 30 TAC §§305.62 and 305.66 and Texas Water Code Section 7.302. The filing of a request by the permittee for a permit amendment, suspension and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

g. There shall be no unauthorized discharge of wastewater or any other waste. For the purpose of this permit, an unauthorized discharge is considered to be any discharge of wastewater into or adjacent to water in the state at any location not permitted as an outfall or otherwise defined in the Special Provisions section of this permit.

h. The permittee is subject to administrative, civil, and criminal penalties, as applicable, under Texas Water Code §§7.051 - 7.075 (relating to Administrative Penalties), 7.101 - 7.111 (relating to Civil Penalties), and 7.141 - 7.202 (relating to Criminal Offenses and Penalties).

3. Inspections and Entry

a. Inspection and entry shall be allowed as prescribed in the Texas Water Code Chapters 26, 27, and 28, and Texas Health and Safety Code Chapter 361.

b. The members of the Commission and employees and agents of the Commission are entitled to enter any public or private property at any reasonable time for the purpose of inspecting and investigating conditions relating to the quality of water in the state or the compliance with any rule, regulation, permit or other order of the Commission. Members, employees, or agents of the Commission and Commission contractors are entitled to enter public or private property at any reasonable time to investigate or monitor or, if the responsible party is not responsive or there is an immediate danger to public health or the environment, to remove or remediate a condition related to the quality of water in the state. Members, employees, Commission contractors, or agents acting under this authority who enter private property shall observe the establishment's rules and regulations concerning safety, internal security, and fire protection, and if the property has management in residence, shall notify management or the person then in charge of his presence and shall exhibit proper credentials. If any member, employee, Commission contractor, or agent is refused the right to enter in or on public or private property under this authority, the Executive Director may invoke the remedies authorized in Texas Water Code Section 7.002. The statement above, that Commission entry shall occur in accordance with an establishment's rules and regulations concerning safety, internal security, and fire protection, is not grounds for denial or restriction of entry to any part of the facility, but merely describes the Commission's duty to observe appropriate rules and regulations during an inspection.

4. Permit Amendment with or without Renewal

a. The permittee shall give notice to the Executive Director as soon as possible of any planned physical alterations or additions to the permitted facility if such alterations or additions would require a permit amendment or result in a violation of permit requirements. Notice shall also be required under this paragraph when:

i. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements in Monitoring Requirements No. 9;

ii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Prior to any facility modifications, additions, or expansions that will increase the plant capacity beyond the permitted flow, the permittee must apply for and obtain proper authorization from the Commission before commencing construction.

c. The permittee must apply for an amendment or renewal at least 180 days prior to expiration of the existing permit in order to continue a permitted activity after the expiration date of the permit. If an application is submitted prior to the expiration date of the permit, the existing permit shall remain in effect until the application is approved, denied, or returned. If the application is returned or denied, authorization to continue such activity shall terminate upon the effective date of the action. If an application is not submitted prior to the expiration date of the permit, the permit shall expire and authorization to continue such activity shall terminate.

d. Prior to accepting or generating wastes which are not described in the permit application or which would result in a significant change in the quantity or quality of the existing discharge, the permittee must report the proposed changes to the Commission. The permittee must apply for a permit amendment reflecting any necessary changes in permit conditions, including effluent limitations for pollutants not identified and limited by this permit.

e. In accordance with the Texas Water Code §26.029(b), after a public hearing, notice of which shall be given to the permittee, the Commission may require the permittee, from time to time, for good cause, in accordance with applicable laws, to conform to new or additional conditions.

5. Permit Transfer

a. Prior to any transfer of this permit, Commission approval must be obtained. The Commission shall be notified in writing of any change in control or ownership of facilities authorized by this permit. Such notification should be sent to the Applications Review and Processing Team (MC 148) of the Water Quality Division.

b. A permit may be transferred only according to the provisions of 30 TAC §305.64 (relating to Transfer of Permits) and 30 TAC §50.133 (relating to Executive Director Action on Application or WQMP update).

6. Relationship to Hazardous Waste Activities

This permit does not authorize any activity of hazardous waste storage, processing, or disposal which requires a permit or other authorization pursuant to the Texas Health and Safety Code.

7. Property Rights

A permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit Enforceability

The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

9. Relationship to Permit Application

The application pursuant to which the permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

10. Notice of Bankruptcy.

    a. Each permittee shall notify the Executive Director, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 (Bankruptcy) of the United States Code (11 USC) by or against:

        i. the permittee;
        ii. an entity (as that term is defined in 11 USC, §101(15)) controlling the permittee or listing the permit or permittee as property of the estate; or
        iii. an affiliate (as that term is defined in 11 USC, §101(2)) of the permittee.

    b. This notification must indicate:

        i. the name of the permittee;
        ii. the permit number(s);
        iii. the bankruptcy court in which the petition for bankruptcy was filed; and
        iv. the date of filing of the petition.

OPERATIONAL REQUIREMENTS

1. The permittee shall at all times ensure that the facility and all of its systems of collection, treatment, and disposal are properly operated and maintained. This includes, but is not limited to, the regular, periodic examination of wastewater solids within the treatment plant by the operator in order to maintain an appropriate quantity and quality of solids inventory as described in the various operator training manuals and according to accepted industry standards for process control. Process control, maintenance, and operations records shall be retained at the facility site, or shall be readily available for review by a TCEQ representative, for a period of three years.

2. Upon request by the Executive Director, the permittee shall take appropriate samples and provide proper analysis in order to demonstrate compliance with Commission rules. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall comply with all applicable provisions of 30 TAC Chapter 312 concerning sewage sludge use and disposal and 30 TAC §§319.21 - 319.29 concerning the discharge of certain hazardous metals.

3. Domestic wastewater treatment facilities shall comply with the following provisions:

    a. The permittee shall notify the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, in writing, of any facility expansion at least 90 days prior to conducting such activity.

    b. The permittee shall submit a closure plan for review and approval to the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, for any closure activity at least 90 days prior to conducting such activity. Closure is the act of permanently taking a waste management unit or treatment facility out of service and includes the permanent removal from service of any pit, tank, pond, lagoon, surface impoundment or other treatment unit regulated by this permit.

4. The permittee is responsible for installing prior to plant start-up, and subsequently maintaining, adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures by means of alternate power sources, standby generators, or retention of inadequately treated wastewater.

5. Unless otherwise specified, the permittee shall provide a readily accessible sampling point and, where applicable, an effluent flow measuring device or other acceptable means by which effluent flow may be determined.

6. The permittee shall remit an annual water quality fee to the Commission as required by 30 TAC Chapter 21. Failure to pay the fee may result in revocation of this permit under Texas Water Code §7.302(b)(6).

7. Documentation

   For all written notifications to the Commission required of the permittee by this permit, the permittee shall keep and make available a copy of each such notification under the same conditions as self-monitoring data are required to be kept and made available. Except for information specified as not confidential in 30 TAC §1.5(d), any information submitted pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted in the manner prescribed in the application form or by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, information may be made available to the public without further notice. If the Commission or Executive Director agrees with the designation of confidentiality, the TCEQ will not provide the information for public inspection unless required by the Texas Attorney General or a court pursuant to an open records request. If the Executive Director does not agree with the designation of confidentiality, the person submitting the information will be notified.

8. Facilities which generate domestic wastewater shall comply with the following provisions; domestic wastewater treatment facilities at permitted industrial sites are excluded.

   a. Whenever flow measurements for any domestic sewage treatment facility reach 75 percent of the permitted daily average or annual average flow for three consecutive months, the permittee must initiate engineering and financial planning for expansion or upgrading of the domestic wastewater treatment or collection facilities. Whenever the flow reaches 90 percent of the permitted daily average or annual average flow for three consecutive months, the permittee shall obtain necessary authorization from the Commission to commence construction of the necessary additional treatment or collection facilities. In the case of a domestic wastewater treatment facility which reaches 75 percent of the permitted daily average or annual average flow for three consecutive months, and the planned population to be served or the quantity of waste produced is not expected to exceed the design limitations of the treatment facility, the permittee shall submit an engineering report supporting this claim to the Executive Director of the Commission.

      If in the judgment of the Executive Director the population to be served will not cause permit noncompliance, then the requirement of this section may be waived. To be effective, any waiver must be in writing and signed by the Director of the Enforcement Division (MC 149) of the Commission, and such waiver of these requirements will be reviewed upon expiration of the existing permit; however, any such waiver shall not be interpreted as condoning or excusing any violation of any permit parameter.

   b. The plans and specifications for domestic sewage collection and treatment works associated with any domestic permit must be approved by the Commission, and failure to secure approval before commencing construction of such works or making a discharge is a violation of this permit and each day is an additional violation until approval has been secured.

   c. Permits for domestic wastewater treatment plants are granted subject to the policy of the Commission to encourage the development of area-wide waste collection, treatment and disposal systems. The Commission reserves the right to amend any domestic wastewater permit in accordance with applicable procedural requirements to require the system covered by this permit to be integrated into an area-wide system, should such be developed; to require the delivery of the wastes authorized to

be collected in, treated by or discharged from said system, to such area-wide system; or to amend this permit in any other particular to effectuate the Commission's policy. Such amendments may be made when the changes required are advisable for water quality control purposes and are feasible on the basis of waste treatment technology, engineering, financial, and related considerations existing at the time the changes are required, exclusive of the loss of investment in or revenues from any then existing or proposed waste collection, treatment or disposal system.

9. Domestic wastewater treatment plants shall be operated and maintained by sewage plant operators holding a valid certificate of competency at the required level as defined in 30 TAC Chapter 30.

10. Facilities which generate industrial solid waste as defined in 30 TAC §335.1 shall comply with these provisions:

    a. Any solid waste, as defined in 30 TAC §335.1 (including but not limited to such wastes as garbage, refuse, sludge from a waste treatment, water supply treatment plant or air pollution control facility, discarded materials, discarded materials to be recycled, whether the waste is solid, liquid, or semisolid), generated by the permittee during the management and treatment of wastewater, must be managed in accordance with all applicable provisions of 30 TAC Chapter 335, relating to Industrial Solid Waste Management.

    b. Industrial wastewater that is being collected, accumulated, stored, or processed before discharge through any final discharge outfall, specified by this permit, is considered to be industrial solid waste until the wastewater passes through the actual point source discharge and must be managed in accordance with all applicable provisions of 30 TAC Chapter 335.

    c. The permittee shall provide written notification, pursuant to the requirements of 30 TAC §335.8(b)(1), to the Environmental Cleanup Section (MC 127) of the Remediation Division informing the Commission of any closure activity involving an Industrial Solid Waste Management Unit, at least 90 days prior to conducting such an activity.

    d. Construction of any industrial solid waste management unit requires the prior written notification of the proposed activity to the Registration and Reporting Section (MC 129) of the Permitting and Remediation Support Division. No person shall dispose of industrial solid waste, including sludge or other solids from wastewater treatment processes, prior to fulfilling the deed recordation requirements of 30 TAC §335.5.

    e. The term "industrial solid waste management unit" means a landfill, surface impoundment, waste-pile, industrial furnace, incinerator, cement kiln, injection well, container, drum, salt dome waste containment cavern, or any other structure vessel, appurtenance, or other improvement on land used to manage industrial solid waste.

    f. The permittee shall keep management records for all sludge (or other waste) removed from any wastewater treatment process. These records shall fulfill all applicable requirements of 30 TAC Chapter 335 and must include the following, as it pertains to wastewater treatment and discharge:

        i. volume of waste and date(s) generated from treatment process;
        iii. volume of waste disposed of on-site or shipped off-site;
        iv. date(s) of disposal;
        v. identity of hauler or transporter;
        vi. location of disposal site; and
        vii. method of final disposal.

The above records shall be maintained on a monthly basis. The records shall be retained at the facility site, or shall be readily available for review by authorized representatives of the TCEQ for at least five years.

11. For industrial facilities to which the requirements of 30 TAC Chapter 335 do not apply, sludge and solid wastes, including tank cleaning and contaminated solids for disposal, shall be disposed of in accordance with Chapter 361 of the Texas Health and Safety Code.

TCEQ Revision 06/2008

TECHNICAL SUMMARY AND EXECUTIVE DIRECTOR'S PRELIMINARY DECISION
TCEQ Permit No. WQ0005487000

DESCRIPTION OF APPLICATION

Applicant:	Wharton AD 1, LLC; Permit No. WQ0005487000
Regulated Activity:	Industrial Wastewater Permit
Type of Application:	New permit
Request:	New permit
Authority:	Texas Water Code § 26.027; 30 Texas Administrative Code (30 TAC) Chapter 305, Subchapters C-F, Chapters 307, 309, and 319; Commission policies.

EXECUTIVE DIRECTOR RECOMMENDATION

The Executive Director has made a preliminary decision that this permit, if issued, meets all statutory and regulatory requirements. The draft permit will expire at midnight, **five years** from date of permit issuance. A five year term for this draft permit is being recommended based on its unique operation.

REASON FOR PROJECT PROPOSED

The applicant has applied to the Texas Commission on Environmental Quality (TCEQ) for a new permit.

PROJECT DESCRIPTION AND LOCATION

The applicant proposes to operate Pierce Ranch, a biogas production facility utilizing anaerobic digestion to produce renewable natural gas and other agricultural by-product such as liquid fertilizer.

Anaerobic digestion is a process by which organic material, such as animal manure and food waste, is broken down by microbes in an enclosed environment to produce biogas. The facility will accept food waste (i.e., restaurant food, expired foods, etc.) and cow manure to produce renewable natural gas and other agricultural by product such as liquid fertilizer. There will be two anaerobic digesters at the facility. Feed to the digesters will be food waste slurry. Manure will be transferred into the aerobic digester (AD) tanks by tanker trucks as needed to maintain gas production. Food waste will be sent to a hydrolysis tank prior to being introduced to the digesters. The heated digester will include mixing to homogenize the waste. Biogas will be collected from the digesters. Liquid digestate is the effluent discharged from the digesters. Liquid digestate will be stored in the onsite lagoon with a storage capacity of 34.2 acre-feet prior to land application on 28,955 acres of corn, Bermuda grass, and cotton.

This permit does not authorize the disposal of domestic wastewater. All domestic wastewater must be disposed of in an approved manner, such as routing to an approved on-site septic tank and drainfield system or to an authorized third party for treatment and disposal.

The plant site will be located approximately 1.5 miles southeast of the intersection of Pierce West Road and United States (U.S.) Highway 59, near the City of Pierce, in Wharton County, Texas 77437 and the diposal areas will be located across multiple tracts in a north, northeast, and southeast direction from the facility.

The facility and land application site will be located in the drainage area of Colorado River Below La Grange in Segment No. 1402 of the Colorado River Basin. The designated uses for Segment No. 1402 are primary contact recreation, public water supply, and high aquatic life use. All determinations are preliminary and subject to additional review and revisions.

SUMMARY OF EFFLUENT DATA

Self-reporting data is not available because the facility has not been constructed.

DRAFT PERMIT CONDITIONS

The draft permit authorizes the disposal of process wastewater from the digesters to the storage lagoon at a daily average flow not to exceed 0.075 million gallons per day (MGD) and a hydraulic loading rate (application rate) not to exceed 0.023 acre-feet per acre irrigated per year (ac-ft/ac/yr) on 28,955 acres of corn, Bermuda grass, and cotton.

Final effluent limitations are established in the draft permit as follows:

Pollutant	Daily Average	Daily Maximum
Flow [1]	0.075 MGD	Report, MGD
Flow [2]	Report, MGD	Report, MGD
Biochemical Oxygen Demand, 5-day (BOD_5)	N/A	Report, mg/L
Total Suspended Solids (TSS)	N/A	Report, mg/L
Oil and Grease (as HEM) [3]	N/A	Report, mg/L
Fecal Coliform	N/A	Report, cfu/100 mL [4]
Nitrate-Nitrogen	N/A	Report, mg/L
Ammonia Nitrogen	N/A	Report, mg/L
Total Organic Nitrogen	N/A	Report, mg/L
Total Kjeldahl Nitrogen (TKN)	N/A	Report, mg/L
Total Phosphorus	N/A	Report, mg/L
Electrical Conductivity	N/A	Report, mmhos/cm
pH, Standard Units (SU)	6.0 SU (min)	9.0 SU

Application rates and loading rates shall not exceed the following levels of effluent routed to the irrigation fields.

Hydraulic loading rate: 0.023 ac-ft/acre/year

Organic loading rate: 100 pound per acre per day (lbs/acre/day) [measured as BOD_5)

The daily average flow effluent limitation and daily maximum monitoring requirement have been included in the draft permit to keep a record of the volume generated and routed to the storage lagoon. Flow monitoring requirements have also been included to ensure the effluent application rate is not exceeded. The BOD_5 effluent values will be used to determine the organic loading rate for compliance with this limitation. Monitoring requirements for BOD_5, TSS, fecal coliform, and oil and grease (as HEM) were included in the draft permit based on the type of

[1] Flow should be measured after the digesters prior to entering the storage lagoon.

[2] Flow should be measured at the on-site storage lagoon, prior to being pumped to the land application area.

[3] Oil and Grease (as HEM) means total recoverable oil and grease measured as n-hexane extractable.

[4] Colony forming units (cfu) per 100 mL or most probable number (MPN) per 100 mL.

operation. Monitoring requirements for electrical conductivity have been included in the draft permit to keep a record of the electrical conductivity for future calculations in the water balance. Monitoring requirements for ammonia nitrogen, nitrate nitrogen, total organic nitrogen, TKN, total phosphorus, and hydraulic loading rate have been proposed in the draft permit to provide controls and obtain data to provide oversight and prevent excessive application of nutrients. The organic loading rate is included in the industrial wastewater permits to limit organic loading to this rate to prevent nuisance conditions in the land application fields.

SUMMARY OF CHANGES FROM APPLICATION

No changes were made from the application.

SUMMARY OF CHANGES FROM EXISTING PERMIT

N/A – New Permit.

BASIS FOR DRAFT PERMIT

The following items were considered in developing the draft permit:

1. Application received on March 5, 2025 and additional information received on March 27, 2025, April 6, 2025, April 28, 2025, June 10, 2025, July 17, 2025, and July 23, 2025.
2. Existing permits: N/A – New Permit.
3. TCEQ Rules.
4. *Guidance Document for Establishing Monitoring Frequencies for Domestic and Industrial Wastewater Discharge Permits*, TCEQ Document No. 98-001.000-OWR-WQ, May 1998.
5. TCEQ Groundwater Impact Evaluation dated June 11, 2025.
6. TCEQ Agronomy Evaluation dated July 25, 2025.
7. 30 TAC Chapter 309.
8. *Wharton Soil Survey, Texas*, Version 20, August 30, 2024, Natural Resources Conservation Service.
9. Texas Water Development Board Lake Evaporation and Precipitation data for Quadrangle 811.
10. Consistency with the Coastal Management Plan: N/A.
11. *Bulletin 6019 – Consumptive Use of Water By Major Crops in Texas*, Texas Water Development Board, November 1960.
12. *Urban Hydrology for Small Watersheds – Technical Release No. 55*, U.S. Department of Agriculture, January 1975.
13. *SCS National Engineering Handbook*, Section 4, Hydrology, Chapter 9, U.S. Department of Agriculture, August 1972.

PROCEDURES FOR FINAL DECISION

When an application is declared administratively complete, the Chief Clerk sends a letter to the applicant advising the applicant to publish the Notice of Receipt of Application and Intent to Obtain Permit in the newspaper. In addition, the Chief Clerk instructs the applicant to place a copy of the application in a public place for reviewing and copying in the county where the facility is or will be located. This application will be in a public place throughout the comment period. The Chief Clerk also mails this notice to any interested persons and, if required, to landowners identified in the permit application. This notice informs the public about the application and provides that an interested person may file comments on the application or request a contested case hearing or a public meeting.

Once a draft permit is completed, it is sent, along with the Executive Director's preliminary decision, as contained in the technical summary or fact sheet, to the Chief Clerk. At that time, the Notice of Application and Preliminary Decision will be mailed to the same people and published in the same newspaper as the prior notice. This notice sets a deadline for making public comments. The applicant must place a copy of the Executive Director's preliminary decision and draft permit in the public place with the application. This notice sets a deadline for public comment.

Any interested person may request a public meeting on the application until the deadline for filing public comments. A public meeting is intended for the taking of public comment and is not a contested case proceeding.

After the public comment deadline, the Executive Director prepares a response to all significant public comments on the application or the draft permit raised during the public comment period. The Chief Clerk then mails the Executive Director's response to comments and final decision to people who have filed comments, requested a contested case hearing, or requested to be on the mailing list. This notice provides that if a person is not satisfied with the Executive Director's response and decision, they can request a contested case hearing or file a request to reconsider the Executive Director's decision within 30 days after the notice is mailed.

The Executive Director will issue the permit unless a written hearing request or request for reconsideration is filed within 30 days after the Executive Director's response to comments and final decision is mailed. If a hearing request or request for reconsideration is filed, the Executive Director will not issue the permit and will forward the application and request to the TCEQ Commissioners for their consideration at a scheduled Commission meeting. If a contested case hearing is held, it will be a legal proceeding similar to a civil trial in state district court.

If the Executive Director calls a public meeting or the Commission grants a contested case hearing as described above, the Commission will give notice of the date, time, and place of the meeting or hearing. If a hearing request or request for reconsideration is made, the Commission will consider all public comments in making its decision and shall either adopt the Executive Director's response to public comments or prepare its own response.

For additional information about this application, contact Mónica Vallin-Báez at (512) 239-5784.

Monica Vallin-Baez
Mónica Vallin-Báez

September 2, 2025
Date

Appendix A
Water Balance Calculations

The water balance calculations are designed to evaluate the maximum application rate (hydraulic loading rate) for the land area where irrigation is to occur. The applicant's proposed rate must not exceed the maximum calculated application rate or the maximum application rate based on agronomist analysis.

Hydraulic Application Rate

The maximum allowable application rate is calculated using the following factors: average precipitation, average runoff, average infiltrated rainfall, evapotranspiration, required leaching, total water needs, effluent needed at rootzone, evapotranspiration from reservoir surface, effluent to be applied to land, and consumption from reservoir. The lake evaporation and precipitation data were obtained from the Texas Water Development Board for Quadrangle 811 for the period of record 2000 through 2024. The consumptive use requirements (evapotranspiration losses) of the crop system was obtained from the "Bulletin 6019, Consumptive Use of Water by Major Crops in Texas", Texas Board of Water Engineers. Additional factors considered in this calculation are:

Crop = Corn, Bermuda grass, and Cotton
Curve Number (CN) = 78 dimensionless
Electrical conductivity of the effluent (Ce) = 1.00 mmhos/cm
Maximum allowable conductivity of soil solution (Cl) = 5.00 mmhos/cm
Pond area = 2.89 acres
Irrigation area = 28,955 acres
Irrigation Efficiency, K = 0.85 dimensionless
Design Flow = 0.075 MGD

Details of the calculation are presented in Table 1. Based on this calculation:

Maximum Allowable Application Rate = Max. Consumption from Reservoir/12
= 29.11/12
= 2.43 ac-ft/ac/year

Summary Maximum Allowable Application Rate

The following hydraulic applications have been identified:
Calculated maximum application rate = 2.43 ac-ft/ac/year
Applicant's proposed application rate = 0.023 ac-ft/ac/year
Gross rate (from design flow and acres = 0.023 ac-ft/ac/year

Conclusion

Based on the recommendations from the agronomist, the application rate must not exceed 0.023 acre-feet/ac/year.

Appendix A
Water Balance Calculations
Storage Calculations

The maximum allowable application rate is calculated using the following factors: effluent received for application or storage, rainfall worst year in past 25 years, runoff worst year in past 25 years, infiltrated rainfall, available water, net 25-year low evaporation from reservoir surface effluent storage, and accumulated storage.

The lake evaporation and precipitation data were obtained from the Texas Water Development Board for Quadrangle 811 for the period of record 2000 through 2024. The consumptive use requirements (evapotranspiration losses) of the crops system were obtained from the "Bulletin 6019, Consumptive Use of Water by Major Crops in Texas", Texas Board of Water Engineers. Additional factors considered in this calculation are:

Curve Number (CN) = 78 dimensionless
Pond area = 2.89 acres
Irrigation area = 28,955 acres
Irrigation Efficiency, K = 0.85 dimensionless
Total Water Needs (from Table 1)
Design Flow = 0.075 MGD
Worst (low) net evap. =-18.96 inches
Corresponding rain = 62.12 inches
Worst-case net year = 2004

The detailed calculations are presented in Table 2. Based on these calculations the required storage is:

Storage Required = (Max. accumulated storage/12) x Irrigation Area
= (0.0118/12) x 28,955 acres
= 28.47 ac-ft

Conclusion
According to the information provided in the application, the applicant has a storage capacity of 11,134,044 gallons (34.2 ac-ft). Based on the storage calculation, the facility has adequate storage to hold the wastewater when the facility is not able to irrigate.

Appendix A
Water Balance Calculations

TABLE 1-MAXIMUM APPLICATION RATE (HYDRAULIC LOADING RATE) CALCULATION
All unit in inches (unless otherwise specified)

Month	Avg Rain	Avg Runoff	Avg Infilt Rainfall	Evapo-trans.	Required Leach	Total Water Needs	Effluent Needed in Root Zone	Raw Net Evap. from Reservoir	Reservoir Net Evap. (as inches on plot acres)	Effluent Needed Based on Irrigation Efficiency	Reservoir Consumption (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	3.36	1.39	1.97	0.81	0.00	0.81	0.00	-1.03	0.00	0.00	0.00
February	2.15	0.57	1.58	1.17	0.00	1.17	0.00	0.11	0.00	0.00	0.00
March	2.90	1.05	1.84	0.60	0.00	0.60	0.00	0.67	0.00	0.00	0.00
April	3.05	1.16	1.88	2.20	0.08	2.28	0.39	1.35	0.00	0.46	0.46
May	4.51	2.30	2.21	4.90	0.67	5.57	3.36	0.37	0.00	3.96	3.96
June	4.06	1.94	2.13	9.70	1.89	11.59	9.47	1.68	0.00	11.14	11.14
July	3.68	1.63	2.04	3.60	0.39	3.99	1.95	2.48	0.00	2.29	2.29
August	3.32	1.36	1.96	4.59	0.66	5.25	3.29	2.97	0.00	3.87	3.87
September	3.79	1.72	2.07	5.13	0.77	5.90	3.83	1.22	0.00	4.50	4.50
October	3.95	1.84	2.10	4.05	0.49	4.54	2.44	0.28	0.00	2.86	2.86
November	3.72	1.67	2.05	2.07	0.00	2.07	0.02	-0.75	0.00	0.02	0.02
December	2.72	0.94	1.79	0.99	0.00	0.99	0.00	-0.64	0.00	0.00	0.00
Totals	41.21	17.58	23.62	39.81	4.95	44.76	24.74	8.72	0.00	29.11	29.11

Appendix A
Water Balance Calculation

TABLE 2. STORAGE CALCULATIONS
All units in inches (unless otherwise specified)

Month	Effluent Available (as inches on plot acres)	Average Rainfall Distrib. (%)	Rain Worst Year	Field Runoff Worst Year	Infiltrated Rain	Avail Water	Average Net Evap. Distrib. (%)	Low Net Evap. from Reservoir Surface	Effluent to Storage (as inches on plot acres)	Accum Storage (as inches on plot acres)
Units →	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*	*inches*
January	0.00	8.15%	5.06	2.76	2.30	2.30	-11.85%	0.00	0.00	0.01
February	0.00	5.22%	3.24	1.30	1.94	1.94	1.27%	0.00	0.00	0.01
March	0.00	7.03%	4.36	2.18	2.18	2.19	7.71%	0.00	0.00	0.01
April	0.00	7.40%	4.59	2.37	2.22	2.23	15.52%	0.00	-0.06	0
May	0.00	10.95%	6.80	4.30	2.51	2.51	4.24%	0.00	-3.60	0
June	0.00	9.86%	6.13	3.69	2.44	2.44	19.31%	0.00	-10.77	0
July	0.00	8.92%	5.54	3.18	2.36	2.37	28.44%	0.00	-1.91	0
August	0.00	8.06%	5.01	2.72	2.29	2.29	34.12%	0.00	-3.48	0
September	0.00	9.20%	5.71	3.33	2.39	2.39	13.96%	0.00	-4.13	0
October	0.00	9.57%	5.95	3.53	2.41	2.42	3.19%	0.00	-2.49	0
November	0.00	9.03%	5.61	3.24	2.37	2.38	-8.62%	0.00	0.00	0.00
December	0.00	6.61%	4.11	1.97	2.13	2.14	-7.30%	0.00	0.00	0.00
Totals	0.03	100%	62.12	34.57	27.55	27.58	100%	0.00	—	0.01