Administrative 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. Application materials

Portada de Paquete Administrativo

Este archivo contiene los siguientes documentos:

1. Resumen en lenguaje sencillo (PLS, por sus siglas en inglés) de la actividad propuesta
   - Inglés
   - Idioma alternativo (español)
2. Primer aviso (NORI, por sus siglas en inglés)
   - Inglés
   - Idioma alternativo (español)
3. Solicitud original

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

PLAIN LANGUAGE SUMMARY FOR TPDES OR TLAP PERMIT APPLICATIONS

Plain Language Summary Template and Instructions for Texas Pollutant Discharge Elimination System (TPDES) and Texas Land Application (TLAP) Permit Applications

Applicants should use this template to develop a plain language summary as required by Title 30, Texas Administrative Code (30 TAC), Chapter 39, Subchapter H. Applicants may modify the template as necessary to accurately describe their facility as long as the summary includes the following information: (1) the function of the proposed plant or facility; (2) the expected output of the proposed plant or facility; (3) the expected pollutants that may be emitted or discharged by the proposed plant or facility; and (4) how the applicant will control those pollutants, so that the proposed plant will not have an adverse impact on human health or the environment.

Fill in the highlighted areas below to describe your facility and application in plain language. Instructions and examples are provided below. Make any other edits necessary to improve readability or grammar and to comply with the rule requirements.

If you are subject to the alternative language notice requirements in 30 TAC Section 39.426, **you must provide a translated copy of the completed plain language summary in the appropriate alternative language as part of your application package**. For your convenience, a Spanish template has been provided below.

ENGLISH TEMPLATE FOR TPDES or TLAP NEW/RENEWAL/AMENDMENT APPLICATIONS Domestic WASTEWATER/STORMWATER

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 TAC Chapter 39. The information provided in this summary may change during the technical review of the application and is not a federal enforceable representation of the permit application.

City of Manor (CN600632111) proposes to operate East Travis Regional Plant (5. Enter Regulated Entity Number here (i.e., RN1########)), a 6 million gallons per day treatment facility with an average daily flow of 4,170 gpm and peak flows not anticipated to exceed 12,470 gpm. The facility will be located at Hibbs Ln approximately 0.82 miles northeast from intersection with Hog Eye Rd., in Manor, Travis County, Texas 78653. The City of Manor seeks a new permit for this facility.

Discharges from the facility are expected to contain : 6.0 MGD Effluent flow, 5.0 mg/L TSS, 5.0 mg/L $CBOD_5$, 2.0 mgN/L Ammonia N, 1.0 mg/L TP. The domestic wastewater will be treated by rapid mix basin, which will feed into a four-train treatment system. Each train will contain an anaerobic basin, anoxic basin, aeration basin, and secondary clarifier. After which, each train will feed into a disc filter and UV disinfector before effluent is discharged. This facility will be constructed in three phases (1.5 MGD, 3.0 MGD, and 6.0 MGD). During Phase 1, liquid sludge will be hauled to the Wilbarger Wastewater Treatment Plant for processing.

During Phase 2 and the Ultimate Phase sludge processing will through aerobic digestion, thickening, dewatering and then disposed of off site.

PLANTILLA EN ESPAÑOL PARA SOLICITUDES NUEVAS/RENOVACIONES/ENMIENDAS DE TPDES o TLAP

AGUAS RESIDUALES DOMÉSTICAS /AGUAS PLUVIALES

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 requerido por el Capítulo 39 del Código Administrativo de Texas 30. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no es una representación ejecutiva fedérale de la solicitud de permiso.

La ciudad de Manor (CN600632111) propone operar la planta regional de tratamiento de aguas residuales de East Travis 5. Introduzca el número de entidad regulada aquí (es decir, RN1########), una instalación de tratamiento de 6 millones de galones por día con un flujo diario promedio de 4,170 GPM y flujos máximos que no sea mas que 12,470 GPM. La instalación estará ubicada en Hibbs Ln aproximadamente a 0,82 millas al noreste de la intersección con Hog Eye Rd., en Manor, Condado de Travis, Texas 78653. La ciudad de Manor solicita un permiso para esta instalación.

Se espera que las descargas de la instalación contengan 6,0 MGD de flujo de efluente, 5,0 mg/L de SST, 5,0 mg/L de DBO5, 2,0 mgN/L de N de amoníaco, 1,0 mg/L TP. Las aguas residuales domésticas. estará tratado por un tanque mezcla rápida, que alimentará una sistema de tratamiento de cuatro trenes. Cada tren contendrá una cuencea anaeróbica, una cuenca de aireación y una tanque de sedimentación. Después, cada tren alimentará un filtro y desinfección con luz ultravioleta antes de descargar el efluente. Esta instalación se construirá en tres fases (1,5 MGD, 3,0 MGD y 6.0 MGD). Durante la Fase 1, los lodos liquidos se transportarán a la planta de tratamiento de aguas residuales de Wilbarger para su procesamiento. Durante Fase 2 y la Fase Final, el procesamiento de lodos se estara tratado mediante digestión aeróbica, espesamiento, deshidratación y eliminación de sólidos fuera del lugar.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

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

PROPOSED PERMIT NO. WQ0016712001

APPLICATION. City of Manor, P.O. Box 387, Manor, Texas 78653, has applied to the Texas Commission on Environmental Quality (TCEQ) for proposed Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0016712001 (EPA I.D. No. TX0147346) to authorize the discharge of treated wastewater at a volume not to exceed an annual average flow of 6,000,000 gallons per day. The domestic wastewater treatment facility will be located approximately 0.82 mile northeast of the intersection of Hibbs Lane and Hog Eye Road, near the city of Manor, in Travis County, Texas 78653. The discharge route will be from the plant site to Wilbarger Creek; thence to Colorado River Above La Grange. TCEQ received this application on January 24, 2025. The permit application will be available for viewing and copying at City of Manor City Hall, front desk, 105 East Eggleston Street, Manor, in Travis County, Texas prior to the date this notice is published in the newspaper. The application, including any updates, and associated notices are available electronically at the following webpage: https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tpdes-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=-97.465833,30.3125&level=18

ALTERNATIVE LANGUAGE NOTICE. Alternative language notice in Spanish is available at: https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tpdes-applications.
El aviso de idioma alternativo en español está disponible en
https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tpdes-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 City of Manor at the address stated above or by calling Ms. Andrea Mendoza, George Butler Associates Inc., at 737-247-7539.

Issuance Date: February 6, 2025

Comisión de Calidad Ambiental del Estado de Texas

MODIFICADO DE RECIBO DE LA SOLICITUD Y
EL INTENTO DE OBTENER PERMISO PARA LA CALIDAD DEL AGUA

PERMISO PROPUESTO NO. WQ0016712001

SOLICITUD. La ciudad de Manor, P.O. Box 387, Manor, Texas 78653, ha solicitado a la Comisión de Calidad Ambiental del Estado de Texas (siglas en inglés TCEQ) para el Permiso propuesto No. WQ0016712001 (EPA I.D. No. TX0147346) del Sistema de Eliminación de Descargas de Contaminantes de Texas (siglas en inglés TPDES) para autorizar la descarga de aguas residuales tratadas en un volumen que no sobrepasa un flujo promedio diario de 6,000,000 de galones por día. La planta está ubicada en Hibbs Ln aproximadamente a 0,82 millas al noreste de la intersección con Hog Eye Rd., en el Condado de Travis, Texas. La ruta de descarga será en el lugar de la planta a Wilbarger Creek; de allí al río Colorado sobre La Grange. La TCEQ recibió esta solicitud el 24 de enero de 2025. La solicitud para el permiso estará disponible para leerla y copiarla en el ayuntamiento de la ciudad de Manor, 105 East Eggleston Street, Manor, en el Condado de Travis antes de la fecha de publicación de este aviso en el periódico. Esta aplicacion incluye todas las actulizaciones y avisos asociados estaran disponibles de forma electronica en el siguiente portal:
https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tpdes-applications.
Este enlace te lleva a un mapa electrónico de la ubicación general del lugar o de la instalación es proporcionado como una cortesía y no como parte de la solicitud o del aviso. Para la ubicación exacta, consulte la solicitud.
https://gisweb.tceq.texas.gov/LocationMapper/?marker=-97.465833,30.3125&level=18

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 ciudad de Manor a la dirección indicada arriba o llamando a Andrea Mendoza, George Butler, Associates Inc. al 737-247-7539.

Fecha de emission: 14 de febrero de 2025

9601 Amberglen Blvd. #109
Austin, TX 78729

LETTER OF TRANSMITTAL

Date: January 24th, 2025

To: Texas Commission on Environmental Quality
Water Quality Division
Applications Review and Processing Team (MC148)
P.O. Box 13087
Austin, Texas 78711-3087

Attention: Applications Review and Processing Team

Project Number: 16619

Subject: TDPES New Permit Application

We are sending you: ☒ Attached ☐ Under separate cover via:__________

☐ Shop drawings ☐ Prints ☐ Plans ☐Specifications

☐ Copy of letter ☐ Change order ☐ Catalog

☒ Permit Applications ☐ Prints returned after loan to us_____________

COPIES	DATE	DESCRIPTION
1	01/24/25	Original TDPES New Permit Application
2	01/24/25	Copies of TDPES New Permit Application
1	01/24/25	USB with Affected Landowner Mailing Labels

These are transmitted as checked below:

☐For approval ☐Reviewed ☐Prints returned after loan to us

☐For your use ☐Furnish as corrected ☐Rejected

☐As requested ☒Review and Comment _____________copies

☐Submit ___________ copies for distribution ☐__________________________

☐For bids due ___________, 20_____

Remarks:

Copy to: Matthew Woodard, City of Manor

Signed:
Jose Castillo

Agent Authorization Form
For Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

I Dr. Christopher Harvey,
Print Name

Mayor,
Title - Owner/President/Other

of City of Manor,
Corporation/Partnership/Entity Name

have authorized Jose Castillo
Print Name of Agent/Engineer

of GBA
Print Name of Firm

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.

5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

Applicant's Signature

12-16-2024
Date

THE STATE OF Texas §

County of Travis §

BEFORE ME, the undersigned authority, on this day personally appeared Dr. Christopher Harvey known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this 16th day of December, 2024.

NOTARY PUBLIC

Lluvia T. Almaraz
Typed or Printed Name of Notary

LLUVIA T. ALMARAZ
Notary Public, State of Texas
Comm. Expires 10-25-2025
Notary ID 11988227

MY COMMISSION EXPIRES: 10-25-2025

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

DOMESTIC WASTEWATER PERMIT APPLICATION CHECKLIST

Complete and submit this checklist with the application.

APPLICANT NAME: City of Manor

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
Administrative Report 1.0	☒	☐
Administrative Report 1.1	☒	☐
SPIF	☒	☐
Core Data Form	☒	☐
Public Involvement Plan Form	☒	☐
Technical Report 1.0	☒	☐
Technical Report 1.1	☒	☐
Worksheet 2.0	☒	☐
Worksheet 2.1	☐	☒
Worksheet 3.0	☐	☒
Worksheet 3.1	☐	☒
Worksheet 3.2	☐	☒
Worksheet 3.3	☐	☒
Worksheet 4.0	☐	☒
Worksheet 5.0	☐	☒
Worksheet 6.0	☐	☒
Worksheet 7.0	☐	☒

	Y	N
Original USGS Map	☒	☐
Affected Landowners Map	☒	☐
Landowner Disk or Labels	☒	☐
Buffer Zone Map	☒	☐
Flow Diagram	☒	☐
Site Drawing	☒	☐
Original Photographs	☒	☐
Design Calculations	☒	☐
Solids Management Plan	☒	☐
Water Balance	☐	☒

For TCEQ Use Only

Segment Number ____________________________________County _____________________
Expiration Date ____________________________________Region_____________________
Permit Number ____

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

DOMESTIC WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.0

For any questions about this form, please contact the Applications Review and Processing Team at 512-239-4671.

Section 1. Application Fees (Instructions Page 26)

Indicate the amount submitted for the application fee (check only one).

Flow	New/Major Amendment	Renewal
<0.05 MGD	$350.00 ☐	$315.00 ☐
≥0.05 but <0.10 MGD	$550.00 ☐	$515.00 ☐
≥0.10 but <0.25 MGD	$850.00 ☐	$815.00 ☐
≥0.25 but <0.50 MGD	$1,250.00 ☐	$1,215.00 ☐
≥0.50 but <1.0 MGD	$1,650.00 ☐	$1,615.00 ☐
≥1.0 MGD	$2,050.00 ☒	$2,015.00 ☐

Minor Amendment (for any flow) $150.00 ☐

Payment Information:

Mailed Check/Money Order Number: Click to enter text.

Check/Money Order Amount: Click to enter text.

Name Printed on Check: Click to enter text.

EPAY Voucher Number: 738725

Copy of Payment Voucher enclosed? Yes ☒

Section 2. Type of Application (Instructions Page 26)

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

☒ Publicly-Owned Domestic Wastewater

☐ Privately-Owned Domestic Wastewater

☐ Conventional Wastewater Treatment

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

☐ Active ☒ Inactive

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

☒ TPDES Permit

☐ TLAP

☐ TPDES Permit with TLAP component

☐ Subsurface Area Drip Dispersal System (SADDS)

d. Check the box next to the appropriate application type

☒ New

☐ Major Amendment *with* Renewal

☐ Minor Amendment *with* Renewal

☐ Major Amendment *without* Renewal

☐ Minor Amendment *without* Renewal

☐ Renewal without changes

☐ Minor Modification of permit

e. For amendments or modifications, describe the proposed changes: Click to enter text.

f. **For existing permits**:

Permit Number: WQ00 Click to enter text.

EPA I.D. (TPDES only): TX Click to enter text.

Expiration Date: Click to enter text.

Section 3. Facility Owner (Applicant) and Co-Applicant Information (Instructions Page 26)

A. The owner of the facility must apply for the permit.

What is the Legal Name of the entity (applicant) applying for this permit?

City of Manor

(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal documents forming the entity.)

If the applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at http://www15.tceq.texas.gov/crpub/

CN: 600632111

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

Prefix: Mr.

Last Name, First Name: Harvey, Christopher

Title: City Mayor

Credential: Click to enter text.

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

What is the Legal Name of the co-applicant applying for this permit?

N/A

(The legal name must be spelled exactly as filed with the TX SOS, with the County, or in the legal documents forming the entity.)

If the co-applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at: http://www15.tceq.texas.gov/crpub/

CN: Click to enter text.

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

Prefix: Click to enter text. Last Name, First Name: Click to enter text.

Title: Credential: Click to enter text.

Provide a brief description of the need for a co-permittee: Click to enter text.

C. Core Data Form

Complete the Core Data Form for each customer and include as an attachment. If the customer type selected on the Core Data Form is **Individual**, complete **Attachment 1** of Administrative Report 1.0. Attachment A.2

Section 4. Application Contact Information (Instructions Page 27)

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

A. Prefix: Mr. Last Name, First Name: Castillo, Jose

Title: Associate Credential: P.E., Lic. No. 91237

Organization Name: George Butler Associates Inc.

Mailing Address: 9601 Amberglen Blvd. Suite 109 City, State, Zip Code: Austin, TX 78729

Phone No.: (737) 247-7544 E-mail Address: jcastillo@gbateam.com

Check one or both: ☒ Administrative Contact ☒ Technical Contact

B. Prefix: Click to enter text. Last Name, 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 Code: Click to enter text.

Phone No.: Click to enter text. E-mail Address: Click to enter text.

Check one or both: ☐ Administrative Contact ☐ Technical Contact

Section 5. Permit Contact Information (Instructions Page 27)

Provide the names and contact information for two individuals that can be contacted throughout the permit term.

A. Prefix: Mr. Last Name, First Name: Woodard, Matthew

Title: Director of Public Works Credential: Click to enter text.

Organization Name: City of Manor

Mailing Address: P.O. Box 387 City, State, Zip Code: Manor, TX 78653

Phone No.: (512) 272-5555 E-mail Address: mwoodard@manortx.gov

B. Prefix: Mr. Last Name, First Name: Phelan, Frank

Title: City Engineer Credential: P.E., Lic. No. 93874

Organization Name: George Butler Associates Inc.

Mailing Address: 9601 Amberglen Blvd. Suite 109 City, State, Zip Code: Austin, TX 78729

Phone No.: (737) 247-7556 E-mail Address: fphelan@gbateam.com

Section 6. Billing Contact Information (Instructions Page 27)

The permittee is responsible for paying the annual fee. The annual fee will be assessed to 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 (using form TCEQ-20029).

Prefix: Ms. Last Name, First Name: Almaraz, Lluvia

Title: City Secretary Credential: Click to enter text.

Organization Name: City of Manor

Mailing Address: P.O. Box 387 City, State, Zip Code: Manor, TX 78653

Phone No.: (512) 272-5555 E-mail Address: lalmaraz@manortx.gov

Section 7. DMR/MER Contact Information (Instructions Page 27)

Provide the name and complete mailing address of the person delegated to receive and submit Discharge Monitoring Reports (DMR) (EPA 3320-1) or maintain Monthly Effluent Reports (MER).

Prefix: Mr. Last Name, First Name: Woodard, Matthew

Title: Director of Public Works Credential: Click to enter text.

Organization Name: City of Manor

Mailing Address: P.O. Box 387 City, State, Zip Code: Manor, TX 78653

Phone No.: (512) 272-5555 E-mail Address: mwoodard@manortx.gov

Section 8. Public Notice Information (Instructions Page 27)

A. Individual Publishing the Notices

Prefix: Mr. Last Name, First Name: Almaraz, Lluvia

Title: City Secretary Credential: Click to enter text.

Organization Name: City of Manor

Mailing Address: P.O. Box 387 City, State, Zip Code: Manor, TX 78653

Phone No.: (512) 272-5555 E-mail Address: lalmaraz@manortx.gov

B. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package

Indicate by a check mark the preferred method for receiving the first notice and instructions:

☒ E-mail Address

☐ Fax

☐ Regular Mail

C. Contact permit to be listed in the Notices

Prefix: Ms. Last Name, First Name: Mendoza, Andrea

Title: Staff Engineer Credential: Click to enter text.

Organization Name: George Butler Associates Inc.

Mailing Address: 9601 Amberglen Blvd. City, State, Zip Code: Austin, TX 78729

Phone No.: (737) 247-7539 E-mail Address: amendoza@gbateam.com

D. Public Viewing Information

If the facility or outfall is located in more than one county, a public viewing place for each county must be provided.

Public building name: Manor City Hall

Location within the building: Front Desk

Physical Address of Building: 105 E. Eggleston

City: Manor County: Travis

Contact (Last Name, First Name): Almaraz, Lluvia

Phone No.: (512) 272-5555 Ext.: 5

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.

Please call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine whether an alternative language notices are 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** Section 9 below.

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

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.3

G. Public Involvement Plan Form

Complete the Public Involvement Plan Form (TCEQ Form 20960) for each application for a **new permit or major amendment to a permit** and include as an attachment.

Attachment: A.4

Section 9. Regulated Entity and Permitted Site Information (Instructions Page 29)

A. If the site is currently regulated by TCEQ, provide the Regulated Entity Number (RN) issued to this site. **RN** Click to enter text.

Search the TCEQ's Central Registry at http://www15.tceq.texas.gov/crpub/ to determine if the site is currently regulated by TCEQ.

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

East Travis Regional Wastewater Treatment Plant

C. Owner of treatment facility: City of Manor

Ownership of Facility: ☒ Public ☐ Private ☐ Both ☐ Federal

D. Owner of land where treatment facility is or will be:

Prefix: Mr Last Name, First Name: Moore, Scott

Title: City Manager Credential: Click to enter text.

Organization Name: City of Manor

Mailing Address: P.O. Box 387 City, State, Zip Code: Manor, TX 78653

Phone No.: (512) 272-5555 E-mail Address: smoore@manortx.gov

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: Click to enter text.

E. Owner of effluent disposal site:

Prefix: Mr | Last Name, First Name: Moore, Scott

Title: City Manager | Credential: Click to enter text.

Organization Name: City of Manor

Mailing Address: P.O. Box 387 | City, State, Zip Code: Manor, TX, 78653

Phone No.: (512) 272-5555 | E-mail Address: smoore@manortx.gov

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: Click to enter text.

F. Owner sewage sludge disposal site (if authorization is requested for sludge disposal on property owned or controlled by the applicant)::

Prefix: Mr | Last Name, First Name: Moore, Scott

Title: City Manager | Credential: Click to enter text.

Organization Name: City of Manor

Mailing Address: P.O. Box 387 | City, State, Zip Code: Manor, TX 78653

Phone No.: (512) 272-5555 | E-mail Address: smoore@manortx.gov

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: Click to enter text.

Section 10. TPDES Discharge Information (Instructions Page 31)

A. Is the wastewater treatment facility location in the existing permit accurate?

☐ Yes ☐ No

If **no, or a new permit application**, please give an accurate description:

The proposed wastewater treatment facility is situated in southeastern Manor, approximately 0.82 miles northeast of the intersection of Hog Eye Rd and Hibbs Ln, in eastern Travis County.

B. Are the point(s) of discharge and the discharge route(s) in the existing permit correct?

☐ Yes ☐ No

If **no, or a new or amendment permit application**, provide an accurate description of the point of discharge and the discharge route to the nearest classified segment as defined in 30 TAC Chapter 307:

The point of discharge is located at the confluence of Wilbarger Creek and Cottonwood Creek, upstream of where Willow Creek and Dry Creek join Wilbarger Creek. This discharge point lies within stream segment 1434D.

City nearest the outfall(s): Manor, TX

County in which the outfalls(s) is/are located: Travis

C. 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, provide copies of letters that show proof of contact and the approval letter upon receipt.

Attachment: Click to enter text.

D. 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: Bastrop, Fayette, Colorado

Section 11. TLAP Disposal Information (Instructions Page 32)

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

☐ Yes ☐ No

If **no, or a new or amendment permit application**, provide an accurate description of the disposal site location:

Click to enter text.

B. City nearest the disposal site: Click to enter text.

C. County in which the disposal site is located: Click to enter text.

D. For **TLAPs**, describe the routing of effluent from the treatment facility to the disposal site:

Click to enter text.

E. For **TLAPs**, please identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained: Click to enter text.

Section 12. Miscellaneous Information (Instructions Page 32)

A. Is the facility located on or does the treated effluent cross American Indian Land?

☐ Yes ☒ No

B. If the existing permit contains an onsite sludge disposal authorization, is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☐ No ☒ Not Applicable

If No, or if a new onsite sludge disposal authorization is being requested in this permit application, provide an accurate location description of the sewage sludge disposal site.

During Phase 1, sludge will be hauled for processing at the Wilbarger Wastewater Treatment Plant. During Phase 2 and the Ultimate Phase sludge will be processed on site. Sludge disposal following processing will be transported to a local disposal site. A site drawing showing the designed layout for the future treatment plant has been attached in later sections as Attachment T.E.

C. 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 formerly employed by the TCEQ who represented your company and was paid for service regarding the application: Jose Castillo

D. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If **yes**, provide the following information:

Account number: Click to enter text.

Amount past due: Click to enter text.

E. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If **yes**, please provide the following information:

Enforcement order number: Click to enter text.

Amount past due: Click to enter text.

Section 13. Attachments (Instructions Page 33)

Indicate which attachments are included with the Administrative Report. Check all that apply:

☐ Lease agreement or deed recorded easement, if the land where the treatment facility is located or the effluent disposal site are not owned by the applicant or co-applicant.

☒ Original full-size USGS Topographic Map with the following information:

- Applicant's property boundary
- Treatment facility boundary
- Labeled point of discharge for each discharge point (TPDES only)
- Highlighted discharge route for each discharge point (TPDES only)
- Onsite sewage sludge disposal site (if applicable)
- Effluent disposal site boundaries (TLAP only)
- New and future construction (if applicable)
- 1 mile radius information
- 3 miles downstream information (TPDES only)
- All ponds.

☐ Attachment 1 for Individuals as co-applicants

☐ Other Attachments. Please specify: Click to enter text.

Section 14. Signature Page (Instructions Page 34)

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

Permit Number:

Applicant: City of Manor

Certification:

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

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

Signatory name (typed or printed): Dr. Christopher Harvey

Signatory title: Mayor

Signature:_______________ Date: 12-16-2024

(Use blue ink)

Subscribed and Sworn to before me by the said Dr. Christopher Harvey

on this 16th day of December, 2024.

My commission expires on the 25th day of October, 2024.

____
Notary Public

LLUVIA T. ALMARAZ
Notary Public, State of Texas
Comm. Expires 10-25-2025
Notary ID 11988227

[SEAL]

Travis
County, Texas

DOMESTIC WASTEWATER PERMIT APPLICATION ADMINISTRATIVE REPORT 1.0

The following information is required for new and amendment applications.

Section 1. Affected Landowner Information (Instructions Page 36)

A. Indicate by a check mark that the landowners map or drawing, with scale, includes the following information, as applicable:

- ☒ 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 (for example, irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property
- ☐ The property boundaries of all landowners surrounding the effluent disposal site
- ☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners surrounding 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 (for example, sludge surface disposal site or sludge monofill) is located

B. ☒ Indicate by a check mark that a separate list with the landowners' names and mailing addresses cross-referenced to the landowner's map has been provided.

C. Indicate by a check mark in which format the landowners list is submitted:

☒ USB Drive ☐ Four sets of labels

D. Provide the source of the landowners' names and mailing addresses: TCAD Database

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.

Section 2. Original Photographs (Instructions Page 38)

Provide original ground level photographs. Indicate with checkmarks that the following information is provided.

☒ 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

Section 3. Buffer Zone Map (Instructions Page 38)

A. Buffer zone map. Provide a buffer zone map on 8.5 x 11-inch paper with all of the following information. The applicant's property line and the buffer zone line may be distinguished by using dashes or symbols and appropriate labels.

- The applicant's property boundary;
- The required buffer zone; and
- Each treatment unit; and
- The distance from each treatment unit to the property boundaries.

B. Buffer zone compliance method. Indicate how the buffer zone requirements will be met. Check all that apply.

☒ Ownership

☐ Restrictive easement

☐ Nuisance odor control

☐ Variance

C. Unsuitable site characteristics. Does the facility comply with the requirements regarding unsuitable site characteristic found in 30 TAC § 309.13(a) through (d)?

☒ Yes ☐ No

DOMESTIC 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: Attachment A.9

WATER QUALITY PERMIT

PAYMENT SUBMITTAL FORM

Use this form to submit the Application Fee, if the mailing the payment.

- 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 **Waste Permit No:** Click 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.

Staple Check or Money Order in This Space

ATTACHMENT 1

INDIVIDUAL INFORMATION

Section 1. Individual Information (Instructions Page 41)

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

Prefix (Mr., Ms., Miss): Click to enter text.

Full legal name (Last Name, First Name, Middle Initial): Click to enter text.

Driver's License or State Identification Number: Click to enter text.

Date of Birth: Click to enter text.

Mailing Address: Click to enter text.

City, State, and Zip Code: Click to enter text.

Phone Number: Click to enter text. Fax Number: Click to enter text.

E-mail Address: Click to enter text.

CN: Click to enter text.

For Commission Use Only:
Customer Number:
Regulated Entity Number:
Permit Number:

DOMESTIC WASTEWATER PERMIT APPLICATION CHECKLIST OF COMMON DEFICIENCIES

Below is a list of common deficiencies found during the administrative review of domestic wastewater permit applications. To ensure the timely processing of this application, please review the items below and indicate by checking Yes that each item is complete and in accordance applicable rules at 30 TAC Chapters 21, 281, and 305. If an item is not required this application, indicate by checking N/A where appropriate. Please do not submit the application until the items below have been addressed.

Core Data Form (TCEQ Form No. 10400) ☒ Yes
(Required for all application types. Must be completed in its entirety and signed. Note: Form may be signed by applicant representative.)

Correct and Current Industrial Wastewater Permit Application Forms ☒ Yes
(TCEQ Form Nos. 10053 and 10054. Version dated 6/25/2018 or later.)

Water Quality Permit Payment Submittal Form (Page 19) ☐ Yes
(Original payment sent to TCEQ Revenue Section. See instructions for mailing address.)

7.5 Minute USGS Quadrangle Topographic Map Attached ☒ Yes
(Full-size map if seeking "New" permit.
8 ½ x 11 acceptable for Renewals and Amendments)

Current/Non-Expired, Executed Lease Agreement or Easement ☒ N/A ☐ Yes

Landowners Map ☐ N/A ☒ Yes
(See instructions for landowner requirements)

Things to Know:

- All the items shown on the map must be labeled.
- The applicant's complete property boundaries must be delineated which includes boundaries of contiguous property owned by the applicant.
- The applicant cannot be its own adjacent landowner. You must identify the landowners immediately adjacent to their property, regardless of how far they are from the actual facility.
- If the applicant's property is adjacent to a road, creek, or stream, the landowners on the opposite side must be identified. Although the properties are not adjacent to applicant's property boundary, they are considered potentially affected landowners. If the adjacent road is a divided highway as identified on the USGS topographic map, the applicant does not have to identify the landowners on the opposite side of the highway.

Landowners Cross Reference List ☐ N/A ☒ Yes
(See instructions for landowner requirements)

Landowners Labels or USB Drive attached ☐ N/A ☒ Yes
(See instructions for landowner requirements)

Original signature per 30 TAC § 305.44 – Blue Ink Preferred ☒ Yes
(If signature page is not signed by an elected official or principle executive officer, a copy of signature authority/delegation letter must be attached)

Plain Language Summary ☒ Yes

ADMINISTRATIVE REPORT

ATTACHMENT LIST

- ATTACHMENT A.1: EPAY VOUCHER
- ATTACHMENT A.2: TCEQ CORE DATA FORM
- ATTACHMENT A.3: PLAIN LANGUAGE SUMMARY
- ATTACHMENT A.4: PUBLIC INVOLVEMENT PLAN FORM
- ATTACHMENT A.5: USGS TOPOGRAPHIC MAP
- ATTACHMENT A.6: AFFECTED LANDOWNER MAP & LIST
- ATTACHMENT A.7: ORIGINAL PHOTOGRAPHS & PHOTOGRAPH PLOT MAP
- ATTACHMENT A.8: BUFFER ZONE MAP
- ATTACHMENT A.9: SPIF

ATTACHMENT A.1

Questions or Comments >>

Shopping Cart | Select Fee | Search Transactions | Sign Out

Your transaction is complete. Thank you for using TCEQ ePay.

Note: It may take up to 3 working days for this electronic payment to be processed and be reflected in the TCEQ ePay system. Print this receipt and the vouchers for your records. An email receipt has also been sent.

Transaction Information

Trace Number: 582EA000641583
Date: 01/03/2025 02:08 PM
Payment Method: CC - Authorization 0000006769
ePay Actor: RAYMOND MUNIZ
Actor Email: rmuniz@manortx.gov
IP: 12.110.209.106
TCEQ Amount: $2,050.00
Texas.gov Price: $2,096.38*

* This service is provided by Texas.gov, the official website of Texas. The price of this service includes funds that support the ongoing operations and enhancements of Texas.gov, which is provided by a third party in partnership with the State.

Payment Contact Information

Name: RAYMOND MUNIZ
Company: CITY OF MANOR
Address: 416 GREGG ST, MANOR, TX 78653
Phone: 512-364-3759

Cart Items

Click on the voucher number to see the voucher details.

Voucher	Fee Description	AR Number	Amount
738725	WW PERMIT - FACILITY WITH FLOW >= 1.0 MGD - NEW AND MAJOR AMENDMENTS		$2,000.00
738726	30 TAC 305.53B WQ NOTIFICATION FEE		$50.00
		TCEQ Amount:	$2,050.00

ePay Again | Exit ePay

Note: It may take up to 3 working days for this electronic payment to be processed and be reflected in the TCEQ ePay system. Print this receipt for your records.

Site Help | Disclaimer | Web Policies | Accessibility | Our Compact with Texans | TCEQ Homeland Security | Contact Us
Statewide Links: Texas.gov | Texas Homeland Security | TRAIL Statewide Archive | Texas Veterans Portal

ATTACHMENT A.2

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 600632111		**RN 109469262**

SECTION II: Customer Information

4. General Customer Information | **5. Effective Date for Customer Information Updates** (mm/dd/yyyy)

☐ 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:*

City of Manor

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID** (9 digits)	**10. DUNS Number** *(if applicable)*
	30008389238	74-1664745	

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:

PO Box 387

City	Manor	**State**	TX	**ZIP**	78653	**ZIP + 4**	0387

16. Country Mailing Information *(if outside USA)*

17. E-Mail Address *(if applicable)*

mwoodard@manortx.gov

18. Telephone Number	**19. Extension or Code**	**20. Fax Number** *(if applicable)*

(512) 272-5555	5	(512) 272-8636

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.)*

East Travis Regional Plant

23. Street Address of the Regulated Entity: ***(No PO Boxes)***	Hibbs Lane						
	City	Manor	**State**	TX	**ZIP**	78653	**ZIP + 4**
24. County	Travis						

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

25. Description to Physical Location:	Proposed facility is located in Hibbs Ln approximately 0.82 miles northeast from intersection with Hog Eye Rd.

26. Nearest City	**State**	**Nearest ZIP Code**
Manor	Tx	78653

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:	30.31254		**28. Longitude (W) In Decimal:**	97.4657	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
30	18	45	97	27	56

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)
4950	4941	221320	221320

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

Wastewater Treatment Facility

34. Mailing Address:	416 Gregg Street						
	City	Manor	**State**	Tx	**ZIP**	78653	**ZIP + 4**
35. E-Mail Address:	mwoodard@manortx.gov						

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
(512) 272-5555	5	(512) 272-8792

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:

SECTION IV: Preparer Information

40. Name:	Jose Castillo, PE	**41. Title:**	Associate
42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(737) 247-7544		( ) -	jcastillo@gbateam.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:	George Butler Associates, Inc.	**Job Title:**	Associate
Name *(In Print)*:	Jose Castillo	**Phone:**	(737) 247- **7544**
Signature:		**Date:**	1/13/2025

ATTACHMENT A.3

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

PLAIN LANGUAGE SUMMARY FOR TPDES OR TLAP PERMIT APPLICATIONS

Plain Language Summary Template and Instructions for Texas Pollutant Discharge Elimination System (TPDES) and Texas Land Application (TLAP) Permit Applications

Applicants should use this template to develop a plain language summary as required by Title 30, Texas Administrative Code (30 TAC), Chapter 39, Subchapter H. Applicants may modify the template as necessary to accurately describe their facility as long as the summary includes the following information: (1) the function of the proposed plant or facility; (2) the expected output of the proposed plant or facility; (3) the expected pollutants that may be emitted or discharged by the proposed plant or facility; and (4) how the applicant will control those pollutants, so that the proposed plant will not have an adverse impact on human health or the environment.

Fill in the highlighted areas below to describe your facility and application in plain language. Instructions and examples are provided below. Make any other edits necessary to improve readability or grammar and to comply with the rule requirements.

If you are subject to the alternative language notice requirements in 30 TAC Section 39.426, **you must provide a translated copy of the completed plain language summary in the appropriate alternative language as part of your application package**. For your convenience, a Spanish template has been provided below.

ENGLISH TEMPLATE FOR TPDES or TLAP NEW/RENEWAL/AMENDMENT APPLICATIONS Domestic WASTEWATER/STORMWATER

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 TAC Chapter 39. The information provided in this summary may change during the technical review of the application and is not a federal enforceable representation of the permit application.

City of Manor (CN600632111) proposes to operate East Travis Regional Plant (5. Enter Regulated Entity Number here (i.e., RN1########)), a 6 million gallons per day treatment facility with an average daily flow of 4,170 gpm and peak flows not anticipated to exceed 12,470 gpm. The facility will be located at Hibbs Ln approximately 0.82 miles northeast from intersection with Hog Eye Rd., in Manor, Travis County, Texas 78653. The City of Manor seeks a new permit for this facility.

Discharges from the facility are expected to contain : 6.0 MGD Effluent flow, 5.0 mg/L TSS, 5.0 mg/L $CBOD_5$, 2.0 mgN/L Ammonia N, 1.0 mg/L TP. The domestic wastewater will be treated by rapid mix basin, which will feed into a four-train treatment system. Each train will contain an anaerobic basin, anoxic basin, aeration basin, and secondary clarifier. After which, each train will feed into a disc filter and UV disinfector before effluent is discharged. This facility will be constructed in three phases (1.5 MGD, 3.0 MGD, and 6.0 MGD). During Phase 1, liquid sludge will be hauled to the Wilbarger Wastewater Treatment Plant for processing.

During Phase 2 and the Ultimate Phase sludge processing will through aerobic digestion, thickening, dewatering and then disposed of off site.

PLANTILLA EN ESPAÑOL PARA SOLICITUDES NUEVAS/RENOVACIONES/ENMIENDAS DE TPDES o TLAP

AGUAS RESIDUALES DOMÉSTICAS /AGUAS PLUVIALES

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 requerido por el Capítulo 39 del Código Administrativo de Texas 30. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no es una representación ejecutiva fedérale de la solicitud de permiso.

La ciudad de Manor (CN600632111) propone operar la planta regional de tratamiento de aguas residuales de East Travis 5. Introduzca el número de entidad regulada aquí (es decir, RN1########), una instalación de tratamiento de 6 millones de galones por día con un flujo diario promedio de 4,170 GPM y flujos máximos que no sea mas que 12,470 GPM. La instalación estará ubicada en Hibbs Ln aproximadamente a 0,82 millas al noreste de la intersección con Hog Eye Rd., en Manor, Condado de Travis, Texas 78653. La ciudad de Manor solicita un permiso para esta instalación.

Se espera que las descargas de la instalación contengan 6,0 MGD de flujo de efluente, 5,0 mg/L de SST, 5,0 mg/L de DBO5, 2,0 mgN/L de N de amoníaco, 1,0 mg/L TP. Las aguas residuales domésticas. estará tratado por un tanque mezcla rápida, que alimentará una sistema de tratamiento de cuatro trenes. Cada tren contendrá una cuencea anaeróbica, una cuenca de aireación y una tanque de sedimentación. Después, cada tren alimentará un filtro y desinfección con luz ultravioleta antes de descargar el efluente. Esta instalación se construirá en tres fases (1,5 MGD, 3,0 MGD y 6.0 MGD). Durante la Fase 1, los lodos liquidos se transportarán a la planta de tratamiento de aguas residuales de Wilbarger para su procesamiento. Durante Fase 2 y la Fase Final, el procesamiento de lodos se estara tratado mediante digestión aeróbica, espesamiento, deshidratación y eliminación de sólidos fuera del lugar.

INSTRUCTIONS

1. Enter the name of applicant in this section. The applicant name should match the name associated with the customer number.
2. Enter the Customer Number in this section. Each Individual or Organization is issued a unique 11-digit identification number called a CN (e.g. CN123456789).
3. Choose "operates" in this section for existing facility applications or choose "proposes to operate" for new facility applications.
4. Enter the name of the facility in this section. The facility name should match the name associated with the regulated entity number.
5. Enter the Regulated Entity number in this section. Each site location is issued a unique 11-digit identification number called an RN (e.g. RN123456789).
6. Choose the appropriate article (a or an) to complete the sentence.
7. Enter a description of the facility in this section. For example: steam electric generating facility, nitrogenous fertilizer manufacturing facility, etc.
8. Choose "is" for an existing facility or "will be" for a new facility.
9. Enter the location of the facility in this section.
10. Enter the City nearest the facility in this section.
11. Enter the County nearest the facility in this section.
12. Enter the zip code for the facility address in this section.
13. Enter a summary of the application request in this section. For example: renewal to discharge 25,000 gallons per day of treated domestic wastewater, new application to discharge process wastewater and stormwater on an intermittent and flow-variable basis, or major amendment to reduce monitoring frequency for pH, etc. If more than one outfall is included in the application, provide applicable information for each individual outfall.
14. List all pollutants expected in the discharge from this facility in this section. If applicable, refer to the pollutants from any federal numeric effluent limitations that apply to your facility.
15. Enter the discharge types from your facility in this section (e.g., stormwater, process wastewater, once through cooling water, etc.)
16. Choose the appropriate verb tense to complete the sentence.
17. Enter a description of the wastewater treatment used at your facility. Include a description of each process, starting with initial treatment and finishing with the outfall/point of disposal. Use additional lines for individual discharge types if necessary.

Questions or comments concerning this form may be directed to the Water Quality Division's Application Review and Processing Team by email at WQ-ARPTeam@tceq.texas.gov or by phone at (512) 239-4671.

Example

Individual Industrial Wastewater 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 TAC 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.

ABC Corporation (CN600000000) operates the Starr Power Station (RN10000000000), a two-unit gas-fired electric generating facility. Unit 1 has a generating capacity of 393 megawatts (MWs) and Unit 2 has a generating capacity of 528 MWs. The facility is located at 1356 Starr Street, near the City of Austin, Travis County, Texas 78753.

This application is for a renewal to discharge 870,000,000 gallons per day of once through cooling water, auxiliary cooling water, and also authorizes the following waste streams monitored inside the facility (internal outfalls) before it is mixed with the other wastewaters authorized for discharge via main Outfall 001, referred to as "previously monitored effluents" (low-volume wastewater, metal-cleaning waste, and stormwater (from diked oil storage area yards and storm drains)) via Outfall 001. Low-volume waste sources, metal-cleaning waste, and stormwater drains on a continuous and flow-variable basis via internal Outfall 101.

The discharge of once through cooling water via Outfall 001 and low-volume waste and metal-cleaning waste via Outfall 101 from this facility is subject to federal effluent limitation guidelines at 40 CFR Part 423. The pollutants expected from these discharges based on 40 CFR Part 423 are: free available chlorine, total residual chlorine, total suspended solids, oil and grease, total iron, total copper, and pH. Temperature is also expected from these discharges. Additional potential pollutants are included in the Industrial Wastewater Application Technical Report, Worksheet 2.0.

Cooling water and boiler make-up water are supplied by Lake Starr Reservoir. The City of Austin municipal water plant (CN600000000, PWS 00000) supplies the facility's potable water and serves as an alternate source of boiler make-up water. Water from the Lake Starr Reservoir is withdrawn at the intake structure and treated with sodium hypochlorite to prevent biofouling and sodium bromide as a chlorine enhancer to improve efficacy and then passed through condensers and auxiliary equipment on a once-through basis to cool equipment and condense exhaust steam.

Low-volume wastewater from blowdown of boiler Units 1 and 2 and metal-cleaning wastes receive no treatment prior to discharge via Outfall 101. Plant floor and equipment drains and stormwater runoff from diked oil storage areas, yards, and storm drains are routed through an oil and water separator prior to discharge via Outfall 101. Domestic wastewater, blowdown, and backwash water from the service water filter, clarifier, and sand filter are routed to the Starr Creek Domestic Sewage Treatment Plant, TPDES Permit No. WQ0010000001, for treatment and disposal. Metal-cleaning waste from equipment cleaning is generally disposed of off-site.

ATTACHMENT A.4

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.

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.

Manor

(City)

Tavis

(County)

48453045900

(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

85.8%

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

$33,538 per capita income

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

53.77% Hispanic or Latino

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

44.1% Households with a Language other than English spoken at home.

(e) Languages commonly spoken in area by percentage

42.33% speak Spanish, 0.90% Speak IndoEuropean Languages,

(f) Community and/or Stakeholder Groups

Travis county is a stake holder as they are the owners of multiple adjacent properties. Conservation tracts adjacent to the WWTP property were also a significant consideration in the selection of this site location.

(g) Historic public interest or involvement

As both of the above listed stakeholders will not include future residential or commercial developments, the site location comes with inherit buffer zones. Most of the down stream property ownership is Travis County.

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.

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) Manor City Hall

Section 7. Voluntary Submittal

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

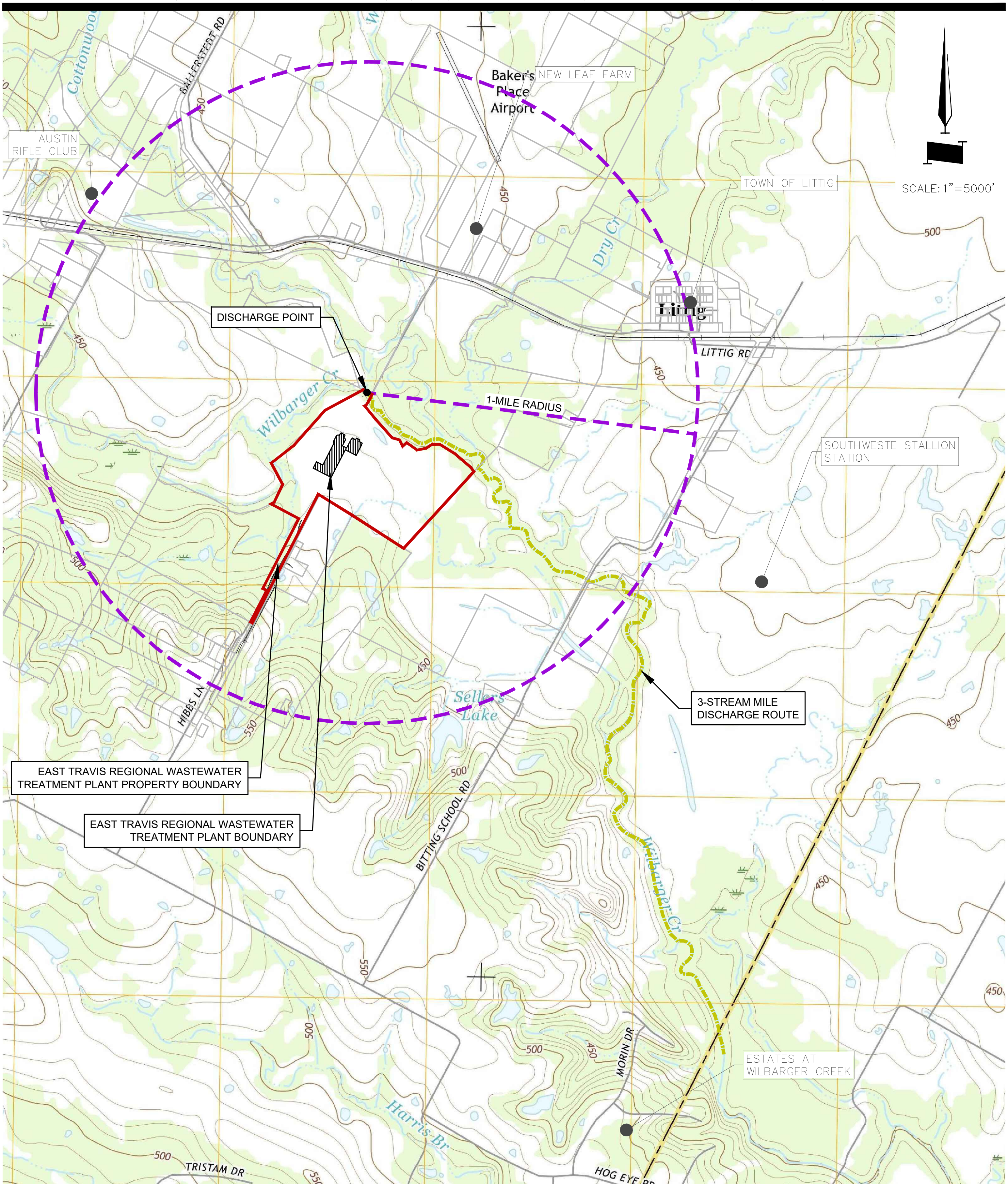
Will you provide notice of this application, including notice in alternative languages?

☐ 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)

ATTACHMENT A.5



GBA

PROJECT NUMBER	EAST TRAVIS REGIONAL WASTEWATER TREATMENT PLANT PERMIT	SHEET NUMBER
16619		
DATE 1/10/25	*USGS TOPOGRAPHIC MAP*	1

ATTACHMENT A.6

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

FOR AGENCIES REVIEWING DOMESTIC OR INDUSTRIAL TPDES WASTEWATER PERMIT APPLICATIONS

TCEQ USE ONLY:

Application type: _____Renewal _____Major Amendment ____Minor Amendment _____New

County: ______________________________________ Segment Number: __________________

Admin Complete Date: _______________________

Agency Receiving SPIF:

______ Texas Historical Commission ______ U.S. Fish and Wildlife

______ Texas Parks and Wildlife Department ______ U.S. Army Corps of Engineers

This form applies to TPDES permit applications only. (Instructions, Page 53)

Complete this form as a separate document. TCEQ will mail a copy to each agency as required by our agreement with EPA. If any of the items are not completely addressed or further information is needed, we will contact you to provide the information before issuing the permit. Address each item completely.

Do not refer to your response to any item in the permit application form. Provide each attachment for this form separately from the Administrative Report of the application. The application will not be declared administratively complete without this SPIF form being completed in its entirety including all attachments. Questions or comments concerning this form may be directed to the Water Quality Division's Application Review and Processing Team by email at WQ-ARPTeam@tceq.texas.gov or by phone at (512) 239-4671.

The following applies to all applications:

1. Permittee: City of Manor

   Permit No. WQ00 Click here to enter text. EPA ID No. TX D990708422

   Address of the project (or a location description that includes street/highway, city/vicinity, and county):

   The project site can best be described as approximately 0.82 miles northeast of Hibbs Lane, Manor TX 78653 in Travis County. With the coordinates of 30.31254˚, -97.4657˚

Provide the name, address, phone and fax number of an individual that can be contacted to answer specific questions about the property.

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

First and Last Name: Matthew Woodard

Credential (P.E, P.G., Ph.D., etc.): Click here to enter text.

Title: Director of Public Works

Mailing Address: P.O. Boc 387

City, State, Zip Code: Manor, TX 78653

Phone No.: 512-272-555 Ext.: Click here to enter text. Fax No.: Click here to enter text.

E-mail Address: mwoodard@manortx.gov

2. List the county in which the facility is located: Travis

3. If the property is publicly owned and the owner is different than the permittee/applicant, please list the owner of the property.

   This property is owned by the City of Manor, Texas, which is the same entity as the permit applicant.

4. Provide a description of the effluent discharge route. The discharge route must follow the flow of effluent from the point of discharge to the nearest major watercourse (from the point of discharge to a classified segment as defined in 30 TAC Chapter 307). If known, please identify the classified segment number.

   The initial effluent discharge point will be directly into Wilbarger Creek (SegID: 1434D), just downstream of where the Cottonwood Creek joins the Wilbarger Creek. From this point, the effluent discharge route follows the Wilbarger Creek route as it flows downstream to the east along the north end of the project property.

5. Please provide a separate 7.5-minute USGS quadrangle map with the project boundaries plotted and a general location map showing the project area. Please highlight the discharge route from the point of discharge for a distance of one mile downstream. (This map is required in addition to the map in the administrative report).

   Provide original photographs of any structures 50 years or older on the property.

   Does your project involve any of the following? Check all that apply.

   - ☒ Proposed access roads, utility lines, construction easements
   - ☐ Visual effects that could damage or detract from a historic property's integrity
   - ☐ Vibration effects during construction or as a result of project design
   - ☒ Additional phases of development that are planned for the future
   - ☐ Sealing caves, fractures, sinkholes, other karst features

☒ Disturbance of vegetation or wetlands

1. List proposed construction impact (surface acres to be impacted, depth of excavation, sealing of caves, or other karst features):

   Approximately 25 acres will be directly impacted by construction work involved in this project. There are no known caves or other karst features within the construction zone.

2. Describe existing disturbances, vegetation, and land use:

   The property on which the project site is located is approximately 96 acres of undeveloped rural land. Currently, a majority of the property is unmaintained grass with some sparse trees along the edges. The land in the immediate surrounding area is either undeveloped, or agricultural use.

THE FOLLOWING ITEMS APPLY ONLY TO APPLICATIONS FOR NEW TPDES PERMITS AND MAJOR AMENDMENTS TO TPDES PERMITS

3. List construction dates of all buildings and structures on the property:

   There are currently no structures or buildings on the property.

4. Provide a brief history of the property, and name of the architect/builder, if known.

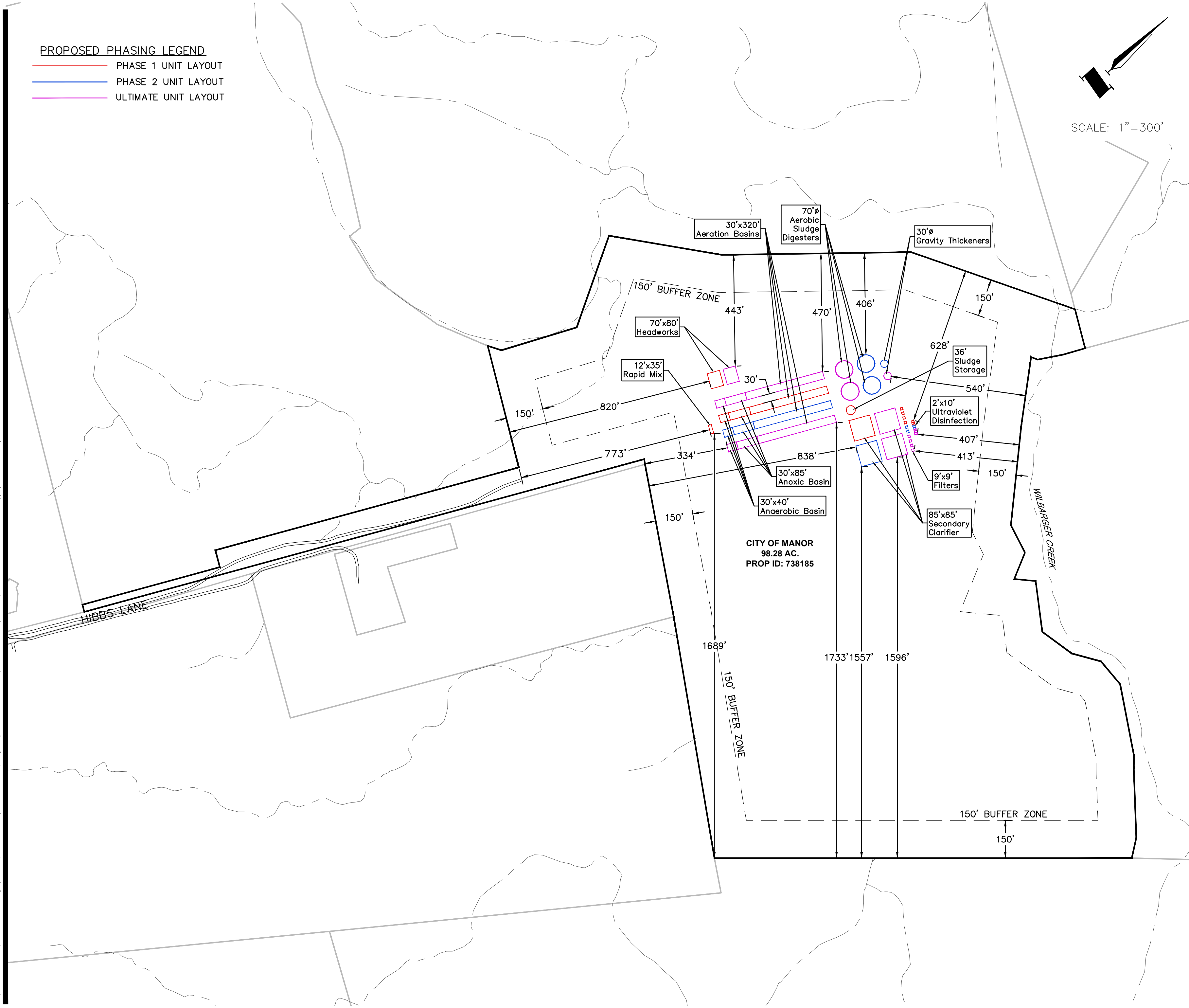
   This property was purchased by the City of Manor for the purpose of this project. There is no architect or builder associated with this property as there are no structures on the property.

Photo 1: View to Proposed Plant Location, from South

Photo 2: View of Outfall Looking Downstream

Photo 3: View of Outfall Looking Upstream

ATTACHMENT A.8



EAST TRAVIS REGIONAL WASTEWATER TREATMENT PLANT PERMIT

BUFFER ZONE MAP

PROJECT NUMBER
16619

DATE
1/13/25

SHEET NUMBER
1

G:\16619\Civil 3D\Production Drawings\Exhibits\TCEQ Exhibits\Buffer Zone Map.dwg Layout: Buffer Zone Map --- Thursday January 23, 2025, 10:41am ---

ATTACHMENT A.9

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

FOR AGENCIES REVIEWING DOMESTIC OR INDUSTRIAL TPDES WASTEWATER PERMIT APPLICATIONS

TCEQ USE ONLY:

Application type: _____Renewal _____Major Amendment ____Minor Amendment _____New

County: ___________________________________ Segment Number: _________________

Admin Complete Date: ______________________

Agency Receiving SPIF:

______ Texas Historical Commission ______ U.S. Fish and Wildlife

______ Texas Parks and Wildlife Department ______ U.S. Army Corps of Engineers

This form applies to TPDES permit applications only. (Instructions, Page 53)

Complete this form as a separate document. TCEQ will mail a copy to each agency as required by our agreement with EPA. If any of the items are not completely addressed or further information is needed, we will contact you to provide the information before issuing the permit. Address each item completely.

Do not refer to your response to any item in the permit application form. Provide each attachment for this form separately from the Administrative Report of the application. The application will not be declared administratively complete without this SPIF form being completed in its entirety including all attachments. Questions or comments concerning this form may be directed to the Water Quality Division's Application Review and Processing Team by email at WQ-ARPTeam@tceq.texas.gov or by phone at (512) 239-4671.

The following applies to all applications:

1. Permittee: City of Manor

   Permit No. WQ00 Click here to enter text. EPA ID No. TX D990708422

   Address of the project (or a location description that includes street/highway, city/vicinity, and county):

   The project site can best be described as approximately 0.82 miles northeast of Hibbs Lane, Manor TX 78653 in Travis County. With the coordinates of 30.31254˚, -97.4657˚

Provide the name, address, phone and fax number of an individual that can be contacted to answer specific questions about the property.

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

First and Last Name: Matthew Woodard

Credential (P.E, P.G., Ph.D., etc.): Click here to enter text.

Title: Director of Public Works

Mailing Address: P.O. Boc 387

City, State, Zip Code: Manor, TX 78653

Phone No.: 512-272-555 Ext.: Click here to enter text. Fax No.: Click here to enter text.

E-mail Address: mwoodard@manortx.gov

2. List the county in which the facility is located: Travis
3. If the property is publicly owned and the owner is different than the permittee/applicant, please list the owner of the property.

This property is owned by the City of Manor, Texas, which is the same entity as the permit applicant.

4. Provide a description of the effluent discharge route. The discharge route must follow the flow of effluent from the point of discharge to the nearest major watercourse (from the point of discharge to a classified segment as defined in 30 TAC Chapter 307). If known, please identify the classified segment number.

The initial effluent discharge point will be directly into Wilbarger Creek (SegID: 1434D), just downstream of where the Cottonwood Creek joins the Wilbarger Creek. From this point, the effluent discharge route follows the Wilbarger Creek route as it flows downstream to the east along the north end of the project property.

5. Please provide a separate 7.5-minute USGS quadrangle map with the project boundaries plotted and a general location map showing the project area. Please highlight the discharge route from the point of discharge for a distance of one mile downstream. (This map is required in addition to the map in the administrative report).

Provide original photographs of any structures 50 years or older on the property.

Does your project involve any of the following? Check all that apply.

☒ Proposed access roads, utility lines, construction easements

☐ Visual effects that could damage or detract from a historic property's integrity

☐ Vibration effects during construction or as a result of project design

☒ Additional phases of development that are planned for the future

☐ Sealing caves, fractures, sinkholes, other karst features

☒ Disturbance of vegetation or wetlands

1. List proposed construction impact (surface acres to be impacted, depth of excavation, sealing of caves, or other karst features):

   Approximately 25 acres will be directly impacted by construction work involved in this project. There are no known caves or other karst features within the construction zone.

2. Describe existing disturbances, vegetation, and land use:

   The property on which the project site is located is approximately 96 acres of undeveloped rural land. Currently, a majority of the property is unmaintained grass with some sparse trees along the edges. The land in the immediate surrounding area is either undeveloped, or agricultural use.

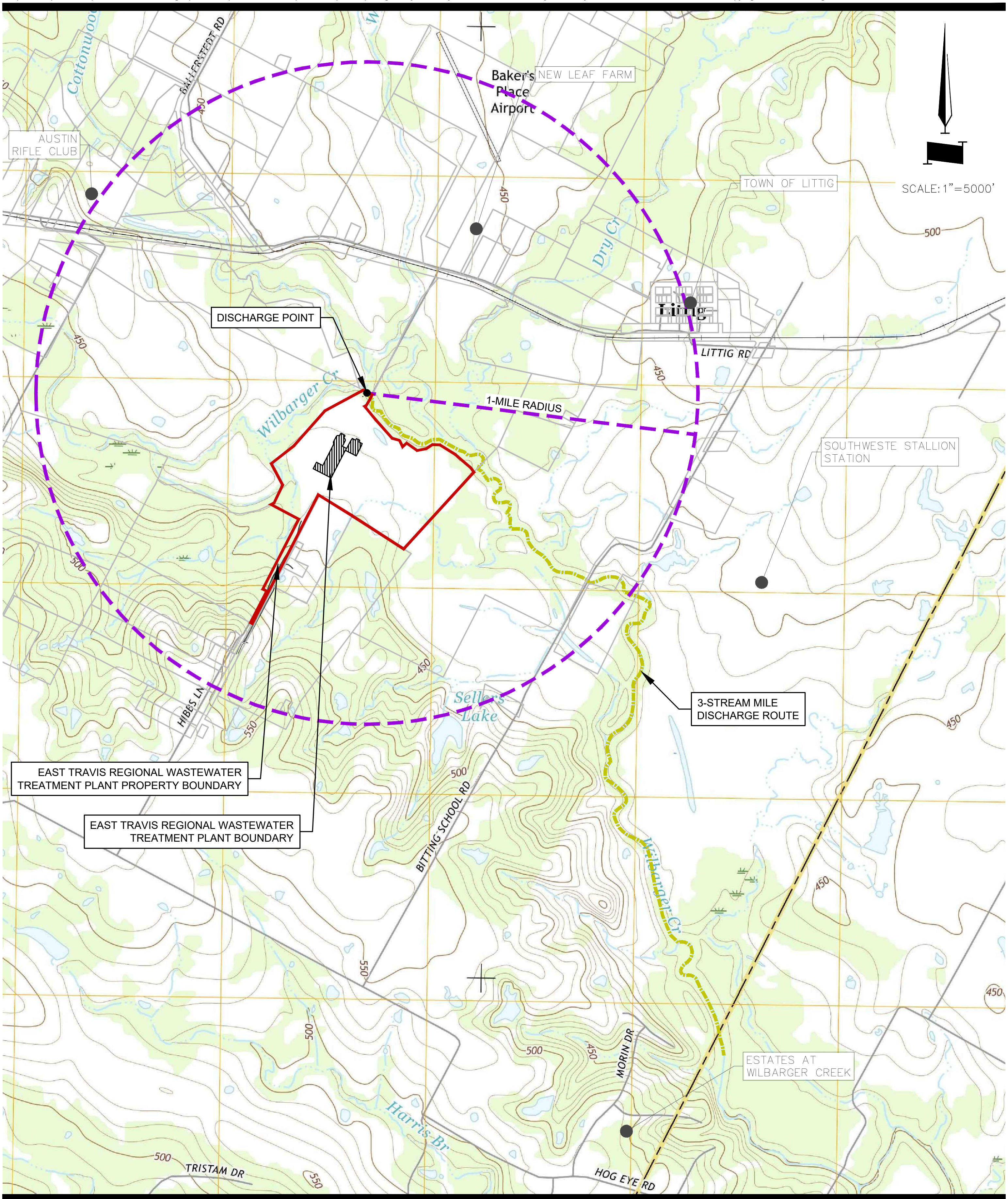
THE FOLLOWING ITEMS APPLY ONLY TO APPLICATIONS FOR NEW TPDES PERMITS AND MAJOR AMENDMENTS TO TPDES PERMITS

3. List construction dates of all buildings and structures on the property:

   There are currently no structures or buildings on the property.

4. Provide a brief history of the property, and name of the architect/builder, if known.

   This property was purchased by the City of Manor for the purpose of this project. There is no architect or builder associated with this property as there are no structures on the property.



GBA

PROJECT NUMBER	EAST TRAVIS REGIONAL WASTEWATER TREATMENT PLANT PERMIT	SHEET NUMBER
16619		
DATE	*USGS TOPOGRAPHIC MAP*	1
1/10/25		

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

DOMESTIC WASTEWATER PERMIT APPLICATION TECHNICAL REPORT 1.0

For any questions about this form, please contact the Domestic Wastewater Permitting Team at 512-239-4671.

The following information is required for all renewal, new, and amendment applications.

Section 1. Permitted or Proposed Flows (Instructions Page 42)

A. Existing/Interim I Phase

Design Flow (MGD): 1.5

2-Hr Peak Flow (MGD): 4.5

Estimated construction start date: May 2033

Estimated waste disposal start date: May 2035

B. Interim II Phase

Design Flow (MGD): 3.0

2-Hr Peak Flow (MGD): 9.0

Estimated construction start date: May 2043

Estimated waste disposal start date: May 2045

C. Final Phase

Design Flow (MGD): 6.0

2-Hr Peak Flow (MGD): 18.0

Estimated construction start date: May 2053

Estimated waste disposal start date: May 2055

D. Current Operating Phase

Provide the startup date of the facility: TBD

Section 2. Treatment Process (Instructions Page 42)

A. Current Operating Phase

Provide a detailed description of the treatment process. **Include the type of treatment plant, mode of operation, and all treatment units.** Start with the plant's head works and finish with the point of discharge. Include all sludge processing and drying units. **If more than one phase exists or is proposed, a description of *each phase* must be provided.**

The East Travis Wastewater Treatment Plant (WWTP) is a new facility designed for phased implementation.

<u>Phase 1:</u>

Headworks: Includes an automatic bar screen and a grit chamber for solids and debris removal.

Rapid Mix Basin: Receives all return activated sludge (RAS) from secondary clarifiers and combines with the incoming flow for mixing before biological treatment.

Biological Treatment – A2/O Process: Includes an anaerobic zone to promote phosphorus release, an anoxic zone to facilitate denitrification, and an aeration zone for nitrification and organic matter removal.

Secondary Clarification: Settles solids, with RAS returned to the rapid mix basin. Waste activated sludge (WAS) is sent to the Wilbarger WWTP (RN101610228) for further treatment.

Tertiary Treatment: Includes disc filtration for additional solids removal and in-line UV disinfection.

<u>Phase 2:</u>

Phase 2 involves the addition of another treatment train, including A2/O basins, a secondary clarifier, and additional filtration and UV disinfection units to handle increased capacity. Phase 2 also includes the addition of a gravity thickener and aerobic sludge digestors for on-site sludge stabilization.

<u>Ultimate Phase:</u>

The ultimate phase includes the addition of treatment units outlined in Phase 1 and 2 to accommodate increasing capacity. See Attachments T.A, T.B, and T.C for detailed design calculations.

B. Treatment Units

In Table 1.0(1), provide the treatment unit type, the number of units, and dimensions (length, width, depth) **of each treatment unit, accounting for *all* phases of operation.**

Table 1.0(1) - Treatment Units

Treatment Unit Type	Number of Units	Dimensions (L x W x D)
	Phase 1, 1.5 MGD	
Headworks Building (Bar Screens and Grit Chamber)	1	80’ x 70’ x 12’
Rapid Mix Basin	1	35’ x 12’ x 16’
Anaerobic Basin	1	40’ x 30’ x 16’
Anoxic Basin	1	85’ x 30’ x 16’
Aeration Basin	1	320’ x 30’ x 16’
Secondary Clarifier	1	85’ Diameter, 16’ Depth
Disc Filters	3	20’ x 20’ x 6.5’
Sludge Holding Basin	1	36’ Diameter, 16’ Depth

Treatment Unit Type	Number of Units	Dimensions (L x W x D)
Phase 2, 3.0 MGD		
Headworks Building (Bar Screens and Grit Chamber)	1	80’ x 70’ x 12’
Rapid Mix Basin	1	35’ x 12’ x 16’
Anaerobic Basin	2	40’ x 30’ x 16’
Anoxic Basin	2	85’ x 30’ x 16’
Aeration Basin	2	320’ x 30’ x 16’
Secondary Clarifier	2	85’ Diameter, 16’ Depth
Disc Filters	6	20’ x 20’ x 6.5’
Gravity Thickener	1	30’ Diameter, 10’ Depth
Aerobic Sludge Digester	2	70’ Diameter, 16’ Depth
Ultimate Phase, 6.0 MGD		
Headworks Building (Bar Screens and Grit Chamber)	2	80’ x 70’ x 12’
Rapid Mix Basin	1	35’ x 12’ x 16’
Anaerobic Basin	4	40’ x 30’ x 16’
Anoxic Basin	4	85’ x 30’ x 16’
Aeration Basin	4	320’ x 30’ x 16’
Secondary Clarifier	4	85’ Diameter, 16’ Depth
Disc Filters	10	20’ x 20’ x 6.5’
Gravity Thickener	2	30’ Diameter, 10’ Depth
Aerobic Sludge Digester	4	70’ Diameter, 16’ Depth

C. Process Flow Diagram

Provide flow diagrams for the existing facilities and **each** proposed phase of construction.

Attachment: See Attachment T.1 for Process Flow Diagrams

Section 3. Site Information and Drawing (Instructions Page 43)

Provide the TPDES discharge outfall latitude and longitude. Enter N/A if not applicable.

- Latitude: 97.4639099°W
- Longitude: 30.3171075°N

Provide the TLAP disposal site latitude and longitude. Enter N/A if not applicable.

- Latitude: N/A
- Longitude: N/A

Provide a site drawing for the facility that shows the following:

- The boundaries of the treatment facility;

- The boundaries of the area served by the treatment facility;
- If land disposal of effluent, the boundaries of the disposal site and all storage/holding ponds; and
- If sludge disposal is authorized in the permit, the boundaries of the land application or disposal site.

Attachment: See Attachment T.2 for the site drawing.
Provide the name **and** a description of the area served by the treatment facility.

The East Travis Regional Wastewater Treatment Plant will serve the east portion of Travis County.

Collection System Information **for wastewater TPDES permits only**: Provide information for each **uniquely owned** collection system, existing and new, served by this facility, including satellite collection systems**. Please see the instructions for a detailed explanation and examples.**

Collection System Information

Collection System Name	Owner Name	Owner Type	Population Served
Manor Wastewater Collection System	City of Manor	**Publicly Owned**	**20,209**
		Choose an item.	
		Choose an item.	
		Choose an item.	

Section 4. Unbuilt Phases (Instructions Page 44)

Is the application for a renewal of a permit that contains an unbuilt phase or phases?

☐ Yes ☒ No

If yes, does the existing permit contain a phase that has not been constructed **within five years** of being authorized by the TCEQ?

☐ Yes ☐ No

If yes, provide a detailed discussion regarding the continued need for the unbuilt phase. **Failure to provide sufficient justification may result in the Executive Director recommending denial of the unbuilt phase or phases.**

Click to enter text.

Section 5. Closure Plans (Instructions Page 44)

Have any treatment units been taken out of service permanently, or will any units be taken out of service in the next five years?

☐ Yes ☒ No

If yes, was a closure plan submitted to the TCEQ?

☐ Yes ☐ No

If yes, provide a brief description of the closure and the date of plan approval.

Click to enter text.

Section 6. Permit Specific Requirements (Instructions Page 44)

For applicants with an existing permit, check the Other Requirements or Special Provisions of the permit.

A. Summary transmittal

Have plans and specifications been approved for the existing facilities and each proposed phase?

☐ Yes ☒ No

If yes, provide the date(s) of approval for each phase: Click to enter text.

Provide information, including dates, on any actions taken to meet a *requirement or provision* pertaining to the submission of a summary transmittal letter. **Provide a copy of an approval letter from the TCEQ, if applicable.**

Click to enter text.

B. Buffer zones

Have the buffer zone requirements been met?

☒ Yes ☐ No

Provide information below, including dates, on any actions taken to meet the conditions of the buffer zone. If available, provide any new documentation relevant to maintaining the buffer zones.

The buffer zone is within the proposed site's property.

C. Other actions required by the current permit

Does the *Other Requirements* or *Special Provisions* section in the existing permit require submission of any other information or other required actions? Examples include Notification of Completion, progress reports, soil monitoring data, etc.

☐ Yes ☒ No

If yes, provide information below on the status of any actions taken to meet the conditions of an *Other Requirement* or *Special Provision.*

Click to enter text.

D. Grit and grease treatment

1. ***Acceptance of grit and grease waste***

Does the facility have a grit and/or grease processing facility onsite that treats and decants or accepts transported loads of grit and grease waste that are discharged directly to the wastewater treatment plant prior to any treatment?

☐ Yes ☒ No

If No, stop here and continue with Subsection E. Stormwater Management.

2. ***Grit and grease processing***

Describe below how the grit and grease waste is treated at the facility. In your description, include how and where the grit and grease is introduced to the treatment works and how it is separated or processed. Provide a flow diagram showing how grit and grease is processed at the facility.

Click to enter text.

3. ***Grit disposal***

Does the facility have a Municipal Solid Waste (MSW) registration or permit for grit disposal?

☐ Yes ☐ No

If No, contact the TCEQ Municipal Solid Waste team at 512-239-2335. Note: A registration or permit is required for grit disposal. Grit shall not be combined with treatment plant sludge. See the instruction booklet for additional information on grit disposal requirements and restrictions.

Describe the method of grit disposal.

Click to enter text.

4. ***Grease and decanted liquid disposal***

Note: A registration or permit is required for grease disposal. Grease shall not be combined with treatment plant sludge. For more information, contact the TCEQ Municipal Solid Waste team at 512-239-2335.

Describe how the decant and grease are treated and disposed of after grit separation.

Click to enter text.

E. Stormwater management

1. ***Applicability***

Does the facility have a design flow of 1.0 MGD or greater in any phase?

☒ Yes ☐ No

Does the facility have an approved pretreatment program, under 40 CFR Part 403?

☐ Yes ☒ No

If no to both of the above, then skip to Subsection F, Other Wastes Received.

2. *MSGP coverage*

Is the stormwater runoff from the WWTP and dedicated lands for sewage disposal currently permitted under the TPDES Multi-Sector General Permit (MSGP), TXR050000?

☐ Yes ☒ No

If yes, please provide MSGP Authorization Number and skip to Subsection F, Other Wastes Received:

TXR05 Click to enter text. or TXRNE Click to enter text.

If no, do you intend to seek coverage under TXR050000?

☒ Yes ☐ No

3. ***Conditional exclusion***

Alternatively, do you intend to apply for a conditional exclusion from permitting based TXR050000 (Multi Sector General Permit) Part II B.2 or TXR050000 (Multi Sector General Permit) Part V, Sector T 3(b)?

☐ Yes ☒ No

If yes, please explain below then proceed to Subsection F, Other Wastes Received:

Click to enter text.

4. ***Existing coverage in individual permit***

Is your stormwater discharge currently permitted through this individual TPDES or TLAP permit?

☐ Yes ☒ No

If yes, provide a description of stormwater runoff management practices at the site that are authorized in the wastewater permit then skip to Subsection F, Other Wastes Received.

Click to enter text.

5. ***Zero stormwater discharge***

Do you intend to have no discharge of stormwater via use of evaporation or other means?

☐ Yes ☒ No

If yes, explain below then skip to Subsection F. Other Wastes Received.

Click to enter text.

Note: If there is a potential to discharge any stormwater to surface water in the state as the result of any storm event, then permit coverage is required under the MSGP or an individual discharge permit. This requirement applies to all areas of facilities with treatment plants or systems that treat, store, recycle, or reclaim domestic sewage, wastewater or sewage sludge (including dedicated lands for sewage sludge disposal located within the onsite property boundaries) that meet the applicability criteria of above. You have the option of obtaining coverage under the MSGP for direct discharges, (recommended), or obtaining coverage under this individual permit.

6. ***Request for coverage in individual permit***

Are you requesting coverage of stormwater discharges associated with your treatment plant under this individual permit?

☐ Yes ☒ No

If yes, provide a description of stormwater runoff management practices at the site for which you are requesting authorization in this individual wastewater permit and describe whether you intend to comingle this discharge with your treated effluent or discharge it via a separate dedicated stormwater outfall. Please also indicate if you intend to divert stormwater to the treatment plant headworks and indirectly discharge it to water in the state.

Click to enter text.

Note: Direct stormwater discharges to waters in the state authorized through this individual permit will require the development and implementation of a stormwater pollution prevention plan (SWPPP) and will be subject to additional monitoring and reporting requirements. Indirect discharges of stormwater via headworks recycling will require compliance with all individual permit requirements including 2-hour peak flow limitations. All stormwater discharge authorization requests will require additional information during the technical review of your application.

F. Discharges to the Lake Houston Watershed

Does the facility discharge in the Lake Houston watershed?

☐ Yes ☒ No

If yes, attach a Sewage Sludge Solids Management Plan. See Example 5 in the instructions. Click to enter text.

G. Other wastes received including sludge from other WWTPs and septic waste

1. ***Acceptance of sludge from other WWTPs***

Does or will the facility accept sludge from other treatment plants at the facility site?

☐ Yes ☒ No

If yes, attach sewage sludge solids management plan. See Example 5 of instructions.

In addition, provide the date the plant started or is anticipated to start accepting sludge, an estimate of monthly sludge acceptance (gallons or millions of gallons), an estimate of the BOD_5 concentration of the sludge, and the design BOD_5 concentration of the influent from the collection system. Also note if this information has or has not changed since the last permit action.

Click to enter text.

Note: Permits that accept sludge from other wastewater treatment plants may be required to have influent flow and organic loading monitoring.

2. ***Acceptance of septic waste***

Is the facility accepting or will it accept septic waste?

☐ Yes ☒ No

If yes, does the facility have a Type V processing unit?

☐ Yes ☐ No

If yes, does the unit have a Municipal Solid Waste permit?

☐ Yes ☐ No

If yes to any of the above, provide the date the plant started or is anticipated to start accepting septic waste, an estimate of monthly septic waste acceptance (gallons or millions of gallons), an estimate of the BOD_5 concentration of the septic waste, and the design BOD_5 concentration of the influent from the collection system. Also note if this information has or has not changed since the last permit action.

Click to enter text.

Note: Permits that accept sludge from other wastewater treatment plants may be required to have influent flow and organic loading monitoring.

3. ***Acceptance of other wastes (not including septic, grease, grit, or RCRA, CERCLA or as discharged by IUs listed in Worksheet 6)***

Is or will the facility accept wastes that are not domestic in nature excluding the categories listed above?

☐ Yes ☒ No

If yes, provide the date that the plant started accepting the waste, an estimate how much waste is accepted on a monthly basis (gallons or millions of gallons), a description of the entities generating the waste, and any distinguishing chemical or other physical characteristic of the waste. Also note if this information has or has not changed since the last permit action.

Click to enter text.

Section 7. Pollutant Analysis of Treated Effluent (Instructions Page 49)

Is the facility in operation?

☐ Yes ☒ No

If no, this section is not applicable. Proceed to Section 8.

If yes, provide effluent analysis data for the listed pollutants. ***Wastewater treatment facilities*** complete Table 1.0(2). W***ater treatment facilities*** discharging filter backwash water, complete Table 1.0(3). Provide copies of the laboratory results sheets. **These tables are not applicable for a minor amendment without renewal.** See the instructions for guidance.

Note: The sample date must be within 1 year of application submission.

Table1.0(2) – Pollutant Analysis for Wastewater Treatment Facilities

Pollutant	Average Conc.	Max Conc.	No. of Samples	Sample Type	Sample Date/Time
$CBOD_5$, mg/l					
Total Suspended Solids, mg/l					
Ammonia Nitrogen, mg/l					
Nitrate Nitrogen, mg/l					
Total Kjeldahl Nitrogen, mg/l					
Sulfate, mg/l					
Chloride, mg/l					
Total Phosphorus, mg/l					
pH, standard units					
Dissolved Oxygen*, mg/l					
Chlorine Residual, mg/l					
E.coli (CFU/100ml) freshwater					
Entercocci (CFU/100ml) saltwater					
Total Dissolved Solids, mg/l					
Electrical Conductivity, µmohs/cm, †					

Oil & Grease, mg/l					
Alkalinity ($CaCO_3$)*, mg/l					

*TPDES permits only
†TLAP permits only

Table1.0(3) – Pollutant Analysis for Water Treatment Facilities

Pollutant	Average Conc.	Max Conc.	No. of Samples	Sample Type	Sample Date/Time
Total Suspended Solids, mg/l					
Total Dissolved Solids, mg/l					
pH, standard units					
Fluoride, mg/l					
Aluminum, mg/l					
Alkalinity ($CaCO_3$), mg/l					

Section 8. Facility Operator (Instructions Page 49)

Facility Operator Name: Matthew D Woodard

Facility Operator's License Classification and Level: Wastewater Treatment Operator Class A

Facility Operator's License Number: WW0020221

Section 9. Sludge and Biosolids Management and Disposal (Instructions Page 50)

A. WWTP's Sewage Sludge or Biosolids Management Facility Type

Check all that apply. See instructions for guidance

☒ Design flow>= 1 MGD

☒ Serves >= 10,000 people

☐ Class I Sludge Management Facility (per 40 CFR § 503.9)

☒ Biosolids generator

☐ Biosolids end user – land application (onsite)

☐ Biosolids end user – surface disposal (onsite)

☐ Biosolids end user – incinerator (onsite)

B. WWTP's Sewage Sludge or Biosolids Treatment Process

Check all that apply. See instructions for guidance.

☒ Aerobic Digestion

☐ Air Drying (or sludge drying beds)

☐ Lower Temperature Composting

☐ Lime Stabilization

☐ Higher Temperature Composting

☐ Heat Drying

☐ Thermophilic Aerobic Digestion

☐ Beta Ray Irradiation

☐ Gamma Ray Irradiation

☐ Pasteurization

☐ Preliminary Operation (e.g. grinding, de-gritting, blending)

☒ Thickening (e.g. gravity thickening, centrifugation, filter press, vacuum filter)

☐ Sludge Lagoon

☐ Temporary Storage (< 2 years)

☐ Long Term Storage (>= 2 years)

☐ Methane or Biogas Recovery

☐ Other Treatment Process: Click to enter text.

C. Sewage Sludge or Biosolids Management

Provide information on the *intended* sewage sludge or biosolids management practice. Do not enter every management practice that you want authorized in the permit, as the permit will authorize all sewage sludge or biosolids management practices listed in the instructions. Rather indicate the management practice the facility plans to use.

Biosolids Management

Management Practice	Handler or Preparer Type	Bulk or Bag Container	Amount (dry metric tons)	Pathogen Reduction Options	Vector Attraction Reduction Option
Disposal in Landfill	Off-site Third-Party Handler or Preparer	Bulk	1,000	Class B: PSRP Aerobic Digestion	Option 4: SOUR <=1.5 mg 02/hr/g total solids at 20C (<2% solids)
Choose an item.	Choose an item.	Choose an item.		Choose an item.	Choose an item.
Choose an item.	Choose an item.	Choose an item.		Choose an item.	Choose an item.

If "Other" is selected for Management Practice, please explain (e.g. monofill or transport to another WWTP): Click to enter text.

D. Disposal site

Disposal site name: Austin Wastewater Processing Facility

TCEQ permit or registration number: TCEQ Type V MSW#2384

County where disposal site is located: Travis

E. Transportation method

Method of transportation (truck, train, pipe, other): Truck

Name of the hauler: Wastewater Transport Service

Hauler registration number: 24343

Sludge is transported as a:

Liquid ☐ semi-liquid ☐ semi-solid ☒ solid ☐

Section 10. Permit Authorization for Sewage Sludge Disposal (Instructions Page 52)

A. Beneficial use authorization

Does the existing permit include authorization for land application of biosolids for beneficial use?

☐ Yes ☒ No

If yes, are you requesting to continue this authorization to land apply biosolids for beneficial use?

☐ Yes ☐ No

If yes, is the completed **Application for Permit for Beneficial Land Use of Sewage Sludge (TCEQ Form No. 10451)** attached to this permit application (see the instructions for details)?

☐ Yes ☐ No

B. Sludge processing authorization

Does the existing permit include authorization for any of the following sludge processing, storage or disposal options?

Sludge Composting	☐ Yes	☒ No
Marketing and Distribution of Biosolids	☐ Yes	☒ No
Sludge Surface Disposal or Sludge Monofill	☐ Yes	☒ No
Temporary storage in sludge lagoons	☐ Yes	☒ No

If yes to any of the above sludge options and the applicant is requesting to continue this authorization, is the completed **Domestic Wastewater Permit Application: Sewage Sludge Technical Report (TCEQ Form No. 10056)** attached to this permit application?

☐ Yes ☒ No

Section 11. Sewage Sludge Lagoons (Instructions Page 53)

Does this facility include sewage sludge lagoons?

☐ Yes ☒ No

If yes, complete the remainder of this section. If no, proceed to Section 12.

A. Location information

The following maps are required to be submitted as part of the application. For each map, provide the Attachment Number.

- Original General Highway (County) Map:

  Attachment: Click to enter text.

- USDA Natural Resources Conservation Service Soil Map:

  Attachment: Click to enter text.

- Federal Emergency Management Map:

  Attachment: Click to enter text.

- Site map:

  Attachment: Click to enter text.

Discuss in a description if any of the following exist within the lagoon area. Check all that apply.

☐ Overlap a designated 100-year frequency flood plain

☐ Soils with flooding classification

☐ Overlap an unstable area

☐ Wetlands

☐ Located less than 60 meters from a fault

☐ None of the above

Attachment: Click to enter text.

If a portion of the lagoon(s) is located within the 100-year frequency flood plain, provide the protective measures to be utilized including type and size of protective structures:

Click to enter text.

B. Temporary storage information

Provide the results for the pollutant screening of sludge lagoons. These results are in addition to pollutant results in *Section 7 of Technical Report 1.0.*

Nitrate Nitrogen, mg/kg: Click to enter text.

Total Kjeldahl Nitrogen, mg/kg: Click to enter text.

Total Nitrogen (=nitrate nitrogen + TKN), mg/kg: Click to enter text.

Phosphorus, mg/kg: Click to enter text.

Potassium, mg/kg: Click to enter text.

pH, standard units: Click to enter text.

Ammonia Nitrogen mg/kg: Click to enter text.

Arsenic: Click to enter text.

Cadmium: Click to enter text.

Chromium: Click to enter text.

Copper: Click to enter text.

Lead: Click to enter text.

Mercury: Click to enter text.

Molybdenum: Click to enter text.

Nickel: Click to enter text.

Selenium: Click to enter text.

Zinc: Click to enter text.

Total PCBs: Click to enter text.

Provide the following information:

Volume and frequency of sludge to the lagoon(s): Click to enter text.

Total dry tons stored in the lagoons(s) per 365-day period: Click to enter text.

Total dry tons stored in the lagoons(s) over the life of the unit: Click to enter text.

C. Liner information

Does the active/proposed sludge lagoon(s) have a liner with a maximum hydraulic conductivity of $1x10^{-7}$ cm/sec?

☐ Yes ☐ No

If yes, describe the liner below. Please note that a liner is required.

Click to enter text.

D. Site development plan

Provide a detailed description of the methods used to deposit sludge in the lagoon(s):

Click to enter text.

Attach the following documents to the application.

- Plan view and cross-section of the sludge lagoon(s)

  Attachment: Click to enter text.

- Copy of the closure plan

  Attachment: Click to enter text.

- Copy of deed recordation for the site

  Attachment: Click to enter text.
- Size of the sludge lagoon(s) in surface acres and capacity in cubic feet and gallons

  Attachment: Click to enter text.
- Description of the method of controlling infiltration of groundwater and surface water from entering the site

  Attachment: Click to enter text.
- Procedures to prevent the occurrence of nuisance conditions

  Attachment: Click to enter text.

E. Groundwater monitoring

Is groundwater monitoring currently conducted at this site, or are any wells available for groundwater monitoring, or are groundwater monitoring data otherwise available for the sludge lagoon(s)?

☐ Yes ☐ No

If groundwater monitoring data are available, provide a copy. Provide a profile of soil types encountered down to the groundwater table and the depth to the shallowest groundwater as a separate attachment.

Attachment: Click to enter text.

Section 12. Authorizations/Compliance/Enforcement (Instructions Page 54)

A. Additional authorizations

Does the permittee have additional authorizations for this facility, such as reuse authorization, sludge permit, etc?

☐ Yes ☒ No

If yes, provide the TCEQ authorization number and description of the authorization:

Click to enter text.

B. Permittee enforcement status

Is the permittee currently under enforcement for this facility?

☐ Yes ☒ No

Is the permittee required to meet an implementation schedule for compliance or enforcement?

☐ Yes ☒ No

If yes to either question, provide a brief summary of the enforcement, the implementation schedule, and the current status:

Click to enter text.

Section 13. RCRA/CERCLA Wastes (Instructions Page 55)

A. RCRA hazardous wastes

Has the facility received in the past three years, does it currently receive, or will it receive RCRA hazardous waste?

☐ Yes ☒ No

B. Remediation activity wastewater

Has the facility received in the past three years, does it currently receive, or will it receive CERCLA wastewater, RCRA remediation/corrective action wastewater or other remediation activity wastewater?

☐ Yes ☒ No

C. Details about wastes received

If yes to either Subsection A or B above, provide detailed information concerning these wastes with the application.

Attachment: Click to enter text.

Section 14. Laboratory Accreditation (Instructions Page 55)

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: __________________

DOMESTIC WASTEWATER PERMIT APPLICATION TECHNICAL REPORT 1.1

The following information is required for new and amendment major applications.

Section 1. Justification for Permit (Instructions Page 56)

A. Justification of permit need

Provide a detailed discussion regarding the need for any phase(s) not currently permitted. Failure to provide sufficient justification may result in the Executive Director recommending denial of the proposed phase(s) or permit.

The City of Manor is experiencing rapid growth, particularly in the eastern region, where significant expansion is expected. To support this development, the establishment of the East Travis Regional Wastewater Treatment Plant (WWTP) is critical. According to the City's Wastewater Master Plan (2024), the East Travis Regional WWTP must be fully operational within the next 15 years to accommodate the anticipated growth. Population and flow projections outlined in the Master Plan indicate that the plant will need an initial capacity of at least 1.5 MGD by that time. To keep pace with Manor's ongoing expansion, the facility will need to progressively expand to 3.0 MGD and ultimately to 6.0 MGD.

B. Regionalization of facilities

For additional guidance, please review TCEQ's Regionalization Policy for Wastewater Treatment[1].

Provide the following information concerning the potential for regionalization of domestic wastewater treatment facilities:

1. ***Municipally incorporated areas***

   If the applicant is a city, then Item 1 is not applicable. Proceed to Item 2 Utility CCN areas.

   Is any portion of the proposed service area located in an incorporated city?

   ☐ Yes ☐ No ☒ Not Applicable

   If yes, within the city limits of: Click to enter text.

   If yes, attach correspondence from the city.

   Attachment: Click to enter text.

   If consent to provide service is available from the city, attach a justification for the proposed facility and a cost analysis of expenditures that includes the cost of connecting to the city versus the cost of the proposed facility or expansion attached.

   Attachment: Click to enter text.

2. ***Utility CCN areas***

   Is any portion of the proposed service area located inside another utility's CCN area?

   ☐ Yes ☒ No

[1] https://www.tceq.texas.gov/permitting/wastewater/tceq-regionalization-for-wastewater

If yes, attach a justification for the proposed facility and a cost analysis of expenditures that includes the cost of connecting to the CCN facilities versus the cost of the proposed facility or expansion.

Attachment: Click to enter text.

3. ***Nearby WWTPs or collection systems***

Are there any domestic permitted wastewater treatment facilities or collection systems located within a three-mile radius of the proposed facility?

☒ Yes ☐ No

If yes, attach a list of these facilities and collection systems that includes each permittee's name and permit number, and an area map showing the location of these facilities and collection systems.

Attachment: T.3

If yes, attach proof of mailing a request for service to each facility and collection system, the letters requesting service, and correspondence from each facility and collection system.

Attachment: T.4

If the facility or collection system agrees to provide service, attach a justification for the proposed facility and a cost analysis of expenditures that includes the cost of connecting to the facility or collection system versus the cost of the proposed facility or expansion.

Attachment: Click to enter text.

Section 2. Proposed Organic Loading (Instructions Page 58)

Is this facility in operation?

☐ Yes ☒ No

If no, proceed to Item B, Proposed Organic Loading.

If yes, provide organic loading information in Item A, Current Organic Loading

A. Current organic loading

Facility Design Flow (flow being requested in application): Click to enter text.

Average Influent Organic Strength or BOD_5 Concentration in mg/l: Click to enter text.

Average Influent Loading (lbs/day = total average flow X average BOD_5 conc. X 8.34): Click to enter text.

Provide the source of the average organic strength or BOD_5 concentration.

Click to enter text.

B. Proposed organic loading

This table must be completed if this application is for a facility that is not in operation or if this application is to request an increased flow that will impact organic loading.

Table 1.1(1) – Design Organic Loading

Source	Total Average Flow (MGD)	Influent BOD5 Concentration (mg/l)
Municipality	0.5	250
Subdivision	0.3	200
Trailer park – transient	0.1	350
Mobile home park	0.1	300
School with cafeteria and showers	0.05	200
School with cafeteria, no showers	0.05	150
Recreational park, overnight use	0.05	400
Recreational park, day use	0.05	100
Office building or factory	0.15	250
Motel	0.05	350
Restaurant	0.05	600
Hospital	0.05	300
Nursing home	0.05	300
Other	0.05	250
TOTAL FLOW from all sources	1.5	
AVERAGE BOD_5 from all sources		300

Section 3. Proposed Effluent Quality and Disinfection (Instructions Page 58)

A. Existing/Interim I Phase Design Effluent Quality

Biochemical Oxygen Demand (5-day), mg/l: 5.0

Total Suspended Solids, mg/l: 5.0

Ammonia Nitrogen, mg/l: 2.0

Total Phosphorus, mg/l: 1.0

Dissolved Oxygen, mg/l: 6.0

Other: *E. coli: 126 CFU*

B. Interim II Phase Design Effluent Quality

Biochemical Oxygen Demand (5-day), mg/l: 5.0

Total Suspended Solids, mg/l: 5.0

Ammonia Nitrogen, mg/l: 2.0

Total Phosphorus, mg/l: 1.0

Dissolved Oxygen, mg/l: 6.0

Other: *E. coli: 126 CFU*

C. Final Phase Design Effluent Quality

Biochemical Oxygen Demand (5-day), mg/l: 5.0

Total Suspended Solids, mg/l: 5.0

Ammonia Nitrogen, mg/l: 2.0

Total Phosphorus, mg/l: 1.0

Dissolved Oxygen, mg/l: 6.0

Other: *E. coli: 126 CFU*

D. Disinfection Method

Identify the proposed method of disinfection.

☐ Chlorine: Click to enter text. mg/l after Click to enter text. minutes detention time at peak flow

Dechlorination process: Click to enter text.

☒ Ultraviolet Light: 1 seconds contact time at peak flow

☐ Other: Click to enter text.

Section 4. Design Calculations (Instructions Page 58)

Attach design calculations and plant features for each proposed phase. Example 4 of the instructions includes sample design calculations and plant features.

Attachment: Attachments T.5, T.6, and T.7

Section 5. Facility Site (Instructions Page 59)

A. 100-year floodplain

Will the proposed facilities be located above the 100-year frequency flood level?

☐ Yes ☒ No

If no, describe measures used to protect the facility during a flood event. Include a site map showing the location of the treatment plant within the 100-year frequency flood level. If applicable, provide the size and types of protective structures.

The facility is located within the FEMA Zone A floodplain (see Attachment T.8). Floodplain reclamation efforts will be undertaken, and either a Conditional Letter of Map Revision (CLOMR) or a Letter of Map Revision (LOMR) will be submitted during the design phase.

Provide the source(s) used to determine 100-year frequency flood plain.

FEMA's National Flood Hazard Layer (NFHL) Viewer

For a new or expansion of a facility, will a wetland or part of a wetland be filled?

☐ Yes ☒ No

If yes, has the applicant applied for a US Corps of Engineers 404 Dredge and Fill Permit?

☐ Yes ☐ No

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

If no, provide the approximate date you anticipate submitting your application to the Corps: Click to enter text.

B. Wind rose

Attach a wind rose: See Attachment T.9.

Section 6. Permit Authorization for Sewage Sludge Disposal (Instructions Page 59)

A. Beneficial use authorization

Are you requesting to include authorization to land apply sewage sludge for beneficial use on property located adjacent to the wastewater treatment facility under the wastewater permit?

☐ Yes ☒ No

If yes, attach the completed **Application for Permit for Beneficial Land Use of Sewage Sludge (TCEQ Form No. 10451)**: Click to enter text.

B. Sludge processing authorization

Identify the sludge processing, storage or disposal options that will be conducted at the wastewater treatment facility:

☐ Sludge Composting

☐ Marketing and Distribution of sludge

☐ Sludge Surface Disposal or Sludge Monofill

If any of the above, sludge options are selected, attach the completed **Domestic Wastewater Permit Application: Sewage Sludge Technical Report (TCEQ Form No. 10056)**: Click to enter text.

Section 7. Sewage Sludge Solids Management Plan (Instructions Page 60)

Attach a solids management plan to the application.

Attachment: See Attachment T.10.

The sewage sludge solids management plan must contain the following information:

- Treatment units and processes dimensions and capacities

- Solids generated at 100, 75, 50, and 25 percent of design flow
- Mixed liquor suspended solids operating range at design and projected actual flow
- Quantity of solids to be removed and a schedule for solids removal
- Identification and ownership of the ultimate sludge disposal site
- For facultative lagoons, design life calculations, monitoring well locations and depths, and the ultimate disposal method for the sludge from the facultative lagoon

An example of a sewage sludge solids management plan has been included as Example 5 of the instructions.

DOMESTIC WASTEWATER PERMIT APPLICATION WORKSHEET 2.0: RECEIVING WATERS

The following information is required for all TPDES permit applications.

Section 1. Domestic Drinking Water Supply (Instructions Page 63)

Is there a surface water intake for domestic drinking water supply located within 5 miles downstream from the point or proposed point of discharge?

☐ Yes ☒ No

If **no**, proceed it Section 2. **If yes**, provide the following:

Owner of the drinking water supply: Click to enter text.

Distance and direction to the intake: Click to enter text.

Attach a USGS map that identifies the location of the intake.

Attachment: Click to enter text.

Section 2. Discharge into Tidally Affected Waters (Instructions Page 63)

Does the facility discharge into tidally affected waters?

☐ Yes ☒ No

If **no**, proceed to Section 3. **If yes**, complete the remainder of this section. If no, proceed to Section 3.

A. Receiving water outfall

Width of the receiving water at the outfall, in feet: Click to enter text.

B. Oyster waters

Are there oyster waters in the vicinity of the discharge?

☐ Yes ☐ No

If yes, provide the distance and direction from outfall(s).

Click to enter text.

C. Sea grasses

Are there any sea grasses within the vicinity of the point of discharge?

☐ Yes ☐ No

If yes, provide the distance and direction from the outfall(s).

Click to enter text.

Section 3. Classified Segments (Instructions Page 63)

Is the discharge directly into (or within 300 feet of) a classified segment?

☒ Yes ☐ No

If yes, this Worksheet is complete.

If no, complete Sections 4 and 5 of this Worksheet.

Section 4. Description of Immediate Receiving Waters (Instructions Page 63)

Name of the immediate receiving waters: Click to enter text.

A. Receiving water type

Identify the appropriate description of the receiving waters.

☐ Stream

☐ Freshwater Swamp or Marsh

☐ Lake or Pond

Surface area, in acres: Click to enter text.

Average depth of the entire water body, in feet: Click to enter text.

Average depth of water body within a 500-foot radius of discharge point, in feet: Click to enter text.

☐ Man-made Channel or Ditch

☐ Open Bay

☐ Tidal Stream, Bayou, or Marsh

☐ Other, specify: Click to enter text.

B. Flow characteristics

If a stream, man-made channel or ditch was checked above, provide the following. For existing discharges, check one of the following that best characterizes the area *upstream* of the discharge. For new discharges, characterize the area *downstream* of the discharge (check one).

☐ Intermittent - dry for at least one week during most years

☐ Intermittent with Perennial Pools - enduring pools with sufficient habitat to maintain significant aquatic life uses

☐ Perennial - normally flowing

Check the method used to characterize the area upstream (or downstream for new dischargers).

☐ USGS flow records

☐ Historical observation by adjacent landowners

☐ Personal observation

☐ Other, specify: Click to enter text.

C. Downstream perennial confluences

List the names of all perennial streams that join the receiving water within three miles downstream of the discharge point.

Click to enter text.

D. Downstream characteristics

Do the receiving water characteristics change within three miles downstream of the discharge (e.g., natural or man-made dams, ponds, reservoirs, etc.)?

☐ Yes ☐ No

If yes, discuss how.

Click to enter text.

E. Normal dry weather characteristics

Provide general observations of the water body during normal dry weather conditions.

Click to enter text.

Date and time of observation: Click to enter text.

Was the water body influenced by stormwater runoff during observations?

☐ Yes ☐ No

Section 5. General Characteristics of the Waterbody (Instructions Page 65)

A. Upstream influences

Is the immediate receiving water upstream of the discharge or proposed discharge site influenced by any of the following? Check all that apply.

☐ Oil field activities ☐ Urban runoff

☐ Upstream discharges ☐ Agricultural runoff

☐ Septic tanks ☐ Other(s), specify: Click to enter text.

B. Waterbody uses

Observed or evidences of the following uses. Check all that apply.

- ☐ Livestock watering
- ☐ Irrigation withdrawal
- ☐ Fishing
- ☐ Domestic water supply
- ☐ Park activities
- ☐ Contact recreation
- ☐ Non-contact recreation
- ☐ Navigation
- ☐ Industrial water supply
- ☐ Other(s), specify: Click to enter text.

C. Waterbody aesthetics

Check one of the following that best describes the aesthetics of the receiving water and the surrounding area.

- ☐ Wilderness: outstanding natural beauty; usually wooded or unpastured area; water clarity exceptional
- ☐ Natural Area: trees and/or native vegetation; some development evident (from fields, pastures, dwellings); water clarity discolored
- ☐ Common Setting: not offensive; developed but uncluttered; water may be colored or turbid
- ☐ Offensive: stream does not enhance aesthetics; cluttered; highly developed; dumping areas; water discolored

DOMESTIC WASTEWATER PERMIT APPLICATION WORKSHEET 2.1: STREAM PHYSICAL CHARACTERISTICS

Required for new applications, major facilities, and applications adding an outfall.

Worksheet 2.1 is not required for discharges to intermittent streams or discharges directly to (or within 300 feet of) a classified segment.

Section 1. General Information (Instructions Page 65)

Date of study: See Attachment T.11 Time of study: Click to enter text.

Stream name: Click to enter text.

Location: Click to enter text.

Type of stream upstream of existing discharge or downstream of proposed discharge (check one).

☐ Perennial ☐ Intermittent with perennial pools

Section 2. Data Collection (Instructions Page 65)

Number of stream bends that are well defined: Click to enter text.

Number of stream bends that are moderately defined: Click to enter text.

Number of stream bends that are poorly defined: Click to enter text.

Number of riffles: Click to enter text.

Evidence of flow fluctuations (check one):

☐ Minor ☐ moderate ☐ severe

Indicate the observed stream uses and if there is evidence of flow fluctuations or channel obstruction/modification.

Click to enter text.

Stream transects

In the table below, provide the following information for each transect downstream of the existing or proposed discharges. Use a separate row for each transect.

Table 2.1(1) - Stream Transect Records

Stream type at transect Select riffle, run, glide, or pool. See Instructions, Definitions section.	**Transect location**	**Water surface width (ft)**	**Stream depths (ft)** at 4 to 10 points along each transect from the channel bed to the water surface. Separate the measurements with commas.
Choose an item.			
Choose an item.			
Choose an item.			
Choose an item.			
Choose an item.			
Choose an item.			
Choose an item.			
Choose an item.			
Choose an item.			
Choose an item.			

Section 3. Summarize Measurements (Instructions Page 65)

Streambed slope of entire reach, from USGS map in feet/feet: Click to enter text.

Approximate drainage area above the most downstream transect (from USGS map or county highway map, in square miles): Click to enter text.

Length of stream evaluated, in feet: Click to enter text.

Number of lateral transects made: Click to enter text.

Average stream width, in feet: Click to enter text.

Average stream depth, in feet: Click to enter text.

Average stream velocity, in feet/second: Click to enter text.

Instantaneous stream flow, in cubic feet/second: Click to enter text.

Indicate flow measurement method (type of meter, floating chip timed over a fixed distance, etc.): Click to enter text.

Size of pools (large, small, moderate, none): Click to enter text.

Maximum pool depth, in feet: Click to enter text.

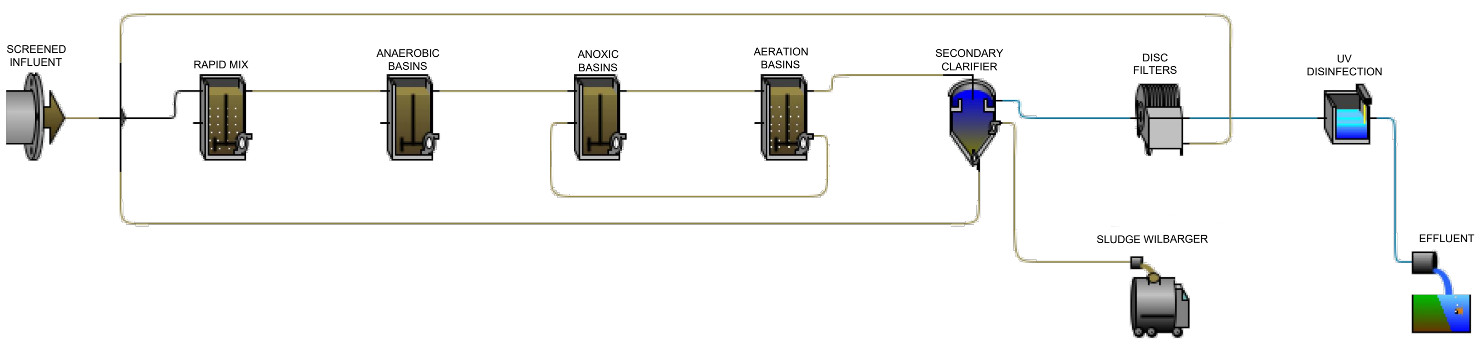
TECHNICAL REPORT

ATTACHMENT LIST

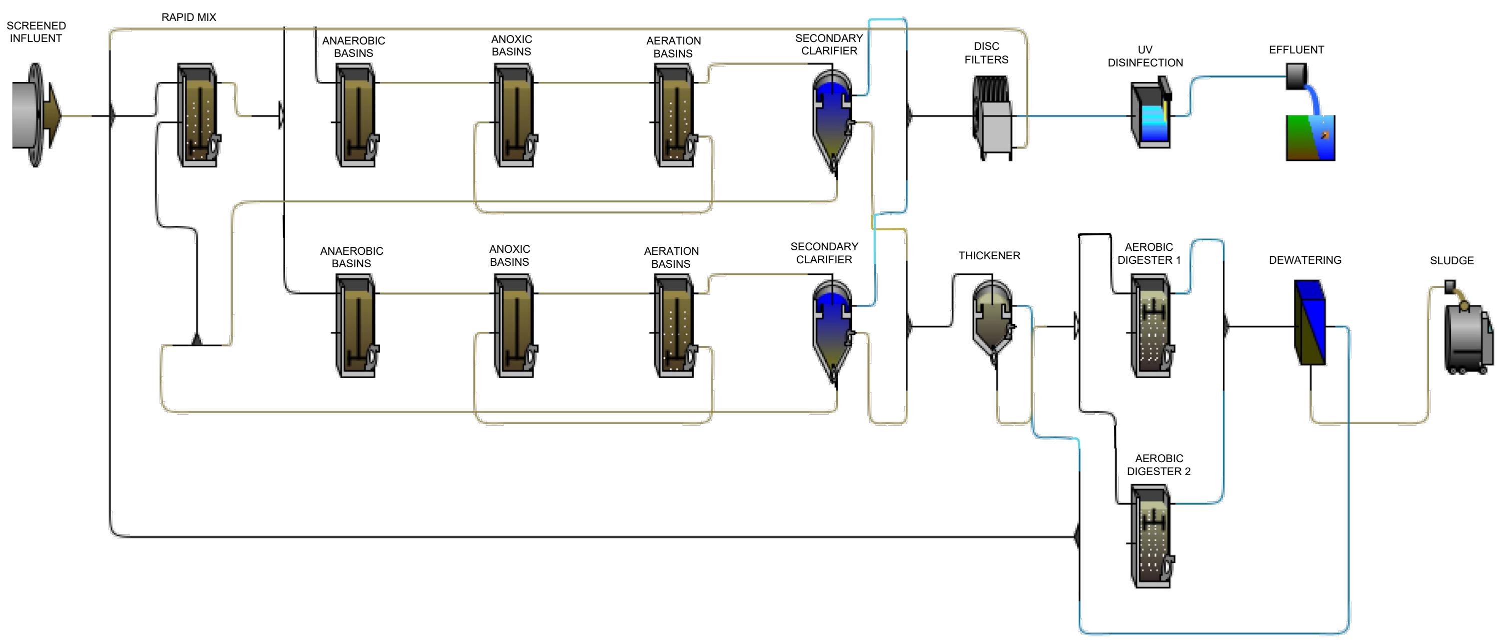
- ATTACHMENT T.1: FLOW DIAGRAM
- ATTACHMENT T.2: SITE DRAWING
- ATTACHMENT T.3: NEARBY OUTFALLS
- ATTACHMENT T.4: GREAT ESCAPES COMMUNICATION
- ATTACHMENT T.5: PROPOSED PHASE I 1.5 MGD PLANT DESIGN CALCULATIONS
- ATTACHMENT T.6: PROPOSED PHASE II 3.0 MGD PLANT DESIGN CALCULATIONS
- ATTACHMENT T.7: PROPOSED ULTIMATE PHASE 6.0 MGD PLANT DESIGN CALCULATIONS
- ATTACHMENT T.8: 100 YEAR FLOODPLAIN MAP
- ATTACHMENT T.9: WIND ROSE
- ATTACHMENT T.10: SLUDGE MANAGEMENT PLANS
- ATTACHMENT T.11: EMAIL OMITTING COLLECTION OF TRANSECT DATA REQUIREMENT
- ATTACHMENT T.12: CITY OF MANOR 2024 WASTEWATER MASTER PLAN

ATTACHMENT T.1

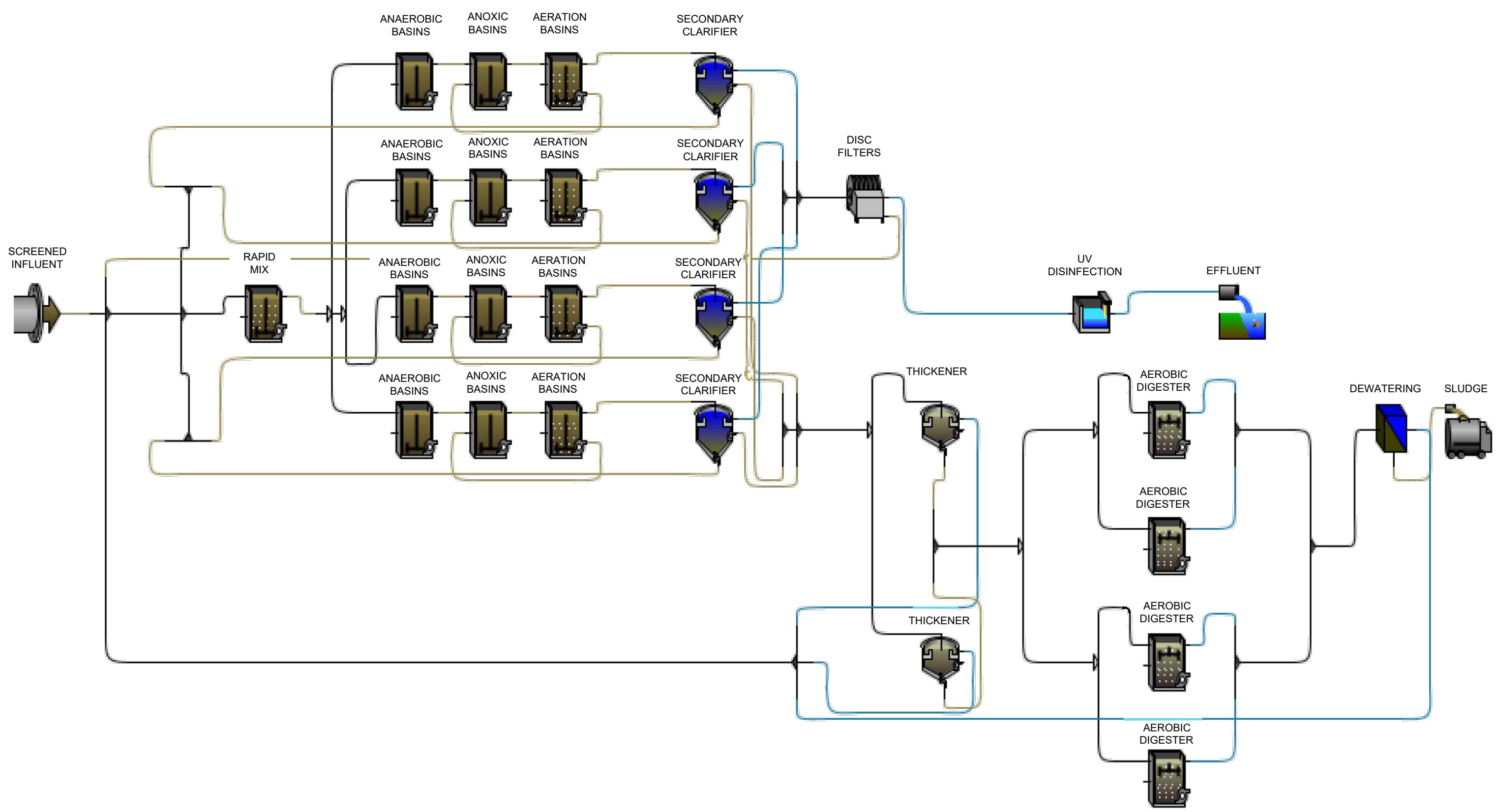
PHASE 1 EAST TRAVIS WASTEWATER TREATMENT PLANT



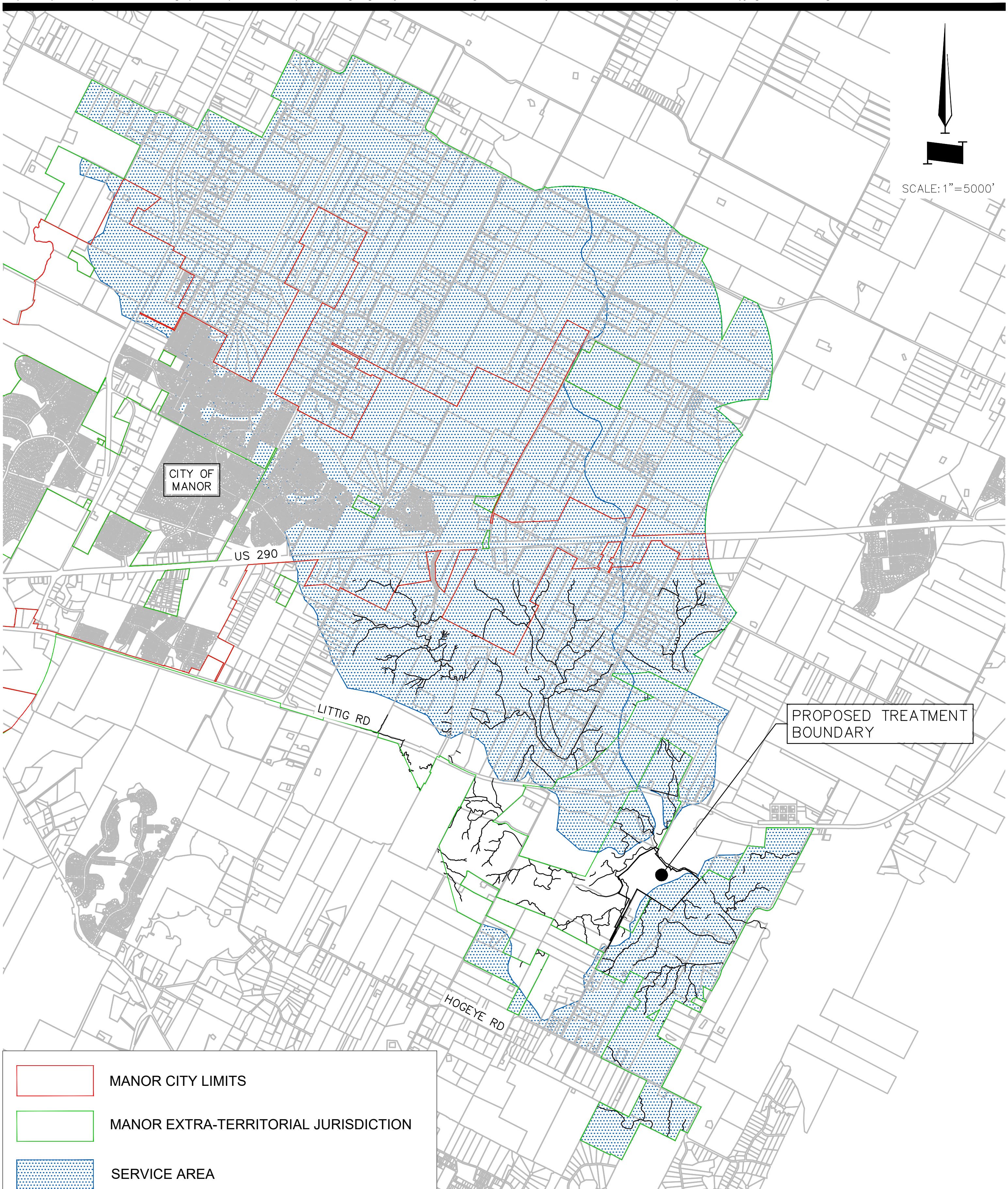
PHASE 2 EAST TRAVIS WASTEWATER TREATMENT PLANT



ULTIMATE PHASE EAST TRAVIS WASTEWATER TREATMENT PLANT



ATTACHMENT T.2

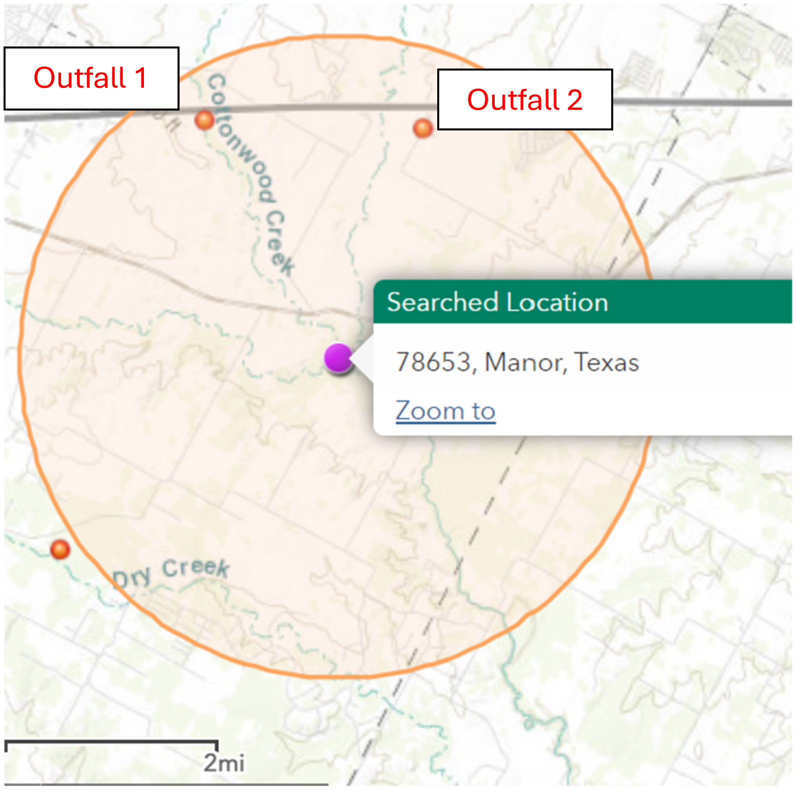


GBA

PROJECT NUMBER	EAST TRAVIS REGIONAL WASTEWATER TREATMENT PLANT PERMIT	SHEET NUMBER
16619		
DATE	*SITE DRAWING*	1
12/2/24		

ATTACHMENT T.3

Attachment T.3 – Exhibit of Nearby WWTPs or Collection Systems



There are two (2) outfall permits within a three-mile radius of the proposed outfall location for this permit application as shown in the figure above.

Outfall 1:
Permit number: 14129-002
Outfall: 001
NPDES Number: 0137448
Permittee: City of Manor
As the permit holder for Outfall 1 is the same as the applicant for this permit application, an internal regionalization study has already been conducted and it has been found that the existing facility at Outfall 1 cannot handle the projected flow increases that provide the basis of need for the East Travis Regional WWTP.

Outfall 2:
Permit number: 15802-001
Outfall: 001
NPDES Number: 0139343
Permittee: Great Escapes Opportunity Zone Fund llc.
This Permittee was contacted by a representative of the City of Manor for a previous permit application regarding this outfall location where it was revealed that this outfall permit is located at a campground and trailer park that is under development and will not have any treatment facilities capable of handling outside flows.

ATTACHMENT T.4

Andrea Mendoza

From: Andrea Mendoza
Sent: Monday, January 13, 2025 2:16 PM
To: manager.elgin@greatescapesrvresorts.com
Cc: Paige Reddehase; Jose Castillo
Subject: Wastwater Outfall Permit Number 15802-001 Inquiry
Attachments: Outfall15802ResponseLetter.pdf

Good afternoon,

We are applying for a WWTP expansion permit through the TCEQ for the East Travis Regional Wastewater Treatment Plant, which is within 3 miles of the outfall permit number 15802-001 (located at 16740 Albert Voelker Rd, Elgin, TX). Great Escapes Opportunity Zone Fund LLC is listed as the permit holder for this outfall. To move forward with the permit application for the East Travis Regional Wastewater Treatment Plant, the commission requires that we submit a letter from all treatment facilities within 3 miles of our proposed project site confirming that the nearby facilities do not have the capacities to accept or are willing to expand to accept the proposed volume. The proposed volume we are requesting a permit for is 1.5 MGD of wastewater flow.

I have attached a letter for you, or the appropriate party, to sign confirming that you cannot support this volume of wastewater.

Thank you,

Andrea Mendoza

GBA
Andrea Mendoza Staff AES | Water Environment Group
9601 Amberglen Blvd. | Suite 109 | Austin, TX 78729
1500 County Road 269 | Leander, TX 78641
d 737.247.7539

ATTACHMENT T.5

Attachment T.5a) Design Calculations For
East Travis Regional Wastewater Treatment Plant Phase 1 - 1.5 MGD

Design Type:	**A2/O**		**Plant Location:**	**Manor**	
Phase:	**1**		**Latitude:**	**97.4639099°W**	
Design Flow:	**1.5**	**MGD**	**Longitude:**	**30.3171075°N**	
Design Flow :	**1040**	**gpm**	**Elevation:**	**444**	AMSL
Peak Factor:	**3**				

- Historical data from the Cottonwood WWTP (in same service area) has peaking factors less than 3.

2-Hour Peak Flow	**3120**	**gpm**

Design Parameters

Influent Waste Characterization

BOD_5 Concentration =	300	mg/l
TSS Concentration =	270	mg/l
$(NH_3\text{-}N)_0$ Concentration =	55	mg/l
$(NO_2^-/NO_3^-)_o$ Concentration =	1	
Organic N =	23.6	
P Concentration =	8.0	mg/l

Waste Loading

$CBOD_5$ Loading =	3,753	lb/d
TSS Loading =	3,378	lb/d
NH_3-N Loading =	688	lb/d
NO_2^-/NO_3^- Loading =	13	lb/d
Organic N Loading =	295	lb/d
P Loading =	100	lb/d

Effluent Parameter Set

BOD_5 Concentration (Daily Ave.) =	5	mg/l
TSS Concentration (Daily Ave.) =	5	mg/l
$(NH_3\text{-}N)_e$ Concentration (Daily Ave.) =	2	mg/l
$(NO_2^-/NO_3^-)_e$ Concentration =	1.05	
Organic N =	3.85	
P Concentration (Daily Ave.)=	1	
pH =	6.0-9.0	
D.O. =	6	mg/l

Required Removal Efficiencies

$CBOD_5$ =	98.33%
TSS =	98.15%
NH_3-N =	96.36%
NO_2^-/NO_3^-	-5.00%
Organic N =	83.67%
P =	87.50%

Rapid Mix Basin

Length =	35	ft
Width =	12	ft
Depth =	16	ft
Provided Volume =	50,266	gal
Retention Time =	0.80	hrs

Final Dimensions = 35' Long x 12' Wide x 16' Deep

Anaerobic Basin

Influent Flow =	1.50	MGD
RAS Return Ratio =	0.40	
Flow to Anaerobic Basin (Influent + RAS) =	87,731	gal/hr
Number of Basins =	1	
Detention Volume @ Detention Time =	131,596	gal
Detention Volume @ Detention Time =	17,593	cuft
Detention Volume @ Detention Time per Basin =	17,593	cuft
Width of Aeration =	30	ft
Depth =	16	ft
Required Length =	36.7	ft

Design Detention Time =	1.5	hr

Selected Anaerobic Basin Dimensions

Width =	30.0	ft
Depth =	16.0	ft
Length =	40.0	ft
Provided Volume =	19,200	cuft
Provided Volume =	143,616	gal
Supplied Detention Time =	1.64	hr
Check =	**OK**	

Food to Microorganism Ratio = 1.04 *- Calculations are provided in Attachment T.5b*

Final Dimensions = 40' Long x 30' Wide x 16' Deep

Anoxic Basin

Influent Flow =	1.5	MGD			
RAS Return Ratio =	0.40				
Internal Recycle (IR) Ratio =	3.3				
Flow to Anoxic Basin (Influent + RAS + IR) =	7.01	MGD			
Number of Basins =	1				
Water Depth Avg. =	16	ft	Basin Width =	30	ft
			Required Length =	81.4	ft
Required Anoxic Detention Time =	1	hours	Selected Length =	85	ft
Required Volume per Basin =	292,255	gal	Provided Volume per Basin =	305,184	gal
Required Volume per Basin =	39,071	cf	Check =	OK	hours
Food to Microorganism Ratio =	0.40	*- Calculations are provided in Attachment T.5b*			

Final Dimensions = 85' Long x 30' Wide x 16' Deep

Aeration Basin

Flow (Influent + RAS) =	2.11	(MGD)
Peak Flow =	6.32	(MGD)
RAS Return Ratio =	0.40	
BOD Loading to Aeration =	300	(mg/l)
Water Depth Avg. =	16	(ft)
Number of Basins =	1	

TCEQ Criteria

Minimum Depth (ft) =	8
Minimum Freeboard (in) =	18
Max. Organic Loading (lb BOD5/d/1000ft^3) =	35

Total Organic Loading =	(BOD Loading)(Flow)(8.34) =	5,268	lb/d
Organic Loading (per basin) =	(BOD Loading)(Flow)(8.34) / No. Trains =	5,268	lb/d
Required Aeration Volume (per basin)=	((Organic Loading)(1000 ft^3))/Max Org. Load) / No. Trains =	150,516	ft^3
Required Surface Area (per basin) =	(Required Aeration Volume) / (Depth) =	9,407	ft^2
Aeration Basin Width =	=	30	ft
Required Aeration Basin Length =	(Surface Area/Width) =	313.6	ft
Provided Aeration Basin Length =		**320.0**	**ft**
Final Dimensions =	**320' Long x 30' Wide x 16' Deep**		
	Design/Provided Aeration Volume =	153,600	ft^3
	Design/Provided Aeration Volume =	1,148,928	gal
Organic Loading at Proposed Design =	(Organic Loading)/(Length)(Width)(Depth)/(1000) =	**34.30**	lb/d/1000ft^3
	Equal or Less Than TCEQ Criteria =	OK	

Aeration Basin

Hydraulic Retention Time =		(Aeration Volume)/(Avg Flow+RAS Flow) =	**9.33**	hours
MLSS =	4,500 mg/l			
MLVSS = 0.8 MLSS =	2,700 mg/l			
F/M Ratio =		(Flow)(BOD Conc.)/(Vol Aer)(MLVSS) =	**0.20**	
		For Single Stage Nitrification between 0.10 and 0.25 =	**OK**	

RAS & WAS

60 Minute Set	300 ml			
RVSS (RAS VSS) =	9,000 mg/l			
WAS =	0.019 MGD			
Approximate MCRT =		(Vol Aer)(MLVSS)/(WAS)(RVSS) =	**18.37**	d

TCEQ 217 Airflow Requirements

1SCFM =	0.01725 lb/O2			
Fine Bubble Diffuser Efficiency per Foot =	2.00%			
Submergance Depth =	8 ft			
O_2R =		1.5 (BODu) + 4.6 (NH3-N) / BODu	2.32	lb O_2/lb BOD
Clean Water Oxygen Transfer Efficiency (clear water) =		1.5 (BODu) + 4.6 (NH3-N) / BODu	16.00%	
Wastewater Oxygen Transfer Efficiency (WOTE) =		(0.45)(Clean WOTE) =	7.20%	
Diffuser Submergence Correction Factors (DCF) =			1.56	
Required Air Flow (RAF) =		**(DCF*(PPD BOD5)*(O2R))/(WOTE*0.23*0.075*1440)**	**7,599**	**SCFM**

TCEQ Mixing Requirements

Air requirements for mixing must be greater than or equal to 0.12 scfm per square foot for a fine bubble diffuser

SCFM / SF =	**0.79**	
Check (Air Supplied must exceed Mixing Air Required) =	**OK**	

Aeration Equipment

Air Flow per Diffuser	25 scfm		
Number of Diffusers Required =		**(Required Air Flow)/(Air Flow per Diffuser) =**	**304**

Secondary Clarifier

Design Flow (Influent Flow + RAS) =	2.11	(MGD)
Design Flow =	87,731	gal/hr
Peak Flow =	6.32	(MGD)
Solids Loading to Clarifier =	4,500	(mg/l)
Depth =	16	(ft)
Number of Clarifiers =	1	
RAS Rate =	40%	Flow
Inlet Pipe Diameter =	18	(in)
RAS Pipe Diameter =	8	(in)

TCEQ Criteria

Max. Surface Loading @ Peak (g/d/ft^2) =	1200
Min. Detention Time @ Peak (hr) =	1.8
Max. Surface Loading @ Design (g/d/ft^2) =	600
Min. Detention Time @ Design (hr) =	3
Max. Weir Loading @ Peak (g/d/ft) =	30,000
Max. Solids Loading @ Peak (lb/d/ft^2) =	50

Required Surface Area @ Peak =	(Peak Flow)/(Max. Surface Loading @ Peak) =	5,264	ft^2
Required Diameter @ Peak =	2* SQRT((Surface Area)/PI)) =	81.9	ft
Required Volume Time @ Peak =	(Min. Det. Time)(Peak Flow)/((7.48)(24) =	63,335	ft^3
Required Surface Area @ Peak =	Volume/Depth =	3,958	ft^2
Required Diameter @ Peak =	2* SQRT((Surface Area)/PI)) =	71	ft
Required Surface Area @ Design =	(Design Flow)/(Max. Surface Loading @ Design) =	3509	ft^2
Required Diameter @ Design =	2* SQRT((Surface Area)/PI)) =	67	ft
Volume @ Design =	(Min. Det. Time)(Design Flow)/((7.48)(24) =	35,186	ft^3
Surface Area @ Design =	Volume/Depth =	2199	ft^2
Diameter @ Design =	2* SQRT((Surface Area)/PI)) =	53	ft
Minimum Diameter =	**Largest Dia. Based on Peak and Design Flows for Detention Time and Surface Loading =**	**81.9**	**ft**
Selected Diameter =		**85**	**ft**
Provided Volume =		90,792	ft^3
Provided Volume =		679,124	gal
Actual Weir Loading =	(Peak Flow)/((2)(PI)(Radius)) =	24,224	g/d/ft
	Equal to or less than TCEQ Requirements =	**OK**	
Solids Loading =	(Solids Loading To Clarifier)(Peak Flow)(8.34) =	79,021	lb/d
Actual Solids Loading Rate =	(Solids Loading)/(Surface Area) =	14	lb/d/ft^2
	Equal to or less than TCEQ Requirements =	**OK**	
Actual Peak Surface Loading =	(Peak Flow)(1440)/(Selected Surface Area) =	1,113	lb/d/ft^2
	Equal to or less than TCEQ Requirements =	**OK**	
Actual Detention Time at Peak =	(Actual Volume)/(Peak Flow) =	3.63	hours
	Greater than or equal to TCEQ Requirements =	**OK**	
Actual Detention Time at Peak =	(Actual Volume)/(Design Flow) =	7.74	hours
	Greater than or equal to TCEQ Requirements =	**OK**	

Clarifier Piping

Inlet Piping

Average Flow Plus RAS =	(Average Flow)+(RAS)	2.11	mgd
Average Flow Plus RAS =	((Average Flow)+(RAS))(1000000/1440)	1462	gpm
Peak Flow Plus RAS =	(Peak Flow)+(RAS)	7.17	mgd
Peak Flow Plus RAS =	((Peak Flow)+(RAS))(1000000/1440)	4977	gpm
Inlet Pipe Velocity at Avg. Flow =	(Avg. Flow Plus RAS)/(Pipe Area)	1.84	fps
Inlet Pipe Velocity at Peak Flow =	(Peak Flow Plus RAS)/(Pipe Area)	6.28	fps

RAS Piping

RAS Flow =	(Average Flow)(RAS rate) =	0.85	mgd
RAS Flow =		590	gpm
RAS Velocity in RAS Pipe =	(RAS Flow Plus RAS)/(Pipe Area)	3.77	fps

Final Dimensions = **85' Diameter x 16' Deep**

Tertiary Filtration

Flow (Wet Weather 30 Day ave.) =	1.50	(MGD)
Peak Flow =	4.50	(MGD)
Number of Treatment Trains =	1	
Number of Redundant Filters =	1	
Number of Active Filter Units =	2	
Total Number of Filter Units =	**3**	

TCEQ Criteria

Maximum Design Filter Rate =	6.5	gpm/sf
Average Design Filter Rate =	3	gpm/sf

** Based off the AquaDisk Package: Model ADFSP-54 x 8/6E-PC*

Required Total Filter Area =		480.77	sf
Area per Filter Disc =		54	sf
Number of Discs per Filter Unit =		6	
Area per Filter Unit =		322.8	sf
Required No. of Active Filter Units =		**2**	
Average Design Flow per Filter =	(MGD)(1000000)/((1440))/No. of Active Filters =	521	gpm
Average Design Filter Rate per Filter Unit =	Average Flow per Filter/Filter Area =	1.61	gpm/sf
	Equal to or greater than TCEQ Requirements =	**OK**	
Peak Flow Per Filter =	(MGD)(1000000)/((1440))/No. of Active Filters =	1563	gpm
Maximum Design Filter Rate =	Peak Flow per Filter/Filter Area =	4.84	gpm/sf
	Equal to or greater than TCEQ Requirements =	**OK**	

Ultraviolet Disinfection

Design Flow =	1.50	(MGD)	
Peak Flow =	4.50	(MGD)	
Minimum Transmittance =	65%		
Maximum TSS (Daily Average) =	10	mg/l	
End of Life Lamp Output =	0.85		
End of Life Fouling Factor =	0.9		
Minimum UV Dose =	40	mJ/cm2	

Flow Rate @ Peak =	((Peak Flow)/(1440))(1000000) =	3,125	gpm
Flow Rate @ Peak =	((Peak Flow)/(1440))(1000000)(3.79) =	11,844	L/min
Combined Correction Factor =	(End of Life Lamp Output)(End of Life Fouling Factor) =	0.765	
Flow Rate per Lamp =	((Minimum UV Dose)/((10^(-2.428)) * ((Minimum Transmittance*100)^3.126) * (Combined Correction Factor))) ^(-1/(Minimum Transmittance) =	219	L/min-lamp
Number of Lamps Required =	(Flow Rate @ Peak) / (Flow Rate per Lamp) =	55	

**Based on the Evoqua ETS-UV UVLW-30800-24 In-Line UV Model*

Number of Lamps per Unit =		30	
Number of Active Units Required =	(Number of Lamps Required)/(Number of Lamps per Unit) =	2	
Total Number of Units Required =	(Number of Active Units Required + 1 Standby Unit =	**3**	

Number of In-Line UV Units = 3 Total (2 Active and 1 Standby)

Aerobic Sludge Digestion

*Sludge to be hauled to the Wilbarger WWTP for processing for Phase 1.

Gravity Thickener

*Sludge to be hauled to the Wilbarger WWTP for processing for Phase 1.

Sludge Holding Basin

WAS Rate =	40,000	gpd	Sludge Retention Time =	3	days
Depth =	16	ft			
Number of Sludge Holding Basins =	1				
Total Required Sludge Holding Volume =			(Min. SRT) (WAS Rate) =	120,000	gal
Required Surface Area per Basin =			(Required Volume) / Number of Basins / (Depth) =	1,003	sf
Required Diameter =			(2) (SQRT (Surface Area / PI) =	36	ft
Selected Diameter =				**36**	**ft**
Provided Volume =			((PI) (Depth) ((Selected Diameter) / 2)^2) (Number of Basins) =	121,819	gal
Actual SRT =				**3.0**	**days**
Final Dimensions =			**36' Diameter x 16' Deep**		

Attachment T.5b) Ph 1 - A2/O Sizing

Average Design Flow =	1.5	MGD
Average Design Flow =	5,682	m^3/ day
Influent BOD5 =	300	mg/l
Influent TSS =	270	mg/l

Aeration Basin Sizing:

θ'_c Solids Retention Time for Nitrification Combined System =	9.3	days
Heterotroph Yield =	0.45	g VSS / g COD
Inf COD =	480	g COD/ m^3
Eff COD =	2	g COD/ m^3
Heterotroph Decay Rate =	0.12	/day
Non-Degradable Heterotroph Fraction =	0.2	gVSS/gVSS
Fraction Influent Inert Biomass =	0.2	gVSS/gVSS
Assumed VSS / TSS Ratio =	0.7	g VSS / g TSS
Assumed MLVSS =	2,700	g VSS/ m^3
COD / VSS Ratio =	1.42	g COD / g VSS
VSS / N Ratio =	0.12	g VSS / g N
Influent TKN =	78.6	g N/ m^3
Eff Soluble N =	7	g N/ m^3
Nitrifier Yield =	0.12	g VSS / g N
Nitrifier Decay Rate =	0.08	/day
Non-Degradable Nitrifier Fraction =	0.2	gVSS/gVSS
Ratio of O2/NO3-N Produced =	4.57	gO_2/gNO_3-N

Production of Active Heterotrophic Biomass =	(Flow)(Yield)((Inf COD) - (Eff COD))/(1+(Decay Rate)(Solids Retention Time)) =	5.78E+05	gVSS/day
Prod Non-Deg Heterotrophic Biomass =	(Prod of Active Heterotrophic Biomass)(Non-Degradable Fraction)(Decay Rate)(Solids Retention Time) =	1.29E+05	gVSS/day
Prod of Non-Inert Heterotrophic Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) =	7.06E+05	gVSS/day
Estimated Production of NO3-N =	TKN - Eff Soluble N - ((Ratio of VSS/N)Production Non-Inert Hetrotrophic Biomass/Flow) =	56.7	gNO_3-N/m^3
Estimated Production of Active Nitrifier Biomass =	(Flow)(Yield)(Estimated Production of NO3-N)/(1+(Decay Rate)(Solids Retention Time)) =	2.21E+04	gVSS/day
Estimated Production of Non-Deg Nitrifier Biomass =	(Estimated Production of Active Nitrifier Biomass)(Decay Rate)(Solids Retention Time)(Non-Deg Fraction) =	3.30E+03	gVSS/day
Prod of Non-Inert Heterotrophic and Nitrifier Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) + P(Active Nitrifier Biomass) + P(Non-Deg Nitrifiers) =	7.32E+05	gVSS/day
Re-estimated Production of NO3-N =	TKN - Eff Soluble N - ((Ratio of VSS/N)Production Non-Inert Hetrotrophic and Nitrifier Biomass/Flow) =	56.1	gNO_3-N/m^3
% Difference to Estimate =	(Re-estimated Production of NO3-N / Estimated Production of NO3-N) =	99%	
	Less than 5% Difference =	OK	
Production of Active Nitrifier Biomass =	(Flow)(Yield)(Production of NO3-N)/(1+(Decay Rate)(Solids Retention Time)) =	2.19E+04	gVSS/day
Production of Non-Deg Nitrifier Biomass =	(Production of Active Nitrifier Biomass)(Decay Rate)(Solids Retention Time)(Non-Deg Fraction) =	3.26E+03	gVSS/day
Prod of Inert Biomass =	(Flow)(Influent Inert Solids) =	2.15E+05	gVSS/day
Production of Total Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) + P(Active Nitrifier Biomass) + P(Non-Deg Nitrifiers) + P(Inert Biomass) =	**9.46E+05**	**gVSS/day**

Required Aeration Volume =	(Production of Total Biomass)(Solids Retention Time) / (MLVSS) =	3,260.06	m^3
Required Aeration Volume =	=	**860,657**	**gal**
	Aeration Volume met by using TCEQ Organic Loading Rate Calculation =	**OK**	
Oxygen Required for Heterotophs =	((Flow)(Inf - Eff COD)) - ((Ratio of COD/VSS)(Production of Active & Non-Deg Biomass)) =	1.71E+06	gO_2/day
Oxygen Required for Nitrifiers =	(Flow)(NO3-N Produced)(Ratio of O2/NO3-N Produced) =	1.46E+06	gO_2/day
Total Oxygen Required =	Oxygen Required for Heterotrophs + Oxygen Required for Nitrifiers =	3.17E+06	gO_2/day
Oxygen Required =	=	**6,988**	**lbO_2/day**

Clarifier Flow Rate Calculations:

	Assumed Effluent VSS =	10	g VSS/ m^3
	WAS and RAS VSS =	9,000	g VSS/ m^3
Effluent Flow Rate =	((Total Production of Biomass - Influent Flow) Waste VSS) / (Effluent VSS - Waste VSS) =	5,583	m^3/d
Effluent Flow Rate =	=	1.47	MGD
Waste Flow Rate =	Influent Flow - Effluent Flow =	99	m^3/d
Waste Flow Rate =	=	0.0261	MGD
Return Flow Rate =	((Waste Flow)(Waste VSS) - (Influent Flow)(MLVSS) / (MLVSS - Return VSS) =	2,294	m^3/d
	=	0.6055	MGD
RAS Return Ratio =	(Return Flow Rate / Influent Flow Rate) =	**0.40**	
	Metcalf and Eddy Suggested Range = 0.25 - 1.00		

Anoxic Basin Sizing:

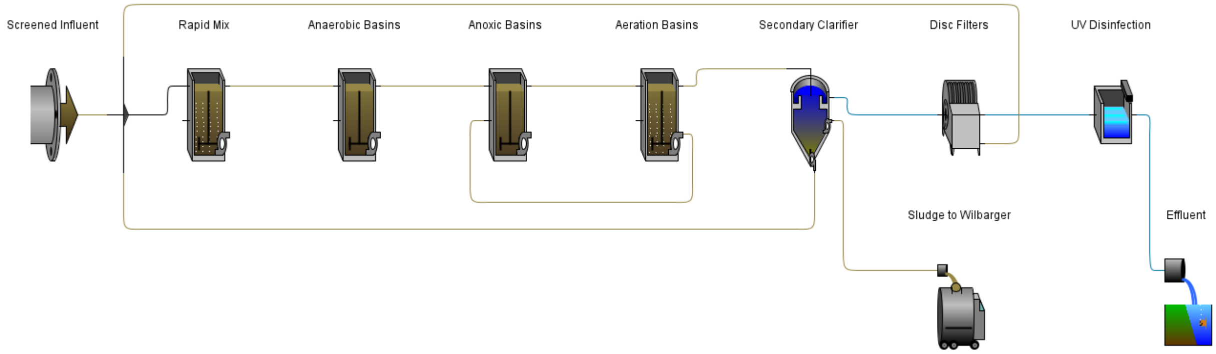
	Assumed Effluent NO_3-N =	12	gNO_3-N/m^3
	Heterotroph Yield (Anoxic) =	0.4	g VSS / g COD
	Heterotroph Decay Rate (Anoxic) =	0.05	/day
Internal Recycle Ratio =	(NO3-N)Produced / (NO3-N)Eff - 1 - R =	3.3	
	Metcalf and Eddy Suggested Range = 1.0 - 4.0	OK	
Internal Recycle Flow Rate =	Internal Recycle Ratio * Influent Flow Rate =	4.91	MGD
Internal Recycle Flow Rate =	=	18,593	m^3/d
Required (NO3-N) Removal =	(QR+QIR)(Effluent NO3-N) =	**2.51E+05**	**gNO_3-N/d**
XaOC =	(SRT/HRT) ((Yield (Inf COD - Eff COD))/(1+ (Decay Rate)(SRT))) =	8462	gVSS/m^3
rbCOD/COD =	=	0.3	
Food to Microorganism Ratio =	(Influent Flow)(Influent COD Conc) / (Anoxic Volume)(XaOC) =	**0.40**	
Anoxic Volume =	25% (Aerobic Volume) =	**815**	**m^3**
Anoxic Volume =	=	215,164	gal
Specific Denitrification Rate (SDNR) =	*From Figure 8-31 from Metcalf and Eddy =*	0.07	gNO_3-N/gVSS-d
Predicted NO3-N Removal =	(Anoxic Volume)(XaOC)(SDNR) =	**4.83E+05**	**gNO_3-N/d**
% Difference =	(Predicted NO3-N Removal) / (Required NO3-N Removal) =	193%	
	> 110% =	**OK**	
	Anoxic Volume Met by using 1 hr Retention Time Calculation =	**OK**	

Anaerobic Basin F/M Calculations:

	Heterotroph Yield (Anaerobic) =	0.2	g VSS / g COD
	Heterotroph Decay Rate (Anaerobic) =	0.04	/day
Anaerobic Volume =	*Calculated in Attachment 5a Using 1.5 hour retention time*	544	m^3
XaOC =	(SRT/HRT) ((Yield (Inf COD))/(1+ (Decay Rate)(SRT))) =	6801	$gVSS/m^3$
Food to Microorganism Ratio =	(Influent Flow)(Influent COD Conc) / (Anaerobic Volume)(XaOC) =	1.04	

Attachment T.5c) GPS-x Modeling Inputs and Results Phase 1

Model Layout



Model Inputs

Raw Influent Characteristics:

Entered:

Flow =	1.5	MGD
COD =	575	mg/l
TKN =	78.6	mg/l
TP =	8.0	mg/l
NH3-N =	55	mg/l
Nitrite =	0.5	mg/l
Nitrate =	0.5	mg/l
Ortho-Phosphate =	6.4	mg/l
Stored Poly-P =	0	mg/l

Calculated:

TSS =	284	mg/l
Projected TSS =	*270*	*mg/l*
Check =	*5%*	
	OK	
CBOD5 =	299.9	mg/l
Projected CBOD5 =	*300*	*mg/l*
Check =	*0%*	
	OK	

Rapid Mix Basin:

Quantity =	1	
Volume =	50,266	gal
Tank Depth =	16	ft

Anaerobic Basins:

Quantity =	1	
Volume =	143,616	gal
Tank Depth =	16	ft

Anoxic Basins:

Quantity =	1	
Volume =	305,184	gal
Tank Depth =	16	ft

Aeration Basins:

Quantity =	1	
Volume =	1,148,928	gal
Tank Depth =	16	ft
IR Recycle Flow	5.63	MGD
DO Setpoint =	3.00	

Secondary Clarifiers:

Surface Area =	5,675	sf
Tank Depth =	16.0	ft
Feed Point =	4.0	ft
RAS Flow =	0.400	MGD
WAS Flow =	0.040	MGD

Filters:

Backwash Rate =	0.02

Modeling Results

		Effluent
Flow	MGD(US)	1.50
TSS	**mg/L**	**2.35**
VSS	mg/L	1.52
cBOD5	**mg/L**	**2.68**
COD	mg/L	33.53
Ammonia N	**mgN/L**	**0.49**
Nitrite N	mgN/L	0.43
Nitrate N	mgN/L	20.39
TKN	mgN/L	2.81
TN	mgN/L	23.62
Soluble PO4-P	mgP/L	0.10
TP	**mgP/L**	**0.49**
Total Alkalinity	mgCaCO3/L	49.80
pH	-	7.00
DO	mgO2/L	3.00

ATTACHMENT T.6

Attachment T.6a) Design Calculations For
East Travis Regional Wastewater Treatment Plant Phase 2 - 3.0 MGD

Design Type:	**A2/O**		**Plant Location:**	**Manor**	
Phase:	**2**		**Latitude:**	**97.4639099°W**	
Design Flow:	**3.0**	**MGD**	**Longitude:**	**30.3171075°N**	
Design Flow :	**2080**	**gpm**	**Elevation:**	**444**	AMSL
Peak Factor:	**3**				

- Historical data from the Cottonwood WWTP (in same service area) has peaking factors less than 3.

2-Hour Peak Flow	**6230**	**gpm**

Design Parameters

Influent Waste Characterization

BOD_5 Concentration =	300	mg/l	$CBOD_5$ Loading =	7,506	lb/d
TSS Concentration =	270	mg/l	TSS Loading =	6,755	lb/d
$(NH_3\text{-}N)_0$ Concentration =	55	mg/l	NH_3-N Loading =	1,376	lb/d
$(NO_2^-/NO_3^-)_o$ Concentration =	1		NO_2^-/NO_3^- Loading =	25	lb/d
Organic N =	23.6		Organic N Loading =	590	lb/d
P Concentration =	8.0	mg/l	P Loading =	200	lb/d

Waste Loading

Effluent Parameter Set

BOD_5 Concentration (Daily Ave.) =	5	mg/l	$CBOD_5$ =	98.33%
TSS Concentration (Daily Ave.) =	5	mg/l	TSS =	98.15%
$(NH_3\text{-}N)_e$ Concentration (Daily Ave.) =	2	mg/l	NH_3-N =	96.36%
$(NO_2^-/NO_3^-)_e$ Concentration =	1.05		NO_2^-/NO_3^-	-5.00%
Organic N =	3.85		Organic N =	83.67%
P Concentration (Daily Ave.)=	1		P =	87.50%
pH =	6.0-9.0			
D.O. =	6	mg/l		

Required Removal Efficiencies

Rapid Mix Basin

Length =	35	ft
Width =	12	ft
Depth =	16	ft
Provided Volume =	50,266	gal
Retention Time =	0.28	hrs

Final Dimensions = 35' Long x 12' Wide x 16' Deep

Anaerobic Basins

Design Flow (Influent Flow + RAS) =	4.2	MGD
Design Flow =	176,443	gal/hr
Number of Basins =	2	
Detention Volume @ Detention Time =	264,665	gal
Detention Volume @ Detention Time =	35,383	cuft
Detention Volume @ Detention Time per Basin =	17,692	cuft
Width of Aeration =	30	ft
Depth =	16	ft
Required Length =	36.9	ft
Food to Microorganism Ratio =	1.04	*- Calculations are provided in Attachment T6b*

Design Detention Time =	1.5	hr

Selected Anaerobic Basin Dimensions

Width =	30.0	ft
Depth =	16.0	ft
Length =	40.0	ft
Provided Volume per Basin =	19,200	cuft
Provided Volume per Basin =	143,616	gal
Supplied Detention Time =	1.63	hr
Check =	**OK**	

Final Dimensions = 40' Long x 30' Wide x 16' Deep

Anoxic Basins

Design Flow (Influent Flow + RAS + IR) =	14.05	(MGD)			
Number of Basins =	2				
Water Depth Avg. =	16	ft	Basin Width =	30	ft
IR Ratio =	3.3		Required Length =	81.5	ft
			Selected Length =	85	ft
Required Anoxic Detention Time =	1	hours	Provided Volume per Basin =	305,184	gal
Required Volume per Basin =	292,746	gal	Check =	OK	hours
Required Volume per Basin =	39,137	cf			
Food to Microorganism Ratio =	0.40	*- Calculations are provided in Attachment T.6b*			

Final Dimensions = 85' Long x 30' Wide x 16' Deep

Aeration Basins

Flow (Wet Weather 30 Day ave.) =	3.0	(MGD)
Peak Flow =	9.0	(MGD)
RAS Return Ratio =	0.41	
BOD Loading to Aeration =	300	(mg/l)
Water Depth Avg. =	16	(ft)
Number of Basins =	2	

TCEQ Criteria

Minimum Depth (ft) =	8
Minimum Freeboard (in) =	18
Max. Organic Loading (lb BOD5/d/1000ft^3) =	35

Total Organic Loading =	(BOD Loading)(Flow)(8.34) =	10,595	lb/d
Organic Loading (per basin) =	(BOD Loading)(Flow)(8.34) / No. Trains =	5,298	lb/d
Required Aeration Volume (per basin)=	((Organic Loading)(1000 ft^3))/Max Org. Load) / No. Trains =	151,358	ft^3
Required Surface Area (per basin) =	(Required Aeration Volume) / (Depth) =	9,460	ft^2
Aeration Basin Width =	(Width of Clarifier Section) =	30	ft
Required Aeration Basin Length =	(Surface Area/Width) =	315.3	ft
Provided Aeration Basin Length =		**320.0**	**ft**

Final Dimensions = 320' Long x 30' Wide x 16' Deep

	Design/Provided Aeration Volume per Basin =	153,600	ft^3
	Design/Provided Aeration Volume per Basin =	1,148,928	gal
Organic Loading at Proposed Design =	(Organic Loading)/(Length)(Width)(Depth)/(1000) =	**34.49**	lb/d/1000ft^3
	Equal or Less Than TCEQ Criteria =	OK	

Aeration Basins

Total Provided Aeration Volume =		(Aeration Volume per Basin) (Number of Basins) =	2,297,856	gal
Hydraulic Retention Time =		(Aeration Volume)/(Avg Flow+RAS Flow) =	**13.02**	hours
MLSS =	4,500 mg/l			
MLVSS = 0.8 MLSS =	3,600 mg/l			
F/M Ratio =		(Flow)(BOD Conc.)/(Vol Aer)(MLVSS) =	**0.11**	
		For Single Stage Nitrification between 0.10 and 0.25 =	**OK**	

RAS & WAS

60 Minute Set	300 ml			
RVSS (RAS VSS) =	12,000 mg/l			
WAS =	0.038 MGD			
Approximate MCRT =		(Vol Aer)(MLVSS)/(WAS)(RVSS) =	**18.37**	d

TCEQ 217 Airflow Requirements

1SCFM =	0.01725 lb/O2			
Fine Bubble Diffuser Efficiency per Foot =	2%			
Submergance Depth =	8 ft			
O_2R =		1.5 (BODu) + 4.3 (NH3-N) / BODu	2.27	lb O_2/lb BOD
Clean Water Oxygen Transfer Efficiency (clear water) =		(Fine Bubble Diffuser Eff./ft.)(Submergance Depth) =	16.00%	
Wastewater Oxygen Transfer Efficiency (WOTE) =		(0.45)(Clean WOTE) =	7.20%	
Diffuser Submergence Correction Factors (DCF) =			1.82	
Required Air Flow (RAF) =		**(DCF*(PPD BOD5)*(O2R))/(WOTE*0.23*0.075*1440)**	**17,323**	**SCFM**

TCEQ Mixing Requirements

Air requirements for mixing must be greater than or equal to 0.12 scfm per square foot for a fine bubble diffuser

		SCFM / SF =	**1.80**	
		Check (Air Supplied must exceed Mixing Air Required) =	**OK**	

Aeration Equipment

Air Flow per Diffuser	18 scfm			
Number of Diffusers Required =		**(Required Air Flow)/(Air Flow per Diffuser) =**	**962**	

Secondary Clarifiers

Deisgn Flow (Avg Flow + RAS) =	4.2	(MGD)
Peak Flow =	12.7	(MGD)
Solids Loading to Clarifier =	4,500	(mg/l)
Depth =	16	(ft)
Number of Clarifiers =	2	
RAS Rate =	41%	Flow
Inlet Pipe Diameter =	18	(in)
RAS Pipe Diameter =	8	(in)

TCEQ Criteria

Max. Surface Loading @ Peak (g/d/ft^2) =	1200
Min. Detention Time @ Peak (hr) =	1.8
Max. Surface Loading @ Design (g/d/ft^2) =	600
Min. Detention Time @ Design (hr) =	3
Max. Weir Loading @ Peak (g/d/ft) =	30,000
Max. Solids Loading @ Peak (lb/d/ft^2) =	50

Required Surface Area @ Peak =	(Peak Flow)/(Max. Surface Loading @ Peak) =	5,293	ft^2
Required Diameter @ Peak =	2* SQRT((Surface Area)/PI)) =	82.1	ft
Required Volume Time @ Peak =	(Min. Det. Time)(Peak Flow)/((7.48)(24) =	63,689	ft^3
Required Surface Area @ Peak =	Volume/Depth =	3,981	ft^2
Required Diameter @ Peak =	2* SQRT((Surface Area)/PI)) =	71	ft
Required Surface Area @ Design =	(Design Flow)/(Max. Surface Loading @ Design) =	3529	ft^2
Required Diameter @ Design =	2* SQRT((Surface Area)/PI)) =	67	ft
Volume @ Design =	(Min. Det. Time)(Design Flow)/((7.48)(24) =	35,383	ft^3
Surface Area @ Design =	Volume/Depth =	2211	ft^2
Diameter @ Design =	2* SQRT((Surface Area)/PI)) =	53	ft
Minimum Diameter =	**Largest Dia. Based on Peak and Design Flows for Detention Time and Surface Loading =**	**82.1**	**ft**
Selected Diameter =		**85**	**ft**
Provided Volume per Clarifier =		90,792	ft^3
Provided Volume per Clarifier =		679,124	gal
Total Clarifier Volume =		1,358,249	gal
Actual Weir Loading =	(Peak Flow)/((2)(PI)(Radius)) =	24,360	g/d/ft
	Equal to or less than TCEQ Requirements =	**OK**	
Solids Loading =	(Solids Loading To Clarifier)(Peak Flow)(8.34) =	79,463	lb/d
Actual Solids Loading Rate =	(Solids Loading)/(Surface Area) =	14	lb/d/ft^2
	Equal to or less than TCEQ Requirements =	**OK**	
Actual Peak Surface Loading =	(Peak Flow)(1440)/(Selected Surface Area) =	1,119	lb/d/ft^2
	Equal to or less than TCEQ Requirements =	**OK**	
Actual Detention Time at Peak =	(Actual Volume)/(Peak Flow) =	3.63	hours
	Greater than or equal to TCEQ Requirements =	**OK**	
Final Dimensions =	**85' Diameter x 16' Deep**		

Tertiary Filtration

Flow (Wet Weather 30 Day ave.) =	3.0	(MGD)	**TCEQ Criteria**		
Peak Flow =	9.0	(MGD)	Maximum Design Filter Rate =	6.5	gpm/sf
Number of Redundant Filters =	1		Average Design Filter Rate =	3	gpm/sf
Number of Active Filter Units =	5				
Total Number of Filter Units =	**6**				

** Based off the AquaDisk Concrete: Model ADFSC-11 x 10E-X2 with OptiFiber PES-13 Cloth*

Required Total Filter Area =		961.54	sf
Area per Filter Disc =		11	sf
Number of Discs per Filter Unit =		20	
Area per Filter Unit =		216	sf
Required No. of Active Filter Units =		**5**	
Average Design Flow per Filter =	(MGD)(1000000)/((1440))/No. of Active Filters =	417	gpm
Average Design Filter Rate per Filter Unit =	Average Flow per Filter/Filter Area =	1.93	gpm/sf
	Equal to or greater than TCEQ Requirements =	**OK**	
Peak Flow Per Filter =	(MGD)(1000000)/((1440))/No. of Active Filters =	1250	gpm
Maximum Design Filter Rate =	Peak Flow per Filter/Filter Area =	5.79	gpm/sf
	Equal to or greater than TCEQ Requirements =	**OK**	

Number of Filter Units = 6 Total (5 Active and 1 Standby)

Ultraviolet Disinfection

Design Flow =	3.0	(MGD)		
Peak Flow =	9.0	(MGD)		
Minimum Transmittance =	65%			
Maximum TSS (Daily Average) =	10	mg/l		
End of Life Lamp Output =	0.85			
End of Life Fouling Factor =	0.9			
Minimum UV Dose =	40	mJ/cm2		

Flow Rate @ Peak =	((Peak Flow)/(1440))(1000000) =	6,250	gpm
Flow Rate @ Peak =	((Peak Flow)/(1440))(1000000)(3.79) =	23,688	L/min
Combined Correction Factor =	(End of Life Lamp Output)(End of Life Fouling Factor) =	0.765	
Flow Rate per Lamp =	((Minimum UV Dose)/((10^(-2.428)) * ((Minimum Transmittance*100)^3.126) * (Combined Correction Factor))) ^(-1/(Minimum Transmittance) =	219	L/min-lamp
Number of Lamps Required =	(Flow Rate @ Peak) / (Flow Rate per Lamp) =	109	

**Based on the Evoqua ETS-UV UVLW-30800-24 In-Line UV Model*

Number of Lamps per Unit =		30	
Number of Active Units Required =	(Number of Lamps Required)/(Number of Lamps per Unit) =	4	
Total Number of Units Required =	(Number of Active Units Required + 1 Standby Unit =	**5**	

Number of In-Line UV Units = 5 Total (4 Active and 1 Standby)

Gravity Thickener

WAS Flow =	37,536	gpd
WAS Loading =	4,696	lb/d
Desired Retention Time =	1.0	days
Thickened Solids Concentration =	2.0%	
Thickened Solids Concentration =	20,000	mg/l
Number of Thickeners =	1	

TCEQ Criteria

Surface Loading Rate Minimum (gpd/sf) =	400
Surface Loading Rate Maximum (gpd/sf) =	800

Metcalf and Eddy Criteria

Solids Loading Rate Minimum (lb/sf-d) =	4
Solids Loading Rate Maximum (lb/sf-d) =	8

Manufacturer Recommendations

Solids Loading Rate (lb/d-sf) =	7

TCEQ:			
Required Maximum Surface Area per Thickener =	(Solids Loading in gpd/sf) / Number of Thickeners / (Min Surface Loading Rate) =	94	sf
Maximum Diameter =	(2) (SQRT (Surface Area / PI) =	11	ft
Required Minimum Surface Area per Thickener =	(Solids Loading in gpd/sf) / Number of Thickeners / (Max Surface Loading Rate) =	47	sf
Minimum Diameter =	(2) (SQRT (Surface Area / PI) =	8	ft
Metcalf and Eddy:			
Required Maximum Surface Area per Thickener =	(Solids Loading in lb/sf) / Number of Thickeners / (Min Surface Loading Rate) =	1174	sf
Maximum Diameter =	(2) (SQRT (Surface Area / PI) =	39	ft
Required Minimum Surface Area per Thickener =	(Solids Loading in lb/sf) / Number of Thickeners / (Max Surface Loading Rate) =	587	sf
Minimum Diameter =	(2) (SQRT (Surface Area / PI) =	27	ft
Manufacturer:			
Required Surface Area per Thickener =	(Solids Loading) / Number of Thickeners / (Solids Loading Rate) =	671	
Required Diameter =	(2) (SQRT (Surface Area / PI) =	29	ft
Selected:			
Selected Diameter =		**30**	**ft**
Surface Loading Rate =	(Solids Loading in gpd)/ Number of Thickeners / (Surface Area) =	53	gpd/sf
	Meets TCEQ Requirements =	**WARNING**	

To meet the manufacturer and Metcalf and Eddy's recommended solids loading rate, the surface loading rate falls below the TCEQ range of 400 to 800 gallons per day.

Solids Loading Rate =	(Solids Loading in lb/d) / Number of Thickeners / (Surface Area) =	7	lb/sf-d
	Meets Metcalf and Eddy Requirements =	**OK**	
Required Volume per Thickener =	(Desired Retention Time) (Solids Loading) / (Number of Thickeners) =	37,536	gal
Required Depth of Thickener =	(Required Volume in cf) / (Surface Area) =	7	ft
Selected Depth of Thickener =		**10**	ft
Provided Volume per Thickener =	(Surface Area) (Depth) =	52,873	gal
Thickener Underflow Rate =	(WAS Flow Rate) (WAS Solids Conc) / (Thickened Solids Conc) =	22,522	gpd
Final Dimensions =	**30' Diameter x 10' Deep**		

Aerobic Sludge Digestion

Number of Digester Basins =	2		
Depth of Digester =	16	ft	
Thickener Underflow Rate =	22,522	gpd	
Volatile Solids =	5,524	lb/day	

TCEQ Criteria

Min. Sludge Retention Time (d) =	40
Max. Solids Concentration used to Calc Total Detention Time (%) =	2%
Min. Volatile Solids Loading Rate (lbs/1000 cf-d) =	100
Max. Volatile Solids Loading Rate (lbs/1000 cf-d) =	200

Total Required Digester Volume =	(Min. SRT) (Thickener Underflow Rate) =	900,864	gal
	=	120,436	cf
Required Surface Area of Each Digester =	otal Required Digester Volume) / (Depth) (Number of Digester Basins) =	3,764	sf
Required Digester Diameter =	(2) (SQRT (Surface Area / PI) =	69	ft
Selected Digester Diameter =		70	ft
Total Provided Volume =	((PI) (Depth) ((Selected Diameter) / 2)^2) (Number of Digester Basins) =	123,150	cf
	=	921,165	gal
Volatile Solids Loading Rate =		45	lbs/1000 cf-d
	Meets TCEQ Requirements =	**WARNING**	

To meet the minimum required time for SRT, the organic loading rate falls below the TCEQ range of 100 to 200 lbs of volatile solids per 1,000 cubic feet per day.

Final Dimensions = **70' Diameter x 16' Deep**

Attachment T.6b) Ph 2 - A2/O Sizing

Average Design Flow =	3.0	MGD
Average Design Flow =	11,364	m^3/ day
Influent BOD5 =	300	mg/l
Influent TSS =	270	mg/l

Aeration Basin Sizing:

θ'_c Solids Retention Time for Nitrification Combined System =	9.3	days
Heterotroph Yield =	0.4	g VSS / g COD
Inf COD =	480	g COD/ m^3
Eff COD =	2	g COD/ m^3
Heterotroph Decay Rate =	0.12	/day
Non-Degradable Heterotroph Fraction =	0.2	gVSS/gVSS
Fraction Influent Inert Biomass =	0.2	gVSS/gVSS
Assumed VSS / TSS Ratio =	0.7	g VSS / g TSS
Assumed MLVSS =	3,600	g VSS/ m^3
COD / VSS Ratio =	1.42	g COD / g VSS
VSS / N Ratio =	0.12	g VSS / g N
Influent TKN =	78.6	g N/ m^3
Eff Soluble N =	7	g N/ m^3
Nitrifier Yield =	0.12	g VSS / g N
Nitrifier Decay Rate =	0.08	/day
Non-Degradable Nitrifier Fraction =	0.2	gVSS/gVSS
Ratio of O2/NO3-N Produced =	4.57	gO_2/gNO_3-N

Production of Active Heterotrophic Biomass =	(Flow)(Yield)((Inf COD) - (Eff COD))/(1+(Decay Rate)(Solids Retention Time)) =	1.03E+06	gVSS/day
Prod Non-Deg Heterotrophic Biomass =	(Prod of Active Heterotrophic Biomass)(Non-Degradable Fraction)(Decay Rate)(Solids Retention Time) =	2.29E+05	gVSS/day
Prod of Non-Inert Heterotrophic Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) =	1.26E+06	gVSS/day
Estimated Production of NO3-N =	TKN - Eff Soluble N - ((Ratio of VSS/N)Production Non-Inert Hetrotrophic Biomass/Flow) =	58.3	gNO_3-N/m^3
Estimated Production of Active Nitrifier Biomass =	(Flow)(Yield)(Estimated Production of NO3-N)/(1+(Decay Rate)(Solids Retention Time)) =	4.56E+04	gVSS/day
Estimated Production of Non-Deg Nitrifier Biomass =	Fraction) =	6.78E+03	gVSS/day
Prod of Non-Inert Heterotrophic and Nitrifier Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) + P(Active Nitrifier Biomass) + P(Non-Deg Nitrifiers) =	1.31E+06	gVSS/day
Re-estimated Production of NO3-N =	TKN - Eff Soluble N - ((Ratio of VSS/N)Production Non-Inert Hetrotrophic and Nitrifier Biomass/Flow) =	57.8	gNO_3-N/m^3
% Difference to Estimate =	(Re-estimated Production of NO3-N / Estimated Production of NO3-N) =	99%	
	Less than 5% Difference =	OK	
Production of Active Nitrifier Biomass =	(Flow)(Yield)(Production of NO3-N)/(1+(Decay Rate)(Solids Retention Time)) =	4.52E+04	gVSS/day
Production of Non-Deg Nitrifier Biomass =	(Production of Active Nitrifier Biomass)(Decay Rate)(Solids Retention Time)(Non-Deg Fraction) =	6.72E+03	gVSS/day
Prod of Inert Biomass =	(Flow)(Influent Inert Solids) =	4.30E+05	gVSS/day
Production of Total Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) + P(Active Nitrifier Biomass) + P(Non-Deg Nitrifiers) + P(Inert Biomass) =	**1.74E+06**	**gVSS/day**

Required Aeration Volume =	(Production of Total Biomass)(Solids Retention Time) / (MLVSS) =	4,488.33	m^3
Required Aeration Volume =	=	**1,184,918**	**gal**
	Aeration Volume met by using TCEQ Organic Loading Rate Calculation =	**OK**	
Oxygen Required for Heterotophs =	((Flow)(Inf - Eff COD)) - ((Ratio of COD/VSS)(Production of Active & Non-Deg Biomass)) =	3.65E+06	gO_2/day
Oxygen Required for Nitrifiers =	(Flow)(NO3-N Produced)(Ratio of O2/NO3-N Produced) =	3.00E+06	gO_2/day
Total Oxygen Required =	Oxygen Required for Heterotrophs + Oxygen Required for Nitrifiers =	6.65E+06	gO_2/day
Oxygen Required =	=	**14,656**	**lbO_2/day**

Clarifier Flow Rate Calculations:

	Assumed Effluent VSS =	10	g VSS/ m^3
	WAS and RAS VSS =	12,000	g VSS/ m^3
Effluent Flow Rate =	((Total Production of Biomass - Influent Flow) Waste VSS) / (Effluent VSS - Waste VSS) =	11,228	m^3/d
Effluent Flow Rate =	=	2.96	MGD
Waste Flow Rate =	Influent Flow - Effluent Flow =	135	m^3/d
Waste Flow Rate =	=	0.0358	MGD
Return Flow Rate =	((Waste Flow)(Waste VSS) - (Influent Flow)(MLVSS) / (MLVSS - Return VSS) =	4,677	m^3/d
	=	1.2346	MGD
RAS Return Ratio =	(Return Flow Rate / Influent Flow Rate) =	**0.41**	
	Metcalf and Eddy Suggested Range = 0.25 - 1.00		

<u>Anoxic Basin Sizing:</u>

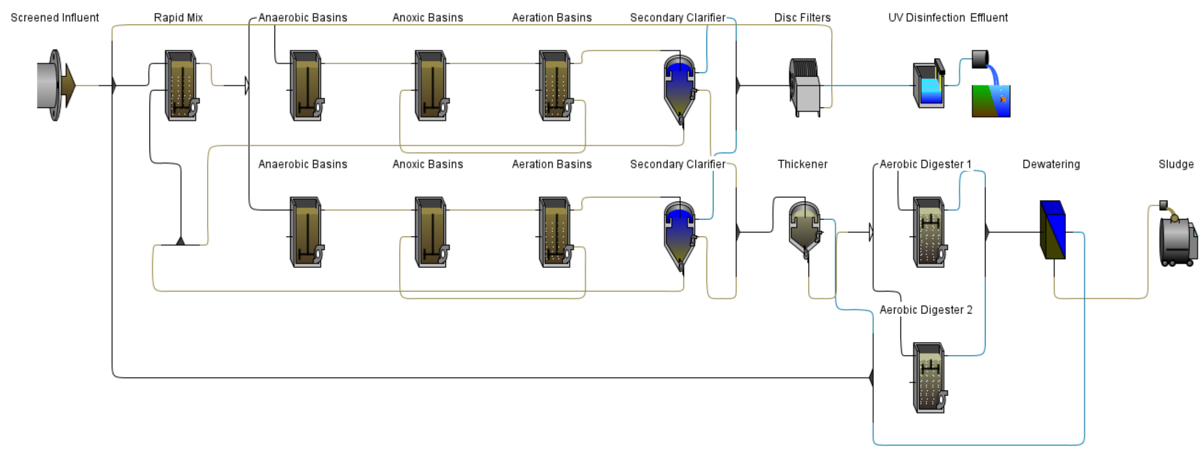
	Assumed Effluent NO_3-N =	12	gNO_3-N/m^3
	Heterotroph Yield (Anoxic) =	0.4	g VSS / g COD
	Heterotroph Decay Rate (Anoxic) =	0.05	/day
Internal Recycle Ratio =	(NO3-N)Produced / (NO3-N)Eff - 1 - R =	3.4	
	Metcalf and Eddy Suggested Range = 1.0 - 4.0	OK	
Internal Recycle Flow Rate =	Internal Recycle Ratio * Influent Flow Rate =	10.20	MGD
Internal Recycle Flow Rate =	=	38,652	m^3/d
Required (NO3-N) Removal =	(QR+QIR)(Effluent NO3-N) =	**5.20E+05**	**gNO_3-N/d**
XaOC =	(SRT/HRT) ((Yield (Inf COD - Eff COD))/(1+ (Decay Rate)(SRT))) =	12292	gVSS/m^3
rbCOD/COD =	=	0.3	
Food to Microorganism Ratio =	(Influent Flow)(Influent COD Conc) / (Anoxic Volume)(XaOC) =	**0.40**	
Anoxic Volume =	25% (Aerobic Volume) =	**1,122**	**m^3**
Anoxic Volume =	=	296,229	gal
Specific Denitrification Rate (SDNR) =	*From Figure 8-31 from Metcalf and Eddy =*	0.07	gNO_3-N/gVSS-d
Predicted NO3-N Removal =	(Anoxic Volume)(XaOC)(SDNR) =	**9.65E+05**	**gNO_3-N/d**
% Difference =	(Predicted NO3-N Removal) / (Required NO3-N Removal) =	186%	
	> 110% =	**OK**	
	Anoxic Volume Met by using 2.5 hr Retention Time Calculation =	**OK**	

Anaerobic Basin F/M Calculations:

	Heterotroph Yield (Anaerobic) =	0.2	g VSS / g COD
	Heterotroph Decay Rate (Anaerobic) =	0.04	/day
Anaerobic Volume =	*Calculated in Attachment 6a Using 1.5 hour retention time*	1087	m^3
XaOC =	(SRT/HRT) ((Yield (Inf COD))/(1+ (Decay Rate)(SRT))) =	6801	$gVSS/m^3$
Food to Microorganism Ratio =	(Influent Flow)(Influent COD Conc) / (Anoxic Volume)(XaOC) =	1.04	

Attachment T.6c) GPS-x Modeling Inputs and Results - Phase 2

Model Layout



Model Inputs

Raw Influent Characteristics:

Entered:

Flow =	3.00	MGD
COD =	575	mg/l
TKN =	78.6	mg/l
TP =	8.0	mg/l
NH3-N =	55	mg/l
Nitrite =	0.5	mg/l
Nitrate =	0.5	mg/l
Ortho-Phosphate =	6.4	mg/l
Stored Poly-P =	0	mg/l

Calculated:

TSS =	284	mg/l
Projected TSS =	*270*	*mg/l*
Check =	*5%*	
	OK	
CBOD5 =	299.9	mg/l
Projected CBOD5 =	*300*	*mg/l*
Check =	*0%*	
	OK	

Rapid Mix Basin:

Quantity =	1	
Volume =	50,266	gal
Tank Depth =	16	ft

Anaerobic Basins:

Quantity =	2	
Volume =	143,616	gal
Tank Depth =	16	ft

Anoxic Basins:

Quantity =	2	
Volume =	305,184	gal
Tank Depth =	16	ft

Aeration Basins:

Quantity =	2	
Volume =	1,148,928	gal
Tank Depth =	16	ft
IR Recycle Flow =	5.63	MGD
DO Setpoint =	3.00	

Secondary Clarifiers:

Quantity =	2	
Surface Area =	5,675	sf
Tank Depth =	16.0	ft
Feed Point =	4.0	ft
RAS Flow =	0.40	MGD
WAS Flow =	0.040	MGD

Filters:

Backwash Rate =	0.02

Gravity Thickener:

Quantity =	1	
Surface Area =	707	sf
Depth =	10	ft
Underflow =	0.0225	MGD
Removal Efficiency =	0.9	

Aerobic Digester:

Quantity =	2	
Volume =	460,583	gal
Depth =	16	ft

Dewatering Screw Press:

Underflow Solids =	25,000	mg/l
Removal Efficiency =	0.95	

Model Results

		Effluent
Flow	MGD(US)	3.00
TSS	**mg/L**	**2.33**
VSS	mg/L	1.50
cBOD5	**mg/L**	**2.69**
COD	mg/L	33.55
Ammonia N	**mgN/L**	**0.44**
Nitrite N	mgN/L	0.40
Nitrate N	mgN/L	23.02
TKN	mgN/L	2.76
TN	mgN/L	26.18
Soluble PO4-P	mgP/L	0.12
TP	**mgP/L**	**0.51**
Total Alkalinity	mgCaCO3/L	49.37
pH	-	7.00
DO	mgO2/L	3.00

ATTACHMENT T.7

Attachment T.7a) Design Calculations For
East Travis Regional Wastewater Treatment Plant Ultimate Phase - 6.0 MGD

Design Type:	**A2/O**	**Plant Location:**	**Manor**
Phase:	**Ultimate**	**Latitude:**	**97.4639099°W**
Design Flow:	**6.0 MGD**	**Longitude:**	**30.3171075°N**
Design Flow :	**4170 gpm**	**Elevation:**	**444** AMSL
Peak Factor:	**3**		

- Historical data from the Cottonwood WWTP (in same service area) has peaking factors less than 3.

2-Hour Peak Flow **12470 gpm**

Design Parameters

Influent Waste Characterization			Waste Loading		
BOD_5 Concentration =	300	mg/l	$CBOD_5$ Loading =	15,012	lb/d
TSS Concentration =	270	mg/l	TSS Loading =	13,511	lb/d
$(NH_3\text{-}N)_0$ Concentration =	55	mg/l	NH_3-N Loading =	2,752	lb/d
$(NO_2^-/NO_3^-)_o$ Concentration =	1		NO_2^-/NO_3^- Loading =	50	lb/d
Organic N =	23.6		Organic N Loading =	1,180	lb/d
P Concentration =	8.0	mg/l	P Loading =	400	lb/d

Effluent Parameter Set			Required Removal Efficiencies	
BOD_5 Concentration (Daily Ave.) =	5	mg/l	$CBOD_5$ =	98.33%
TSS Concentration (Daily Ave.) =	5	mg/l	TSS =	98.15%
$(NH_3\text{-}N)_e$ Concentration (Daily Ave.) =	2	mg/l	NH_3-N =	96.36%
$(NO_2^-/NO_3^-)_e$ Concentration =	1.05		NO_2^-/NO_3^-	-5.00%
Organic N =	3.85		Organic N =	83.67%
P Concentration (Daily Ave.)=	1		P =	87.50%
pH =	6.0-9.0			
D.O. =	6	mg/l		

Rapid Mix Basin

Length =	35	ft
Width =	12	ft
Depth =	16	ft
Provided Volume =	50,266	gal
Retention Time =	0.14	hrs

Final Dimensions = 35' Long x 12' Wide x 16' Deep

Anaerobic Basins

Design Flow (Influent Flow + RAS) =	8.5	MGD
Design Flow =	352,887	gal/hr
Number of Basins =	4	
Detention Volume @ Detention Time =	529,330	gal
Detention Volume @ Detention Time =	70,766	cuft
Detention Volume @ Detention Time per Basin =	17,692	cuft
Width of Aeration =	30	ft
Depth =	16	ft
Required Length =	36.9	ft

Design Detention Time =	1.5	hr

Selected Anaerobic Basin Dimensions

Width =	30.0	ft
Depth =	16.0	ft
Length =	40.0	ft
Provided Volume per Basin =	19,200	cuft
Supplied Detention Time =	1.63	hr
Check =	**OK**	

Food to Microorganism Ratio = 1.04 *- Calculations are provided in Attachment T.7b*

Final Dimensions = 40' Long x 30' Wide x 12' Deep

Anoxic Basin (Rapid Mix)

Design Flow (Influent Flow + RAS + IR) =	28.10	(MGD)			
Number of Basins =	4				
Water Depth Avg. =	16	ft	Basin Width =	30	ft
IR Ratio =	3.3		Required Length =	81.5	ft
Required Anoxic Detention Time =	1	hours	Selected Length =	85	ft
Required Volume per Basin =	292,746	gal	Provided Volume per Basin =	305,184	gal
Required Volume per Basin =	39,137	cf	Check =	OK	hours
Food to Microorganism Ratio =	0.40	*- Calculations are provided in Attachment T.7b*			

Final Dimensions = 115' Long x 30' Wide x 12' Deep

Aeration

Flow (Wet Weather 30 Day ave.) =	6.0	(MGD)
Peak Flow =	18.0	(MGD)
RAS Return Ratio =	0.41	
BOD Loading to Aeration =	300	(mg/l)
Water Depth Avg. =	16	(ft)
Number of Basins =	4	

TCEQ Criteria

Minimum Depth (ft) =	8
Minimum Freeboard (in) =	18
Max. Organic Loading (lb BOD5/d/1000ft^3) =	35

Total Organic Loading =	(BOD Loading)(Flow)(8.34) =	21,190	lb/d
Organic Loading (per basin) =	(BOD Loading)(Flow)(8.34) / No. Trains =	5,298	lb/d
Required Aeration Volume (per basin)=	((Organic Loading)(1000 ft^3))/Max Org. Load) / No. Trains =	151,358	ft^3
Required Surface Area (per basin) =	(Required Aeration Volume) / (Depth) =	9,460	ft^2
Aeration Basin Width =	(Width of Clarifier Section) =	30	ft
Required Aeration Basin Length =	(Surface Area/Width) =	315.3	ft
Provided Aeration Basin Length =		**320.0**	**ft**

Final Dimensions = 320' Long x 30' Wide x 12' Deep

Aeration

	Design/Provided Aeration Volume per Basin =	153,600	ft^3
	Design/Provided Aeration Volume per Basin =	1,148,928	gal
Organic Loading at Proposed Design =	(Organic Loading)/(Length)(Width)(Depth)/(1000) =	**34.49**	lb/d/1000ft^3
	Equal or Less Than TCEQ Criteria =	**OK**	
Total Provided Aeration Volume =	(Aeration Volume per Basin) (Number of Basins) =	4,595,712	gal
Hydraulic Retention Time =	(Aeration Volume)/(Avg Flow+RAS Flow) =	**13.02**	hours

MLSS = 4,500 mg/l
MLVSS = 0.8 MLSS = 3,600 mg/l

F/M Ratio =	(Flow)(BOD Conc.)/(Vol Aer)(MLVSS) =	**0.11**	
	For Single Stage Nitrification between 0.10 and 0.25 =	**OK**	

RAS & WAS

60 Minute Set 300 ml
RVSS (RAS VSS) = 12,000 mg/l
WAS = 0.038 MGD

Approximate MCRT =	(Vol Aer)(MLVSS)/(WAS)(RVSS) =	**36.73**	d

TCEQ 217 Airflow Requirements

1SCFM = 0.01725 lb/O2
Fine Bubble Diffuser Efficiency per Foot = 2%
Submergance Depth = 8 ft

O_2R =	1.5 (BODu) + 4.3 (NH3-N) / BODu	2.27	lb O_2/lb BOD
Clean Water Oxygen Transfer Efficiency (clear water) =	(Fine Bubble Diffuser Eff./ft.)(Submergance Depth) =	16.00%	
Wastewater Oxygen Transfer Efficiency (WOTE) =	(0.45)(Clean WOTE) =	7.20%	
Diffuser Submergence Correction Factors (DCF) =		1.82	
Required Air Flow (RAF) =	**(DCF*(PPD BOD5)*(O2R))/(WOTE*0.23*0.075*1440)**	**34,645**	**SCFM**

TCEQ Mixing Requirements

Air requirements for mixing must be greater than or equal to 0.12 scfm per square foot for a fine bubble diffuser

SCFM / SF =	**3.61**
Check (Air Supplied must exceed Mixing Air Required) =	**OK**

Aeration Equipment

Air Flow per Diffuser 18 scfm

Number of Diffusers Required =	**(Required Air Flow)/(Air Flow per Diffuser) =**	**1925**

Secondary Clarifier

Deisgn Flow (Avg Flow + RAS) =	8.5	(MGD)	
Peak Flow =	25.4	(MGD)	
Solids Loading to Clarifier =	4,500	(mg/l)	
Depth =	16	(ft)	
Number of Clarifiers =	4		
RAS Rate =	41%	Flow	
Inlet Pipe Diameter =	18	(in)	
RAS Pipe Diameter =	8	(in)	

TCEQ Criteria

Max. Surface Loading @ Peak (g/d/ft^2) =	1200
Min. Detention Time @ Peak (hr) =	1.8
Max. Surface Loading @ Design (g/d/ft^2) =	600
Min. Detention Time @ Design (hr) =	3
Max. Weir Loading @ Peak (g/d/ft) =	30,000
Max. Solids Loading @ Peak (lb/d/ft^2) =	50

Required Surface Area @ Peak =	(Peak Flow)/(Max. Surface Loading @ Peak) =	5,293	ft^2
Required Diameter @ Peak =	2* SQRT((Surface Area)/PI)) =	82.1	ft
Required Volume Time @ Peak =	(Min. Det. Time)(Peak Flow)/((7.48)(24) =	63,689	ft^3
Required Surface Area @ Peak =	Volume/Depth =	3,981	ft^2
Required Diameter @ Peak =	2* SQRT((Surface Area)/PI)) =	71	ft
Required Surface Area @ Design =	(Design Flow)/(Max. Surface Loading @ Design) =	3529	ft^2
Required Diameter @ Design =	2* SQRT((Surface Area)/PI)) =	67	ft
Volume @ Design =	(Min. Det. Time)(Design Flow)/((7.48)(24) =	35,383	ft^3
Surface Area @ Design =	Volume/Depth =	2211	ft^2
Diameter @ Design =	2* SQRT((Surface Area)/PI)) =	53	ft
Minimum Diameter =	**Largest Dia. Based on Peak and Design Flows for Detention Time and Surface Loading =**	**82.1**	**ft**
Selected Diameter =		**85**	**ft**
Provided Volume per Clarifier =		90,792	ft^3
Provided Volume per Clarifier =		679,124	gal
Total Clarifier Volume =		2,716,497	gal
Actual Weir Loading =	(Peak Flow)/((2)(PI)(Radius)) =	24,360	g/d/ft
	Equal to or less than TCEQ Requirements =	OK	
Solids Loading =	(Solids Loading To Clarifier)(Peak Flow)(8.34) =	79,463	lb/d
Actual Solids Loading Rate =	(Solids Loading)/(Surface Area) =	14	lb/d/ft^2
	Equal to or less than TCEQ Requirements =	OK	
Actual Peak Surface Loading =	(Peak Flow)(1440)/(Selected Surface Area) =	1,119	lb/d/ft^2
	Equal to or less than TCEQ Requirements =	OK	
Actual Detention Time at Peak =	(Actual Volume)/(Peak Flow) =	3.63	hours
	Greater than or equal to TCEQ Requirements =	OK	
Final Dimensions =	**85' Diameter x 16' Deep**		

Tertiary Filtration

Flow (Wet Weather 30 Day ave.) =	6.0	(MGD)
Peak Flow =	18.0	(MGD)
Number of Redundant Filters =	1	
Number of Active Filter Units =	9	
Total Number of Filter Units =	**10**	

TCEQ Criteria

Maximum Design Filter Rate =	6.5	gpm/sf
Average Design Filter Rate =	3	gpm/sf

** Based off the AquaDisk Concrete: Model ADFSC-11 x 10E-X2 with OptiFiber PES-13 Cloth*

Required Total Filter Area =		1923.08	sf
Area per Filter Disc =		11	sf
Number of Discs per Filter Unit =		20	
Area per Filter Unit =		216	sf
Required No. of Active Filter Units =		**9**	
Average Design Flow per Filter =	(MGD)(1000000)/((1440))/No. of Active Filters =	463	gpm
Average Design Filter Rate per Filter Unit =	Average Flow per Filter/Filter Area =	2.14	gpm/sf
	Equal to or greater than TCEQ Requirements =	**OK**	
Peak Flow Per Filter =	(MGD)(1000000)/((1440))/No. of Active Filters =	1389	gpm
Maximum Design Filter Rate =	Peak Flow per Filter/Filter Area =	6.43	gpm/sf
	Equal to or greater than TCEQ Requirements =	**OK**	

Number of Filter Units = 10 Total (9 Active and 1 Standby)

Ultraviolet Disinfection

Design Flow =	6.0	(MGD)
Peak Flow =	18.0	(MGD)

Minimum Transmittance =	65%	
Maximum TSS (Daily Average) =	10	mg/l
End of Life Lamp Output =	0.85	
End of Life Fouling Factor =	0.9	
Minimum UV Dose =	40	mJ/cm2

Flow Rate @ Peak =	((Peak Flow)/(1440))(1000000) =	12,500	gpm
Flow Rate @ Peak =	((Peak Flow)/(1440))(1000000)(3.79) =	47,375	L/min
Combined Correction Factor =	(End of Life Lamp Output)(End of Life Fouling Factor) =	0.765	
Flow Rate per Lamp =	((Minimum UV Dose)/((10^(-2.428)) * ((Minimum Transmittance*100)^3.126) * (Combined Correction Factor))) ^(-1/(Minimum Transmittance) =	219	L/min-lamp
Number of Lamps Required =	(Flow Rate @ Peak) / (Flow Rate per Lamp) =	217	

**Based on the Evoqua ETS-UV UVLW-30800-24 In-Line UV Model*

Number of Lamps per Unit =		30	
Number of Active Units Required =	(Number of Lamps Required)/(Number of Lamps per Unit) =	8	
Total Number of Units Required =	(Number of Active Units Required + 1 Standby Unit =	**9**	

Number of In-Line UV Units = 9 Total (8 Active and 1 Standby)

Gravity Thickener

WAS Flow =	75,072	gpd
WAS Loading =	9,392	lb/d
Desired Retention Time =	1.0	days
Thickened Solids Concentration =	2.0%	
Thickened Solids Concentration =	20,000	mg/l
Number of Thickeners =	2	

TCEQ Criteria	
Surface Loading Rate Minimum (gpd/sf) =	400
Surface Loading Rate Maximum (gpd/sf) =	800
Metcalf and Eddy Criteria	
Solids Loading Rate Minimum (lb/sf-d) =	4
Solids Loading Rate Maximum (lb/sf-d) =	8
Manufacturer Recommendations	
Solids Loading Rate (lb/d-sf) =	7

TCEQ:			
Required Maximum Surface Area per Thickener =	(Solids Loading in gpd/sf) / Number of Thickeners / (Min Surface Loading Rate) =	94	sf
Maximum Diameter =	(2) (SQRT (Surface Area / PI) =	11	ft
Required Minimum Surface Area per Thickener =	(Solids Loading in gpd/sf) / Number of Thickeners / (Max Surface Loading Rate) =	94	sf
Minimum Diameter =	(2) (SQRT (Surface Area / PI) =	11	ft
Metcalf and Eddy:			
Required Maximum Surface Area per Thickener =	(Solids Loading in lb/sf) / Number of Thickeners / (Min Surface Loading Rate) =	2348	sf
Maximum Diameter =	(2) (SQRT (Surface Area / PI) =	55	ft
Required Minimum Surface Area per Thickener =	(Solids Loading in lb/sf) / Number of Thickeners / (Max Surface Loading Rate) =	1174	sf
Minimum Diameter =	(2) (SQRT (Surface Area / PI) =	39	ft
Manufacturer:			
Required Surface Area per Thickener =	(Solids Loading) / Number of Thickeners / (Solids Loading Rate) =	1342	
Required Diameter =	(2) (SQRT (Surface Area / PI) =	41	ft
Selected:			
Selected Diameter =		**30**	**ft**
Surface Loading Rate =	(Solids Loading in gpd)/ Number of Thickeners / (Surface Area) =	53	gpd/sf
	Meets TCEQ Requirements =	**WARNING**	

To meet the manufacturer and Metcalf and Eddy's recommended solids loading rate, the surface loading rate falls below the TCEQ range of 400 to 800 gallons per day.

Solids Loading Rate =	(Solids Loading in lb/d) / Number of Thickeners / (Surface Area) =	7	lb/sf-d
	Meets Metcalf and Eddy Requirements =	**OK**	
Required Volume per Thickener =	(Desired Retention Time) (Solids Loading) / (Number of Thickeners) =	37,536	gal
Required Depth of Thickener =	(Required Volume in cf) / (Surface Area) =	7	ft
Selected Depth of Thickener =		**10**	**ft**
Provided Volume per Thickener =	(Surface Area) (Depth) =	52,873	gal
Thickener Underflow Rate =	(WAS Flow Rate) (WAS Solids Conc) / (Thickened Solids Conc) =	45,043	gpd
Final Dimensions =	**30' Diameter x 10' Deep**		

Aerobic Sludge Digestion

Number of Digester Basins =	4	
Depth of Digester =	16	ft
Thickener Underflow Rate =	45,043	gpd
Volatile Solids =	11,049	lb/day

TCEQ Criteria*

Min. Sludge Retention Time (d) =	40
Max. Solids Concentration used to Calc Total Detention Time (%) =	2%
Min. Volatile Solids Loading Rate (lbs/1000 cf-d) =	100
Max. Volatile Solids Loading Rate (lbs/1000 cf-d) =	200

*All pertinent requirements listed in TCEQ Rule 217.249 (t) will be followed during the determination of the final design calculations.

Total Required Digester Volume =	(Min. SRT) (Thickener Underflow Rate) =	1,801,728	gal
	=	240,873	cf
Required Surface Area of Each Digester =	otal Required Digester Volume) / (Depth) (Number of Digester Basins) =	3,764	sf
Required Digester Diameter =	(2) (SQRT (Surface Area / PI) =	69	ft
Selected Digester Diameter =		70	ft
Total Provided Volume =	((PI) (Depth) ((Selected Diameter) / 2)^2) (Number of Digester Basins) =	246,301	cf
	=	1,842,330	gal
Volatile Solids Loading Rate =		45	lbs/1000 cf-d
	Meets TCEQ Requirements =	**WARNING**	

To meet the minimum required time for SRT, the organic loading rate falls below the TCEQ range of 100 to 200 lbs of volatile solids per 1,000 cubic feet per day.

Final Dimensions = 70' Diameter x 16' Deep

Attachment T.7b) Ultimate Phase - A2/O Sizing

Average Design Flow =	6.0	MGD
Average Design Flow =	22,727	m^3/ day
Influent BOD5 =	300	mg/l
Influent TSS =	270	mg/l

Aeration Basin Sizing:

θ´$_c$ Solids Retention Time for Nitrification Combined System =	9.3	days
Heterotroph Yield =	0.4	g VSS / g COD
Inf COD =	480	g COD/ m^3
Eff COD =	2	g COD/ m^3
Heterotroph Decay Rate =	0.12	/day
Non-Degradable Heterotroph Fraction =	0.2	gVSS/gVSS
Fraction Influent Inert Biomass =	0.2	gVSS/gVSS
Assumed VSS / TSS Ratio =	0.7	g VSS / g TSS
Assumed MLVSS =	3,600	g VSS/ m^3
COD / VSS Ratio =	1.42	g COD / g VSS
VSS / N Ratio =	0.12	g VSS / g N
Influent TKN =	78.6	g N/ m^3
Eff Soluble N =	7	g N/ m^3
Nitrifier Yield =	0.12	g VSS / g N
Nitrifier Decay Rate =	0.08	/day
Non-Degradable Nitrifier Fraction =	0.2	gVSS/gVSS
Ratio of O2/NO3-N Produced =	4.57	gO_2/gNO_3-N

Production of Active Heterotrophic Biomass =	(Flow)(Yield)((Inf COD) - (Eff COD))/(1+(Decay Rate)(Solids Retention Time)) =	2.05E+06	gVSS/day
Prod Non-Deg Heterotrophic Biomass =	(Prod of Active Heterotrophic Biomass)(Non-Degradable Fraction)(Decay Rate)(Solids Retention Time) =	4.58E+05	gVSS/day
Prod of Non-Inert Heterotrophic Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) =	2.51E+06	gVSS/day
Estimated Production of NO3-N =	TKN - Eff Soluble N - ((Ratio of VSS/N)Production Non-Inert Hetrotrophic Biomass/Flow) =	58.3	gNO_3-N/m^3
Estimated Production of Active Nitrifier Biomass =	(Flow)(Yield)(Estimated Production of NO3-N)/(1+(Decay Rate)(Solids Retention Time)) =	9.12E+04	gVSS/day
Estimated Production of Non-Deg Nitrifier Biomass =	Fraction) =	1.36E+04	gVSS/day
Prod of Non-Inert Heterotrophic and Nitrifier Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) + P(Active Nitrifier Biomass) + P(Non-Deg Nitrifiers) =	2.62E+06	gVSS/day
Re-estimated Production of NO3-N =	TKN - Eff Soluble N - ((Ratio of VSS/N)Production Non-Inert Hetrotrophic and Nitrifier Biomass/Flow) =	57.8	gNO_3-N/m^3
% Difference to Estimate =	(Re-estimated Production of NO3-N / Estimated Production of NO3-N) =	99%	
	Less than 5% Difference =	OK	
Production of Active Nitrifier Biomass =	(Flow)(Yield)(Production of NO3-N)/(1+(Decay Rate)(Solids Retention Time)) =	9.03E+04	gVSS/day
Production of Non-Deg Nitrifier Biomass =	(Production of Active Nitrifier Biomass)(Decay Rate)(Solids Retention Time)(Non-Deg Fraction) =	1.34E+04	gVSS/day
Prod of Inert Biomass =	(Flow)(Influent Inert Solids) =	8.59E+05	gVSS/day
Production of Total Biomass =	P(Active Heterotrophic Biomass) + P(Non-Degradable Heterotrophic Biomass) + P(Active Nitrifier Biomass) + P(Non-Deg Nitrifiers) + P(Inert Biomass) =	**3.47E+06**	**gVSS/day**
Required Aeration Volume =	(Production of Total Biomass)(Solids Retention Time) / (MLVSS) =	8,976.65	m^3
Required Aeration Volume =	=	**2,369,836**	**gal**
	Aeration Volume met by using TCEQ Organic Loading Rate Calculation =	OK	

Oxygen Required for Heterotophs =	((Flow)(Inf - Eff COD)) - ((Ratio of COD/VSS)(Production of Active & Non-Deg Biomass)) =	7.30E+06	gO_2/day
Oxygen Required for Nitrifiers =	(Flow)(NO3-N Produced)(Ratio of O2/NO3-N Produced) =	6.00E+06	gO_2/day
Total Oxygen Required =	Oxygen Required for Heterotrophs + Oxygen Required for Nitrifiers =	1.33E+07	gO_2/day
Oxygen Required =	=	**29,311**	**lbO_2/day**

Clarifier Flow Rate Calculations:

	Assumed Effluent VSS =	10	g VSS/ m^3
	WAS and RAS VSS =	12,000	g VSS/ m^3
Effluent Flow Rate =	((Total Production of Biomass - Influent Flow) Waste VSS) / (Effluent VSS - Waste VSS) =	22,456	m^3/d
Effluent Flow Rate =	=	5.93	MGD
Waste Flow Rate =	Influent Flow - Effluent Flow =	271	m^3/d
Waste Flow Rate =	=	0.0715	MGD
Return Flow Rate =	((Waste Flow)(Waste VSS) - (Influent Flow)(MLVSS) / (MLVSS - Return VSS) =	9,353	m^3/d
	=	2.4693	MGD
RAS Return Ratio =	(Return Flow Rate / Influent Flow Rate) =	**0.41**	
	Metcalf and Eddy Suggested Range = 0.25 - 1.00		

Anoxic Basin Sizing:

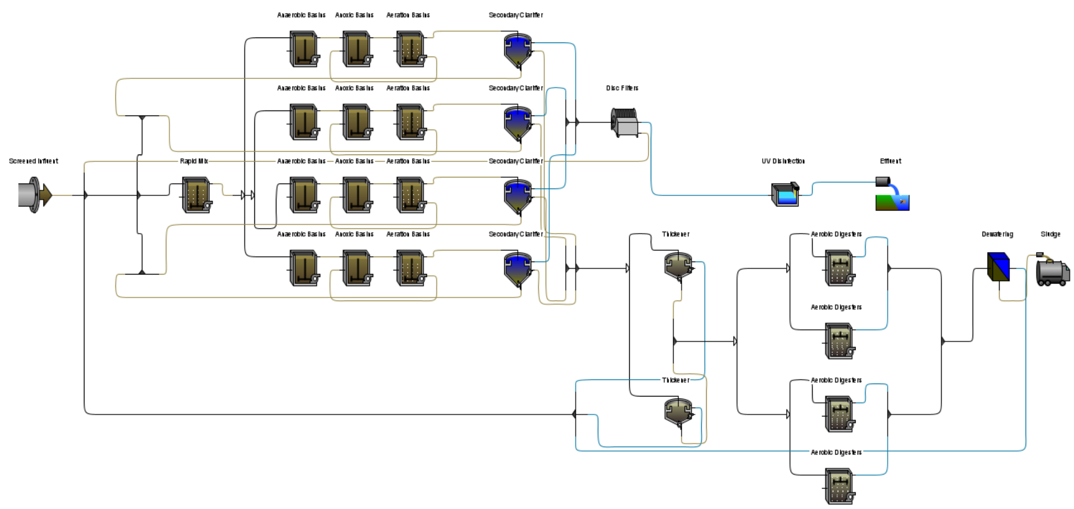
	Assumed Effluent NO_3-N =	12	gNO_3-N/m^3
	Heterotroph Yield (Anoxic) =	0.4	g VSS / g COD
	Heterotroph Decay Rate (Anoxic) =	0.05	/day
Internal Recycle Ratio =	(NO3-N)Produced / (NO3-N)Eff - 1 - R =	3.4	
	Metcalf and Eddy Suggested Range = 1.0 - 4.0	OK	
Internal Recycle Flow Rate =	Internal Recycle Ratio / Influent Flow Rate =	0.57	MGD
Internal Recycle Flow Rate =	=	2,147	m^3/d
Required (NO3-N) Removal =	(QR+QIR)(Effluent NO3-N) =	**1.04E+06**	**gNO_3-N/d**
XaOC =	(SRT/HRT) ((Yield (Inf COD - Eff COD))/(1+ (Decay Rate)(SRT))) =	12292	gVSS/m^3
rbCOD/COD =	=	0.3	
Food to Microorganism Ratio =	(Influent Flow)(Influent COD Conc) / (Anoxic Volume)(XaOC) =	**0.40**	
Anoxic Volume =	25% (Aerobic Volume) =	**2,244**	**m^3**
Anoxic Volume =	=	592,459	gal
Specific Denitrification Rate (SDNR) =	*From Figure 8-31 from Metcalf and Eddy =*	0.07	gNO_3-N/gVSS-d
Predicted NO3-N Removal =	(Anoxic Volume)(XaOC)(SDNR) =	**1.93E+06**	**gNO_3-N/d**
% Difference =	(Predicted NO3-N Removal) / (Required NO3-N Removal) =	186%	
	> 110% =	**OK**	
	Anoxic Volume Met by using 2.5 hr Retention Time Calculation =	**OK**	

Anaerobic Basin F/M Calculations:

	Heterotroph Yield (Anaerobic) =	0.2	g VSS / g COD
	Heterotroph Decay Rate (Anaerobic) =	0.04	/day
Anaerobic Volume =	*Calculated in Attachment 7a Using 1.5 hour retention time*	2175	m^3
XaOC =	(SRT/HRT) ((Yield (Inf COD))/(1+ (Decay Rate)(SRT))) =	6801	$gVSS/m^3$
Food to Microorganism Ratio =	(Influent Flow)(Influent COD Conc) / (Anoxic Volume)(XaOC) =	1.04	

Attachment T.7c) GPS-x Modeling Inputs and Results - Ultimate Phase

Model Layout



Model Inputs

Raw Influent Characteristics:

Entered:				**Calculated:**		
Flow =	3.00	MGD		TSS =	284	mg/l
COD =	575	mg/l		*Projected TSS =*	*270*	*mg/l*
TKN =	78.6	mg/l		*Check =*	*5%*	
TP =	8.0	mg/l			**OK**	
NH3-N =	55	mg/l				
Nitrite =	0.5	mg/l		CBOD5 =	299.9	mg/l
Nitrate =	0.5	mg/l		*Projected CBOD5 =*	*300*	*mg/l*
Ortho-Phosphate =	6.4	mg/l		*Check =*	*0%*	
Stored Poly-P =	0	mg/l			**OK**	

Rapid Mix Basin:

Quantity =	1	
Volume =	50,266	gal
Tank Depth =	16	ft

Anaerobic Basins:

Quantity =	4	
Volume =	143,616	gal
Tank Depth =	16	ft

Aeration Basins:

Quantity =	4	
Volume =	1,148,928	gal
Tank Depth =	16	ft
IR Recycle Flow	5.63	MGD
DO Setpoint =	3.00	

Anoxic Basins:

Quantity =	4	
Volume =	305,184	gal
Tank Depth =	16	ft

Secondary Clarifiers:

Quantity =	4	
Surface Area =	5,675	sf
Tank Depth =	16.0	ft
Feed Point =	4.0	ft
RAS Flow =	0.80	MGD
WAS Flow =	0.080	MGD

Filters:

Backwash Rate	0.02

Gravity Thickeners:

Quantity =	2	
Surface Area =	707	sf
Depth =	10	ft
Underflow =	0.0450	MGD
Removal Efficiency =	0.9	

Aerobic Digesters:

Quantity =	4	
Volume =	460,583	gal
Depth =	16	ft

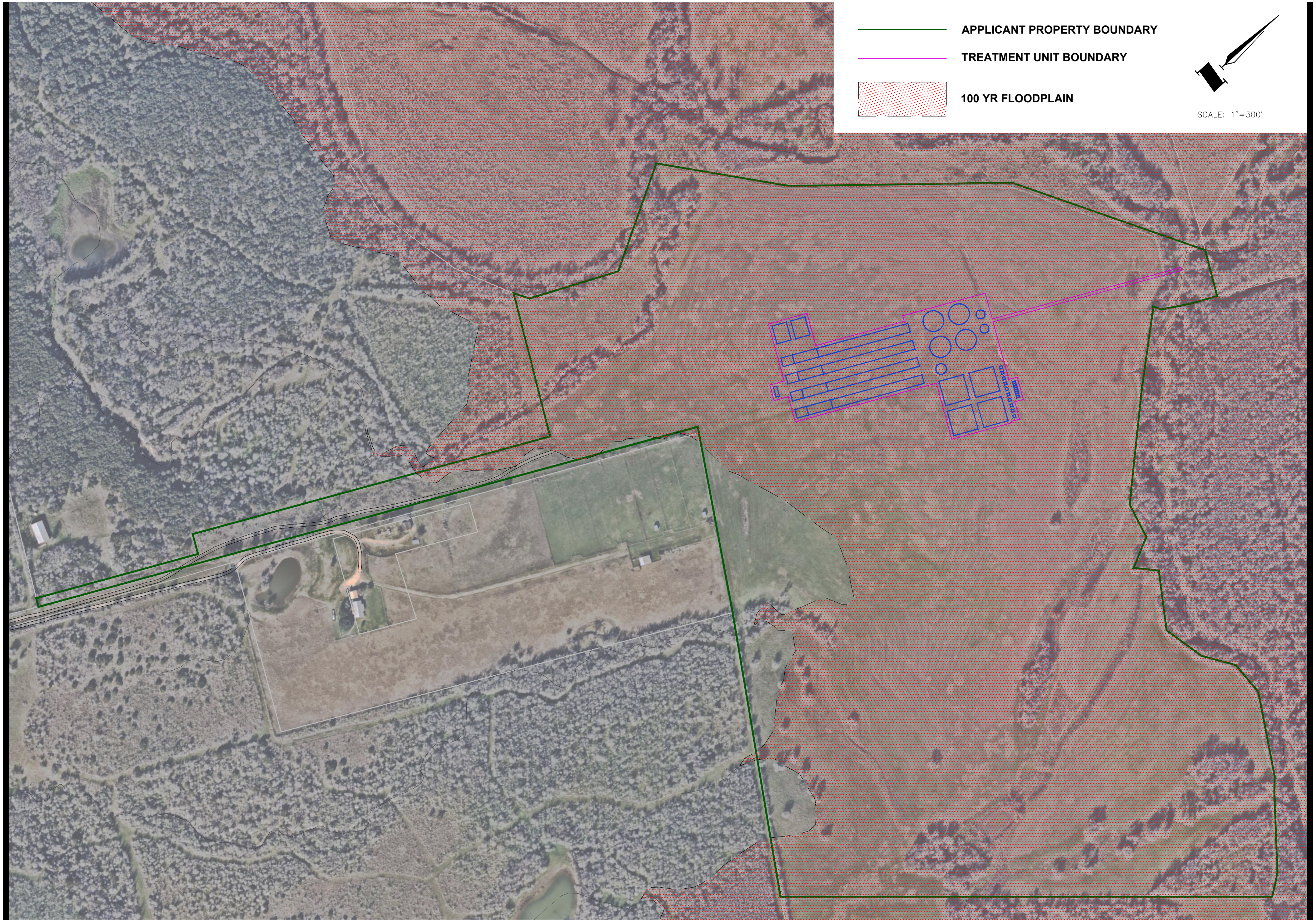
Dewatering Screw Press:

Underflow Solids =	25,000	mg/l
Removal Efficiency =	0.95	

Model Results

		Effluent
Flow	MGD(US)	6.00
TSS	**mg/L**	**2.34**
VSS	mg/L	1.49
cBOD5	**mg/L**	**2.48**
COD	mg/L	33.25
Ammonia N	**mgN/L**	**0.46**
Nitrite N	mgN/L	0.40
Nitrate N	mgN/L	18.07
TKN	mgN/L	2.75
TN	mgN/L	21.22
Soluble PO4-P	mgP/L	0.27
TP	**mgP/L**	**0.67**
Total Alkalinity	mgCaCO3/L	50.33
pH	-	7.00
DO	mgO2/L	3.00

ATTACHMENT T.8



GBA

EAST TRAVIS REGIONAL WASTEWATER TREATMENT PLANT PERMIT

BUFFER ZONE MAP

PROJECT NUMBER
16619

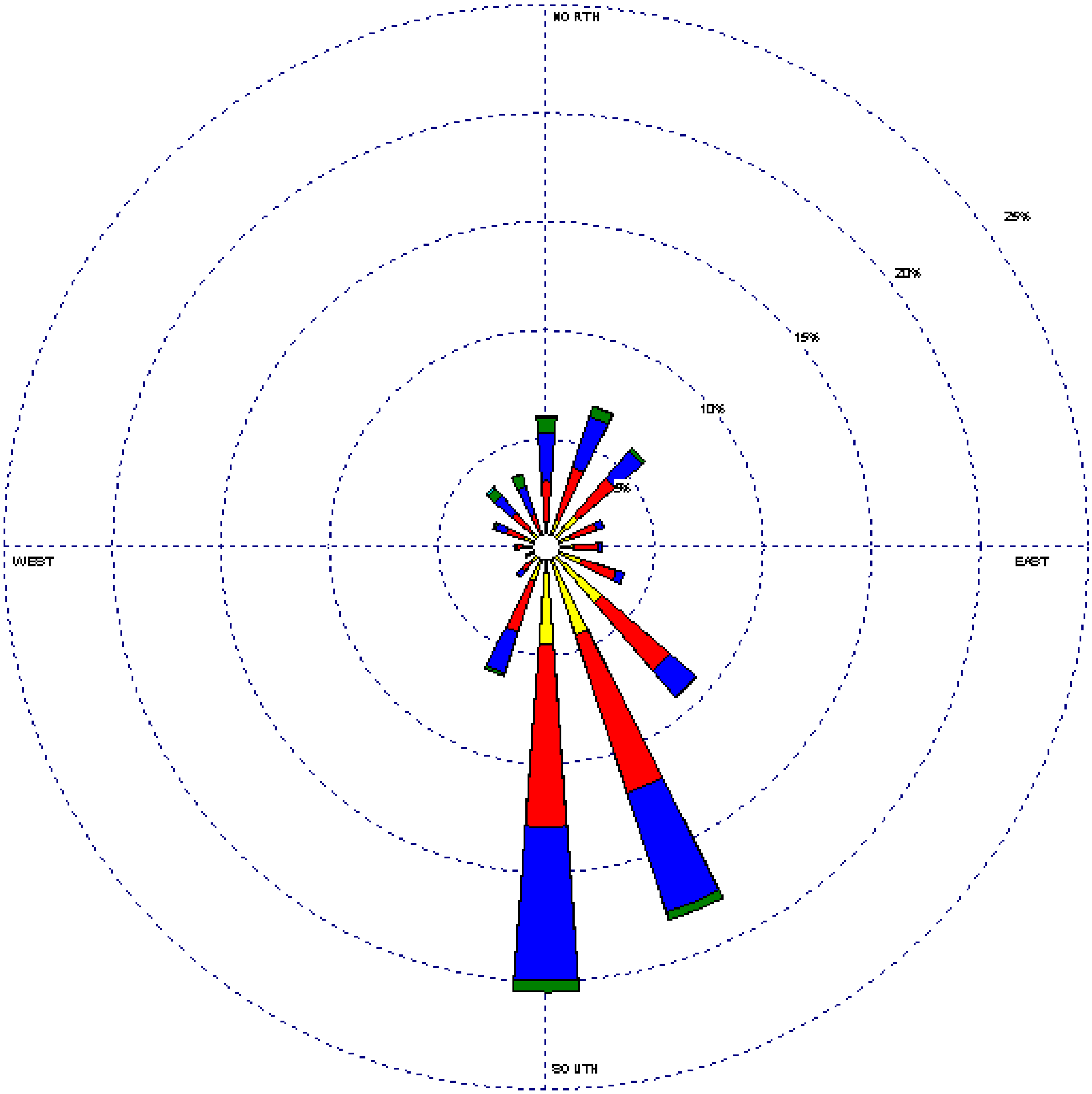
DATE
1/10/25

SHEET NUMBER
1

ATTACHMENT T.9

WIND ROSE PLOT

Station #13958 - AUSTIN/MUNICIPAL ARPT, TX



Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE	COMPANY NAME
Sara West	8/29/2002	USDA-ARS

DISPLAY	UNIT	COMMENTS
Wind Speed	m/s	

AVG. WIND SPEED	CALM WINDS
4.68 m/s	3.55%

ORIENTATION	PLOT YEAR-DATE-TIME
Direction (blowing from)	1961 Apr 1 - Apr 30 Midnight - 11 PM

ATTACHMENT T.10

Attachment T.10a) Sludge Management Plan Phase 1

Owner:	**RM 2243 WWTP**	
Plant Phase:	**Phase 1**	
Plant Capacity:	**1,500,000**	**gpd (Ph 1)**

Design Parameters

Plant Influent BOD5 Loading =	3,753	lb/day
Plant Influent TSS Loading =	3,378	lb/day
Sludge Production =	0.65	lb sludge/lb BOD5
Sludge Production =	0.30	lb sludge/lb TSS
Waste Sludge =	3,453	lb/day
Volatile Fraction =	0.80	est.
Volatile Solids = WAS =	2,762	lb/day
Volatile Solids Reduction =	0.40	
Volatile Solids Reduced =	1,105	lb/day
Digested Sludge =	2,348	lb/day

CBOD5 Removal

Influent Concentration =	300	mg/l
Effluent Concentration =	5	mg/l
Net Removal =	295	mg/l

Solids Generation

	100% Flow	75% Flow	50% Flow	25% Flow
Pounds of Dry Sludge Produced =	2,348	1,761	1,174	587
Pounds of Wet Sludge Produced =	156,525	117,394	78,263	39,131
Volume of Wet Sludge Produced (gpd) =	18,768	14,076	9,384	4,692

Assumes:

Percent Solids = 1.50%

Attachment T.10b) Sludge Management Plan Phase 2

Owner:	**RM 2243 WWTP**	
Plant Phase:	**Phase 2**	
Plant Capacity:	**3,000,000**	**gpd (Ph 1)**

Design Parameters

Plant Influent BOD5 Loading =	7,506	lb/day
Plant Influent TSS Loading =	6,755	lb/day
Sludge Production =	0.65	lb sludge/lb BOD5
Sludge Production =	0.30	lb sludge/lb TSS
Waste Sludge =	6,906	lb/day
Volatile Fraction =	0.80	est.
Volatile Solids = WAS =	5,524	lb/day
Volatile Solids Reduction =	0.40	
Volatile Solids Reduced =	2,210	lb/day
Digested Sludge =	4,696	lb/day

CBOD5 Removal

Influent Concentration =	300	mg/l
Effluent Concentration =	5	mg/l
Net Removal =	295	mg/l

Solids Generation

	100% Flow	75% Flow	50% Flow	25% Flow
Pounds of Dry Sludge Produced =	4,696	3,522	2,348	1,174
Pounds of Wet Sludge Produced =	313,050	234,788	156,525	78,263
Volume of Wet Sludge Produced (gpd) =	37,536	28,152	18,768	9,384

Assumes:

Percent Solids = 1.50%

Attachment T.10c) Sludge Management Plan Ultimate Phase

Owner: RM 2243 WWTP
Plant Phase: Ultimate
Plant Capacity: 6,000,000 gpd (Ph 1)

Design Parameters

Plant Influent BOD5 Loading =	15,012	lb/day
Plant Influent TSS Loading =	13,511	lb/day
Sludge Production =	0.65	lb sludge/lb BOD5
Sludge Production =	0.30	lb sludge/lb TSS
Waste Sludge =	13,811	lb/day
Volatile Fraction =	0.80	est.
Volatile Solids = WAS =	11,049	lb/day
Volatile Solids Reduction =	0.40	
Volatile Solids Reduced =	4,420	lb/day
Digested Sludge =	9,392	lb/day

CBOD5 Removal

Influent Concentration =	300	mg/l
Effluent Concentration =	5	mg/l
Net Removal =	295	mg/l

Solids Generation

	100% Flow	75% Flow	50% Flow	25% Flow
Pounds of Dry Sludge Produced =	9,392	7,044	4,696	2,348
Pounds of Wet Sludge Produced =	626,100	469,575	313,050	156,525
Volume of Wet Sludge Produced (gpd) =	75,072	56,304	37,536	18,768

Assumes:

Percent Solids = 1.50%

ATTACHMENT T.11

Andrea Mendoza

From: Andrea Mendoza
Sent: Thursday, October 17, 2024 4:06 PM
To: James Michalk; Mike Lindner; Peter Schaefer
Cc: Jose Castillo
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

Ok, will do.

Thanks!

Andrea Mendoza Staff AES | Water Environment Group
d 737.247.7539

From: James Michalk <james.michalk@tceq.texas.gov>
Sent: Thursday, October 17, 2024 4:05 PM
To: Andrea Mendoza <amendoza@gbateam.com>; Mike Lindner <Mike.Lindner@tceq.texas.gov>; Peter Schaefer <peter.schaefer@tceq.texas.gov>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

CAUTION: **This email originated from outside the organization. Do not click or open attachments unless you recognize the sender and know the content is safe.**

Please complete the worksheets but you don't need to collect stream transect data.

Thank you,

Jim Michalk
Water Quality Assessment Team

From: Andrea Mendoza <amendoza@gbateam.com>
Sent: Thursday, October 17, 2024 4:01 PM
To: James Michalk <james.michalk@tceq.texas.gov>; Mike Lindner <Mike.Lindner@tceq.texas.gov>; Peter Schaefer <peter.schaefer@tceq.texas.gov>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

Hello,

I wanted to follow up on my previous email regarding whether we should proceed with completing Worksheets 2.0 and 2.1 for our upcoming application. Any updates or guidance would be greatly appreciated.

Thank you,

Andrea Mendoza Staff AES | Water Environment Group
d 737.247.7539

From: Andrea Mendoza <amendoza@gbateam.com>
Sent: Tuesday, October 15, 2024 11:04 AM
To: James Michalk <james.michalk@tceq.texas.gov>; Mike Lindner <Mike.Lindner@tceq.texas.gov>; Peter Schaefer <peter.schaefer@tceq.texas.gov>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

Good morning,

Thank you for your explanation, Jim. Just to confirm, would you like us to proceed with completing the worksheets?

To clarify, the term “partially classified water body” is referenced on page 64 of the TCEQ-10053ins document, as indicated in the screenshot below. It is also mentioned again on page 66 of the same document.

Section 3. Classified Segments

Indicate if the discharge is directly into or within 300 feet of a classified se *Appendix C* or a partially classified waterbody as defined in *Appendix D* *Surface Water Quality Standards (30 TAC § 307.10).* The Water Quality the Water Quality Assessment Section can be contacted to determine if the classified segment.

If yes, the worksheet is complete. It is not necessary to complete Workshee Physical Characteristics Worksheet.

If no, and the discharge goes into a watercourse such as a creek, ditch, or s prior to flowing into a classified segment, then complete Sections 4 and 5.

Section 4. Description of Receiving Waters

a. These items refer to the **immediate** receiving water (at the point the discharged). Check the item that best describes the first receiving wat discharge will flow after it leaves the outfall.

TCEQ-10053ins (04/02/2024)
Instructions for Completing the Domestic Wastewater Permit Application

Thank you,

Andrea Mendoza Staff AES | Water Environment Group
d 737.247.7539

From: James Michalk <james.michalk@tceq.texas.gov>
Sent: Tuesday, October 15, 2024 8:59 AM
To: Mike Lindner <Mike.Lindner@tceq.texas.gov>; Andrea Mendoza <amendoza@gbateam.com>; Peter Schaefer

<peter.schaefer@tceq.texas.gov>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

Good morning,

I've never heard of a "partially classified water body" either. I checked an older paper application file I have (from Nov 2023) and the most recent new permit application file I received last week, and the application itself (in both of the files I looked at), in Section 3 of Domestic Technical Report Worksheet 2.0, just says "Is the discharge directly into (or within 300 feet of) a classified segment?". It references 'Instructions Page 73' -- is that where 'partially classified water bodies' are mentioned? I'm not familiar with the 'Instructions' document or with who would have written that.

To my knowledge, the additional information in this section of the application has always been required of any water body that is not a (fully) classified segment. Classified segments are designated by numbers only. If the water body's designation includes a letter (e.g. '1434D'), that additional information is still required to be provided. It's always been my understanding that being in Appendix D doesn't (and shouldn't) remove the requirement of providing the additional information required for discharges into water bodies that aren't defined classified segments. One important aspect of this additional information would be the collection of stream transect data for refinement of dissolved oxygen modeling, as Peter mentioned.

However, in the case of Wilbarger Creek specifically, we already have sufficient information to have determined the stream's flow status and applicable DO criteria, and the dissolved oxygen model for it already has site-specific hydraulic coefficients, so I don't need any new stream transect data. There are many water bodies with 'A', 'B', 'C', 'D', etc. designations throughout the state (including water bodies included in Appendix D) that we do not have such information for though, so I personally wouldn't support including Appendix D water bodies in the 'no more information required' category.

Jim Michalk
Water Quality Assessment Team

From: Mike Lindner <Mike.Lindner@tceq.texas.gov>
Sent: Sunday, October 13, 2024 11:22 AM
To: Andrea Mendoza <amendoza@gbateam.com>; Peter Schaefer <peter.schaefer@tceq.texas.gov>
Cc: Jose Castillo <jcastillo@gbateam.com>; James Michalk <james.michalk@tceq.texas.gov>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

I am cc'ing Jim to see if he has any bright ideas.

Mike Lindner
Team Leader
Water Quality Assessment
Texas Commission on Environmental Quality (TCEQ)
512.239.3770

From: Andrea Mendoza <amendoza@gbateam.com>
Sent: Friday, October 11, 2024 4:44 PM
To: Peter Schaefer <peter.schaefer@tceq.texas.gov>; Mike Lindner <Mike.Lindner@tceq.texas.gov>

Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

Peter – Thank you for your help.

Mike – Will you need us to complete Worksheet 2.1 as part of the application?

Andrea Mendoza Staff AES | Water Environment Group
d 737.247.7539

From: Peter Schaefer <peter.schaefer@tceq.texas.gov>
Sent: Friday, October 11, 2024 4:34 PM
To: Mike Lindner <Mike.Lindner@tceq.texas.gov>; Andrea Mendoza <amendoza@gbateam.com>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

I have no idea what a "partially classified" waterbody is. Waterbodies listed in Appendix D are considered "unclassified waterbodies". Perhaps the intended wording was... "directly into or within 300 feet of a classified segment as defined in Appendix C or ~~a partially classified waterbody as~~ a section of an unclassified waterbody defined in Appendix D of the Texas Surface Water Quality Standards (30 TAC § 307.10)"

The section of Wilbarger Creek in the map below is downstream of the section of Wilbarger Creek identified in Appendix D. The DO modeler may need the stream transect information found in Sections 2 and 3 of Worksheet 2.1. Mike- I'll let you make that determination since DO modeling is in your shop. Other than that, I don't think there's anything in Worksheet 2.0 or 2.1 that we don't already know for this waterbody.

-Peter

Peter Schaefer, Team Leader
Standards Implementation Team (MC 150)
Water Quality Assessment Section
Water Quality Division, TCEQ
email: *peter.schaefer@tceq.texas.gov*
phone: 512-239-4372
fax: 512-239-4420

From: Mike Lindner <Mike.Lindner@tceq.texas.gov>
Sent: Friday, October 11, 2024 4:04 PM
To: Andrea Mendoza <amendoza@gbateam.com>
Cc: Jose Castillo <jcastillo@gbateam.com>; Peter Schaefer <peter.schaefer@tceq.texas.gov>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

I too cannot tell how App. D denotes a partially classified waterbody and do not see that term in the Standards' definitions section.

I am cc'ing someone I suspect will know the answer to this.

Mike Lindner
Team Leader
Water Quality Assessment
Texas Commission on Environmental Quality (TCEQ)
512.239.3770

From: Andrea Mendoza <amendoza@gbateam.com>
Sent: Friday, October 11, 2024 4:01 PM
To: Mike Lindner <Mike.Lindner@tceq.texas.gov>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

Hi Mike,

It will discharge into 1434D, and I do not see any other segments within 300 feet.

Thank you,

Andrea Mendoza Staff AES | Water Environment Group
d 737.247.7539

From: Mike Lindner <Mike.Lindner@tceq.texas.gov>
Sent: Friday, October 11, 2024 3:58 PM
To: Andrea Mendoza <amendoza@gbateam.com>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Inquiry Regarding the Segment Class of Stream 1434D

Hello Andrea,

Will the discharge be within 300 feet of a classified segment as defined in Appendix C?

Thx,

Mike Lindner
Team Leader
Water Quality Assessment
Texas Commission on Environmental Quality (TCEQ)
512.239.3770

From: Andrea Mendoza <amendoza@gbateam.com>
Sent: Friday, October 11, 2024 3:50 PM
To: Mike Lindner <Mike.Lindner@tceq.texas.gov>
Cc: Jose Castillo <jcastillo@gbateam.com>
Subject: Inquiry Regarding the Segment Class of Stream 1434D

Hi Mike,

I am currently working on putting together a domestic wastewater permit application for a future plant that will be built near Manor, Texas.

The proposed plant will discharge into Wilbarger Creek (1434D), which has a segment class of “unclassified.” In the permit application instructions, it says that most of Worksheet 2.0 and all of Worksheet 2.1 will not need to be completed if the discharge will be “directly into or within 300 feet of a classified segment as defined in Appendix C or a partially classified waterbody as defined in Appendix D of the Texas Surface Water Quality Standards (30 TAC § 307.10)”. Is 1434D considered a “partially classified waterbody”?

Thank you,

Andrea Mendoza

GBA

Andrea Mendoza Staff AES | Water Environment Group

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1500 County Road 269 | Leander, TX 78641

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ATTACHMENT T.12

MANOR
EST. TEXAS 1872

WASTEWATER MASTER PLAN

CITY OF MANOR, TEXAS

FINAL REPORT

OCTOBER 2024

GBA
TBPE Firm No. 4242
9601 Amberglen Blvd, Ste. 109
Austin, TX 78729
www.gbateam.com

GBA PN 15320

City of Manor, Texas

Wastewater Master Plan

October 2024

Prepared for:

City of Manor, Texas

Prepared by:

GBA
TBPE Firm No. 4242
9601 Amberglen Blvd, Ste. 109
Austin, TX 78729

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MANOR
EST. TEXAS 1872

PN: 15320

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Acronyms and Abbreviations

ADDF	Average Daily Dry-Weather Flow
CCI	Construction Cost Index
CCN	Certificate of Convenience and Necessity
CCTV	Closed-Circuit Television
CIF	Community Impact Fee
CIP	Capital Improvement Plan
CIPP	Cured-in-Place Pipe
CIWEM	Chartered Institution of Water and Environmental Management
CNO	Could Not Open
CNL	Could Not Locate
ENR	Engineering News-Record
EPA	United States Environmental Protection Agency
ETJ	Extraterritorial Jurisdiction
FM	Farm-To-Market Road, Flow Meter, or Force Main (depending on context)
fps	Feet Per Second
I/I	Inflow and Infiltration
GIS	Geographic Information System
LF	Linear Feet
LS	Lift Station
LUE	Living Unit Equivalent
MG	Million Gallons
MGD	Million Gallons Per Day
MUD	Municipal Utility District
O&M	Operations & Maintenance
OPCC	Opinion of Probable Construction Cost
PCSWMM	Modeling Software running EPA's Storm Water Management Model (SWMM)
PDWF	Peak Dry Weather Flow
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
RDII	Rainfall Dependent Inflow and Infiltration
ROW	Right-of-Way
SRTC	Sensitivity-Based Radio Tuning Calibration
TCEQ	Texas Commission on Environmental Quality
UCM	Austin Utilities Criteria Manual
WWTP	Wastewater Treatment Plant

0 EXECUTIVE SUMMARY

The City of Manor (City) retained GBA to prepare a Wastewater Master Plan for the next 15-year period. The purpose of this plan is to guide the City towards a wastewater system that supports and serves the City's evolving needs and continued growth. Goals completed as part of this plan include the following:

- Collected manhole data in the field for sewers 12 inches or greater to develop the hydraulic model network and collect asset information.
- Developed growth areas and projected wastewater flows using the City-provided annual population growth rate of 7%.
- Established planning-level design criteria for existing and future infrastructure.
- Developed and calibrated a hydraulic model of the existing collection system in PCSWMM calibrated to 2022 flow monitoring data.
- Conducted model simulations for existing conditions, 5-year growth conditions, and 15-year growth conditions to identify necessary improvements to meet established design criteria.
- Conceptualized sewer extensions to accommodate growth in the future service areas and developed estimated costs.
- Developed a list of projects to address existing and future wastewater infrastructure needs, along with estimated costs, for present day, 5-year, and 15-year growth conditions.

A 5-year, 6-hour design storm event was utilized in the calibrated, hydraulic model to estimate peak wet weather flows in the existing wastewater collection system. This design storm method was selected based on established practices in modeling by the City of Austin and other nearby municipalities, and to provide a balance of conservatism and practicality when estimating inflow and infiltration (I/I) in the existing system. Design criteria from the Austin Utility Criteria Manual (UCM) was used to estimate design flows for extension projects that would extend City sewer service beyond current service limits.

The hydraulic model developed for this plan was calibrated to Fall 2022 flow monitoring data, which demonstrated excessive levels of inflow and infiltration (I/I) in the City's existing sewer system. To address condition and capacity concerns in the existing sewers, the City is currently engaged in I/I mitigation efforts. It is important to note that these I/I mitigation efforts have the potential to reduce peak wet weather flows in the existing system, but I/I mitigation should not be solely relied upon for solving capacity issues. If peak wet weather flows are reduced, then relief or upsizing projects may be delayed or avoided. However, the degree of I/I reduction that can be achieved is not certain. To determine if a relief project can be delayed or avoided, targeted post-rehabilitation flow monitoring will be required to confirm actual flow conditions after I/I reduction projects have been implemented.

If the city can mitigate inflow and infiltration (I/I), it may alleviate capacity concerns within the current system. However, the model simulations identified three project areas that are not currently sized to adequately convey peak flows during 5-year, 6-hour design storm conditions. These three projects are the Llano Street and Lampasas Street Interceptor, Pyrite Road Interceptor, and US-290 Interceptor. There are additional areas within the existing sewer system that will need relief or upsizing by the 15-year time horizon, including both existing Cottonwood Creek interceptors.

Regarding treatment facilities, the establishment of the East Travis Regional Wastewater Treatment Plant (WWTP) by the 15-year time horizon is imperative to serve the growth anticipated in East Manor. In addition, the Cottonwood Creek WWTP will need to be expanded to Phase 3 (0.6 MGD) by the 5-year time horizon, with its future operation dependent upon the phasing and capacity needs at the East Travis Regional WWTP. Similarly, the Wilbarger WWTP will require expansion to a minimum of 2.0 MGD by the 5-year time horizon.

Once the East Travis Regional WWTP is built, it is recommended to decommission existing lift stations 6 (Stonewater), 8 (Presidential Glen Ph. 4B), and 9 (Presidential Heights), rerouting these lift stations' flows via gravity sewer to the proposed regional plant. Decommissioning these lift stations would reduce capacity risks along the existing FM973 and US-290 interceptors, eliminate operations and maintenance (O&M) costs for these lift stations, and reduce capacity needs at Wilbarger WWTP. This could assist in delaying expansion of Wilbarger WWTP beyond 2.0 MGD. Eliminating these lift stations would also improve wastewater quality and reduce risk of H_2S production by eliminating hydraulic detention time in lift station wet wells and force mains.

Manor is growing rapidly and is expected to continue growing over the next 15 years. A majority of this growth is expected to occur in the eastern portions of the City and Travis County. Manor's wastewater system is currently comprised of approximately 335,000 feet of gravity sewer main, 1,370 manholes, 38,000 feet of force main, 13 lift stations, and 2 wastewater treatment plants. To provide wastewater service in the growing eastern region, a network of additional extension interceptors, lift stations, and force main will be required to collect and convey flows to the treatment plants. These extension projects have been conceptualized and summarized for this report.

A summary of recommended projects at each time horizon is presented in Table 0-1. A complete list of identified projects is presented in Table 0-2 and a map of all projects is presented in Figure 0-1. For a more detailed summary of identified projects, please refer to Section 7.

Table 0-1: Summary of Recommended Projects

Projects / Time Horizon	Gravity Sewer: I/I Mitigation	Gravity Sewer: Relief and Upsizing	Gravity Sewer: Extensions for Growth	Lift Stations & Force Main: Lift Stations, Force Main	Lift Stations & Force Main: Decommission Lift Stations	Treatment Capacity	Capital Costs ($M)
Present Day	Continue	3 Projects, 7,000 LF	-	-	-	-	$9M Relief/Upsizing, $11M I/I Mitigation (spread out over 15 yrs)
5-year	Continue	-	1 Project, 6,600 LF	1 New LS, 3,800 LF FM	-	Expand Cottonwood & Wilbarger	$10M Extensions (Gravity, LS, FM) $31M Treatment
15-year	Continue	4 Projects, 16,000 LF	16 Projects, 83,600 LF	2 New LS, 7,100 LF FM	Decommission up to 5 LS	Regional WWTP (1.5 MGD)	$23M Relief/Upsizing $147M Extensions (Gravity, LS, FM) $58M Treatment
Total	*>40,000 LF Pipe Rehabilitated*	*7 Projects, 23,000 LF*	*17 Projects, 90,200 LF*	*3 New LS, 10,900 LF FM*	*Decommission up to 5 LS*	*Expand 2 WWTPs, Build Regional Plant*	***$289M Over 15 Years***

Table 0-2: Overall Project List

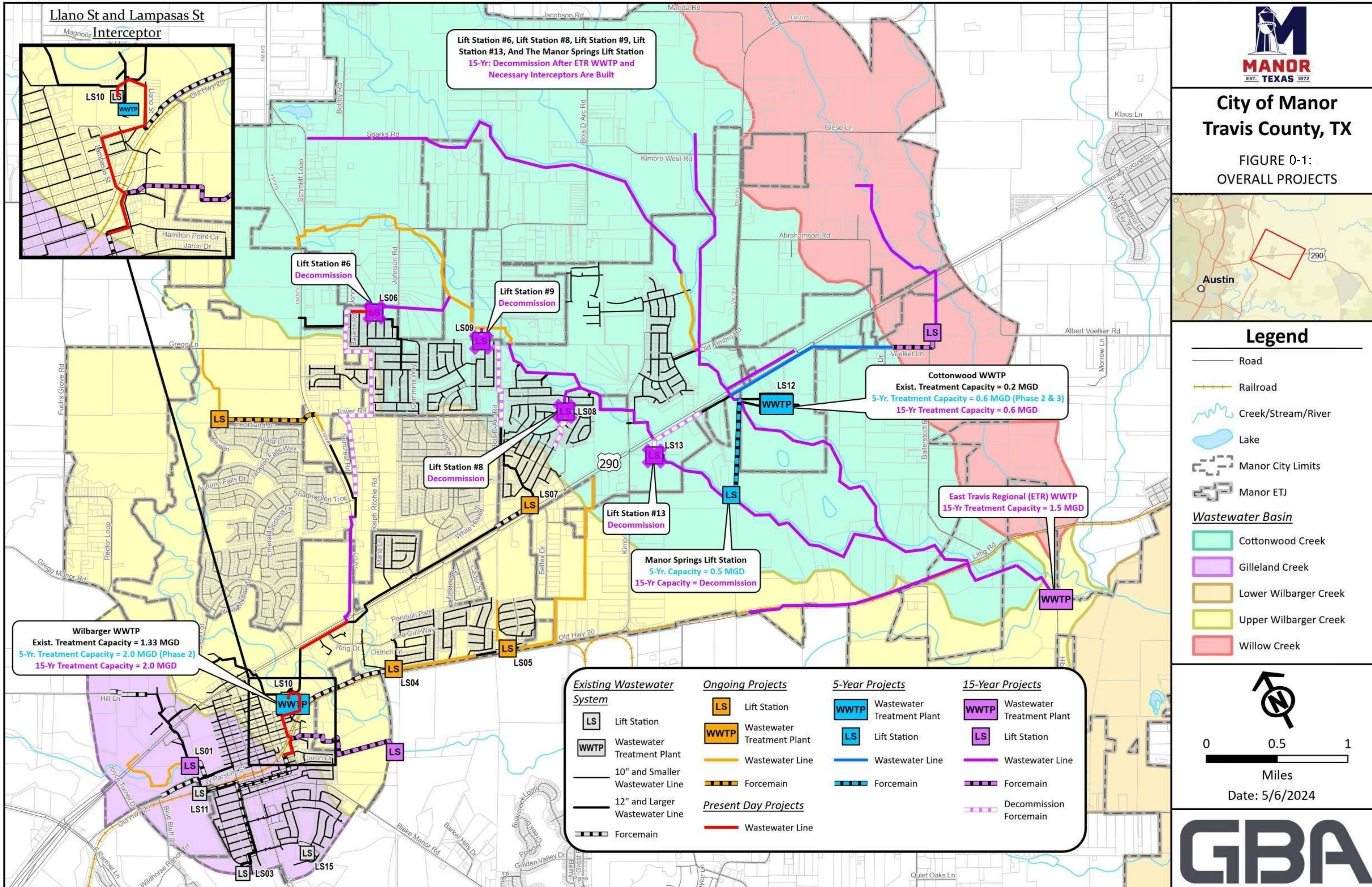
Project ID	Infrastructure Type	Time Horizon	Current CIP Project ID	Project Name	Type of Improvement	Pipe Diameter (in)[1]	Total Length of Pipe (ft)	Lift Station or WWTP Flow Rate (mgd)	Planning-Level Construction OPCC without Contingency	Capital Cost (30% Contingency, 20% Engr./Survey,)[3]
WW.00.01	Existing/Relief	Present Day	-	Llano St and Lampasas St Interceptors[2]	Exist. Gravity Relief/Upsizing	18"-36"	4,060	-	$3,405,040	$5,652,000
WW.00.02	Existing/Relief	Present Day	-	Pyrite Rd Gravity Sewer (upstream of LS06) - *I/I Mitigation Potential*	Exist. Gravity Relief/Upsizing	18"	930	-	$584,010	$911,000
WW.00.03	Existing/Relief	Present Day	CIP-4	US 290 Interceptor (Still Necessary even if LS06/08/09 are Decommissioned)	Exist. Gravity Relief/Upsizing	24"	2,030	-	$1,596,488	$2,491,000
WW.00.04	Existing/Relief	Present Day	-	Rehabilitation and I/I Mitigation in Existing Sewers	Rehabilitation	-	40,440	-	$7,279,200	$11,356,000
WW.05.01	Treatment	5-Year	S-31	Cottonwood WWTP Expansion Ph. 3 (Expansion from 0.4 to 0.6 MGD)	Exist. WWTP Expansion	-	-	0.2	$3,260,000	$5,086,000
WW.05.02	Treatment	5-Year	-	Wilbarger WWTP Expansion (Expansion from 1.33 to 2.0 MGD)	Exist. WWTP Expansion	-	-	0.67	$16,750,000	$26,130,000
WW.05.03	New/Extension	5-Year	S-36	Manor Springs Lift Station Improvements	New LS to Serve Growth	6"(F)	3,760(F)	0.5	$1,606,289	$2,506,000
WW.05.04	New/Extension	5-Year	S-23	Voelker Ln. Wastewater Improvements	New Gravity to Serve Growth	12"	6,560	-	$4,595,771	$7,169,000
WW.15.01	Treatment	15-Year	S-39/40/41	East Travis Regional WWTP	New WWTP to Serve Growth	-	-	1.5	$37,403,000	$58,349,000
WW.15.02	Existing/Relief	15-Year	Dev. Agr.	Lift Station 1 (Las Entradas) and O09-006_O09-005	Exist. LS Expansion	18"	260	-	$164,430	$257,000
WW.15.03	Existing/Relief	15-Year	S-18	West Cottonwood Creek Existing Interceptor	Exist. Gravity Relief/Upsizing	24"-27"	8,500	-	$8,236,967	$12,850,000
WW.15.04	Existing/Relief	15-Year	S-16	East Cottonwood Creek Existing Interceptor	Exist. Gravity Relief/Upsizing	27"-33"	3,070	-	$3,392,810	$5,293,000
WW.15.05	Existing/Relief	15-Year	-	FM973 Interceptor (Not Necessary if LS06 is Decommissioned)	Exist. Gravity Relief/Upsizing	18"	4,220	-	$2,658,600	$4,147,000
WW.15.06	New/Extension	15-Year	S-38	South Cottonwood Creek Wastewater Interceptor Improvements Phase 1[2]	New Gravity to Serve Growth	39"-45"	7,960	-	$15,366,210	$25,508,000
WW.15.07	New/Extension	15-Year	S-38	South Cottonwood Creek Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	36"	8,910	-	$13,811,117	$21,545,000
WW.15.08	New/Extension	15-Year	S-23	Willow Creek Wastewater and Lift Station Improvements	New Gravity/LS to Serve Growth	24"(G), 6"(F)	2,160(G/F)	0.65	$1,642,456	$2,562,000
WW.15.09	New/Extension	15-Year	-	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	24"	5,210	-	$5,424,105	$8,462,000
WW.15.10	New/Extension	15-Year	-	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	15"-21"	7,710	-	$6,455,271	$10,070,000
WW.15.11	New/Extension	15-Year	-	East US290 Wastewater Improvements	New Gravity to Serve Growth	15"	2,920	-	$2,219,654	$3,463,000
WW.15.12	New/Extension	15-Year	-	North Cottonwood Creek East Tributary Wastewater Interceptor Improvements	New Gravity to Serve Growth	15"-18"	8,480	-	$6,720,382	$10,484,000
WW.15.13	New/Extension	15-Year	-	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	27"	7,390	-	$8,791,977	$13,715,000
WW.15.14	New/Extension	15-Year	-	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	27"	3,590	-	$4,424,675	$6,902,000
WW.15.15	New/Extension	15-Year	-	Littig Rd. Wastewater Improvements[2]	New Gravity to Serve Growth	12"	8,510	-	$5,961,816	$9,897,000
WW.15.16	New/Extension	15-Year	-	North Cottonwood Creek Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	21"-24"	7,238	-	$7,379,755	$11,512,000
WW.15.17	New/Extension	15-Year	-	North Cottonwood Creek Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	12"-18"	10,367	-	$8,035,168	$12,535,000
WW.15.18	New/Extension	15-Year	-	South Wilbarger Creek Lift Station Improvements	New LS to Serve Growth	4"(F)	5,040(F)	0.25	$1,287,296	$2,008,000
WW.15.19	New/Extension	15-Year	-	Lift Station #6 (Stonewater) Decommissioning	New Gravity to Abandon LS	18"	3,300	-	$3,134,355	$4,890,000
WW.15.20	New/Extension	15-Year	-	Lift Station #8 (Presidential Glen Ph. 4B) Decommissioning	New Gravity to Abandon LS	12"	1,400	-	$1,281,253	$1,999,000
WW.15.21	New/Extension	15-Year	-	Lift Station #9 (Presidential Heights) Decommissioning	New Gravity to Abandon LS	12"	500	-	$650,448	$1,015,000

Time Horizon	Capital Cost
Present Day	$ 20,410,000
5-Year	$ 40,891,000
15-Year	$ 227,463,000
Total, All Projects	**$ 288,764,000**

Notes:

1) For pipe diameters and lengths, gravity main is assumed, except where (F) indicates force main, and (G) indicates gravity main.
2) Select projects include an additional 10% contingency for railroad crossings to account for additional costs (permitting, extra boring length, etc.).
3) For new/extension projects not within the ROW or an exisitng easement, a unit cost of $87,900/acre was utilized for easement cost estimates.
The easement unit cost includes survey, easement acquisition, engineering fees, condemnation/attorney fees, and ROW agent fees.

LS06, LS08, and LS09 are recommended to be decommissioned and re-routed by gravity towards East Travis Regional WWTP once it is built. This reduces burden on Wilbarger WWTP and the FM973 interceptor, and reduces LS O&M costs.
Projects Not Included: The above list does not include Bell Farms LS upgrades (LS04), Carriage Hills LS or interceptor upgrades, Cottonwood Cr. WWTP Ph. 2 expansion to 0.4 MGD (developer-funded), or other projects currently in-progress.



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1 INTRODUCTION

1.1 Purpose

The purpose of this report is to update the City of Manor's wastewater master plan, providing a guide towards a wastewater system that beneficially supports and serves the City's evolving needs and continued growth. The existing master plan was developed in 2008 and was intended to forecast wastewater collection and treatment system needs for the city within a 10-year planning period. Growth within the city over the intervening period has occurred at a much more rapid rate than previously anticipated, prompting the need to update the plan and re-project flows for a 15-year period.

This master plan evaluates the projected wastewater demands for the next 15 years and introduces alternative strategies and timelines for addressing the potential need for system capacity improvements. In addition, this report provides planning-level estimates of the probable costs for the proposed alternatives. A flow monitoring and inflow and infiltration (I/I) study was performed under a separate project which culminated in a report titled *2023 Inflow & Infiltration Investigations Project – Preliminary Engineering Report*. The flow monitoring data was collected in the Fall of 2022 for that study and was used to model and evaluate the existing system's capacities.

1.2 Scope

The scope of this wastewater master planning project encompassed field data collection, hydraulic modeling of the collection system, growth projections, and proposed infrastructure improvements to meet current and future demands. This Master Plan study and its recommendations are focused on sanitary sewer interceptors with a diameter of 12 inches or greater. The adequacy of existing sewer lines with diameters less than 12 inches will depend on the specifics of new developments that connect to them and may require analysis on a case-by-case basis. Regarding wastewater treatment, this study is focused only on treatment capacity needs and does not cover specific treatment processes or technologies.

The study began with a survey of manholes connected to sewer mains with diameters of 12 inches and greater. The manhole survey data was assembled in GIS and then used to develop a hydraulic model of the collection system using the PCSWMM software. The hydraulic model was used to evaluate both the current capacity of the existing infrastructure as well as options for system improvements. Models of the existing system and future systems for the 5 and 15-year time horizons were developed. These models were evaluated to determine infrastructure needs required to serve current and future flows. Finally, a list of proposed improvements, including anticipated timing and cost, was created based on the analysis.

A summary of major tasks completed for this report is provided below:

- Collected physical data in the field for sewers 12 inches or greater to develop the hydraulic model network and collect asset information.
- Developed a hydraulic model of the existing collection system in PCSWMM and calibrated the model to align with actual flow data gathered during the Fall 2022 flow monitoring season.

- Developed flow projections for five-year and fifteen-year time horizons based on City-provided population and land use projections.
- Performed model simulations of the existing conditions, five-year growth conditions, and fifteen-year growth conditions to identify needed sewer system improvements.
- Selected design criteria consistent with current, local design requirements to be used for planning-level sizing and costing of improvements.
- Developed conceptual projects to serve new growth outside of the existing system with extension sewers, lift stations, and force main.
- Developed a comprehensive report detailing the work completed, analyses, and recommended improvements for the City's sanitary sewer system.

2 PLANNING INFORMATION, DATA COLLECTION AND ASSUMPTIONS

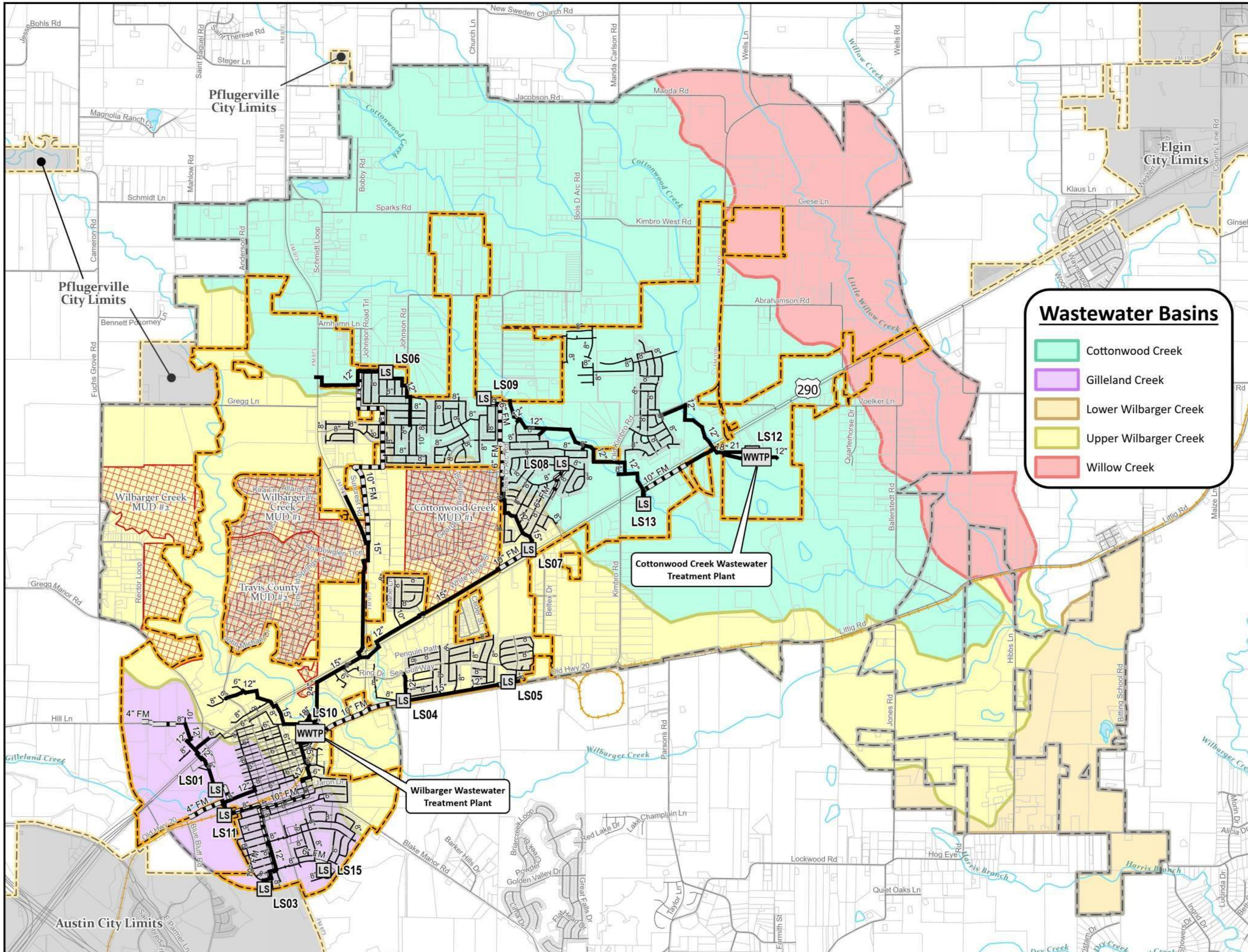
2.1 Wastewater Service Area

The City of Manor is in the eastern part of Travis County, Texas, along U.S. Highway 290. The City of Manor's existing wastewater service area is limited to its current Certificate of Convenience and Necessity (CCN) boundaries, which generally includes areas within City limits, approximately 10 square miles, and portions of its Extra-Territorial Jurisdiction (ETJ), encompassing approximately 20 square miles. Manor's wastewater system is currently comprised of approximately 335,000 feet of gravity sewer main, 1,370 manholes, 38,000 feet of force main, 13 lift stations, and 2 wastewater treatment plants. Figure 2-1 provides a map of Manor's existing wastewater system.

The extent of this report's study area generally follows Manor's extra-territorial jurisdiction (ETJ), as shown in Figure 2-1. The approximately 30 square mile study area includes portions of the Gilleland Creek Basin, Upper Wilbarger Creek Basin, Cottonwood Creek Basin, and Willow Creek Basin. The existing wastewater service area is served by the City's Wilbarger Wastewater Treatment Plant (WWTP) and the City's Cottonwood Creek WWTP. The Wilbarger WWTP serves portions of the Gilleland Creek Basin, Upper Wilbarger Creek Basin, and Cottonwood Creek Basin (namely Lift Stations 6, 8, and 9), while the Cottonwood Creek WWTP serves only the Cottonwood Creek Basin currently.

Most of the wastewater generated in the service area is currently treated at the Wilbarger WWTP, located on Llano Street off of Old Highway 20 on the southwestern side of the City. In 2020, the Wilbarger WWTP was expanded from 0.5 MGD to 1.33 MGD, which included a new onsite lift station (LS10), a new public works building, and provisions for future expansion up to 2.0 MGD. The Wilbarger WWTP is critical to maintaining wastewater service in the western portion of the City, particularly as rapid growth occurs in and around Manor.

The Cottonwood Creek Basin (approximately north and east of Paseo De Presidente Boulevard and Tower Road) is primarily served by the Cottonwood Creek WWTP, which is currently permitted for an average annual discharge of 0.2 MGD. The existing permit allows for permitted capacities of 0.2, 0.4, and 0.5 MGD, but amended phasing of 0.2, 0.4, 0.6 and 0.8 MGD capacities have been applied for at the Texas Commission on Environmental Quality (TCEQ), and a draft permit has been issued. Presently, Phase 2 expansion of the Cottonwood Creek WWTP is fully designed and set to begin upon confirmation that flows have reached a level appropriate to trigger the expansion. Phase 2 expansion will increase the Cottonwood Creek WWTP's capacity to 0.4 MGD. Other phases of expansion are planned for Cottonwood Creek WWTP (0.6 MGD at Phase 3, 0.8 MGD at Phase 4), and the timing and necessity of these phases is explored in Section 6 of this report.



![Manor logo]

MANOR
EST. TEXAS 1872

City of Manor
Travis County, TX

FIGURE 2-1: EXISTING WASTEWATER SYSTEM

Austin
290

Legend

- LS — Lift Station
- WWTP — Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Forcemain
- Road
- Railroad
- Creek/Stream/River
- Lake
- Manor City Limits
- Manor ETJ

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2.2 Municipal Utility Districts

A Municipal Utility District (MUD) is a special district that functions as an independent, limited government. MUDs provide developers an alternate way to finance infrastructure, such as water, sewer, drainage, and road facilities. There are MUDs directly adjacent to or encapsulated by Manor's city limits that have residents that are excluded from Manor's population numbers and wastewater service. The MUDs that comprise the ShadowGlen (Wilbarger Creek MUD #1 and #2 and Travis County MUD #2) and Presidential Meadows (Cottonwood Creek MUD #1) developments have an estimated combined total of nearly 4,000 single and multi-family units and a population of over 13,000. The Metro H2O WWTP is owned and operated by the MUDs and serves the MUDs wastewater treatment needs. These MUDs have been able to send flow to Manor's wastewater system only during agreed upon emergency circumstances through a system interconnect.

Prior to and during the Fall 2022 flow monitoring period (August to December 2022), the Wilbarger WWTP received flow from the ShadowGlen and Presidential Meadows MUDs because the WWTP that would typically treat MUD flows was failing and a new plant was under construction. These MUDs are now served by the new Metro H2O WWTP. The route by which the Presidential Meadows MUD contributes flow to Manor's wastewater system has not been confirmed, though the City believes the flow from this MUD was received during the flow monitoring period via a MUD system backup from the Metro H2O plant to the interconnect. Because these MUDs contributed flow to Manor's system during the flow monitoring period, the flows from the MUDs needed to be accounted for during model calibration. The model was calibrated using flow monitoring data, so the MUD contribution needed to be included in the model during calibration but removed during future growth modeling.

2.3 Future Land Use Assumptions

Future land use assumptions were used to develop projections of future wastewater flow contributions in the collection system model. The future land use assumptions were provided by the City in the "Future Land Use Map" of the City's *Destination 2050 Comprehensive Plan* report. A copy of this map is provided in Figure 2-2. This map provides approximate locations of various land use types across the City of Manor. These land uses provide information on the types, potential densities, and locations of future development. The City also provided information regarding the planned and in-progress developments in the form of a map, a copy of which is provided in Figure 2-3. This map was used to estimate which parcels were most likely to develop within the 5-year time horizon.

Future land use assumptions are important factors for projecting future wastewater flows and identifying the required infrastructure to serve planned growth. Future land use assumptions do not represent zoning regulations or requirements, and actual future land use may vary from these assumptions. Rather, these land use assumptions are a best approximation of the types of developments and densities the City may support in the future.

Table 2-1 provides the development density assumptions in terms of Living Unit Equivalent (LUE) per acre for each land use type assigned by the Comprehensive Plan. An LUE is a planning tool that estimates the typical flow of water or wastewater used/produced by a single-family residence.

These density estimates were developed as part of the City's latest Community Impact Fee (CIF) study. For the purposes of this study, one (1) LUE was assumed to represent 3 persons (or population equivalents) and produce 200 gallons per day (gpd) of wastewater. The 200 gpd/LUE wastewater production rate is an average rate developed based on flow monitoring.

Table 2-1: Density Assumptions for Future Land Use Types

Land Use Category	Category Abbreviation	Density Assumption (LUE/acre)
Commercial (Corridor)	C	2
Community Mixed Use	CMU	5
Downtown Mixed Use	DMU	4
Employment	E	1
High Density Single Family	SF-4	5
Mixed Density Neighborhood	MDNB	4
Multi-Family	MF	10
Neighborhood	NB	4
Neighborhood Mixed Use	NMU	5
Parks/Open Space	OS	0
Public/Semi-Public	P/SP	1

By applying both the LUE/acre density from Table 2-1 and the 200 gpd/LUE flow estimate to a given land area (in acres), an approximate wastewater production can be estimated for all land uses shown on the future land use map. The estimated wastewater production was then used in the hydraulic model of the collection system. Please refer to Section 4.2 for further discussion of the flow projections and distributions of flow.

Figure 2-2: Future Land Use Map from City's Comprehensive Plan

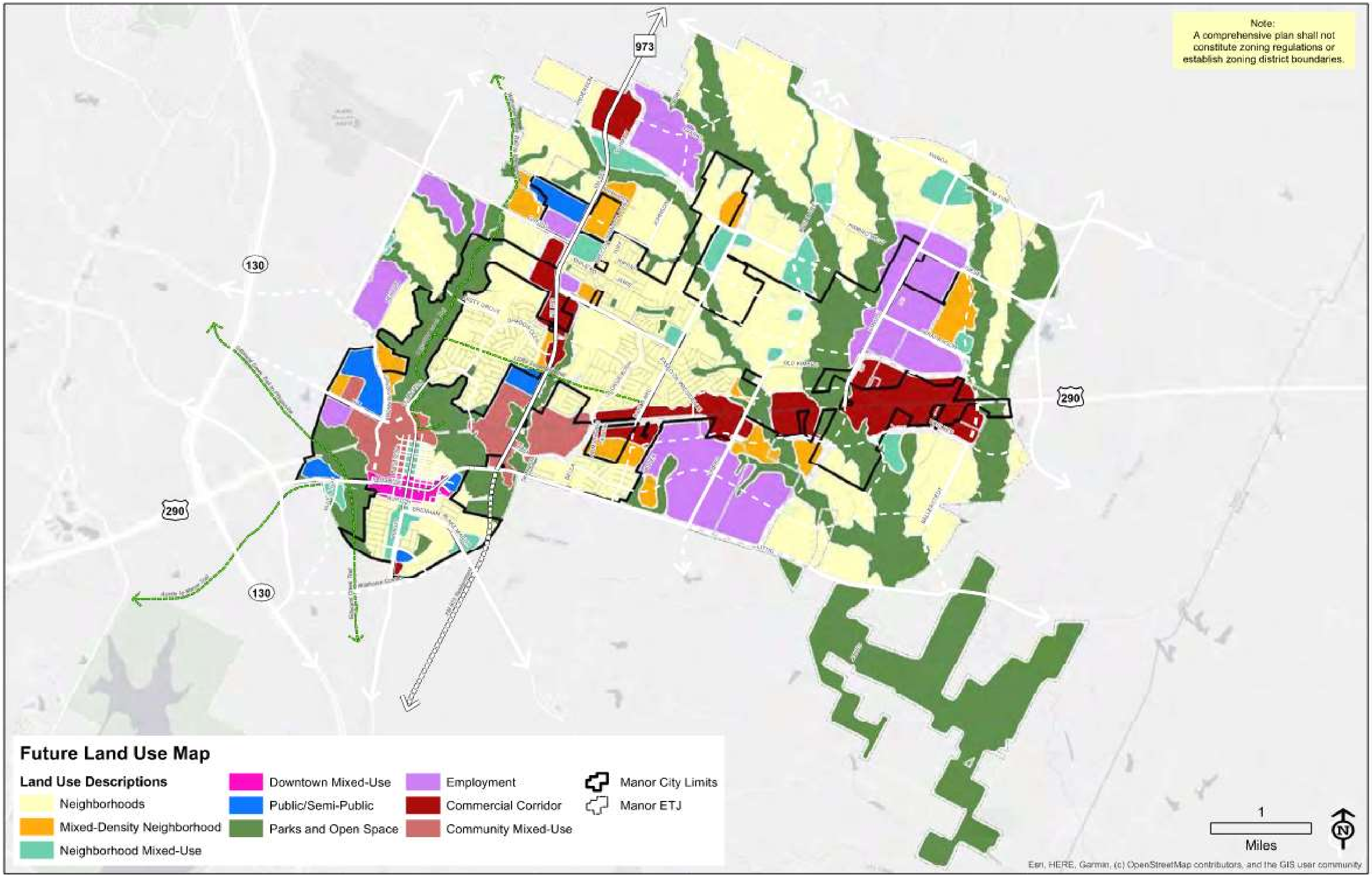
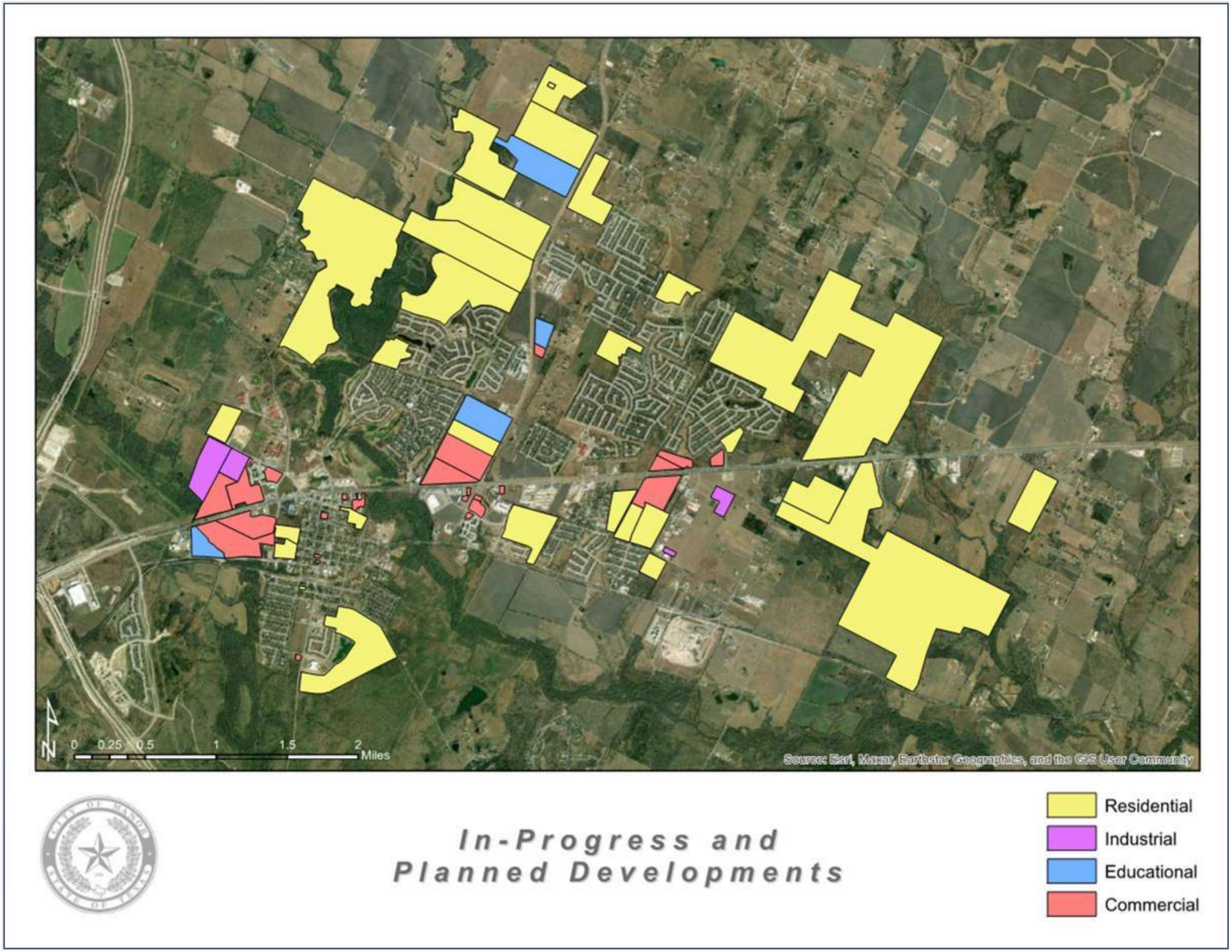


Figure 2-3: In-Progress and Planned Development Map (Spring 2023)



2.4 Population Projections

The population projections utilized for this report were determined by the City and held at a constant 7% annual growth rate for population and LUEs throughout the 15-year time horizon. The chosen growth rate is also being used as part of other ongoing planning studies (e.g., the most recent Rate Study and Water Master Plan) for the City to ensure consistency and alignment across the studies. The present number of LUEs within City limits was estimated at 6,845 based on a count of developed parcels. The population projections below are representative of population within City limits. It was assumed for this report that as the City provides wastewater service to more area, that area will be annexed into City limits over time.

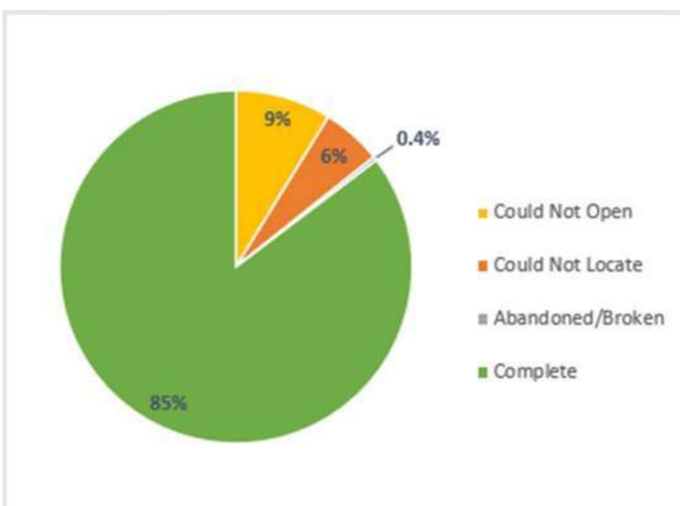
Table 2-2: Population and LUE Projections Assuming 7% Annual Growth Rate

Planning Time Horizon	Year	Present and Projected Populations[1]	Projected No. of LUEs[2]
Present	2023	20,535	6,845
5-year	2028	28,800	9,600
15-year	2038	56,700	18,900
1) Projected populations rounded to nearest 100 persons 2) Assumed 3 persons per LUE			

2.5 Manhole Survey

GBA field staff attempted survey and inspection of 273 City-owned manholes to create a hydraulic model of the existing wastewater collection system. Among these 273 manholes with attempted inspections, 233 were completed successfully, 24 were unable to be opened (i.e., Could Not Open or "CNO"), 15 manholes could not be located (i.e., Could Not Locate or "CNL"), and 1 manhole was abandoned. Figure 2-4 shows a pie chart and relative percentages of each inspection result. Manhole survey summary maps are provided in Appendix A.

Figure 2-4: Manhole Survey and Inspection Summary



The data collected during manhole inspections include X and Y coordinates, rim elevations, depths, and manhole cover sizes, as well as rim-to-invert depths and diameters of incoming and outgoing pipes. Manholes that were located but not able to be opened were considered partially inspected, as location and rim elevation data could still be collected. After GBA's initial attempt to locate and open each manhole, a list of CNO and CNL manholes was provided to City operations staff. City staff were able to open 23 manholes that were originally CNO and locate 6 manholes that were originally CNL, providing manhole depth measurements for use in the model.

2.6 Planning-Level Design Criteria

To model, size, and plan for new wastewater infrastructure, planning-level design criteria were established for this study. It is important to note that all sizing of improvements for this study are conceptual only; actual designs may vary from the conceptual designs presented in this report. Table 2-3 provides a summary of the criteria used to guide this study. This table is broken into three sections:

(1) Existing Infrastructure Flow Calculations (Modeled System),
(2) Future Infrastructure Flow Calculations (Extensions to Serve Growth Areas), and
(3) Conceptual Sizing of New Infrastructure (Relief, Replacement or Extensions).

2.6.1 Definitions

Below is a list of basic definitions used to describe planning and design criteria:

- **ADDF**: Average Daily Dry Weather Flow is the normal wastewater flow generated in the sanitary sewer system during dry weather conditions. This flow includes wastewater production and permanent infiltration naturally present during dry conditions. This flow does not include rainfall-induced infiltration and inflow.
- **PDWF**: Peak Dry Weather Flow is the instantaneous peak flow generated in the sanitary sewer system over the course of a 24-hour period, during dry weather conditions. This peak is a natural outcome of increased wastewater production at times of peak usage throughout the day. In primarily residential areas, there is typically a peak in the morning and/or a peak in the evening.
- **PWWF**: Peak Wet Weather Flow is the instantaneous peak flow generated in the sanitary sewer system during wet weather conditions. This peak is an outcome of increased inflow and infiltration entering the sewer system during or directly after a rainfall event.
- **I/I**: Inflow and Infiltration is rainfall-induced flow entering the sanitary sewer system. Infiltration generally enters sewers through underground defects such as defective pipes, pipe joints, and manholes. Inflow generally enters from above-ground sources, such as private sewer laterals, downspouts, foundation drains, yard and area drains, storm sump pumps, manhole covers, and cross connections from storm drains.
- **Surcharge**: Surcharge is generally defined as the situation in which the entrance and exit of a gravity sewer pipe are submerged by flow, and the pipe is flowing full and under pressure. Surcharge conditions are generally not ideal, and either indicate an immediate pipe capacity restriction or a downstream bottleneck.
- **Critical Surcharge**: Surcharge levels that are at higher risk of causing a sanitary sewer overflow (SSO).

2.6.2 Flow Calculations

The PCSWMM design storm model of the existing system was primarily used to identify necessary capacity improvements for the City's *existing sewers*, at the present, 5-year, and 15-year time horizons. For sewer extensions, the Austin Utilities Criteria Manual (UCM) guidance and GIS analysis were primarily used to conceptually size the *future sewer extensions* needed to serve growth areas outside of City limits, at the 5-year and 15-year time horizons. Therefore, flow calculations for the existing infrastructure (interceptors and lift stations) modeled in PCSWMM differed from flow calculations for future infrastructure (sewer extensions), which were not modeled in PCSWMM.

Flows from future growth were still plugged into the PCSWMM model of the existing system for future growth scenario modeling in order to demonstrate impacts of growth on the existing sewers. To represent peak wet weather flows from future growth in the PCSWMM model, the synthetic unit hydrograph based on data from flow meter Basin 2C of the 2022 flow monitoring period was assigned to future growth model nodes. Basin 2C was chosen as a representative basin for new growth areas because the sewers in this basin were primarily built within the last 10-20 years, and it demonstrated an average level of I/I for Manor's collection system. (Please see Figure 3-1 for a map of Fall 2022 flow monitoring basins.)

2.6.3 Design Storm

The 5-year, 6-hour design storm was chosen because there is precedence for its use in modeling by the City of Austin and other cities in the Central Texas area. It also represents a moderately conservative storm event to plan for, particularly for systems demonstrating higher levels of I/I. Storm events with higher recurrence intervals (such as 10-year, 25-year, or 50-year) may be overly burdensome to ratepayers of systems with high I/I levels, but storms with lower recurrence intervals (such as 1-year or 2-year) may be insufficient for predicting areas at higher risk of sanitary overflows and backups.

2.6.4 Critical Surcharge

The calibrated PCSWWM model was used to identify locations in the existing system with potential for surcharge under design storm conditions. Not all surcharge of existing sewers requires immediate mitigation, however. To identify higher risk surcharge, critical surcharge criteria were developed to help identify the need for capacity improvement projects. The two-part criteria used during this study is stated in terms of surcharge above the crown of pipe and in terms of minimum "freeboard" (or the distance between maximum surcharge level and manhole rim). This criteria is based on similar criteria used by the Environmental Protection Agency (EPA) in recent sewer consent decrees. It is important to note that this is a criteria for judging the severity of surcharge, not a pipe sizing tool. New gravity sewers (relief, replacement, or extensions) should not be designed to surcharge under design flow conditions.

Levels of surcharge predicted by the hydraulic model will vary widely across the system and depend on factors such as design storm intensity, existing pipe capacities, projected upstream flows and infiltration and inflow (I/I), and downstream bottlenecks. Some sewer agencies allow surcharge in their systems to specified levels (e.g., "surcharge up to 100% of pipe diameter over the crown of pipes"), while other agencies do not allow any surcharge in their systems.

Surcharge may not be acceptable at locations where sewers are relatively shallow (e.g., less than 10 vertical feet from the surface) because of the increased risk of overflow. Surcharge may be more acceptable in locations with particularly deep sewers (e.g., 20 feet or more below the surface) because of the lower risk of overflow. Therefore, it is sometimes pragmatic to allow some surcharge in the existing system before relief sewers are deemed necessary. However, as mentioned previously, all new or relief sewers should be designed for no resulting surcharge during design flow conditions.

2.6.5 Conceptual Pipe Sizing

The Austin UCM Q65/Q85 method of pipe sizing requires pipes be sized to either reach a maximum of 65% of their full capacity during peak dry weather flows (PDWF), or 85% of their capacity during peak wet weather flows (PWWF). This method of sizing provides a safety factor to account for higher than anticipated I/I during a storm event. During peak wet weather storms, Austin UCM requires that pipes be designed such that the peak wet weather flow (PWWF) shall not exceed 85% of the capacity of the pipe flowing full for all pipes 15 inches in diameter and below, and 80% of the capacity for all pipes 18 inches and above. Based on flow monitoring, Manor's wastewater system has a history of surcharging and backup during storm events, so this excess 15%-20% capacity would help to reduce risk of excessive surcharging and overflow. Designing the system with additional capacity provides flexibility for accommodating increased wastewater flows associated with population growth and denser development.

The City of Manor has historically sized pipes to reach full flow ($Q_{full)}$ capacity during peak wet weather events. This is a less conservative method that will still accommodate storm events without providing as much safety factor for growth or increased I/I. Allowing pipes to reach full capacity during the design flow reduces costs by requiring smaller pipe sizes but leaves less room for accommodating future growth and expansion. Backup and surcharging are a greater risk to a system sized using this method. Because of Manor's rapid growth and higher rates of I/I, the more conservative Austin UCM Q65/Q85 approach was chosen for this study and is recommended for future designs.

Table 2-3: Planning-Level Design Criteria

Criteria	Value or Range
Existing Infrastructure Flow Calculations (Modeled System)	
Average Daily Dry Weather Flow (ADDF)	Model Calibrated to Flow Meter Data
Peak Dry Weather Flows (PDWF)	Model Calibrated to Flow Meter Data
Modeled I/I for Existing System(1)	RTK Unit Hydrograph Calibrated to Respective Flow Meter Basin
Modeled I/I for Growth(2)	RTK Unit Hydrograph Calibrated to Flow Meter Basin 2C (representative of new development)
Peak Wet Weather Flows (PWWF)	Design Storm Model (PDWF + I/I)
Design Storm(3)	5-year, 6-hour Event (4.1 inches)
Critical Surcharge Criteria(4)	Flow Depths > 24" above crown of pipe Flow Depths ≤ 36" below manhole rim
Future Infrastructure Flow Calculations (Extensions to Serve Growth Areas)	
Average Daily Dry Weather Flow (ADDF)(5)	200 gpd/LUE
Peak Dry Weather Flows (PDWF)(6)	$Q = \left[\frac{(18 + (0.0206 * ADDF)^{0.5})}{(4 + 0.0206 * ADDF)^{0.5})}\right] * ADDF$
Peak Wet Weather Flows (PWWF)(6)	Q = PDWF + 750 gpd/acre
Conceptual Sizing of New Infrastructure (Relief, Replacement or Extensions)	
Peak Flow Conveyance Criteria(7)	Austin UCM Q65/Q85
Gravity Pipe Capacity	Manning's Equation
Manning's Coefficient (n)	0.013
Gravity Pipe Velocity(8)	2-10 fps
Lift Station Capacity	Maximum 2-hr Peak Flow from Model
Force Main Velocity	3-6 fps

Notes:

1) Inflow and Infiltration (I/I) in the existing system was estimated using synthetic unit hydrographs (calibrated using the RTK method) for each flow meter basin.
2) Flows from new growth areas were plugged into the existing system during growth scenario modeling. To represent flows from growth in the model, flow meter basin 2C's synthetic unit hydrograph was used. Basin 2C was chosen because it is considered an acceptable representation of I/I in Manor's newer sewer basins.
3) Precipitation frequency estimates for design storm provided by NOAA Atlas 14.
4) Based on criteria used in recent EPA Consent Decrees. This criterion defines high risk (critical) surcharge levels in the existing sewer system and was used to define the necessity of capacity improvement projects for existing gravity sewers. It is important to note that new gravity sewers (relief, replacement or extensions) will NOT be designed to surcharge under design flow conditions.
5) Estimated from wastewater flow monitoring data.
6) Sourced from Austin Utilities Criteria Manual (UCM), which is commonly used and accepted throughout the Austin metropolitan area.
7) Sourced from Austin Utilities Criteria Manual (UCM). All gravity sewer projects were conceptually sized to reach a maximum of 80 to 85% of their capacity during peak wet weather flows (PWWF), depending on pipe diameter.
8) Texas Commission on Environmental Quality (TCEQ Chapter 217) design standards.

2.7 Cost Data

Planning level cost equations and tables were developed using past wastewater project data from the Austin metropolitan area and other commonly referenced guidance documents, such as those developed by the EPA. Costs should be considered planning-level only and may not reflect costs of actual construction. ENR Construction Cost Index (CCI) data were used for the Dallas metropolitan area (the closest metropolitan area to Manor with CCI indices) to adjust historical cost data for inflation to better reflect present-day costs. All referenced cost equations were adjusted to account for inflation using the February 2024 CCI for Dallas (CCI = 7824. Please see enr.com/economics/historical_indices for more information regarding ENR CCI values).

The following cost equations were developed to represent lump sum construction costs for typical wastewater improvement projects and may not be representative of more unique situations. Cost equations were generally fit to ENR-adjusted construction bid costs from multiple Central Texas wastewater projects bid within the past five years. If an identified project was already designed or estimated (e.g., Cottonwood Creek WWTP Expansion Phase 3), then the most recent opinion of probable cost was used instead of the cost equations below. The cost equations are representative of construction costs and do not include other soft costs or contingencies (such as easement acquisition, financing, legal, or insurance costs). To estimate a capital cost for each project, a 30% factor was applied to the construction cost to account for soft costs such as engineering design and survey, and then another 20% contingency factor was applied to account for unanticipated costs and scope changes. A summary of the cost equations is presented in Table 2-4 below.

Table 2-4: Planning-Level Construction Cost Equations

Project Type	**General Cost Equation**	**Units**
Gravity Sewer	$y = 322 * 1.038^{x}$	y is $/LF, x is diameter (in)
Steel Encasement	$y = 50x$	y is $/LF, x is casing diam. (in)
Force Main	$y = 18x$	y is $/LF, x is diameter (in)
Lift Station	$y = 1{,}500{,}000 * (x^{0.62})$	y is $, x is capacity (MGD)
Treatment	$y = 25x$	y is $, x is capacity (gpd)

3 EXISTING COLLECTION SYSTEM

3.1 Current Capacities and Projections

Table 3-1 describes the primary interceptor corridors serving Manor. Table 3-2 provides a summary of known information regarding Manor's lift stations, including those lift stations that were modeled. Previously decommissioned lift stations (LS02 at Wilbarger WWTP and LS14 at Manor Heights) are not included in the table or model. Modeled interceptors and lift stations are shown in Figure 4-2.

Table 3-1. Summary of Major Interceptor Corridors

Corridor Name	Pipe Diameter Range	Approx. Length (ft)	Corridor Description
Old Manor	12"-18"	16,600	• Old Manor encompasses all of the interceptors from Flow Meter Basins 1, 3, 4, 8, and 13 (see Figure 3-1) • Flows combine with the flows from Old Hwy 20 before reaching the Llano street interceptor then the Wilbarger WWTP
FM973 and Stonewater	15"	7,400	• Receives flows from the Stonewater Basin and Manor High School • Flows into the US-290 Interceptor • Includes LS06 and associated force main
US-290 and Presidential Glen	12"-24"	14,600	• Receives flow from FM973, Presidential Heights, Presidential Glen, Greenbury, and Stonewater. • Flows directly into the Wilbarger WWTP • The 24" line also received flow from the Wilbarger Creek MUD #1 and Travis County MUD #2 during the 2022 Flow Monitoring Period • Includes LS06, LS07, LS08, and LS09
Cottonwood Creek Basin	12"-21"	31,900	• Consists of the East and West Cottonwood Creek Interceptors • Flows from these interceptors are the only flows that the Cottonwood Creek WWTP currently treats • Includes LS12 and LS13
Old Hwy 20	18"	2,800	• Consists of Carriage Hills Lift Station (LS05) and Bell Farms Lift Station (LS04) • Flows from interceptors are primarily from subdivisions along Old Hwy 20 • There is planned development upstream of the Carriage Hills Lift Station (Manor Commercial Park)

Table 3-2. Summary of Lift Stations

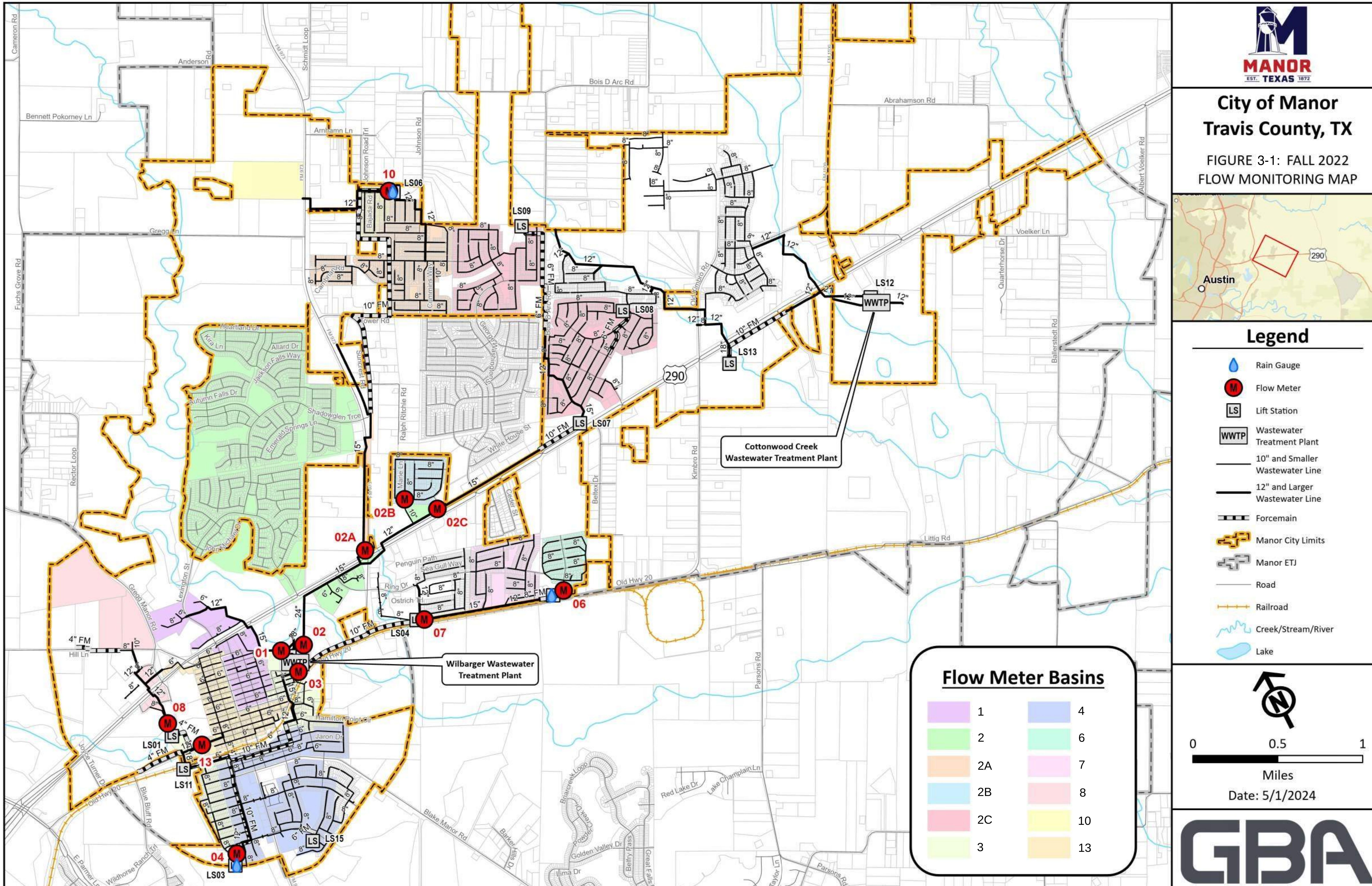
ID	Name/ Location	Modeled	No. of Pumps	Firm Capacity (gpm)	Force Main Diam. (in)	Force Main Length (ft)	Description
LS01	Las Entradas	Yes	2	200	4	980	Serves old high school and areas along Gregg Manor Rd. Developer agreement (Las Entradas) will expand this LS for growth.
LS03	Wildhorse Creek	Yes	2	1075	10	6,390	Serves Wildhorse Creek subdivision southwest of Old Manor. Force main combines with LS11's on S Bastrop St.
LS04	Bell Farms	Yes	2	1600	10	4,040	Serves Bell Farms subdivision and adjacent properties along Old Hwy 20. Currently undergoing capacity improvements; capacity shown reflects upgrades.
LS05	Carriage Hills	Yes	2	650	6	510	Serves Carriage Hills subdivision on Old Hwy 20; will be expanded to serve areas east (e.g., Manor Commercial Park). Design of expansion complete.
LS06	Stonewater	Yes	2	1100	10	11,030	Serves Stonewater subdivision and new high school.
LS07	US-290 (Pres. Glen)	Yes	2	1060	10	1,550	Serves Presidential Glen subdivision (Phase 1). Currently undergoing capacity improvements; capacity shown reflects upgrades.
LS08	Woodrow Wilson St.	No	2	415	6	1,800	Serves Presidential Glen subdivision (Phase 4B). Not included in model due to its size and location.
LS09	Presidential Heights	Yes	2	470	6	3,900	Serves Presidential Heights neighborhood.
LS10	Wilbarger WWTP	No	3	1675	18	440	Serves Wilbarger Creek WWTP, delivering flow to the headworks. Not included in collection system model because the WWTP was not modeled.
LS11	Carrie Manor	Yes	2	806	10	4,290	Serves portion of Old Manor. Force main combines with LS3's on S Bastrop St.
LS12	Cottonwood Cr. WWTP	Yes	2	555	8	260	Serves WWTP and east interceptor of Cottonwood Creek Basin.
LS13	Old Kimbro Rd.	Yes	2	944	10	2,620	Serves west interceptor of Cottonwood Creek Basin.
LS15	Lagos	No	2	311	6	750	Serves Lagos development (Phases 4 and 5) in the southwest part of Manor. Not included in model due to its size and location.

3.2 Flow Characteristics

Prior to the wastewater master plan study, a flow analysis was performed under a separate project to better understand the City's wastewater system and flow conditions. During the Fall 2022 flow monitoring project, the system was separated into 12 interconnected drainage basins with a total length of gravity wastewater pipes of approximately 67,500 linear feet. Flow meters were strategically located to measure flows generated by these basins. Please see Figure 3-1 to see the layout of flow meter locations and basins.

During the Fall 2022 flow monitoring period (8/22/2022-12/16/2022), the City experienced overall rainfall that was comparable to historical averages, with a total depth of rainfall of 11.6 inches. Of the 12 meter locations, 8 meters experienced surcharge during the flow monitoring period. Flow meters 1, 2, 3, 4, 8, and 10 all exhibited surcharge due to backup caused by downstream restriction. Flow meters 2A, 2C, and 3 exhibited surcharge due to pressurized flow caused by lack of capacity. Recommendations provided in the report titled *2023 Inflow & Infiltration Investigations Project – Preliminary Engineering Report* included CCTV inspections and smoke testing in Flow Meter Basins 1, 2B, 3, 4, 8, 10, and 13 to address the excessive inflow and infiltration conditions.

The flow meter data and analysis results were used to assist in the calibration of the PCSWMM model developed for this project. The flow monitoring results of the City's sanitary sewer system provided useful data in respect to ADDF and infiltration and inflow (I/I). The flow meter reactions were varied for the rainfall events, however all meters reacted to several of the rain events, with increased flows indicating I/I. The flow monitoring sites also provided insight into the capacity limitations of the system. For more information about flow characteristics and I/I conditions, please refer to the report titled *2023 Inflow & Infiltration Investigations Project – Preliminary Engineering Report*.



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3.3 Review of Proposed Infrastructure Projects

Table 3-3 lists and describes all wastewater capital improvement projects (CIP) listed under the most recent community impact fee (CIF) update provided by the City. These projects were taken into consideration when analyzing the design storm model runs.

Table 3-3. Status of Ongoing or Planned Wastewater Projects from February 2023 CIF

Project Name	CIP PN / GBA PN	Description	Status
West Cottonwood Gravity Line, Phase 2	S-18	Serves West Cottonwood Sub-Basin up to Bois D'Arc Ln, 21" and 24" gravity wastewater line sized for ultimate capacity.	Complete
Willow Lift Station and Force Main	S-23	Lift station and force main to serve 220 LUEs in Willow Basin along US-290.	Pending
Expand Cottonwood WWTP to 0.40 MGD Capacity	S-30	New treatment plant capacity to serve additional growth.	Pending
Expand Cottonwood WWTP to 0.60 MGD Capacity	S-31	New treatment plant capacity to serve additional growth.	Pending
Wilbarger Basin Gravity Line to Lift Station (off Gregg Lane)	S-33	New wastewater line to serve growth along Gregg Lane.	Pending
Wilbarger Basin Lift Station and Force Main (off Gregg Lane)	S-34	New lift station and force main to serve growth along Gregg Lane.	Pending
Gravity line from City Limits to tie in to Wastewater line to Cottonwood	S-35	New gravity wastewater line to extend wastewater service to City Limits for future growth.	Complete
Lift Station and Force main to Cottonwood WWTP	S-36	New lift station and force main to serve areas south of US Hwy 290 along Old Kimbro Road.	Pending
Expand Cottonwood WWTP to 0.80 MGD Capacity	S-37	New treatment plant capacity to serve additional growth.	Pending

Table 3-3 Continued

Project Name	CIP PN / GBA PN	Description	Status
East Travis County Regional WWTP - with Elgin - Phase 1 - 1.1 MGD and 39" trunk main	S-38	Build new plant at Regional Site, road, and electrical improvements	Pending
Bell Farms Lift Station Expansion	CIP-2	Upgrades at existing lift station.	Nearing Completion
Presidential Glen Lift Station Expansion	CIP-3	Upgrades at existing lift station.	Nearing Completion
US-290 WW Line Expansion	CIP-4	Expand existing wastewater line along US-290 to serve growth.	Pending

4 MODEL DEVELOPMENT

4.1 Introduction

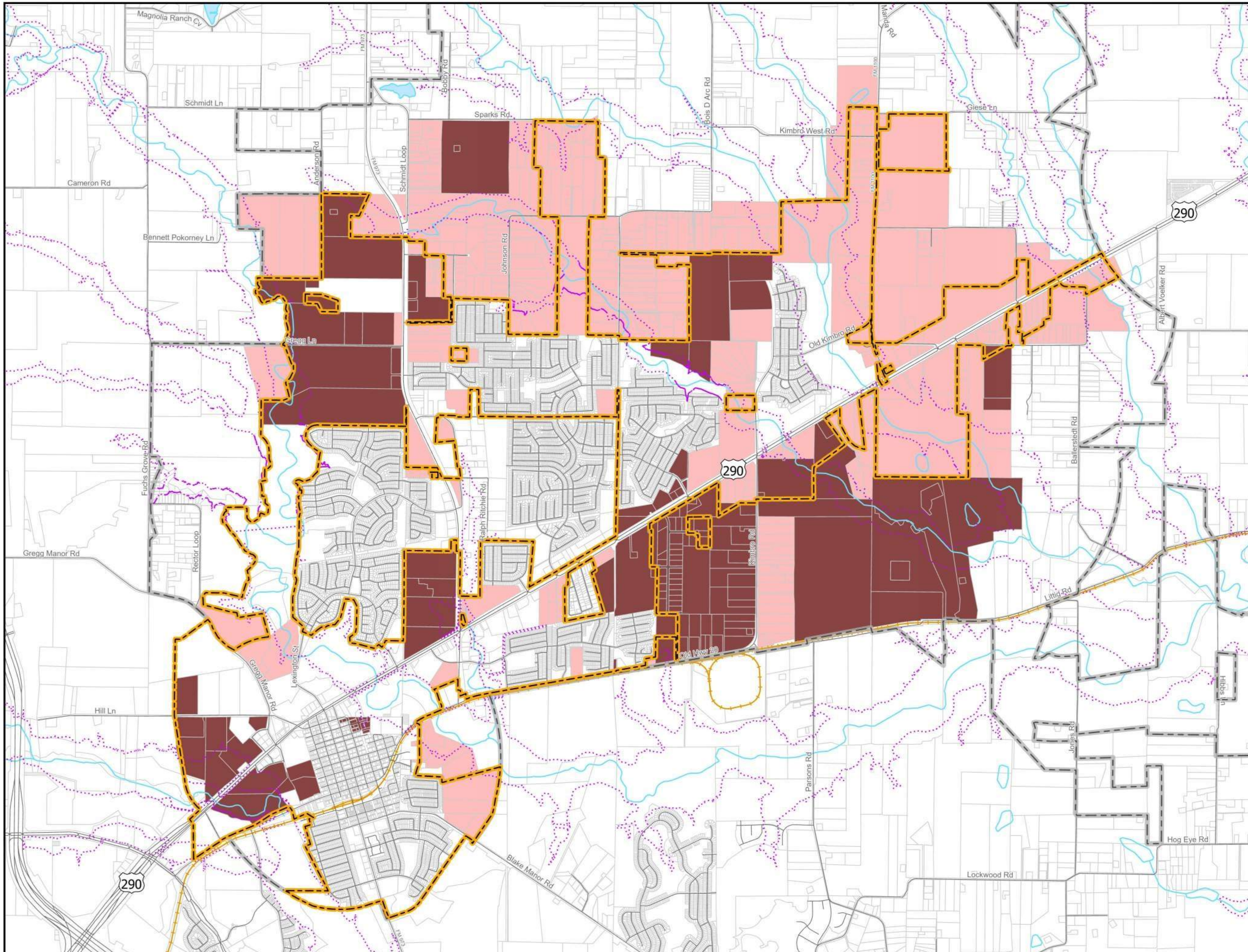
A hydraulic model of the City's sanitary sewer network was developed using GIS and data collected during the manhole survey. The PCSWMM modeling software by Computational Hydraulics International (CHI) was used to create the model. The model was used to determine the impact of population growth on the existing sanitary sewer network. The future growth scenarios modeled for this study were the 5-year and 15-year growth conditions. Section 4.2 provides further detail on growth projections utilized in the model for both time horizons.

4.2 Flow Projections

The overall goal for developing flow projections was to spatially assign growth across Manor's ETJ in a logical manner to align with the City's 7% annual growth rate assumption for the 5- and 15-year time horizons (Table 2-2). As previously mentioned, growth projections were developed based on the future land use map (Figure 2-2) from the City's Comprehensive Plan, as well as the planned and in-progress developments map supplied by the City (Figure 2-3). LUE/acre assumptions for each future land use type, as outlined in Table 2-1, were used to estimate the potential wastewater production for any given parcel. Because the Manor Comprehensive Plan excluded floodplain from developable land area, the same assumption was used for this analysis.

To estimate a zone of growth for the 5-year time horizon, the City's planned and in-progress development map was used. After overlaying the land use assumptions and LUE/acre estimates, a factor of 0.4 (or 40%) was required to align land use and LUE/ac assumptions with the 7% annual population growth assumption. This means that 40% of the developable (non-floodplain) land area within all the planned and in-progress tracts are assumed to be developed by the 5-year time horizon. This provided the necessary geographical information to input growth into the model. The area assumed to be 40% developed by the 5-year time horizon is shown in dark red in Figure 4-1. The floodplain boundaries are also shown to indicate those areas that were considered undevelopable for the purposes of this study.

To estimate a zone of growth for the 15-year time horizon, it was assumed that more lots would be developed around and near the current city limits and the planned and in-progress lots. To align with the 7% annual growth rate assumption, it was assumed that 100% of the current planned and in progress lots are developed by the 15-year time horizon, and 40% of the remainder of the 15-year growth zone is developed by the 15-year time horizon. The area assumed to be 40% developed by the 15-year time horizon is shown in light red/pink in Figure 4-1. The dark red area is assumed to be 100% developed by the 15-year time horizon.



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Travis County, TX

FIGURE 4-1: GROWTH AREA DEVELOPMENT MAP

Legend

- 5-Year 40% Developed, 15-Year 100% Developed
- 15-Year 40% Developed
- Road
- Railroad
- Creek/Stream/River
- Lake
- Floodplain
- Manor City Limits
- Manor ETJ

N

0 0.6 1.2

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4.3 Existing System Model Network Development and Flow Assignment

The model network was developed using existing GIS and the data collected during the manhole survey. In cases of missing data, values were retrieved from city-provided GIS data, record drawings, or interpolated between known data points. Only pipes 12 inches or greater in diameter were included in this model. Figure 4-2 shows the modeled collection system.

The twelve flow meter locations from the 2022 I/I Reduction project were imported into the appropriate manholes in the model, as well as their respective basins. Parcels encompassed in the flow metering basins were imported into the model as subcatchments. Every parcel was assigned a receiving manhole and a living unit equivalent (LUE) count, resulting in each receiving manhole being assigned a total LUE count. The LUE count was utilized to account for variations in wastewater generation from single-family homes, apartments, schools, restaurants, retail properties, and other property types. The sewer shed areas for each flow meter basin were distributed among the manholes based on a weighted system, accounting for the number of LUEs assigned to each manhole.

In summary, the built model network included 273 manholes, 66,000 linear feet of gravity sewer, 32,900 linear feet of force main, and 10 lift stations (Figure 4-2). The lengths of modeled gravity sewers and force main are summarized according to diameter and corresponding flow metering basin in Table 4-1.

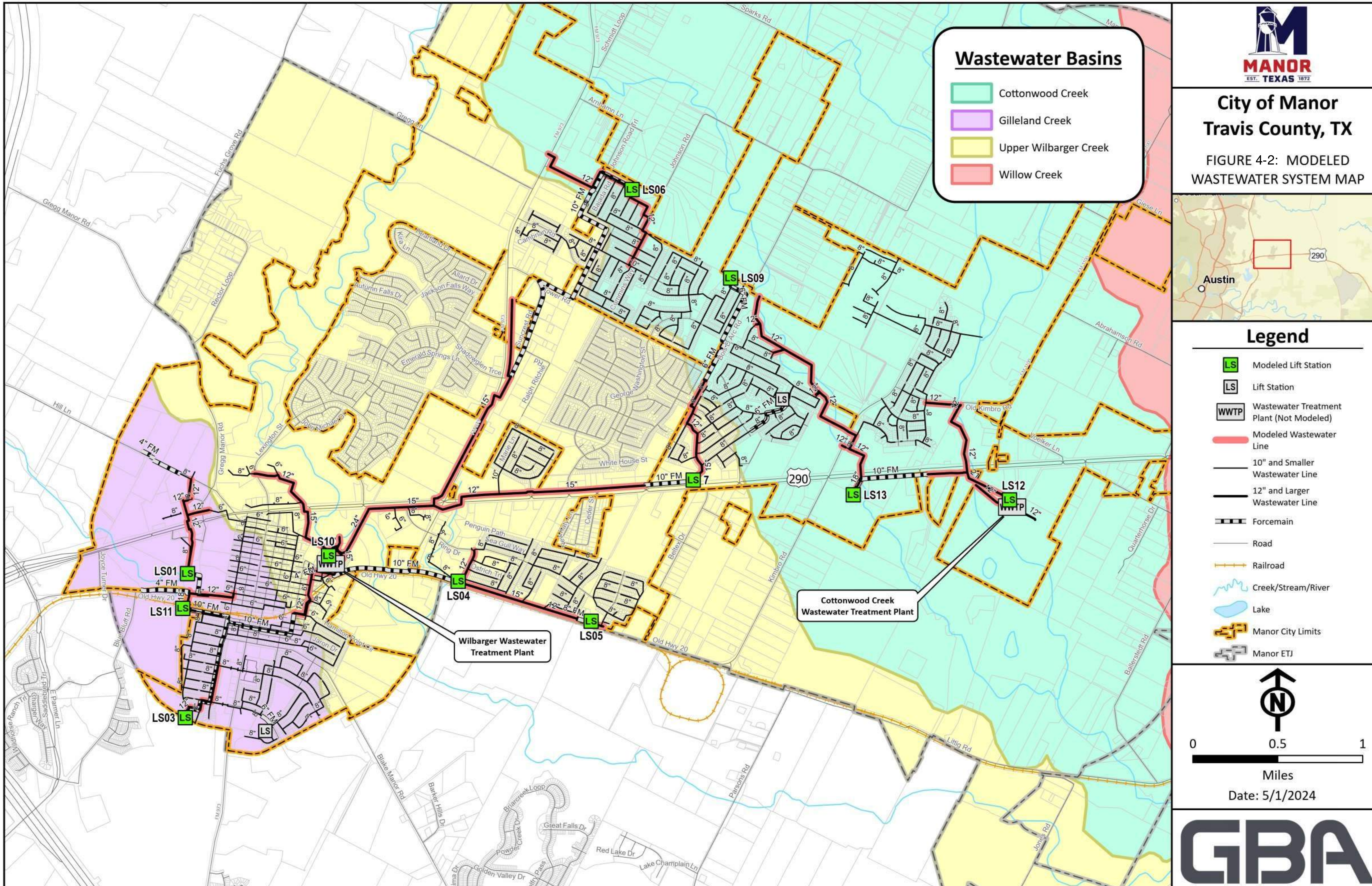

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Table 4-1: Modeled Pipes by Diameter

	Gravity Main						Force Main				
Flow Meter Basin	12"	15"	18"	21"	24"	Totals	4"	6"	8"	10"	Totals
1	1,340	2,612				3,953					
2	1,567	4,145			1,508	7,219					
2A		10,147				10,147				11,026	11,026
2B											
2C	3,086	4,252				7,337		3,900		1,553	5,453
3	2,816	1,502	576			4,893	980		7,999		8,979
4			2,062			2,062					
6											
7	1,434	2,482				3,915			511		511
8	3,587					3,587					
10	3,554					3,553					
13	845					845					
Unmetered: Cottonwood Creek	13,176		562	1,625		15,360		256	2,622		2,878
Unmetered: All Else	1,096	1,566			500	3,163				4,038	4,038
Totals	**32,500**	**26,705**	**3,120**	**1,625**	**2,008**	**66,034**	**980**	**4,157**	**11,132**	**16,617**	**32,885**

** All lengths in linear feet*

4.4 Model Calibration

4.4.1 Dry Weather Calibration

Average daily dry weather flows (ADDF) for each flow monitoring basin were retrieved from the 2022 Flow Monitoring Report by averaging the flows from Sep 27, 2022 - Oct 4, 2022, which was the driest week of the flow monitoring period. The ADDF was then normalized by dividing them by the total number of Living Unit Equivalents (LUEs) within each respective basin, yielding a unit flow per LUE value for each flow metering basin (Table 4-2). To distribute flows throughout the system, the average flow entering each manhole was determined by multiplying the unit flow per LUE by the number of estimated LUEs served by that particular manhole.

Table 4-2: Unit Flow per LUE

Flow Metering Basin	Estimated No. of LUEs Upstream of Meter	Avg. Daily Dry Weather Flow (MGD)	Estimated ADDF/LUE (gpd/LUE)
1	103	0.045	436
2	2,267	0.386	170
2A	1,070	0.129	121
2B	303	0.069	228
2C	1,570	0.189	120
3	360	0.130	360
4	819	0.171	209
6	240	0.051	211
7	419	0.1874	447
8	15	0.065	4,333(1)
10	201	0.064	317
13	290	0.023	80

1) *An abnormally high ADDF per LUE was estimated for Basin 8 due to the challenge of estimating exact LUE counts in basins primarily comprised of multi-family residential and commercial land uses.*

Time patterns were created by using the Time Pattern Creator tool in PCSWMM. Hourly and weekend time patterns were generated based off the dry weather period used for calibration. The outputs of the time pattern creator are hourly multipliers, in which the hourly time pattern has hourly multipliers that are applied to weekdays, while the weekend time pattern has hourly multipliers which are utilized on the weekend. Figure 4-3 shows an example of an hourly time pattern created by PCSWMM. The hourly and weekend time patterns were created for each flow meter basin and assigned to the manholes within their respective flow meter basins.

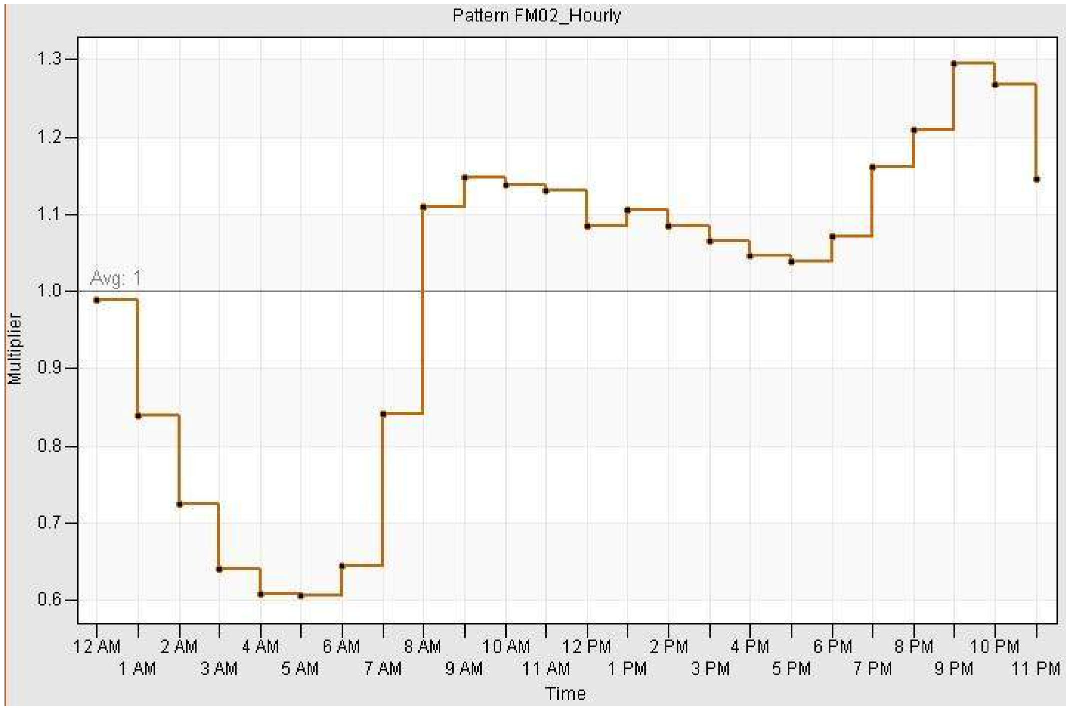

Figure 4-3: Hourly Time Pattern

The model was run after inputting the average flows and time patterns to the manholes, and the model results were compared to the flow meter data. ADDF measured by flow meter data was compared against ADDF calculated by the model. Total volumes for the dry weather period (measured versus modeled) were also compared (Table 4-3). The hydrographs showing modeled and metered flow for the dry weather period for each flow meter are provided in Appendix B.

Table 4-3: Dry Weather Calibration Results

Flow Meter	Metered ADDF (MGD)	Modeled ADDF (MGD)	Diff (MGD)	% Diff	Metered Total Volume (MG)	Modeled Total Volume (MG)	Diff (MG)	% Diff
1	0.31	0.31	0.00	0%	0.04	0.05	0.01	19%
2	5.78	5.86	0.08	1%	0.84	0.90	0.07	8%
2A	1.32	1.35	0.03	2%	0.19	0.24	0.05	26%
2B	0.48	0.48	0.00	0%	0.07	0.07	0.00	2%
2C	1.29	1.32	0.03	2%	0.19	0.20	0.01	7%
3	2.69	2.72	0.03	1%	0.39	0.43	0.04	9%
4	1.20	1.19	-0.01	0%	0.17	0.18	0.00	3%
6	0.35	0.35	0.00	0%	0.05	0.05	0.00	6%
7	1.66	1.66	0.00	0%	0.24	0.27	0.04	15%
8	0.45	0.45	0.00	0%	0.07	0.07	0.01	8%
10	0.45	0.44	0.00	0%	0.06	0.07	0.00	7%
13	0.16	0.16	0.00	0%	0.02	0.03	0.01	28%
Total	16.15	13.32	0.17	**1%**	2.33	2.57	0.23	**10%**

4.4.2 Wet Weather Calibration

The RTK Hydrograph method was chosen to model rainfall dependent inflow and infiltration (RDII) in PCSWMM. RDII is produced as groundwater and stormwater enter through defects in the sanitary network. A RTK unit hydrograph was used to define the proportion of rainfall falling on the basin that enters the sewer system as RDII and the timeframe this rainfall enters the system during and after the storm event. The RTK unit hydrograph is a combination of three separate unit hydrograph triangles which represent slow, medium, and fast responses of flow entering a sanitary network (Figure 4-4). Each response represents RDII that enters a system during and after a rainfall event. The R value symbolizes the fraction of rainfall that is entering the system, which is shown in the figure as the magnitude of the peak, T is the time to peak, and K is the falling limb ratio, which predicts how long the system will respond to a storm event. The slow response can be associated with slow infiltration, which occurs immediately following a rain event and can persist for several hours or even days. The medium response is associated with moderate infiltration that occurs during and soon after an event, when soil surrounding a pipe becomes saturated and starts infiltrating. The fast response time is associated with rapid inflow that enters the system through more direct connections and pathways (such as cracks or holes in manhole frames and covers).

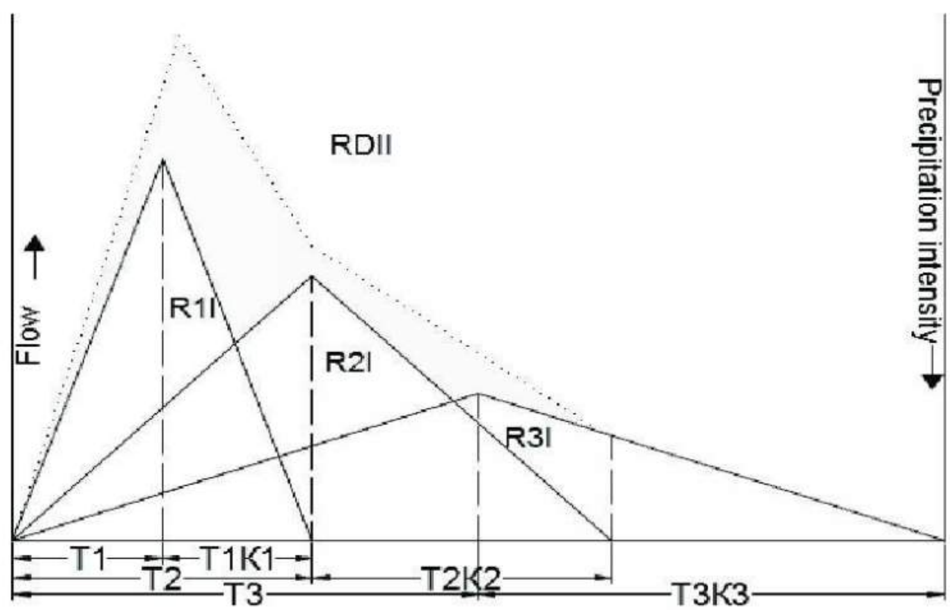

Figure 4-4: RTK Hydrograph

A unit hydrograph was developed for each flow monitoring basin, featuring unique sets of short-, medium-, and long-term R, T, and K values, along with an assigned rain gage. The City of Manor had a total of three rain gages collecting rainfall during the flow monitoring period, as illustrated in Figure 3-1. The Thiessen polygon method was utilized to establish a hypothetical rain gage for each flow monitoring basin, determined by the proximity of the basin to the nearest rain gages.

The Sensitivity-based Radio Tuning Calibration (SRTC) tool in PCSWMM was applied to calibrate modeled data with observed flow meter data. The SRTC tool establishes sensitivity gradients for short, medium, and long-term R, T, and K values, allowing for simultaneous observation of effects across multiple wet weather events. Initial unit hydrographs were generated by estimating R, T, and K values based on computed and observed data from the dry weather calibrated model results. Subsequently, an iterative approach was adopted, adjusting R, T, and K values for each flow meter until the weighted averages of the peaks and total volumes for all observed and usable wet weather responses were within the ranges suggested by the Chartered Institution of Water and Environmental Management (CIWEM): -15% to +25% for peak flow, and -10% to +20% for total volume (Table 4-4). In addition, 45-degree plots were prepared to visually demonstrate how the model's predictions are aligning with the metered flow data (Appendix C).

Table 4-4 shows the wet weather calibration results, including percent differences between the modeled and metered volumes and peak flows for each significant storm response observed during the 2022 flow monitoring period. One storm that was ultimately excluded from consideration during calibration was the November 25, 2022. It was discussed with the City during a model review meeting held on December 7, 2023 that the sewer system's dramatic response to the November 25, 2022 storm was most likely attributed to several compounding factors, including wetter soil conditions from smaller storm events occurring in the weeks prior to November 25, as well as the contribution of excessive flows from the Municipal Utility Districts (MUDs) connected to Manor's sewers during the flow monitoring period.

It was uncertain whether on of the largest MUDs was sending flows to Manor's system regularly or only during larger storm events. These MUDs are no longer contributing flow to Manor's system however, and should not dictate model calibration or analysis. The City also expressed concern that the calibration was overly conservative. After discussing the factors that led to abnormal peak flows during the November 25, 2022 storm event, it was decided that an alternate calibration approach would be more representative of typical storm events observed in the Manor sewer system. The alternate calibration approach results in a better match between metered peaks and modeled peaks for the other storm events that occurred throughout the Fall 2022 flow monitoring period.

Flow meter Basins 2A and 10 have total volume percent differences that exceed the CIWEM acceptable range. This can be attributed to the October 16, 2022 storm that caused a lower-than-average response in these basins. As stated above, the model is calibrated to represent more typical storm events in the Manor sewer system. Similarly, flow meter Basin 13 has a total peak flow percent difference that falls slightly below the CIWEM acceptable range. This is because Basin 13 had three storms in November that caused a higher-than-average response. Excursions like these from the acceptable ranges may be unavoidable in situations where flow meter data does not align as expected with rainfall data.

Table 4-4: Wet Weather Calibration Results

Flow Meter	Basin Area (Acres)	No. of Storm Events with Observable Responses	Weighted Avg. % Difference, Total Volume	Weighted Avg. % Difference, Peak Flow
1	118	7	8%	5%
2	760	7	20%	-4%
2A	215	6	39%*	13%
2B	58	8	8%	-4%
2C	354	8	1%	-12%
3	117	7	19%	-14%
4	258	7	15%	-9%
6	50	6	13%	2%
7	100	6	19%	-6%
8	136	8	16%	25%
10	93	4	27%*	10%
13	100	11	-3%	-19%*
Acceptable Range (CIWEM), % Difference			-10% to +20%	-15% to +25%

*Excursions from the acceptable range are noted with an asterisk. Excursions are typically caused by basins with lower flows or erratic flow monitoring data, which can present challenges to achieving ideal calibration. Overall, the calibration is adequate for planning-level purposes.

4.5 Future Growth Model Development

The future growth projections were incorporated into the model by importing the number of LUEs and the sewershed area into the nearest downstream, modeled manhole (Refer to Section 4.2 for more insight to the development of growth projections). The nearest downstream manhole was determined by the future growth area's location and topography. Extension interceptor lines were conceptualized and included in the final plan as extension projects (Section 7.10) to serve new growth and tie into the existing infrastructure, but these lines were not included in the model. Only projected flows from these extensions were incorporated into the model. The future growth models did not include planned or ongoing improvements; however, known improvements were considered when developing recommendations.

5 MODEL RESULTS ANALYSIS

5.1 Overview of Modeling Results

The existing model, 5-year growth model, and 15-year growth model were simulated with the 5-year, 6-hr design storm (see Section 2.6.3 for more information regarding the design storm). This chapter provides an analysis of the results derived from these simulations. In the maps illustrating the results (Figure 5-1 through Figure 5-3), only manholes meeting the critical surcharge criteria outlined in Section 2.6.4 are depicted as orange circles. The red circles denote manholes experiencing flooding during the simulation period. While the model might indicate flooding, it does not imply that the system will actually flood. It is recommended that further on-site evaluation and data collection (e.g., checking manholes for evidence of surcharge, targeted flow monitoring) be conducted before initiating any project based on modeling results.

To represent pipes in the maps, orange lines symbolize pipes undergoing surcharge during peak wet weather conditions due to backup, stemming from downstream restrictions such as undersized pipes or inadequate lift station capacity. Red lines represent pipes experiencing surcharge due to capacity limitations, indicative of undersized pipe during peak wet weather conditions. When evaluating projects, pipes surcharging due to backup are of lesser concern compared to those surcharging due to capacity limitations.

5.2 Existing System Design Storm Results

The analysis of the existing system under the 5-year design storm reveals three areas of concern (Figure 5-1).

- The Llano St. and Lampasas St. Interceptors receive flows from most of Old Manor before flowing into Wilbarger Creek WWTP, making it an important corridor. This stretch of sewer also has relatively shallow manholes, making it prone to surcharge..
- The Pyrite Road Interceptor that flows into the Stonewater Lift Station (LS06) is undersized when the design storm is run under existing conditions. This interceptor is located in Basin 10 which demonstrated particularly high rates of inflow during Fall 2022 Flow monitoring. Therefore, a potential alternative approach to upsizing the wastewater line would be to mitigate I/I in the upstream system.
- The US-290 interceptor receives flow from FM973, Presidential Heights, Presidential Glen, and Greenbury. This project is of lower priority due to lower levels of surcharge in the existing conditions scenario, but may become a bigger issue as more development occurs upstream.
- LS03, also known as the Wildhorse Creek Lift Station, demonstrated some backup issues in the existing conditions model. However, upon further investigation, these issues are not expected to occur due to recent upgrades at this facility. Because LS03 was recently upgraded, it was assumed that these model results were of little concern. I/I in Old Manor should, however, be further investigated and mitigated so that issues do not arise at LS03 and other lift stations serving the older, downtown area.

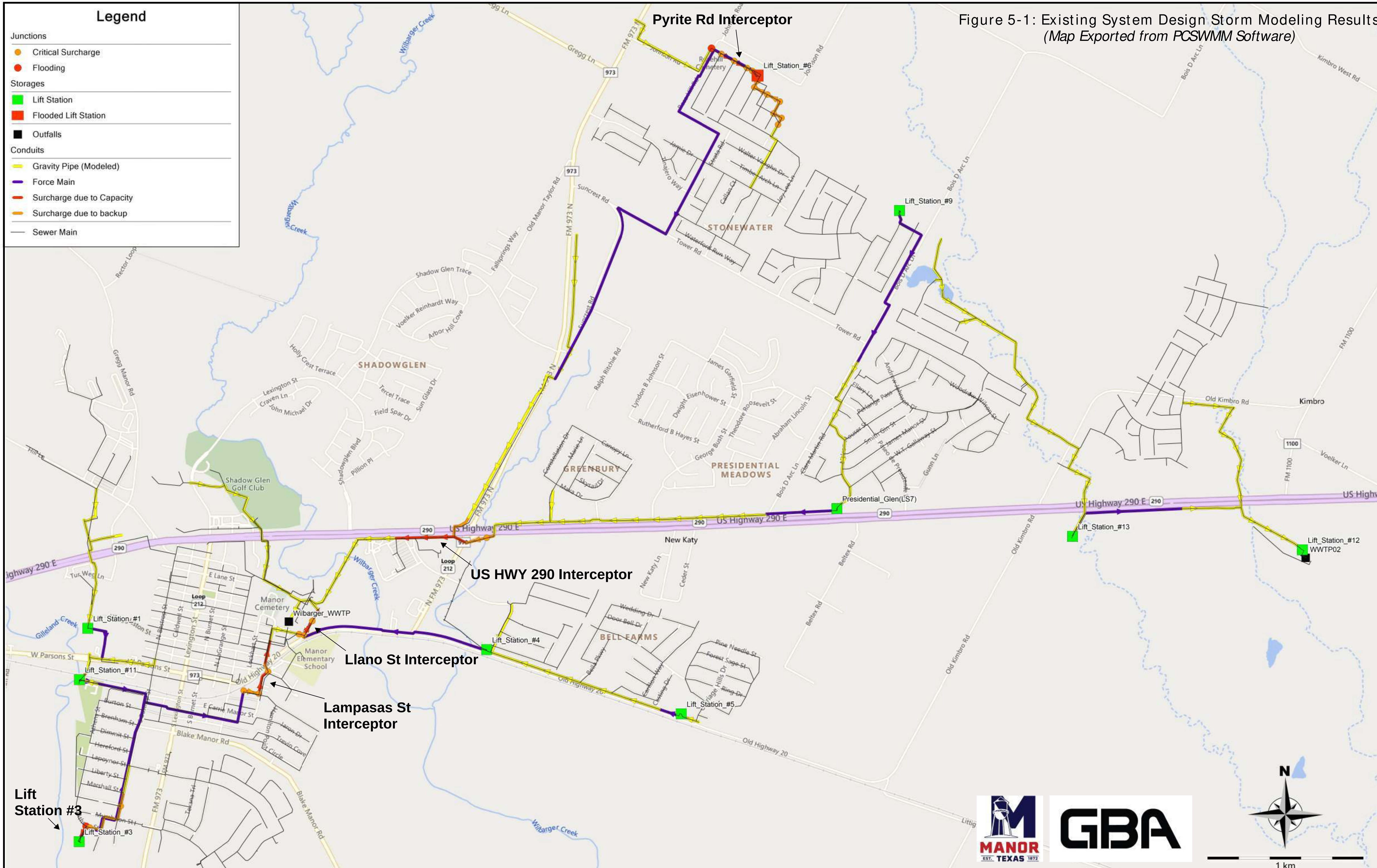

Figure 5-1: Existing System Design Storm Modeling Results
(Map Exported from PCSWMM Software)

5.3 5-year System Design Storm Results

The results from the 5-year growth model simulation conducted with the design storm are presented in Figure 5-2. The two projects that were identified as areas of concern in the 5-year growth scenario are already undergoing improvements.

- The Old Hwy 20 Interceptor serves Carriage Hills and Bell Farms along with some unmetered properties along Simmer Run. LS04 is also shown to be undersized and cannot keep up with the flows coming from contributing basins, though there is an ongoing project to upgrade this facility. Lift station improvements and pipe bursting from Carriage Hills are under design and being reviewed by TCEQ. Therefore, no projects were identified to address these model concerns.
- The FM973 interceptor is surcharging due to backup from the US-290 Interceptor but is not critical in the 5-year growth scenario. However, it does become more critical in the 15-year growth scenario.

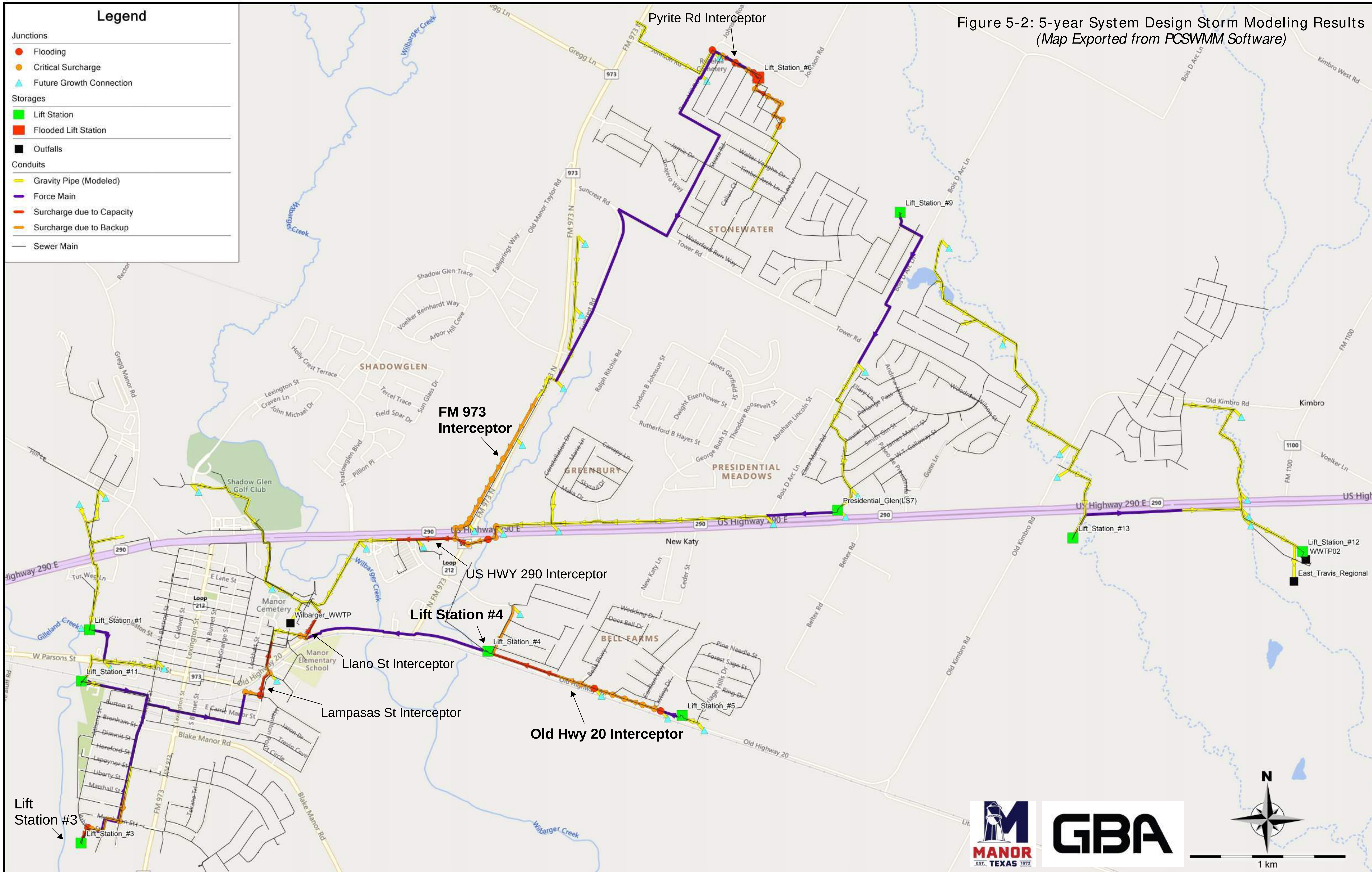

Figure 5-2: 5-year System Design Storm Modeling Results
(Map Exported from PCSWMM Software)

5.4 15-year System Design Storm Results

Similar to the 5-year growth model findings, the previously identified areas of concern have shown exacerbation in terms of surcharging and flooding (Figure 5-3). With the integration of the 15-year growth projection into the model, multiple areas in the wastewater system will be undersized unless improvements are made.

- Lift Station 1, also known as Las Entradas or Old High School Lift Station, and the pipe immediately following the lift station create backup in the 15-year growth scenario (Figure 5-3). However, there is an agreement that requires the developer to expand this LS to accommodate future growth.
- The FM973 Interceptor shows flooding and undersized pipes in the 15-year growth scenario. This project will not be necessary if Lift Station 6 is decommissioned, however.
- Both the East and West Cottonwood Creek interceptors are unable to accommodate for projected 15-year growth. These interceptors were not monitored in the 2022 Flow Monitoring Period; however, the growth projections in the Cottonwood Creek Basin are significant enough to warrant improvements.
- Another project identified during the 15-year future growth scenario was the decommissioning of Lift Stations 6, 8, and 9. This would come after the addition of the East Travis Regional Plant. Flows directed toward these lift stations would be redirected through the addition of an interceptor to flow by gravity to the new treatment plant. This would alleviate capacity concerns created by these three lift stations, removing the need for improvements along FM973 and reducing flows to the Wilbarger WWTP.

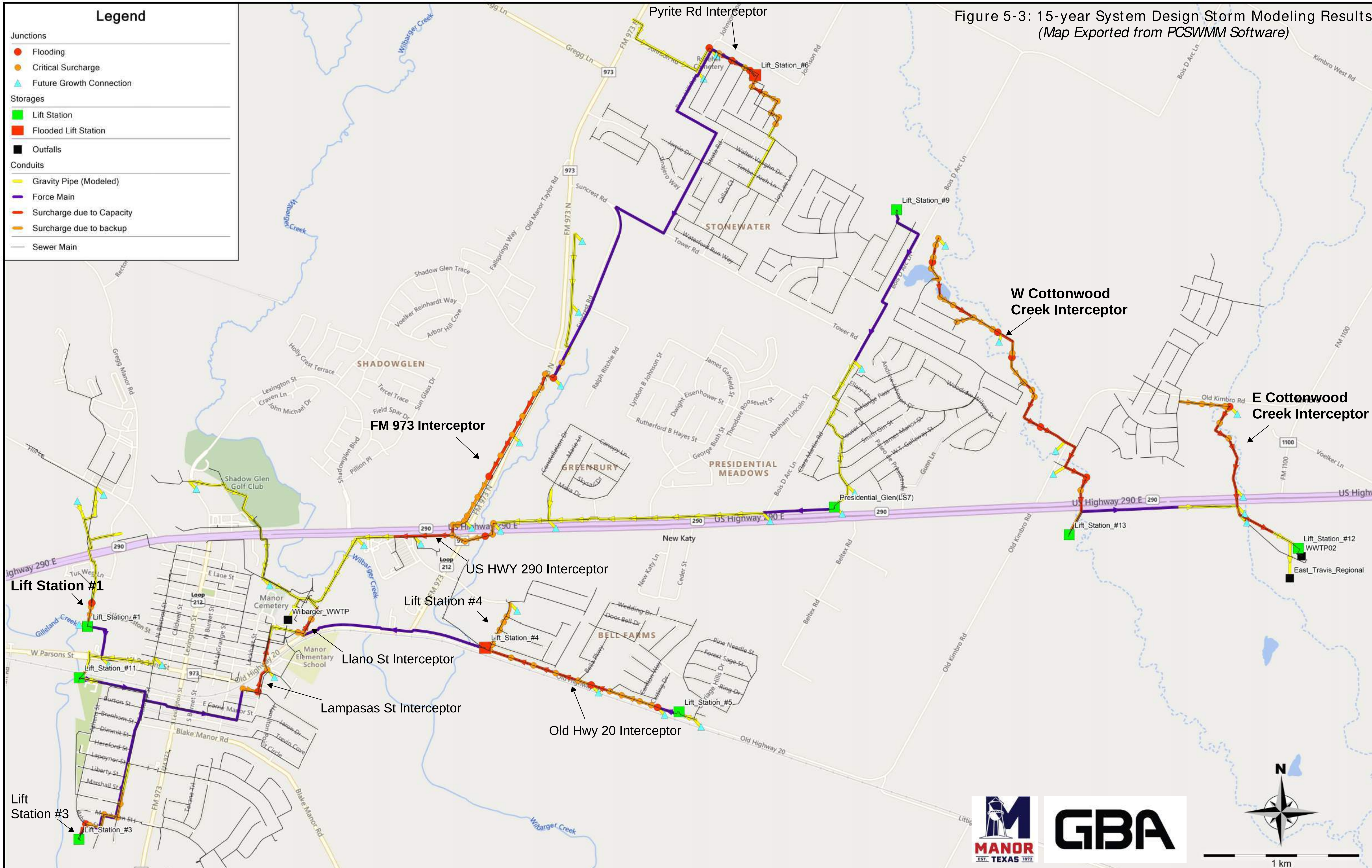

Figure 5-3: 15-year System Design Storm Modeling Results
(Map Exported from PCSWMM Software)

5.5 15-year System Free Flow Results

A free flow model scenario was developed for the 15-year growth conditions whereby pipe capacities were increased until no surcharging or flooding was predicted in the model under 5-year, 6-hour design storm conditions. In the previous non-free flow design storm models, flood loss and surcharging diminish peak flows progressing downstream of any bottlenecks. The free flow analysis assumes that any flow entering the system will flow through the system and to the outfall without encountering restrictions or flood loss. This model scenario enables a comparison between a) the maximum 15-year free flow peaks that could be experienced without upstream flow restrictions and b) the existing full flow capacity of every modeled pipe. Additionally, this analysis facilitates the identification of capacity concerns not highlighted in the non-free flow design storm models, either due to flood loss, surcharging, or other flow restrictions upstream. The findings from the free flow analysis significantly influence the identification and delineation of necessary projects and their extents. The map depicted in Figure 5-4 denotes pipes in red where the maximum 15-year free flow capacity exceeds the existing pipe's full flow capacity.

Figure 5-4: 15-year System Free Flow Modeling Results
(Map Exported from PCSWMM Software)

6 TREATMENT CAPACITY ANALYSIS

The City of Manor currently operates two wastewater treatment plants (WWTPs): the Wilbarger WWTP and the Cottonwood Creek WWTP. A third WWTP has previously been proposed southeast of the Cottonwood Creek WWTP. The third WWTP would be located near the confluence of the Cottonwood Creek, Willow Creek, and Wilbarger Creek, south of Littig Road. This proposed WWTP is referred to in this report as the East Travis Regional WWTP, and it would be strategically located to serve a large area within Manor's eastern ETJ and potentially other municipalities within the region. A map showing the locations of each WWTP is provided in Figure 6-1.

This section describes the projected capacity allocations and phasing for each of the three WWTPs at the 5-year and 15-year time horizons. To assess future treatment plant capacity needs and establish logical timing of expansions, rated plant capacities were compared against flow projections developed during collection system modeling. It is important to note that exact timing of capacity expansions will be dictated by actual influent flows to the WWTPs. TCEQ Chapter 217 Rules require that plant expansion design commence at 75% of permitted phase capacity and construction start at 90% of permitted phase capacity. Therefore, monitoring of WWTP influent flows will be essential to ensure adequate capacity is available as the City grows.

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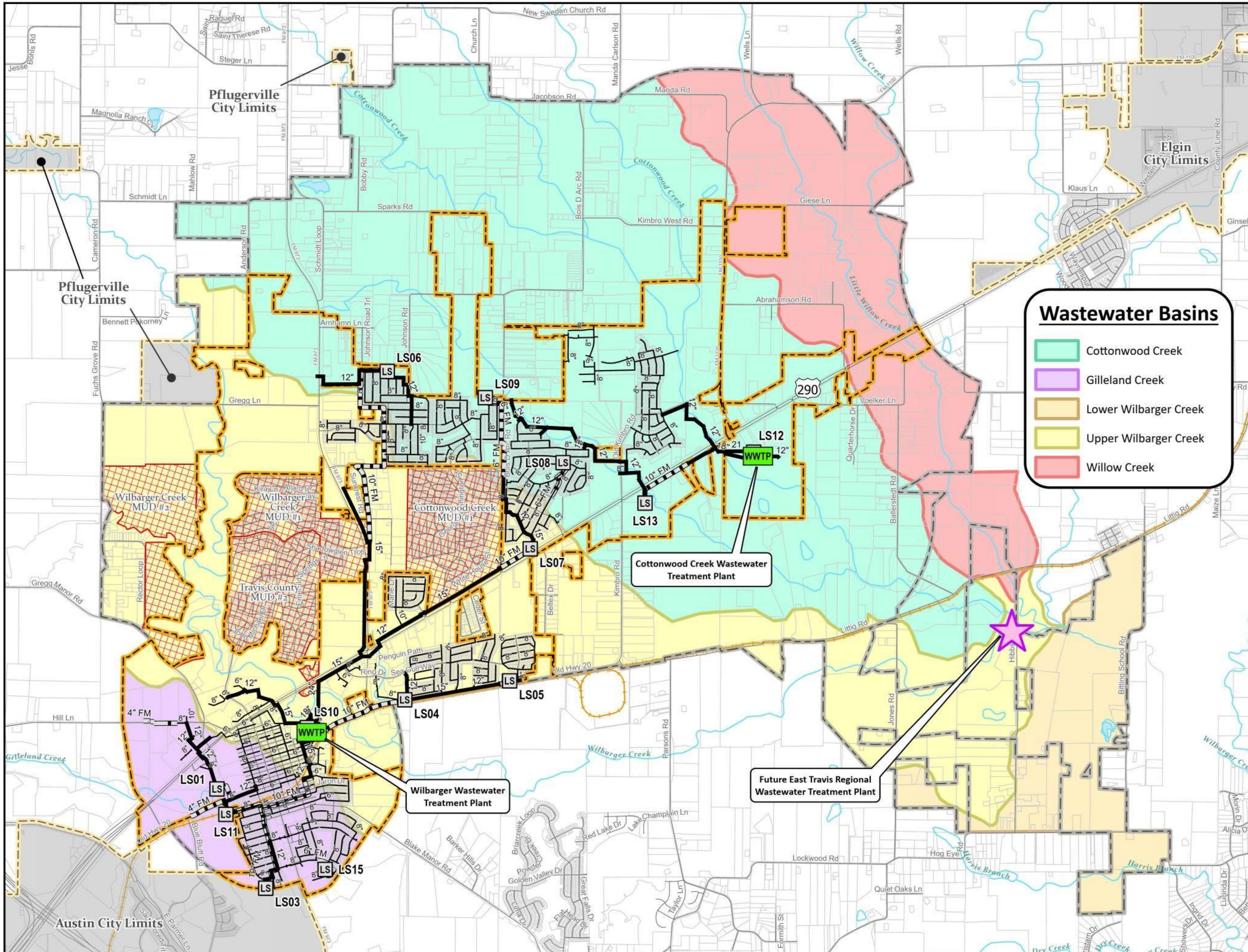
FIGURE 6-1: WASTEWATER TREATMENT PLANT SITES



Legend

- LS Lift Station
- WWTP Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Forcemain
- Road
- Railroad
- Creek/Stream/River
- Lake
- Manor City Limits
- Manor ETJ

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6.1 East Travis Regional Wastewater Treatment Plant (Future Plant)

The East Travis Regional WWTP is essential for serving future growth in the eastern reaches of Manor's ETJ. This treatment plant is proposed to be located near the intersection of Littig Road and Ballerstedt Road, near the confluence of Cottonwood Creek, Wilbarger Creek, and Willow Creek. The new WWTP would be situated at the downstream end of the three primary drainage basins within Manor's ETJ.

The East Travis Regional WWTP was conceptualized as part of previous studies, including Manor's 2008 Wastewater Master Plan Update, and has been included in the City's most recent 10-year wastewater CIP. The plant would be strategically located to ultimately serve a larger area than the current Cottonwood Creek WWTP and is anticipated to eventually allow the Cottonwood Creek WWTP to either be repurposed for wastewater reuse or decommissioned entirely. Recent planning efforts for the East Travis Regional WWTP have assumed an initial capacity of 1.5 MGD. Upon analyzing population and flow projections developed for this report, it was determined that a 1.5 MGD capacity would be required at minimum by the 15-year time horizon to serve growth, and it may be strategic to design the facility to handle additional capacity above 1.5 MGD (e.g., 2.0 MGD) to defer further upgrades.

6.2 Cottonwood Creek Wastewater Treatment Plant

The Cottonwood Creek WWTP currently has a capacity of 0.2 MGD and is located south of the intersection of US-290 and FM1100. This WWTP was designed to be phased from 0.2 MGD up to a maximum of 0.8 MGD in four separate phases. Presently, Phase 2 expansion of the Cottonwood Creek WWTP is fully designed and set to begin upon confirmation that flows have reached a level appropriate to trigger the expansion. Phase 2 expansion will increase the Cottonwood Creek WWTP's capacity to 0.4 MGD. The other phases of expansion that are planned for Cottonwood Creek WWTP are Phase 3 (0.6 MGD Total) and Phase 4 (0.8 MGD Total).

Upon analyzing population and flow projections developed for this report, it was determined that Phase 2 and 3 of the expansion will need to occur within the next five years to serve projected growth. It was also concluded that Phase 4 may be unnecessary, as the East Travis Regional WWTP will be a more permanent location for the City to invest in additional treatment capacity. Regardless, the 0.8 MGD permitted capacity will ensure sufficient capacity within the basin to serve growth if the regional plant cannot be constructed and commissioned before the Phase 3 (0.6 MGD) plant capacity is reached.

The Cottonwood Creek WWTP was conceptualized as a temporary facility that would provide service in Manor's eastern reaches prior to the construction of a much larger and more permanent facility (the East Travis Regional WWTP). Despite it being designed for a shorter life cycle, the Cottonwood Creek WWTP will still serve a critical role in phasing the East Travis Regional WWTP. Due to its location upstream of the proposed site of the regional WWTP, the Cottonwood Creek WWTP will be able to reduce the total influent flow reaching the East Travis Regional plant, which could be strategic during high flow events or during regional plant startup and maintenance. In this way, the Cottonwood Creek WWTP will provide the City some treatment redundancy and operational flexibility when determining how much influent flow to allocate to either facility. For this reason, it is recommended that the Cottonwood Creek WWTP remain in service at least until the East Travis Regional WWTP has adequate capacity and redundancy to serve the entire Cottonwood Creek basin. This may require the Cottonwood Creek WWTP to remain in service beyond the initial construction of 1.5 MGD at the regional facility.

It is also important to note that Phase 3 expansion of the Cottonwood Creek WWTP will permit the City to delay construction of the East Travis Regional plant until average daily flows increase beyond 0.6 MGD. However, once the East Travis Regional WWTP is online, this additional capacity should eliminate the need for Phase 4 expansion of the Cottonwood Creek WWTP.

6.3 Wilbarger Wastewater Treatment Plant

The Wilbarger WWTP, located in Old Manor at the intersection of Llano Street and Old Highway 20, is permitted to be expanded from 1.33 MGD to 2.0 MGD. Average daily dry weather flows at Wilbarger WWTP from January to April 2024 were approximately 1 MGD, or 75% of the current 1.33 MGD capacity. As mentioned previously, the TCEQ Chapter 217 Rules require that plant expansion design commence at 75% of permitted phase capacity and construction start at 90% of permitted phase capacity. Design of the Wilbarger WWTP expansion has begun, and construction of the expansion will be essential within the next five years to keep up with projected growth. However, the timing of further expansions beyond 2.0 MGD will depend on several factors.

Expanding Wilbarger WWTP beyond 2.0 MGD is expected to be more costly than expanding from 1.33 to 2.0 MGD. The current design and layout of multiple ancillary systems (such as the on-site lift station, chemical feed systems, yard and outfall piping, electrical service, etc.) generally allows for efficient expansion to the 2.0 MGD capacity. However, expansion beyond the 2.0 MGD capacity would require these systems to be increased in capacity beyond the current design provisions. This may mean duplicate systems or wholesale replacement of existing equipment with larger capacity equipment, thus reducing or negating economies of scale. Increasing the permitted capacity beyond the current 2.0 MGD would also require a major permit amendment through the TCEQ. The permit amendment process typically takes a minimum of a year and can extend up to three years if the application is protested and a case referred to the State Office of Administrative Hearings. The expansion beyond 2.0 MGD may also require the City to acquire additional land around the current plant to accommodate the expansion. For these reasons, expansion of Wilbarger WWTP beyond 2.0 MGD would be costly, and any opportunity to postpone or indefinitely avoid such an expansion would be preferable.

6.4 Decommissioning Lift Stations 6, 8, and 9

To delay expansion of Wilbarger WWTP beyond 2.0 MGD, it is recommended that the City decommission lift stations 6 (Stonewater), 8 (Presidential Glen Ph. 4B), and 9 (Presidential Heights), rerouting their flows via gravity sewer to the proposed East Travis Regional WWTP once it is built. This would shift an estimated 0.5-0.6 MGD of ADDF away from the Wilbarger WWTP toward the new East Travis Regional WWTP. This decommissioning effort is expected to eliminate the need for expansion of Wilbarger WWTP beyond 2.0 MGD within the 15-year planning window of this study. However, it is not known whether this would permanently eliminate the need for expansion beyond 2.0 MGD, because the City's growth within the

Wilbarger Creek and Gilleland Creek basins may eventually exceed the projections developed for this study. With the recent adoption of Senate Bill 2038 which allows de-annexation from adjacent municipal ETJs, there is increased potential for growth to exceed what has been projected for this study.

Decommissioning lift stations 6, 8, and 9 would have multiple benefits besides delaying further expansion at Wilbarger WWTP. Operations and maintenance costs associated with these lift stations would be eliminated, which could equate to several hundred thousand dollars saved each year. Also, based on hydraulic modeling of the 15-year growth condition, it is anticipated that a costly upsizing project of the existing interceptor paralleling FM973 would be required in the future if LS06 (Stonewater) remains in service. If LS06 is eliminated though, the interceptor along FM973 is expected to have adequate capacity throughout the 15-year planning period. The costs associated with decommissioning lift stations 6, 8, and 9 would entail lift station decommissioning expenses, the cost of gravity sewer to convey flows to the East Travis Regional WWTP, and the cost of additional capacity required at East Travis Regional WWTP.

Another potential benefit of eliminating these lift stations would be the improvement of wastewater quality and reduction of H_2S production. By eliminating hydraulic detention time in lift station wet wells and force mains, wastewater quality issues, odor concerns, and maintenance concerns may be avoided.

6.5 Projected Capacity Allocations

Table 6-1 summarizes the approximate capacities being planned for each WWTP, as well as projected average daily flows, for each planning horizon.

As is shown in Table 6-1, present day ADDF estimates for Wilbarger WWTP and Cottonwood Creek WWTP are 1 MGD and 0.05 MGD respectively and are based on influent flow data from the first quarter of 2024 as provided by the City. By the 5-year time horizon, the Wilbarger WWTP must be expanded to 2 MGD to serve the projected growth in flows. Also, the Cottonwood Creek WWTP must be expanded to 0.6 MGD (Phase 3) by the 5-year time horizon.

The 15-year time horizon is split into two separate scenarios: Scenario 1, in which it is assumed that no decommissioning of lift stations has taken place; and Scenario 2, in which it is assumed that lift stations 6, 8, and 9 have been decommissioned and flows rerouted to East Travis Regional WWTP. It is assumed that the East Travis Regional WWTP will be fully operational by the 15-year time horizon in either scenario, and that the East Travis Regional WWTP will treat all flows in excess of the Cottonwood Creek WWTP's 0.6 MGD capacity. It is recommended that the City decommission lift stations 6, 8, and 9 because by the 15-year time horizon, ADDF at Wilbarger WWTP is projected to exceed the 2 MGD capacity in Scenario 1.

It is important to note that in Scenario 2 of the 15-year time horizon, in which lift stations 6, 8, and 9 are decommissioned, the projected ADDF for Wilbarger WWTP is approximately 1.6 MGD, or 80% of its 2 MGD capacity, and the projected ADDF for East Travis Regional WWTP is approximately 1.4 MGD, or 93% of its 1.5 MGD capacity. For these reasons, it is anticipated that expansion of Wilbarger WWTP and East Travis Regional WWTP beyond their 15-year capacities may be required just outside this study's 15-year planning window. This is dependent on growth continuing at projected rates however, and actual rates of growth will dictate actual timing and necessity of expansions. To delay or avoid further expansion of Wilbarger WWTP beyond 2 MGD, the City may need to reconsider further ETJ releases (as allowed under recent Senate Bill 2038) from the City of Austin that could be served by the Wilbarger plant, as these areas are not accounted for in this study and could increase capacity needs above 2 MGD.

Table 6-1: Projected Treatment Capacity Allocations

	Wilbarger WWTP		**Cottonwood Cr. WWTP**		**East Travis Regional WWTP**		**Total, All WWTPs**	
Time Horizon	Anticipated Capacity (MGD)	Projected ADDF (MGD)	Anticipated Capacity (MGD)	Projected ADDF (MGD)	Anticipated Capacity (MGD)	Projected ADDF (MGD)	Anticipated Capacity (MGD)	Projected ADDF (MGD)
Present (1)	1.33	1.0	0.2	0.05	-	-	1.5	1.1
5-year	2.0	1.3	0.6	0.4	-	-	2.6	1.7
15-year:								
Scenario 1, No LS Decomm. (2)	2.0	2.1	0.6	0.6 (4)	1.5	0.9	4.1	3.6
Scenario 2, LS 6,8,9 Decomm. (3)	2.0	1.6	0.6	0.6 (4)	1.5	1.4	4.1	3.6

Notes:

(1) Present ADDF estimates are based on recent (Jan-Apr 2024) plant influent flow data provided by City.

(2) This scenario represents the 15-year time horizon assuming no lift stations have been decommissioned.

(3) This scenario represents the 15-year time horizon assuming lift stations 6, 8, and 9 have been decommissioned and flows rerouted to East Travis Regional.

(4) It is assumed that by the 15-year time horizon, Cottonwood Creek WWTP will reach its 0.6 MGD capacity and the remainder of flow in the Cottonwood Cr. Basin will be treated at East Travis Regional.

6.6 Recommended Treatment Capacity Projects

Below is a summary of projects recommended for each WWTP based on the capacity analysis described above:

1) Wilbarger WWTP
    a. Within 5 Years: Expand to 2 MGD
    b. Beyond this study (>15 Years): Potential for Expansion Beyond 2 MGD
2) Cottonwood Creek WWTP
    a. Within 5 Years: Expand to 0.6 MGD (Execute Phases 2 and 3)
    b. Beyond this study (>15 Years): Potential for Decommissioning or Reuse
3) East Travis Regional WWTP
    a. Within 15 Years: Design and Construct 1.5 MGD Facility
    b. Beyond this study (>15 Years): Potential for Expansion Beyond 1.5 MGD

7 OVERALL RECOMMENDATIONS AND CONCLUSIONS

This section outlines the conceptual projects identified from modeling, as well as the planning-level costs estimated for each identified project.

7.1 Development of Planning Level Opinion of Probable Costs

All planning-level costs of projects are in February 2024 dollars and include the opinion of probable construction cost (OPCC), along with a 20% construction contingency, a 30% factor for engineering and other soft costs, and an additional 10% contingency for projects involving railroad crossings. The inclusion of the railroad crossing contingency is due to additional engineering costs for obtaining permits and additional construction costs due to longer bores.

The estimated unit cost for acquiring easements for new infrastructure projects outside of existing right-of-way (ROW) or pre-existing easements was approximately $88,000 per acre. This unit cost was determined by averaging the expenses of recent utility infrastructure easements in Central Texas for both developed and undeveloped areas and includes easement survey costs, engineering, ROW agent, condemnation, attorney fees, and easement acquisition costs.

All OPCCs are considered planning-level, and actual costs may vary significantly depending on final design, project scope and bidding environment. Planning-level construction cost estimates for both new and existing infrastructure projects were estimated based on the following assumptions:

- Gravity Lines: Gravity pipe construction costs generally cover excavation, pipe, ditch checks, manholes, extra depth, erosion control, restoration, and mobilization. The gravity pipe construction estimates also assume that 10% of gravity line length will be encased with a steel casing to account for roadway and stream crossings.
- Lift Stations: The cost for lift station construction generally covers erosion control, site work, wet well, pumps, site piping, electrical work, controls, jib crane, hoist, fencing, access road, restoration, and appurtenances. The lift station unit costs were calculated based on averaging construction costs from past lift station projects.
- Force Mains: Force main construction costs generally cover excavation, pipe, erosion control, and restoration.

7.2 Field Investigations Prior to Design

To confirm a relief project's urgency and necessity, field investigations and targeted flow metering are recommended before initiating design and construction. The hydraulic model is most accurate nearest the meter locations used for model calibration. Locations in the model that are relatively far upstream or downstream from a meter location are more likely to be imprecise in terms of flow predictions. Many site-specific factors in the collection system can impact flow conditions at a particular location that may not be readily apparent from flow data collected far downstream of that location (such as branching interceptors or diversions). Also, timing and scale of future growth may vary from growth projections assumed in this report, which may drastically change the necessity of projects listed below under future time horizons. Therefore, it is in the City's best interest to confirm and corroborate model results and project necessity before embarking on a costly relief or replacement project.

Table 7-1 describes the primary benefits and costs of performing targeted field investigations and flow monitoring prior to relief project implementation. Overall, these investigations are highly recommended and can help confirm the necessity and urgency of a project identified from modeling.

Table 7-1: Benefits and Costs of Targeted Investigations Prior to Relief Design

Benefits	Costs
+ Verify site-specific flow conditions necessitate a project at all, potentially saving City budget if a project is eliminated, postponed, or reduced in scope + Determine level of risk of postponing a project if flow conditions are not as concerning as originally predicted/modeled + Verify presence or absence of surcharge evidence (rags, high water marks, high water levels) + Verify site-specific hydraulics for fine-tuned modeling, such as diameters or pipe inverts that could not be collected during initial manhole inspections	- Additional costs of performing field investigations, flow monitoring and any supplementary modeling - Delays timeline toward project completion if project is essential

7.3 Ongoing I/I Mitigation

The City of Manor is currently engaged in I/I mitigation efforts. It is important to note that the impacts of these I/I mitigation efforts could result in lower peak wet weather flows in the interceptors. If peak wet weather flows are reduced from what has been projected for this plan, then relief or upsizing projects may be delayed or avoided. To determine whether a relief project can be delayed or avoided, however, will require targeted, post-rehabilitation flow monitoring to confirm actual flow conditions after I/I reduction projects have been implemented.

7.4 Recommended Model Calibration Updates

As a wastewater system grows and improves, it is important that the associated hydraulic model accounts for such changes over time. The current calibration is not final and should be updated when new flow monitoring data becomes available. It is typically recommended that new flow monitoring data be collected and the hydraulic model re-calibrated at least once every five years.

Modeling a system such as Manor's is an ongoing, collaborative process to account for the dynamics of a growing city. Now that the model is fully developed, the City will have opportunities to re-calibrate the model to new flow meter data collected in the future. As the City performs I/I reduction projects, the future flow meter data will ideally reflect a reduction in I/I. This new flow meter data can be used to re-calibrate the model, which could in turn reduce modeled peak flows during storm events. If the modeled peak flows are reduced based on new flow data, then the flows used for sizing relief projects or new sewer projects may also be reduced accordingly. This would reduce expenses for the City by reducing required pipe sizes. Therefore, it is in the City's best interest to perform regular flow monitoring and re-calibration of the hydraulic model to ensure the most up-to-date information is being used to guide CIP decision making.

7.5 Project Summary

Table 7-2 and Figure 7-1 present a summary of all projects identified as part of this collection system master planning project. Further descriptions of the recommended projects are provided in the sections below. IDs for each project (e.g., "WW.00.01") are formatted such that the middle two digits represent the time horizon by which the project becomes necessary ("00" for present day, "05" for 5-year growth conditions, etc.), and the second two digits represent a unique project number for that time horizon. Though parts of the existing system are overloaded and need relief prior to the 15-year growth horizon, all sizing recommendations are based on the 15-year growth condition flows.

Table 7-2: Overall Project List

Project ID	Infrastructure Type	Time Horizon	Current CIP Project ID	Project Name	Type of Improvement	Pipe Diameter (in)[1]	Total Length of Pipe (ft)	Lift Station or WWTP Flow Rate (mgd)	Planning-Level Construction OPCC without Contingency	Capital Cost (30% Contingency, 20% Engr./Survey,)[3]
WW.00.01	Existing/Relief	Present Day	-	Llano St and Lampasas St Interceptors[2]	Exist. Gravity Relief/Upsizing	18"-36"	4,060	-	$3,405,040	$5,652,000
WW.00.02	Existing/Relief	Present Day	-	Pyrite Rd Gravity Sewer (upstream of LS06) - *I/I Mitigation Potential*	Exist. Gravity Relief/Upsizing	18"	930	-	$584,010	$911,000
WW.00.03	Existing/Relief	Present Day	CIP-4	US 290 Interceptor (Still Necessary even if LS06/08/09 are Decommissioned)	Exist. Gravity Relief/Upsizing	24"	2,030	-	$1,596,488	$2,491,000
WW.00.04	Existing/Relief	Present Day	-	Rehabilitation and I/I Mitigation in Existing Sewers	Rehabilitation	-	40,440	-	$7,279,200	$11,356,000
WW.05.01	Treatment	5-Year	S-31	Cottonwood WWTP Expansion Ph. 3 (Expansion from 0.4 to 0.6 MGD)	Exist. WWTP Expansion	-	-	0.2	$3,260,000	$5,086,000
WW.05.02	Treatment	5-Year	-	Wilbarger WWTP Expansion (Expansion from 1.33 to 2.0 MGD)	Exist. WWTP Expansion	-	-	0.67	$16,750,000	$26,130,000
WW.05.03	New/Extension	5-Year	S-36	Manor Springs Lift Station Improvements	New LS to Serve Growth	6"(F)	3,760(F)	0.5	$1,606,289	$2,506,000
WW.05.04	New/Extension	5-Year	S-23	Voelker Ln. Wastewater Improvements	New Gravity to Serve Growth	12"	6,560	-	$4,595,771	$7,169,000
WW.15.01	Treatment	15-Year	S-39/40/41	East Travis Regional WWTP	New WWTP to Serve Growth	-	-	1.5	$37,403,000	$58,349,000
WW.15.02	Existing/Relief	15-Year	Dev. Agr.	Lift Station 1 (Las Entradas) and O09-006_O09-005	Exist. LS Expansion	18"	260	-	$164,430	$257,000
WW.15.03	Existing/Relief	15-Year	S-18	West Cottonwood Creek Existing Interceptor	Exist. Gravity Relief/Upsizing	24"-27"	8,500	-	$8,236,967	$12,850,000
WW.15.04	Existing/Relief	15-Year	S-16	East Cottonwood Creek Existing Interceptor	Exist. Gravity Relief/Upsizing	27"-33"	3,070	-	$3,392,810	$5,293,000
WW.15.05	Existing/Relief	15-Year	-	FM973 Interceptor (Not Necessary if LS06 is Decommissioned)	Exist. Gravity Relief/Upsizing	18"	4,220	-	$2,658,600	$4,147,000
WW.15.06	New/Extension	15-Year	S-38	South Cottonwood Creek Wastewater Interceptor Improvements Phase 1[2]	New Gravity to Serve Growth	39"-45"	7,960	-	$15,366,210	$25,508,000
WW.15.07	New/Extension	15-Year	S-38	South Cottonwood Creek Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	36"	8,910	-	$13,811,117	$21,545,000
WW.15.08	New/Extension	15-Year	S-23	Willow Creek Wastewater and Lift Station Improvements	New Gravity/LS to Serve Growth	24"(G), 6"(F)	2,160(G/F)	0.65	$1,642,456	$2,562,000
WW.15.09	New/Extension	15-Year	-	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	24"	5,210	-	$5,424,105	$8,462,000
WW.15.10	New/Extension	15-Year	-	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	15"-21"	7,710	-	$6,455,271	$10,070,000
WW.15.11	New/Extension	15-Year	-	East US290 Wastewater Improvements	New Gravity to Serve Growth	15"	2,920	-	$2,219,654	$3,463,000
WW.15.12	New/Extension	15-Year	-	North Cottonwood Creek East Tributary Wastewater Interceptor Improvements	New Gravity to Serve Growth	15"-18"	8,480	-	$6,720,382	$10,484,000
WW.15.13	New/Extension	15-Year	-	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	27"	7,390	-	$8,791,977	$13,715,000
WW.15.14	New/Extension	15-Year	-	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	27"	3,590	-	$4,424,675	$6,902,000
WW.15.15	New/Extension	15-Year	-	Littig Rd. Wastewater Improvements[2]	New Gravity to Serve Growth	12"	8,510	-	$5,961,816	$9,897,000
WW.15.16	New/Extension	15-Year	-	North Cottonwood Creek Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	21"-24"	7,238	-	$7,379,755	$11,512,000
WW.15.17	New/Extension	15-Year	-	North Cottonwood Creek Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	12"-18"	10,367	-	$8,035,168	$12,535,000
WW.15.18	New/Extension	15-Year	-	South Wilbarger Creek Lift Station Improvements	New LS to Serve Growth	4"(F)	5,040(F)	0.25	$1,287,296	$2,008,000
WW.15.19	New/Extension	15-Year	-	Lift Station #6 (Stonewater) Decommissioning	New Gravity to Abandon LS	18"	3,300	-	$3,134,355	$4,890,000
WW.15.20	New/Extension	15-Year	-	Lift Station #8 (Presidential Glen Ph. 4B) Decommissioning	New Gravity to Abandon LS	12"	1,400	-	$1,281,253	$1,999,000
WW.15.21	New/Extension	15-Year	-	Lift Station #9 (Presidential Heights) Decommissioning	New Gravity to Abandon LS	12"	500	-	$650,448	$1,015,000

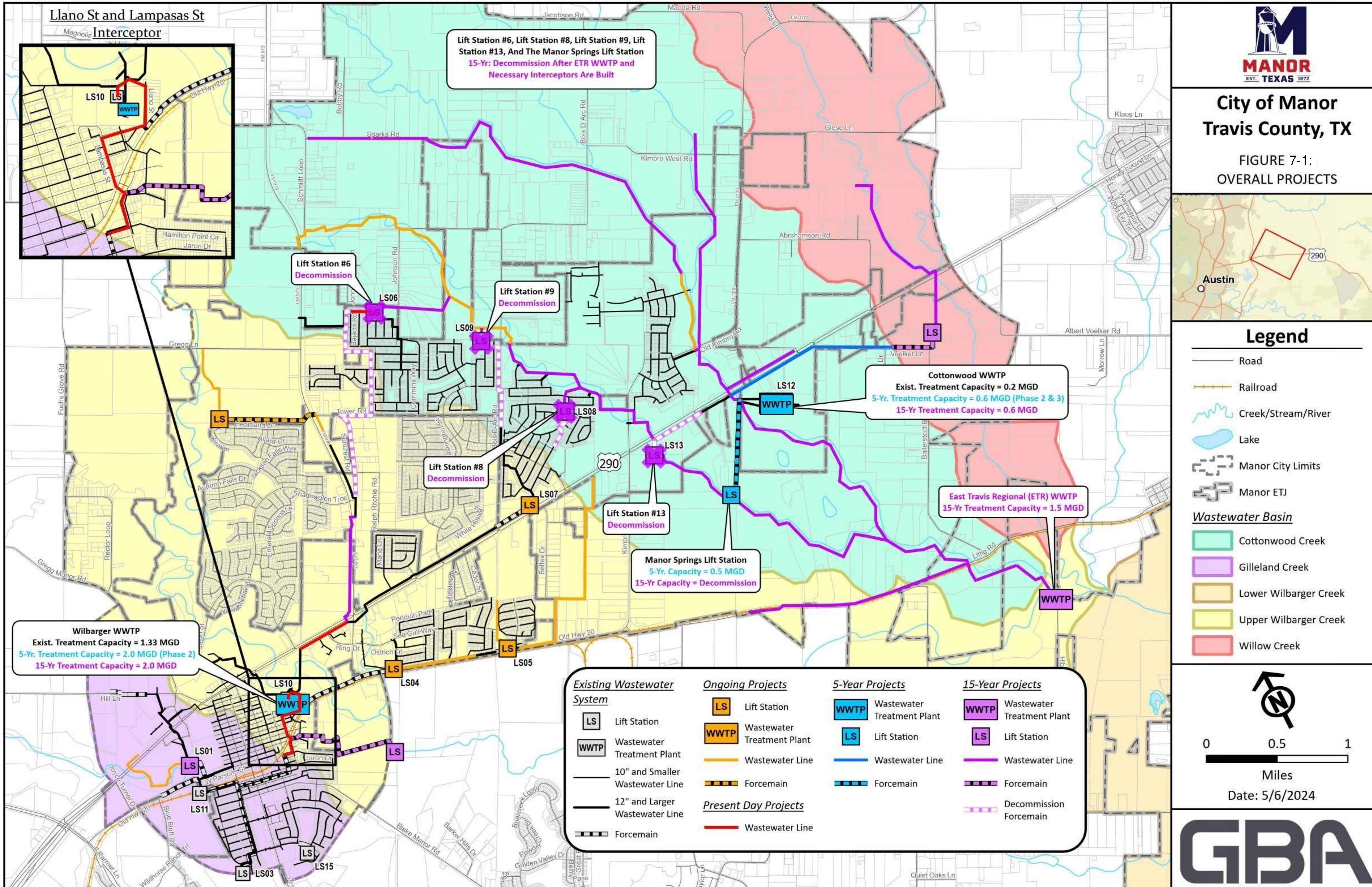
Notes:

1) For pipe diameters and lengths, gravity main is assumed, except where (F) indicates force main, and (G) indicates gravity main.
2) Select projects include an additional 10% contingency for railroad crossings to account for additional costs (permitting, extra boring length, etc.).
3) For new/extension projects not within the ROW or an exisitng easement, a unit cost of $87,900/acre was utilized for easement cost estimates.
The easement unit cost includes survey, easement acquisition, engineering fees, condemnation/attorney fees, and ROW agent fees.

LS06, LS08, and LS09 are recommended to be decommissioned and re-routed by gravity towards East Travis Regional WWTP once it is built. This reduces burden on Wilbarger WWTP and the FM973 interceptor, and reduces LS O&M costs.

Projects Not Included: The above list does not include Bell Farms LS upgrades (LS04), Carriage Hills LS or interceptor upgrades, Cottonwood Cr. WWTP Ph. 2 expansion to 0.4 MGD (developer-funded), or other projects currently in-progress.

Time Horizon	Capital Cost
Present Day	$ 20,410,000
5-Year	$ 40,891,000
15-Year	$ 227,463,000
Total, All Projects	**$ 288,764,000**



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7.6 Present Day Projects

Present day projects (those requiring attention under existing conditions) are presented in Figure 7-2, along with ongoing projects. Further description of present-day projects is provided below.

Llano St. and Lampasas St. Interceptor (WW.00.01)

The Llano St. and Lampasas St. Interceptor was predicted to severely surcharge under peak wet weather flows during the existing system design storm model run. It is recommended as the top priority relief project due to the higher risk of overflow (Refer to Section 7.9 for more information outlining the methodology in prioritizing relief-type projects). The 4,060 ft stretch of pipe runs through Old Manor, from the terminus of the LS03 and LS11 combined force main, to the Wilbarger WWTP, making it a crucial segment of sewer in Old Manor. The interceptor currently has pipe sizes ranging from 12” – 24” and is proposed to be upsized to 18” – 36” diameter pipes to adequately convey peak flows.

Pyrite Rd. Interceptor (WW.00.02)

The Pyrite Rd. Interceptor was shown to severely surcharge in the existing system design storm model. The stretch of pipe that is proposed to be improved is approximately 930 ft in length and serves Manor High School and portions of the Stonewater subdivision (Figure 7-2). The existing pipe segment has a 12” diameter and is proposed to be upsized to 18” based on modeling results.

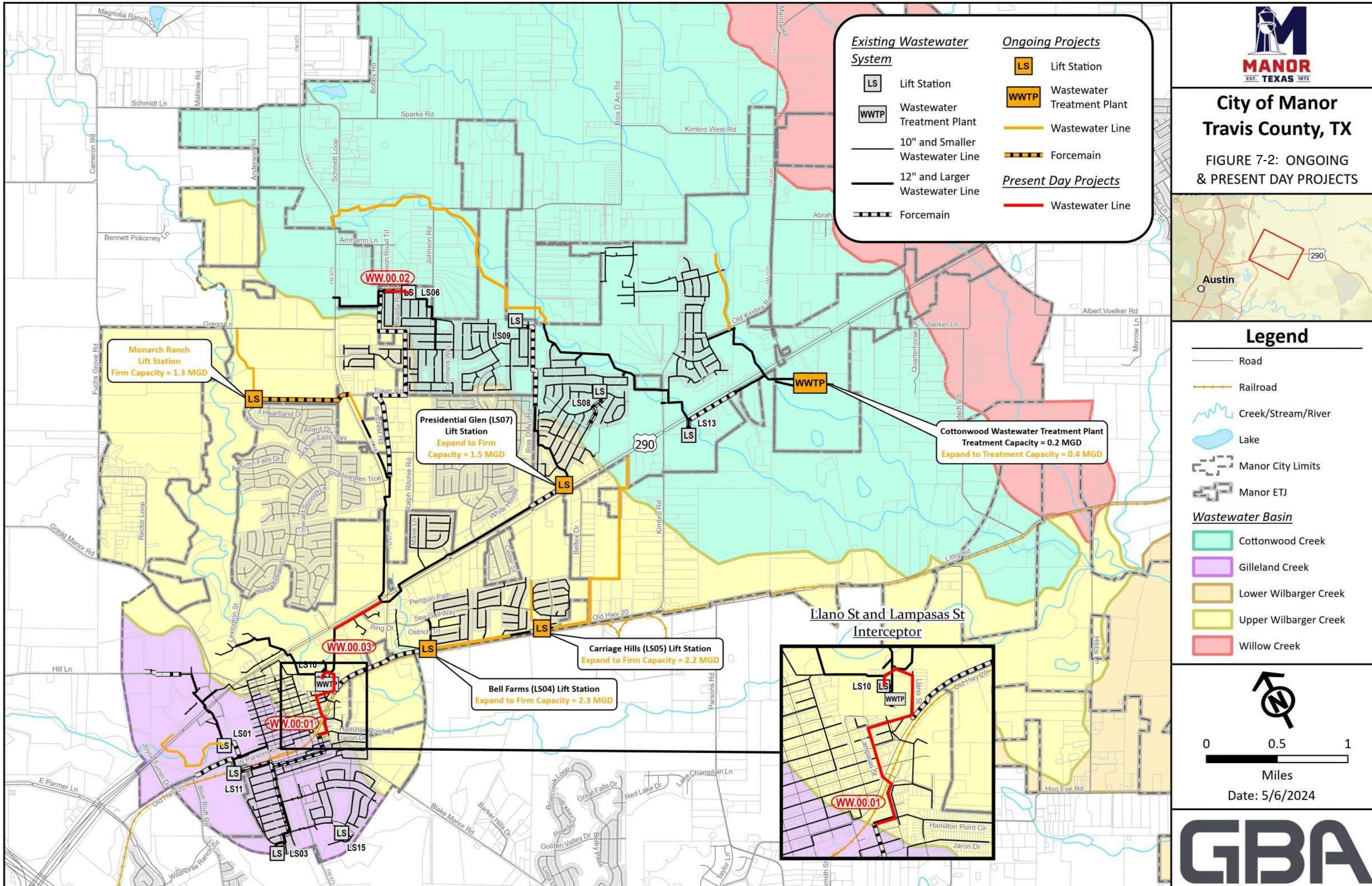
This project may be avoided or delayed if I/I mitigation efforts are successful in Basin 10. Fall 2022 flow data for meter basin 10 informed the model calibration for this portion of the system, and this flow meter basin demonstrated abnormally high peaks during Fall 2022 storm events. If peak flows in this basin are reduced through I/I mitigation efforts and future flow monitoring confirms this, a project along Pyrite Rd. may be avoided.

US-290 Interceptor (WW.00.03)

The US-290 Interceptor was shown to have undersized pipes and moderate surcharging in the existing system design storm model. The stretch of pipe that is proposed to be improved is approximately 2,090 ft in length and conveys flows from FM973, Presidential Heights, Presidential Glen, and Greenbury to the Wilbarger WWTP (Figure 7-2). The existing pipe has diameters ranging from 12” – 15” and is proposed to be upsized to 24”.

Rehabilitation and I/I Mitigation in Existing Sewers (WW.00.04)

The City is committed to rehabilitating its existing gravity sewers and mitigating I/I. Potential rehabilitation methods include Cured-in-Place Pipe (CIPP), pipe bursting, and manhole lining, depending on condition. For a planning-level estimate of possible rehabilitation costs, it was assumed that one third of the total sewer line in the seven high-risk basins (1, 2B, 3, 4, 8, 10, and 13) identified during I/I investigations will need rehabilitation, roughly 40,000 LF. A unit cost of $180/LF of pipe rehabilitated was used, which is estimated from past I/I reduction projects GBA has designed and observed.



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7.7 5-year Projects

Five-year projects (projects requiring attention under 5-year growth conditions) are presented in Figure 7-3. Further description of 5-year projects is provided below.

Cottonwood WWTP Expansion Ph. 3 (WW.05.01)

Phase 3 of the Cottonwood Creek WWTP expansion will increase its capacity to 0.6 MGD. This phase, along with Phase 2, is crucial within the next five years to accommodate anticipated population growth in the Cottonwood Creek Basin. The Cottonwood Creek WWTP will play a vital role in phasing in the larger East Travis Regional WWTP. Its strategic location upstream of the proposed regional plant allows for operational flexibility during peak events or plant maintenance. It is recommended that Cottonwood Creek WWTP continues operating until the East Travis Regional WWTP achieves adequate capacity and redundancy. Additionally, Phase 3 expansion will enable the City to postpone construction of the regional plant until average daily flows are close to surpassing 0.6 MGD. Completion of the regional facility is expected to eliminate the need for Phase 4 expansion of the Cottonwood Creek WWTP.

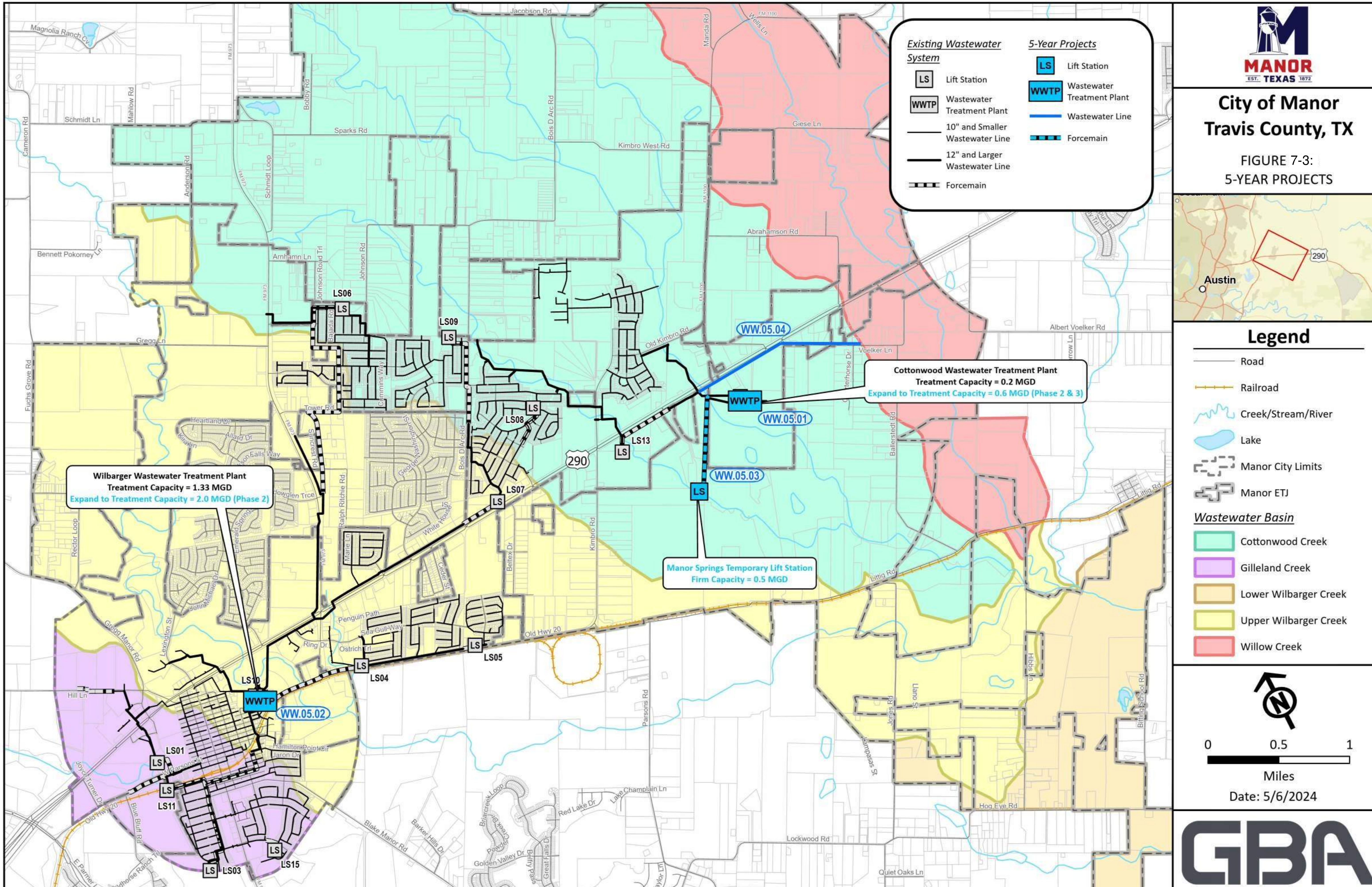
Wilbarger WWTP Expansion Ph. 2 (WW.05.02)

Phase 2 expansion of the Wilbarger WWTP, which would increase capacity from 1.33 MGD to 2.0 MGD, is crucial for keeping pace with projected growth. Current average daily flows to the plant are approximately 75% of the current capacity. The TCEQ Chapter 217 Rules mandate that expansion design begins at 75% capacity and construction starts at 90%. While the current design allows for efficient expansion to 2.0 MGD, further expansion beyond 2.0 MGD would incur significantly higher costs due to the need for increased capacity in ancillary systems, potential permit amendments, and land acquisition. Any opportunity to delay or avoid expansion beyond 2.0 MGD would be advantageous due to these factors.

Extension Projects Summary

There are two future extension projects proposed for the five-year time horizon. The Manor Springs Lift Station (WW.05.03) is proposed due to developer interest in the parcels located north of Littig Rd and east of Old Kimbro Rd. This lift station would be required to provide wastewater service to these parcels and temporarily convey flows to the Cottonwood Creek WWTP. The other five-year extension project includes a 12" gravity extension to serve development along Voelker Ln. and East US-290 (WW.05.04). For a summary of all extension projects, please see Table 7-4.

Two projects identified in the 5-year design storm modeling are either fully designed or being constructed. Therefore, these projects are not being added to the recommended project list for this master plan. They include the Old Hwy 20 Interceptor and LS04 (Bell Farms), both of which serve the Bell Farms and Carriage Hills subdivisions. These sewers and lift stations were shown to be undersized in the 5-year growth condition model, and are currently being addressed as part of ongoing projects.



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7.8 15-year Projects

Fifteen-year projects (projects requiring attention under 15-year growth conditions) are presented in Figure 7-4. Further description of 15-year projects is provided below.

East Travis Regional WWTP (WW.15.01)

The East Travis Regional WWTP is crucial for accommodating future growth in Manor's eastern areas. It is proposed near the intersection of Littig Road and Ballerstedt Road, at the confluence of Cottonwood Creek, Wilbarger Creek, and Willow Creek drainage basins. This WWTP has been conceptualized as part of previous studies and included in the city's recent 10-year wastewater CIP. This plant will serve a larger area than the current Cottonwood Creek WWTP, potentially allowing the City to phase out or repurpose the Cottonwood Creek WWTP. An initial capacity of 1.5 MGD is assumed for the first phase of the regional plant, but additional capacity beyond 1.5 MGD may be required soon after the 15-year time horizon, depending on actual growth conditions.

LS01 Expansion (WW.15.02)

LS01, also referred to as the "Old High School" or "Las Entradas" Lift Station, was shown to be undersized in the 15-year growth conditions model. The 15-year free flow model scenario shows that if this lift station is upsized, then the pipe immediately downstream of the lift station, O09-006_O09-005, may be undersized due to the increase in flow. The downstream pipe currently has a diameter of 12" and it is recommended to be upsized to a diameter of 18". As previously stated, there is an agreement with the developer that states that they are responsible for the expansion of this lift station.

West Cottonwood Creek Interceptor (WW.15.03)

The West Cottonwood Creek Interceptor was predicted to surcharge during the 15-year growth conditions model run. The 8,050 ft stretch of existing pipe receives flows from the West portion of the Cottonwood Creek basin north of US-290 and flows into LS13 before being pumped east to the Cottonwood Creek WWTP (Figure 7-4). The interceptor currently has pipe sizes ranging from 12" – 18" and is proposed to be upsized to 24" – 27" diameter pipes to convey future flows.

East Cottonwood Creek Interceptor (WW.15.04)

The East Cottonwood Creek Interceptor was predicted to undergo surcharging during the 15-year growth conditions model run. The 3,070 ft stretch of pipe receives flows from the East portion of the Cottonwood Creek Basin north of US-290 (Figure 7-4). The interceptor currently has pipe sizes ranging from 12" – 21" and is proposed to be upsized to 27" – 33" diameter pipes to convey future flows.

FM973 Interceptor (WW.15.05)

The FM973 Interceptor was shown to have undersized pipes and flooding in the 15-year growth conditions model. The stretch of pipe that is proposed to be improved is approximately 4,220 ft in length and receives and conveys flows from Stonewater, Manor High School, and other growth areas along FM973 (Figure 7-4). The existing pipe segment has a diameter of 15” and is proposed to be upsized to 18”.

IMPORTANT: If LS06 (Stonewater) is decommissioned and its flows are rerouted to the proposed East Travis Regional Plant, the FM973 improvements may not be necessary within the planning window of this study, based on modeling results and growth assumptions.

Extension Projects Summary

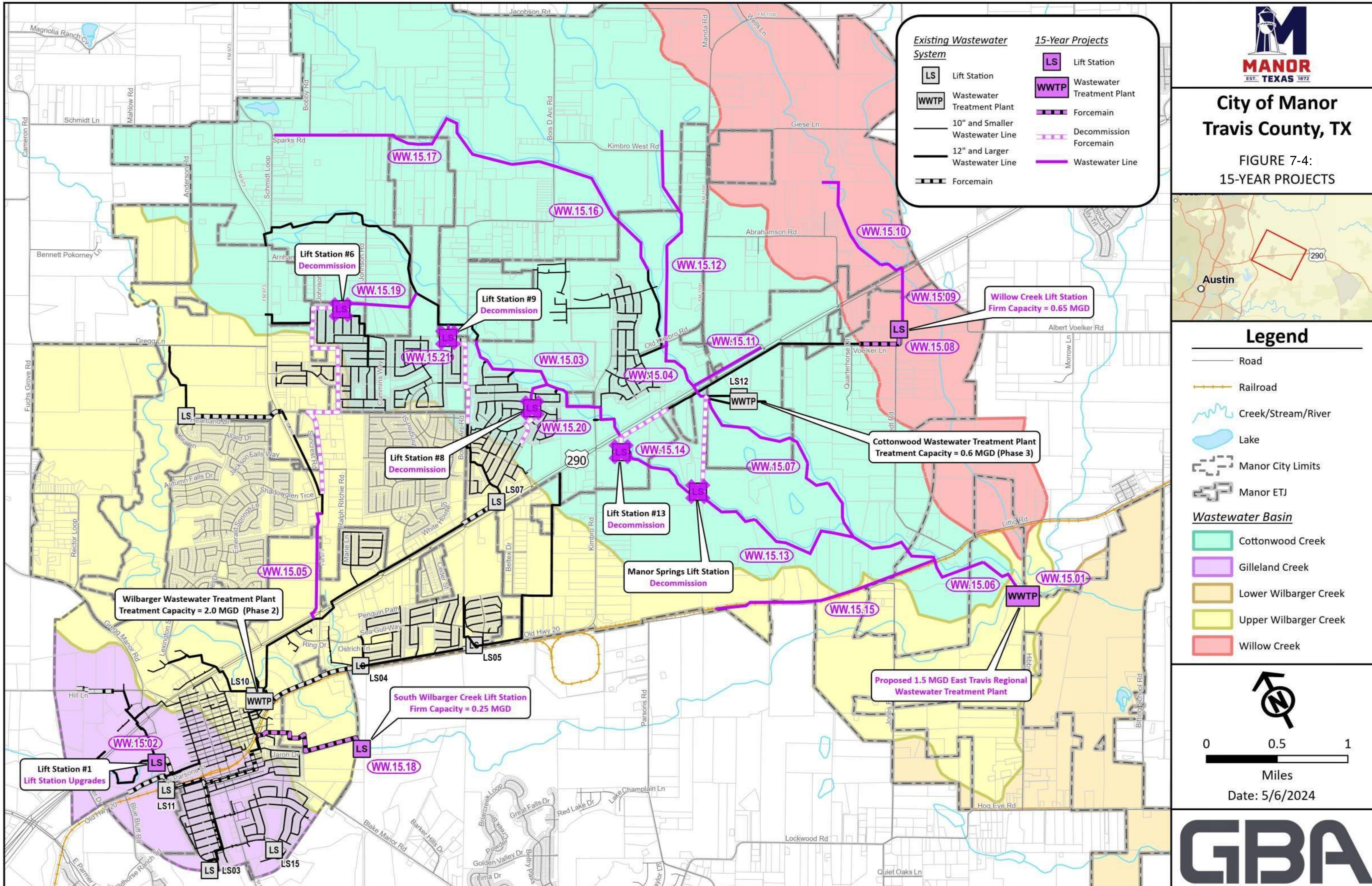
A majority of the 15-year extension projects are located in the Cottonwood Creek basin due to anticipation of growth in the eastern portions of the City. These projects include approximately 70,000 LF of gravity sewer extensions to serve new growth. In addition, lift stations 6, 8, and 9 are proposed to be decommissioned to alleviate pressure on the Wilbarger WWTP and reduce operational costs, rerouting flows by gravity to the East Travis Regional WWTP (WW.15.19 – WW.15.21). LS13 and the Manor Springs Lift Station and are also proposed to be decommissioned by the 15-year time horizon, assuming the East Travis Regional WWTP and the necessary gravity interceptors are built to allow for decommissioning (WW.15.01, WW.15.06, WW.15.13, WW.15.14).

Growth anticipated in the Willow Creek basin may necessitate the construction of approximately 13,000 LF of gravity interceptor and a roughly 0.65 MGD lift station (WW.15.08, WW.15.09, WW.15.10).

Approximately 8,500 LF of gravity sewer is proposed to serve development along Littig Rd and Kimbro Rd and ultimately convey flows to East Travis Regional WWTP via the South Cottonwood Creek Interceptor (WW.15.15).

The South Wilbarger Creek Lift Station is proposed to serve the southwest portion of the Upper Wilbarger Creek basin within city limits, with an associated capacity of roughly 0.25 MGD (WW.15.18).

For a summary of all extension projects, please see Table 7-4.



G:\15320\GIS\WWMP Report Figures\15320_ReportFigures.aprx

7.9 Relief Project Prioritization

Relief-type projects for existing interceptors were prioritized based on various factors, such as the number of manholes meeting critical surcharge criteria, total flood loss, and the maximum ratio of 15-year free flow capacity to the existing pipe's full flow capacity. Table 7-3 presents these factors for each relief-type project, which were then ranked within each time horizon. Future extension projects were not prioritized in this way because they were not modeled and are heavily driven by development demands. Relief-type projects are more dependent on modeling results and the condition and capacity of existing interceptors. Extension-type projects should proceed as development requires them, while relief-type projects should proceed after modeling and monitoring confirm increased capacity risks in the existing sewers.

Table 7-3: Existing Infrastructure Project Prioritization

Project ID	Project Name	Time Horizon	Total Flood Volume(1) (MG)	No. of MHs Exceeding Surcharge Criteria(1)	Max. 15-year Free Flow-to-Existing Capacity Ratio	Relief Project Priority Rank
WW.00.01	Llano/Lampasas St Interceptor	Present Day	0	6	4.0	1
WW.00.02	Pyrite Rd Interceptor	Present Day	0	7	2.3	2
WW.00.03	US-290 Interceptor	Present Day	0	1	4.0	3
WW.15.03	West Cottonwood Creek Interceptor	15-year	0.08	20	2.7	4
WW.15.02	FM973 Interceptor	15-year	0.07	12	1.3	5
WW.15.04	East Cottonwood Creek Interceptor	15-year	0	7	2.9	6
WW.15.01	Lift Station 1 Expansion	15-year	N/A	N/A	N/A	7

(1): Data presented is derived from the model corresponding to the designated time horizon for each project.

IMPORTANT: *Actual order of project implementation will depend on actual growth conditions and confirmation of project needs based on flow monitoring and investigation.*

7.10 Extension Projects Summary

Table 7-4 provides further description of extension-type projects conceptualized for the plan. Extension-type projects are those that extend City sewer service out beyond current service limits with new interceptors, lift stations, and force main. These projects are primarily development and growth driven.

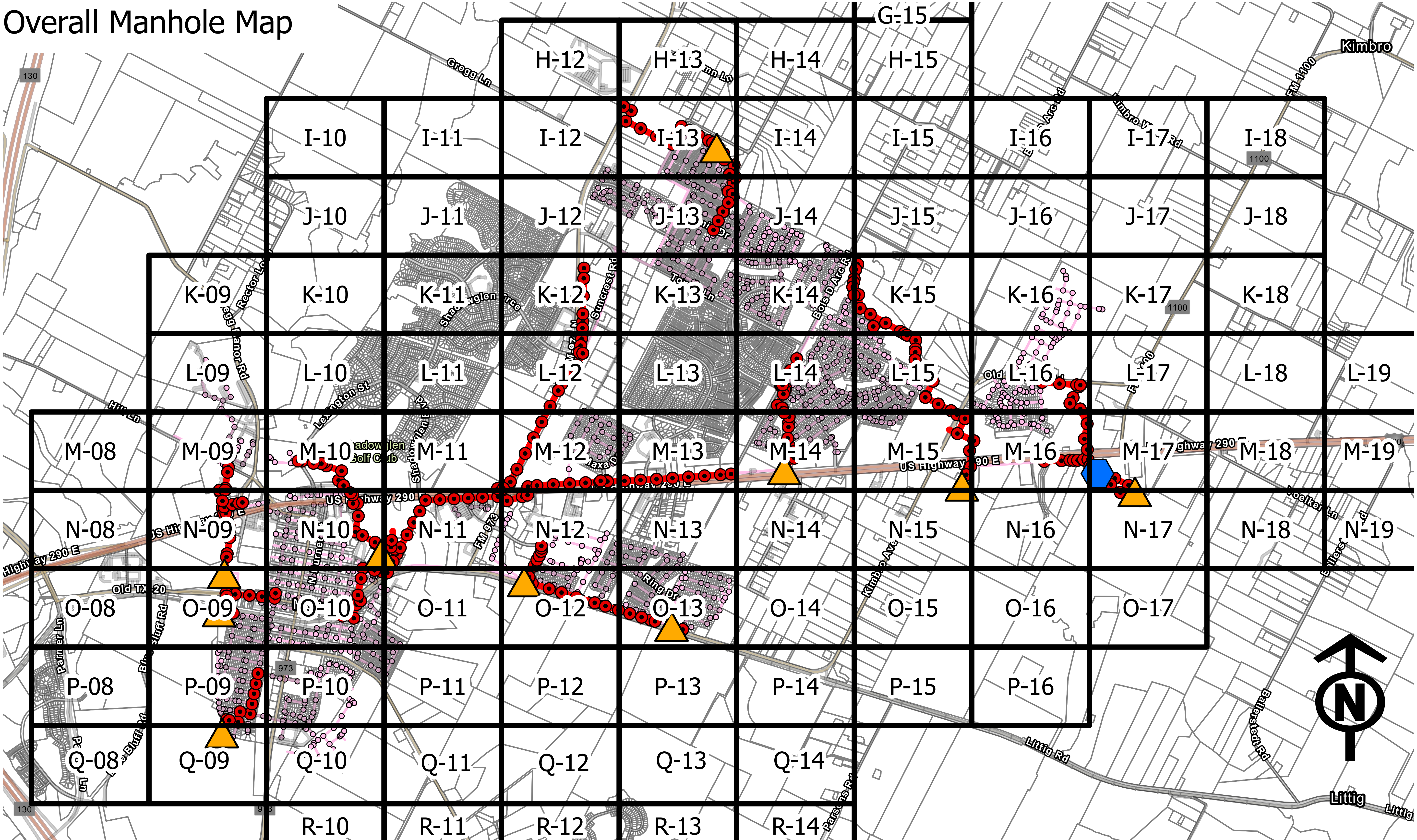
Table 7-4: Extension Projects Summary

Project ID	Project Name	Time Horizon	Project Description
WW.05.03	Manor Springs Lift Station Improvements	5-year	This project includes a temporary 0.5 MGD Lift Station and a 12" Forcemain that will discharge into the Cottonwood Creek Wastewater Interceptor. Flows will go the Cottonwood Creek WWTP until the East Travis Regional WWTP is built. The temporary Lift Station will be decommissioned once the East Travis Regional WWTP and wastewater interceptors are built.
WW.05.04	Voelker Ln. Wastewater Improvements	5-year	This project includes a 12" Gravity Main that will discharge into the Cottonwood Creek Wastewater interceptor. This wastewater line will serve development along Voelker Ln. and East US-290.
WW.15.06	South Cottonwood Creek Wastewater Interceptor Improvements Phase 1	15-year	This interceptor includes a 39", 42" and 45" Gravity Main in the Cottonwood Creek basin. The interceptor will run from the Cottonwood Creek WWTP to the East Travis Regional WWTP.
WW.15.07	South Cottonwood Creek Wastewater Interceptor Improvements Phase 2	15-year	This interceptor includes a 36" Gravity Main in the Cottonwood Creek basin. The interceptor will run from the Cottonwood Creek WWTP to the East Travis Regional WWTP.
WW.15.08	Willow Creek Lift Station Improvements	15-year	This project includes a temporary 0.65 MGD Lift Station, a 6" Forcemain, and a 27" Gravity Main that will discharge into the Cottonwood Creek Wastewater Interceptor. Flows will go the Cottonwood Creek WWTP until the East Travis Regional WWTP is built. The temporary Lift Station will be decommissioned once the East Travis Regional WWTP and wastewater interceptors are built.
WW.15.09	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 1	15-year	This interceptor includes a 24" Gravity Main in the Willow Creek basin. The interceptor will connect to the temporary Willow Creek Lift Station.
WW.15.10	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 2	15-year	This interceptor includes a 15", 18", and 21" Gravity Main in the Willow Creek basin.
WW.15.11	East US-290 Wastewater Improvements	15-year	This project includes a 15" Gravity Main on the Cottonwood Creek basin. This wastewater will serve development along East US-290.
WW.15.12	North Cottonwood Creek East Tributary Wastewater Interceptor Improvements	15-year	This interceptor includes a 15" and 18" Gravity Main in the Cottonwood Creek basin.
WW.15.13	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 1	15-year	This interceptor includes a 27" Gravity Main in the Cottonwood Creek basin. The interceptor will connect to the North Cottonwood Creek West Tributary Wastewater Interceptor and relieve flows going to the Cottonwood Creek WWTP. This project will also include the decommissioning of the Manor Springs Lift Station after completion of this interceptor.
WW.15.14	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 2	15-year	This interceptor includes a 27" Gravity Main in the Cottonwood Creek basin. This project will also include the decommissioning of Lift Station #13 after completion of this interceptor.
WW.15.15	Littig Rd. Wastewater Improvements	15-year	This project includes a 12" Gravity Main that will discharge into the South Cottonwood Creek Interceptor. This wastewater main will serve development along Littig and Kimbro Rd.
WW.15.16	North Cottonwood Creek Wastewater Interceptor Improvements Phase 1	15-year	This interceptor includes a 21" and 24" Gravity Main in the Cottonwood Creek basin.
WW.15.17	North Cottonwood Creek Wastewater Interceptor Improvements Phase 2	15-year	This interceptor includes a 12" and 18" Gravity Main in the Cottonwood Creek basin.
WW.15.18	South Wilbarger Creek Lift Station Improvements	15-year	This project includes a 0.25 MGD Lift Station and a 4" Forcemain serving the south western portion of the Upper Wilbarger Creek basin within city limits.
WW.15.19	Lift Station #6 Decommissioning	15-year	This project includes decommissioning Lift Station #6 and a 18" Gravity Main connecting to the North Cottonwood Creek West Tributary Interceptor.
WW.15.20	Lift Station #8 Decommissioning	15-year	This project includes decommissioning Lift Station #8 and a 12" Gravity Main connecting to the North Cottonwood Creek West Tributary Interceptor.
WW.15.21	Lift Station #9 Decommissioning	15-year	This project includes decommissioning Lift Station #9 and a 12" Gravity Main connecting to the North Cottonwood Creek West Tributary Interceptor.

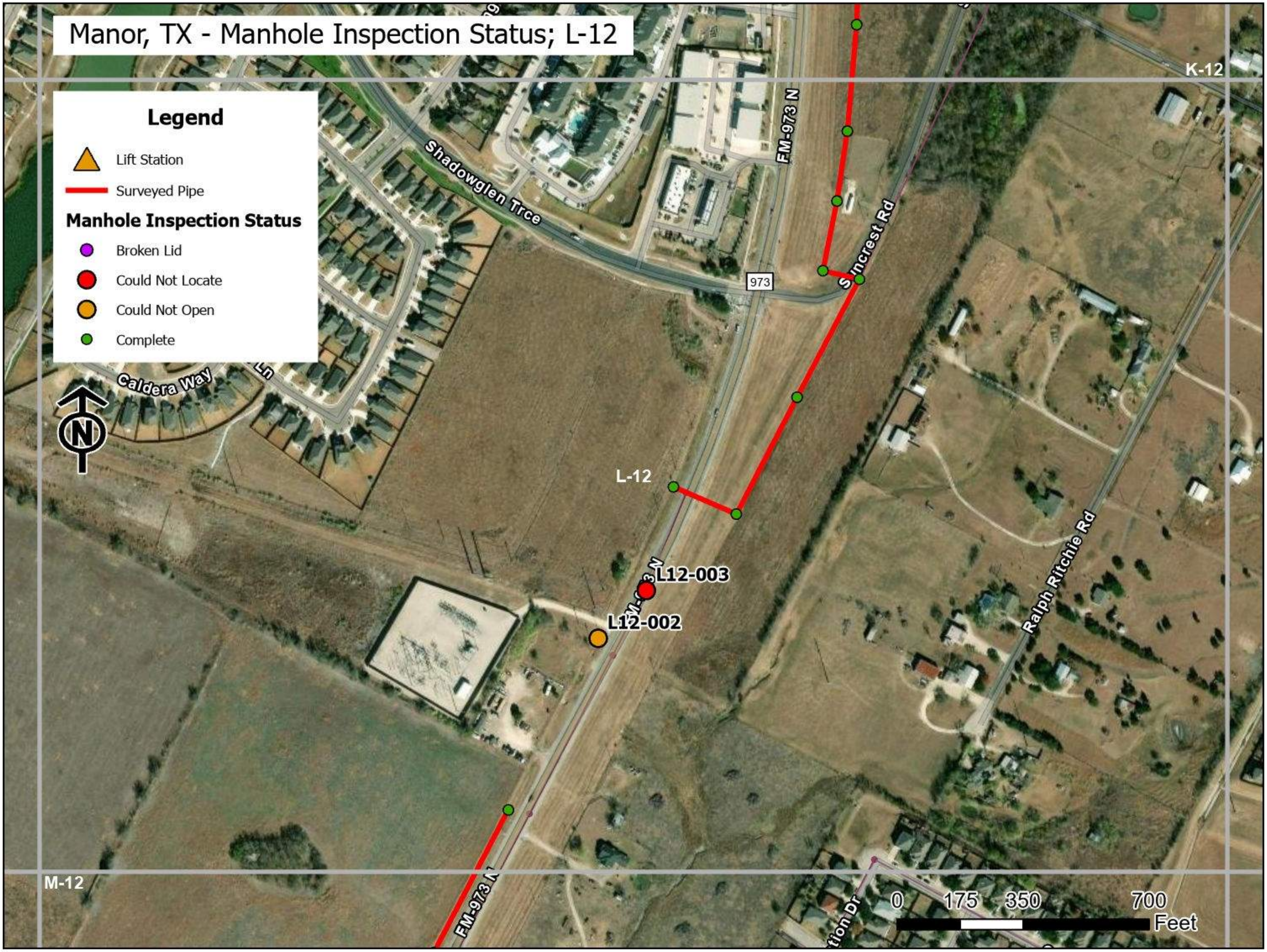
Appendix A: Manhole Survey Summary Maps

Manor, TX - Manhole Survey Inspection Status

Overall Manhole Map

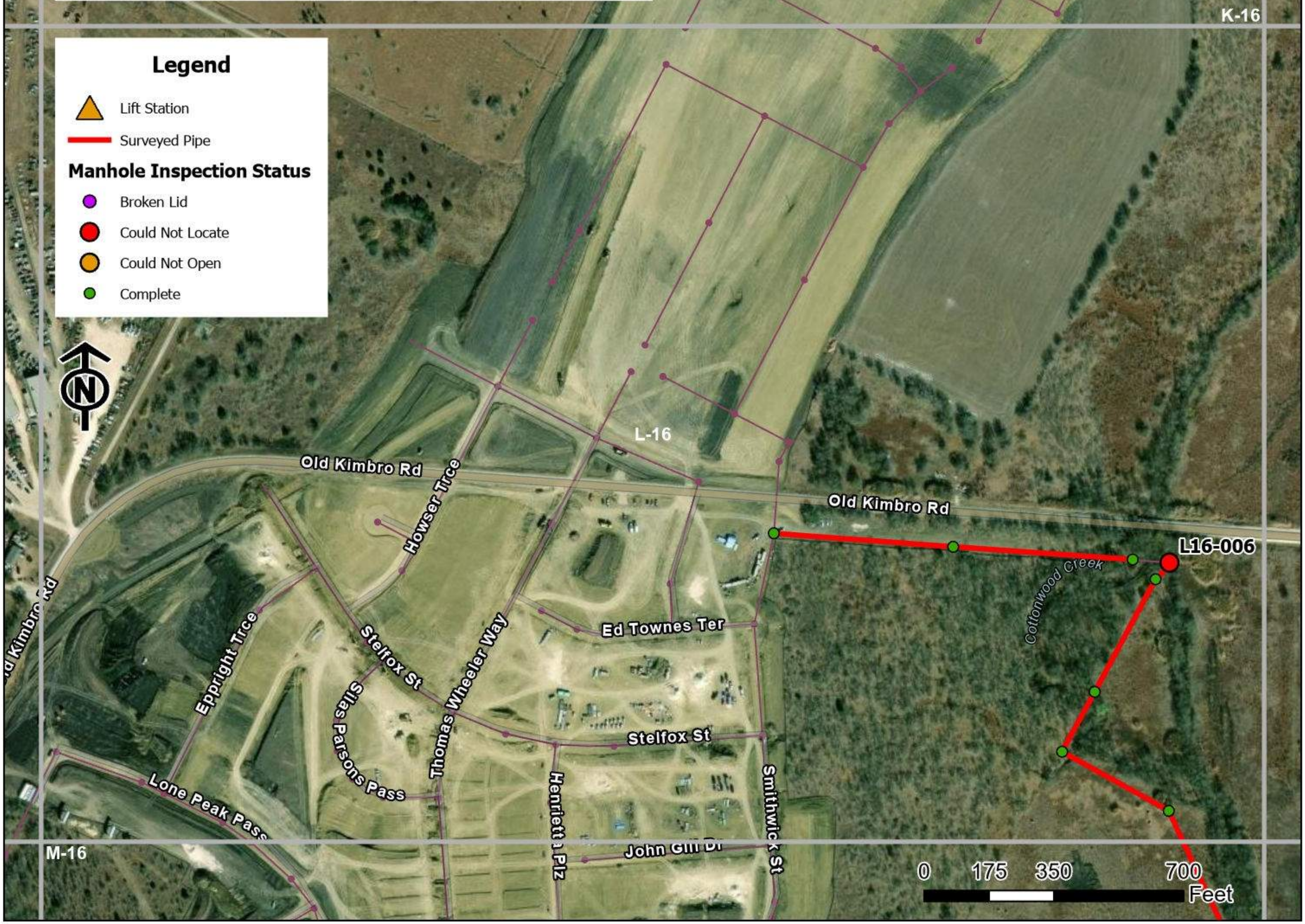


Manor, TX - Manhole Inspection Status; L-12

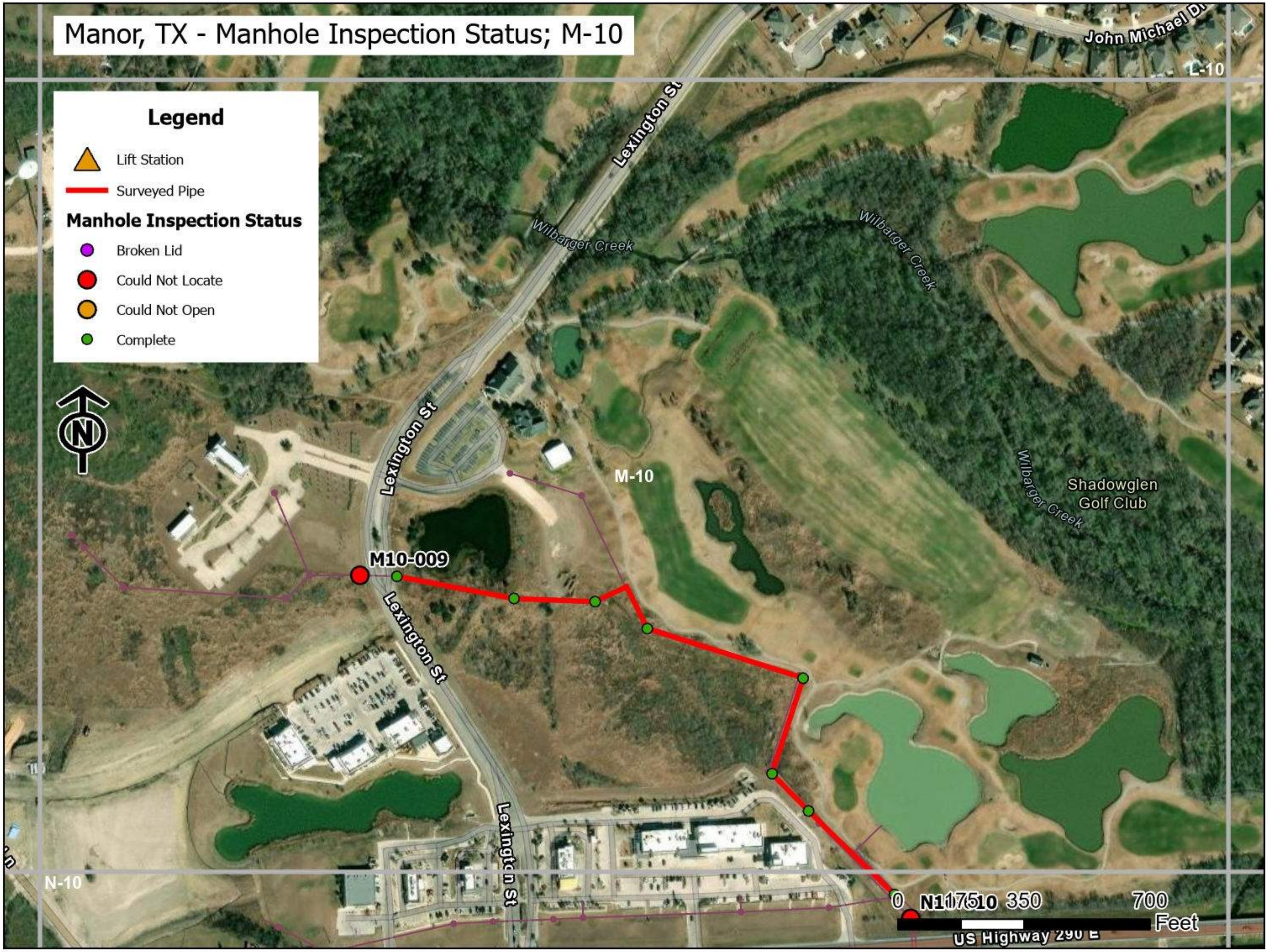



Manor, TX - Manhole Inspection Status; L-14
Legend
Lift Station
Surveyed Pipe
Manhole Inspection Status
Broken Lid
Could Not Locate
Could Not Open
Complete
N
L14-032
L-14
K-14
M-14
Tower Ln
Lady Bird Johnson St
Bois D Arc Rd
Inaugural St
Rushmore St
Paseo de Presidente Blvd
Henry A Wallace Ln
Hubert R Humphrey Rd
Andrew Jackson
Per Lange Pass
Andrew Johnson St
Ellary Ln
Revolutionary Trl
1st Lady St
Abraham Lincoln St
Smith Gin St
James Manor St
WT Galaway
0 175 350 700
Feet

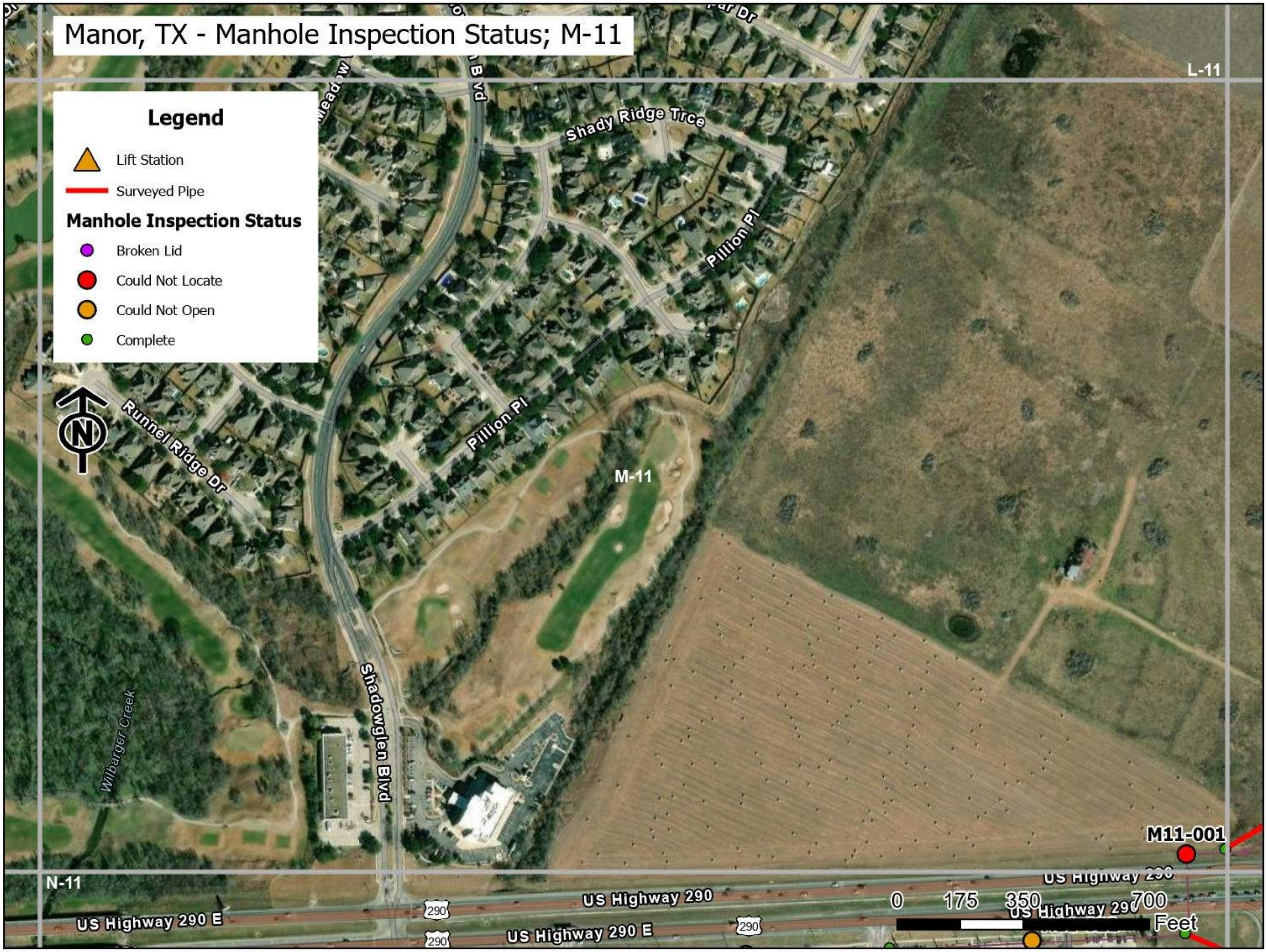
Manor, TX - Manhole Inspection Status; L-16



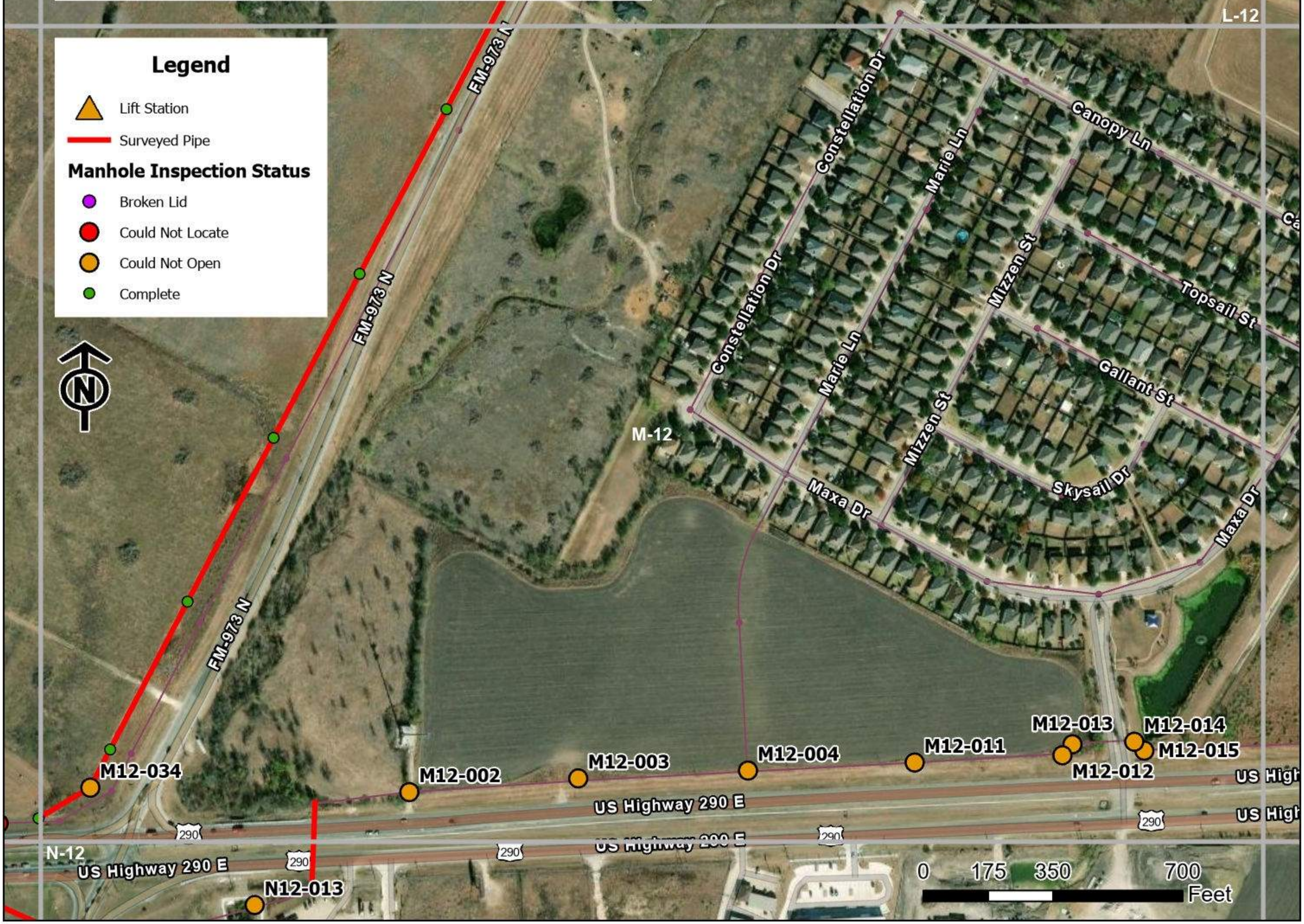
Manor, TX - Manhole Inspection Status; M-10



Manor, TX - Manhole Inspection Status; M-11

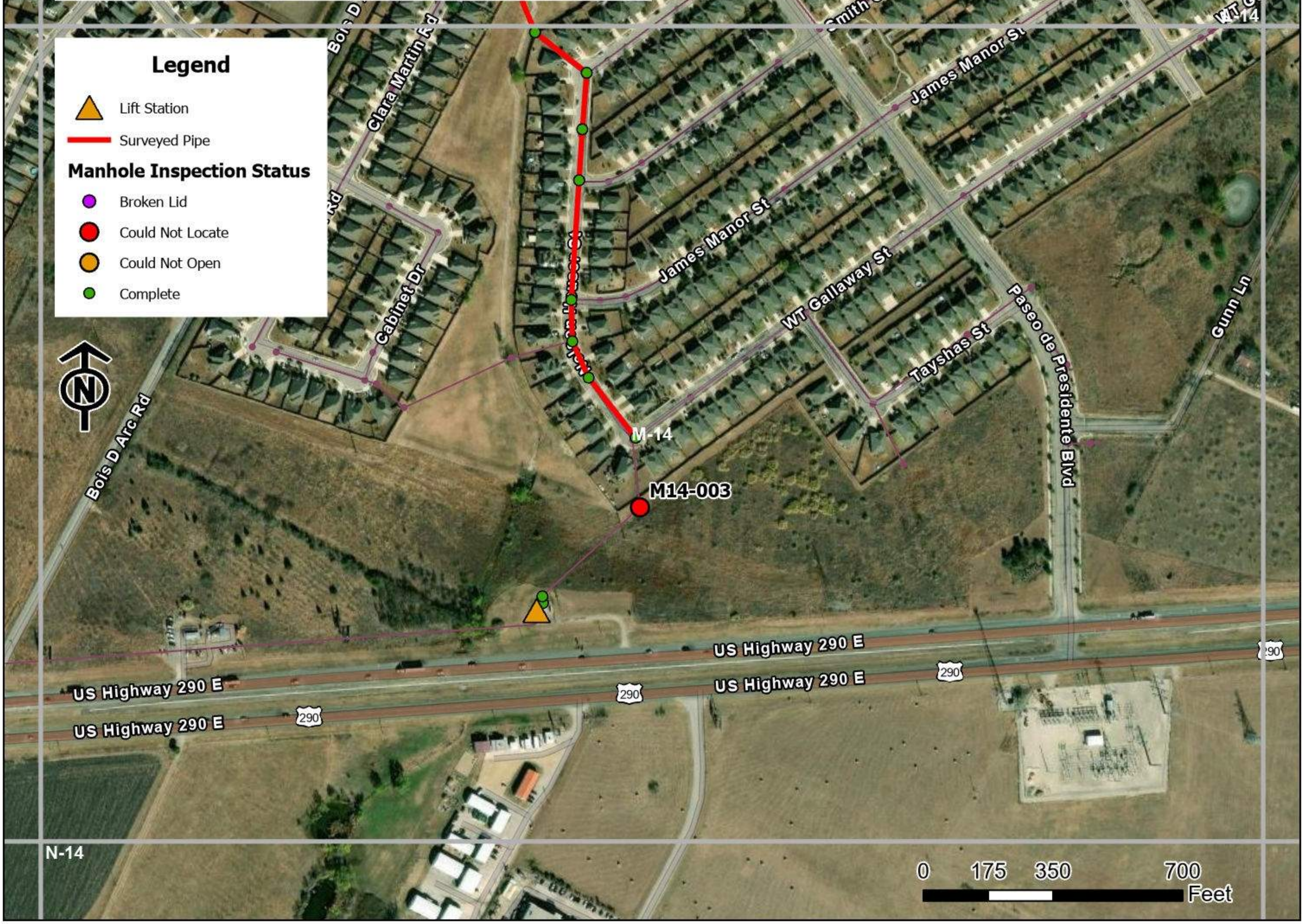


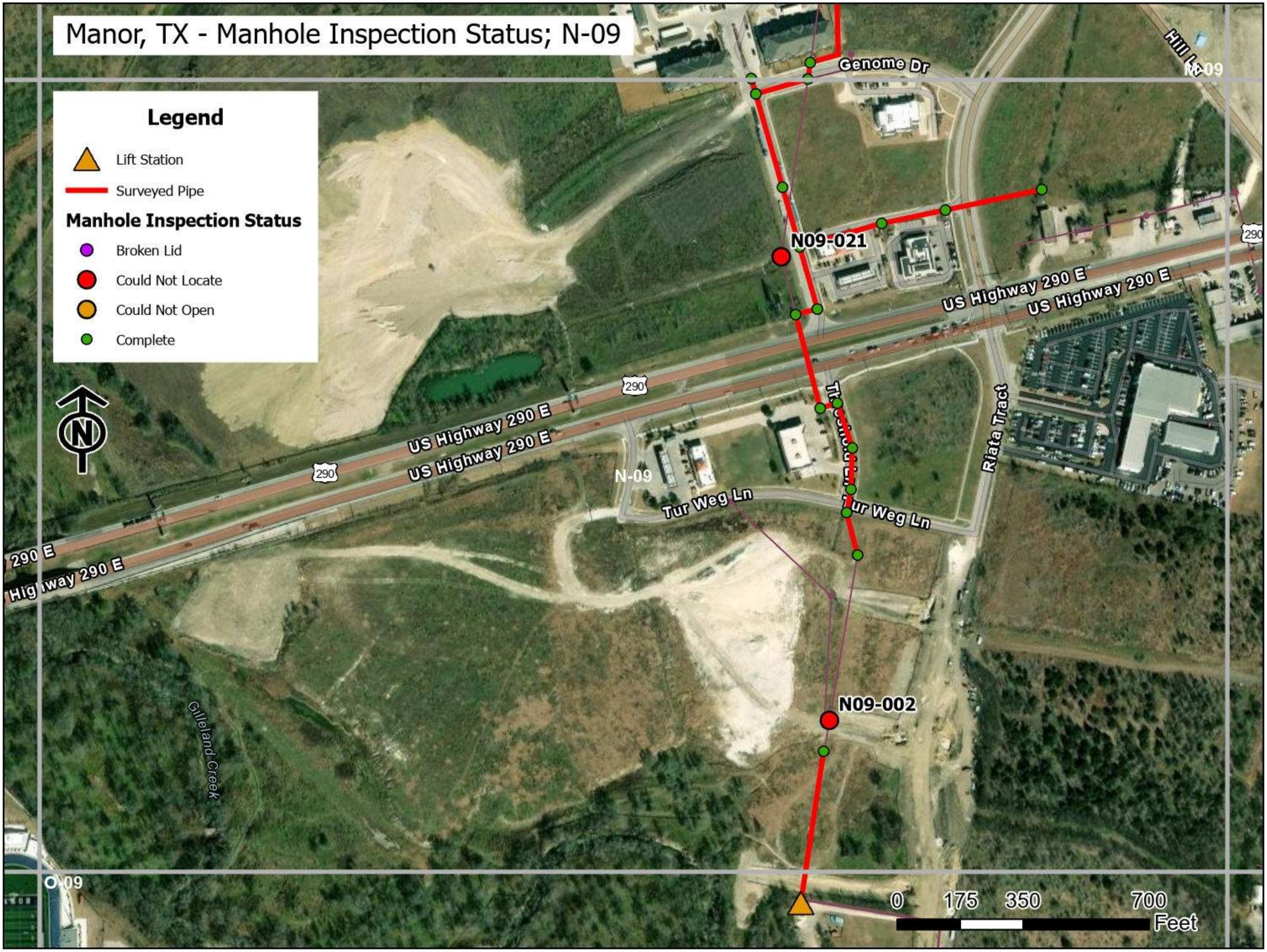
Manor, TX - Manhole Inspection Status; M-12



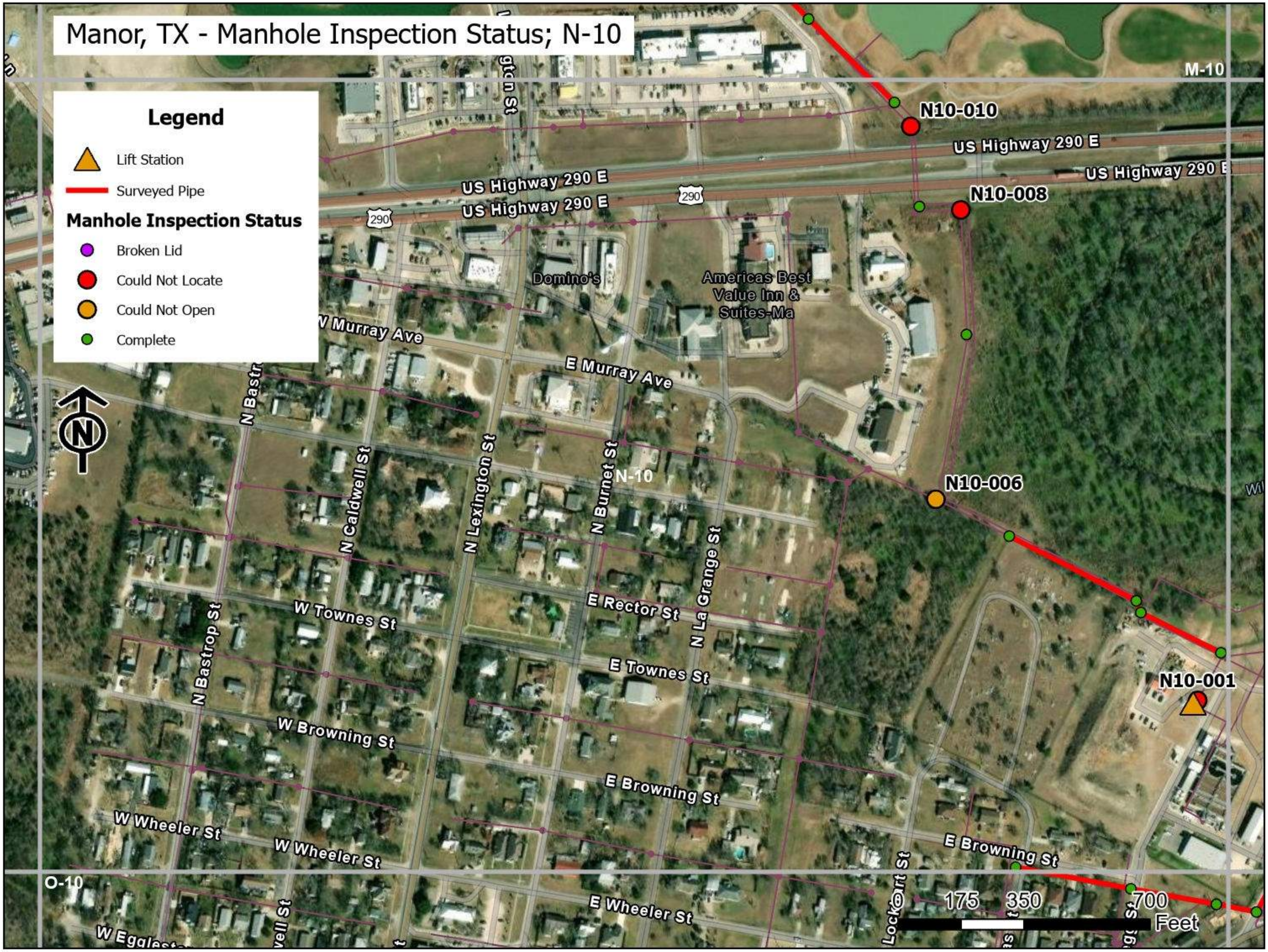
Manor, TX - Manhole Inspection Status; M-13

Manor, TX - Manhole Inspection Status; M-14



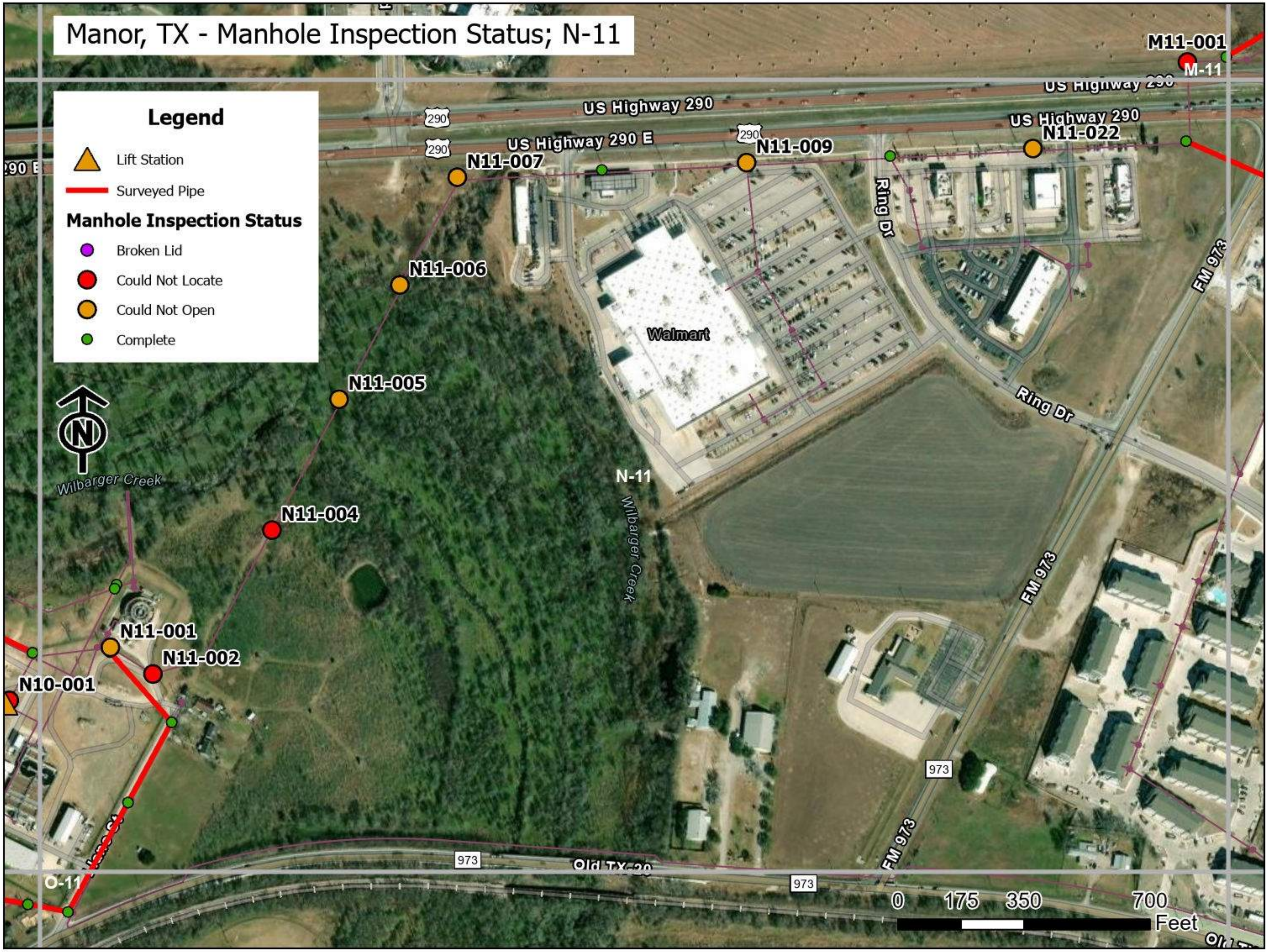


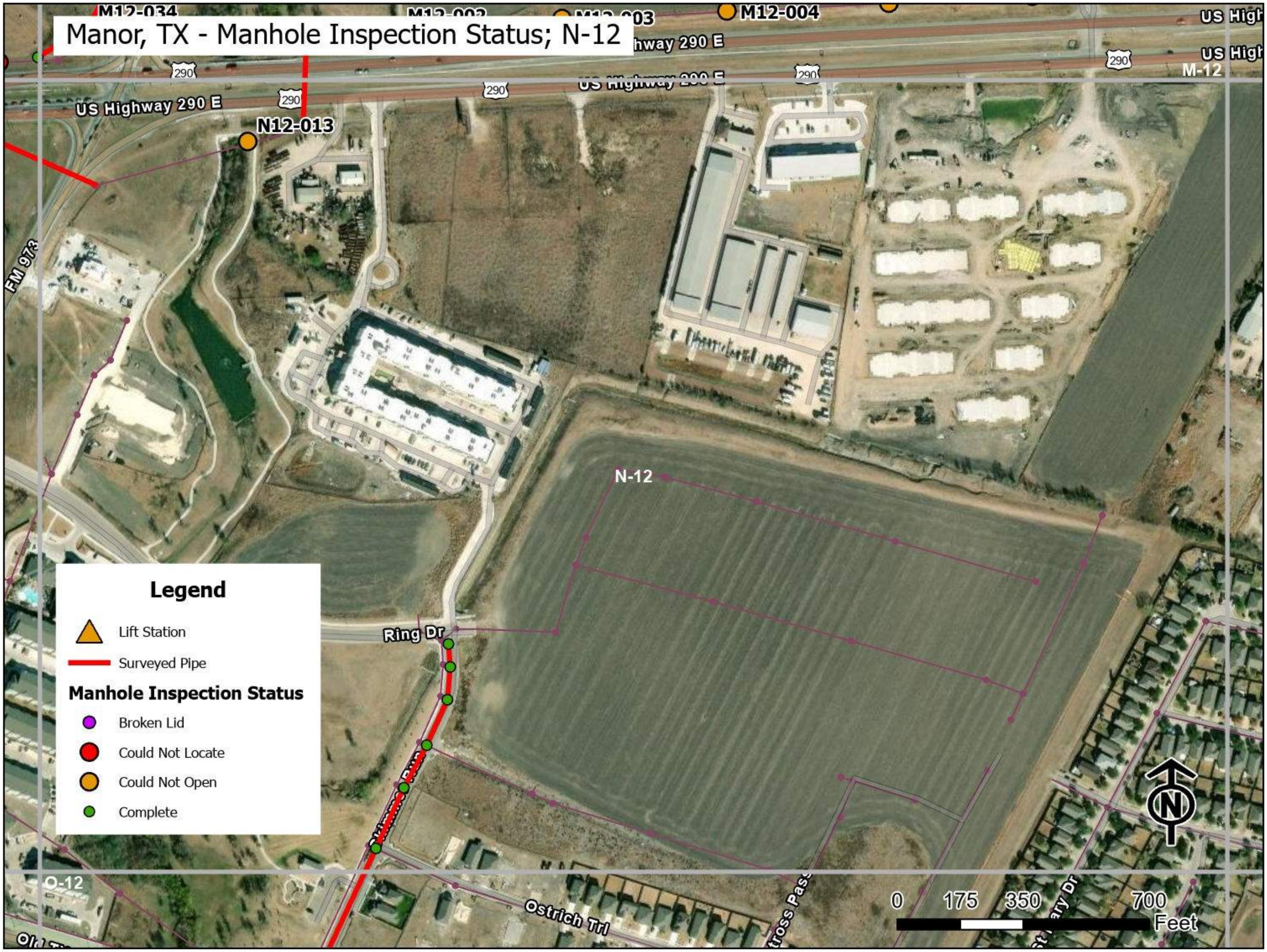
Manor, TX - Manhole Inspection Status; N-09
Legend
Lift Station
Surveyed Pipe
Manhole Inspection Status
Broken Lid
Could Not Locate
Could Not Open
Complete
N
Genome Dr
Hill Ln
M-09
N09-021
US Highway 290 E
US Highway 290 E
US Highway 290 E
US Highway 290 E
290 E
Highway 290 E
290
290
290
Riata Tract
N-09
Tur Weg Ln
Tur Weg Ln
N09-002
Gilleland Creek
O-09
0
175
350
700
Feet



Manor, TX - Manhole Inspection Status; N-10
Legend
Lift Station
Surveyed Pipe
Manhole Inspection Status
Broken Lid
Could Not Locate
Could Not Open
Complete
N10-010
N10-008
N10-006
N10-001
N-10
M-10
O-10
US Highway 290 E
290
W Murray Ave
E Murray Ave
Domino's
Americas Best Value Inn & Suites-Ma
N Bastrop St
N Caldwell St
N Lexington St
N Burnet St
N La Grange St
W Townes St
E Rector St
E Townes St
W Browning St
E Browning St
W Wheeler St
E Wheeler St
W Eggleston
Lockhart St
0 175 350 700
Feet

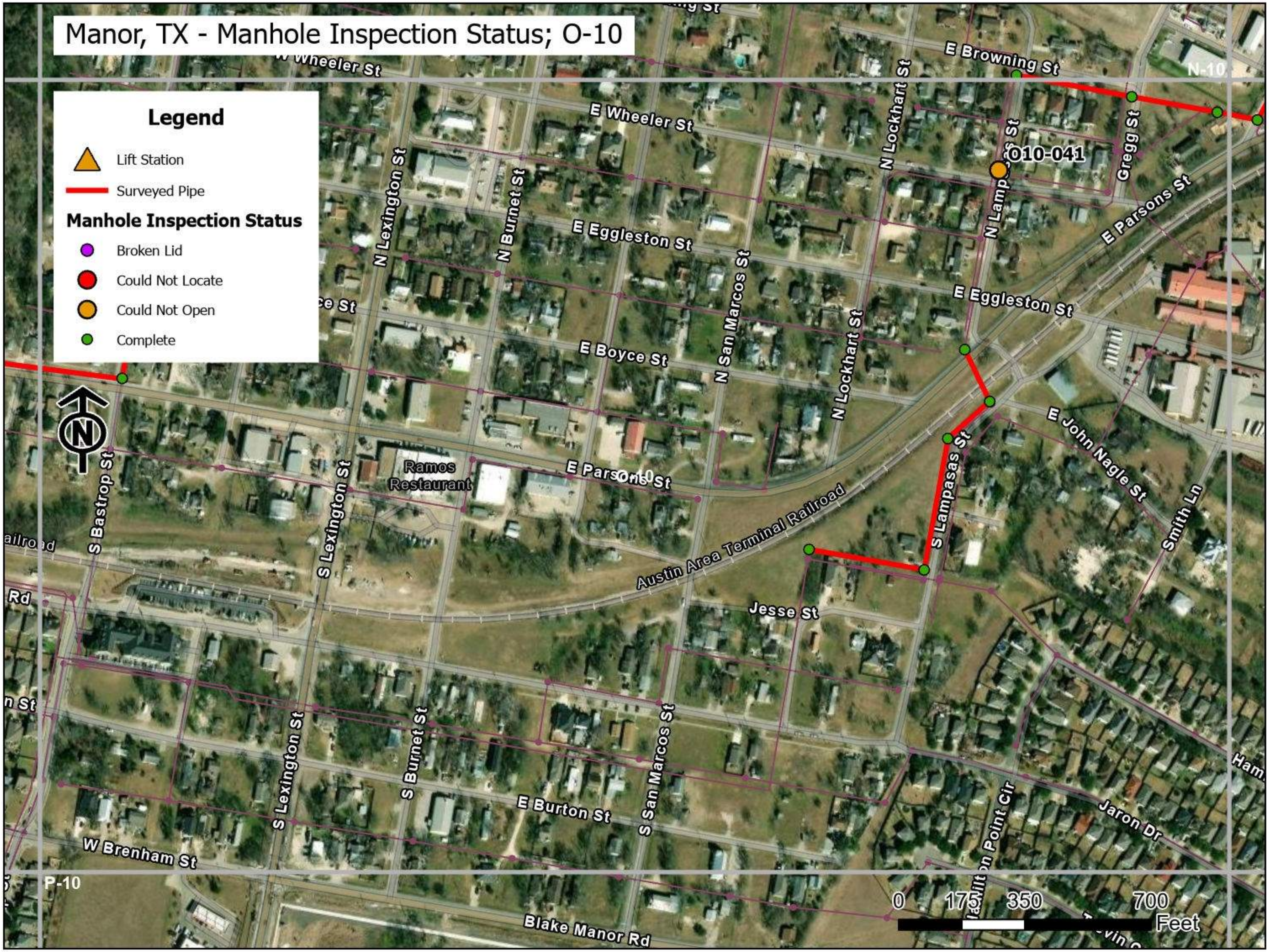
Manor, TX - Manhole Inspection Status; N-11




Manor, TX - Manhole Inspection Status; N-12
M12-004
N12-013
US Highway 290 E
290
M-12
FM 973
N-12
Ring Dr
O-12
Ostrich Trl
Legend
Lift Station
Surveyed Pipe
Manhole Inspection Status
Broken Lid
Could Not Locate
Could Not Open
Complete
0
175
350
700
Feet
N

Manor, TX - Manhole Inspection Status; O-09

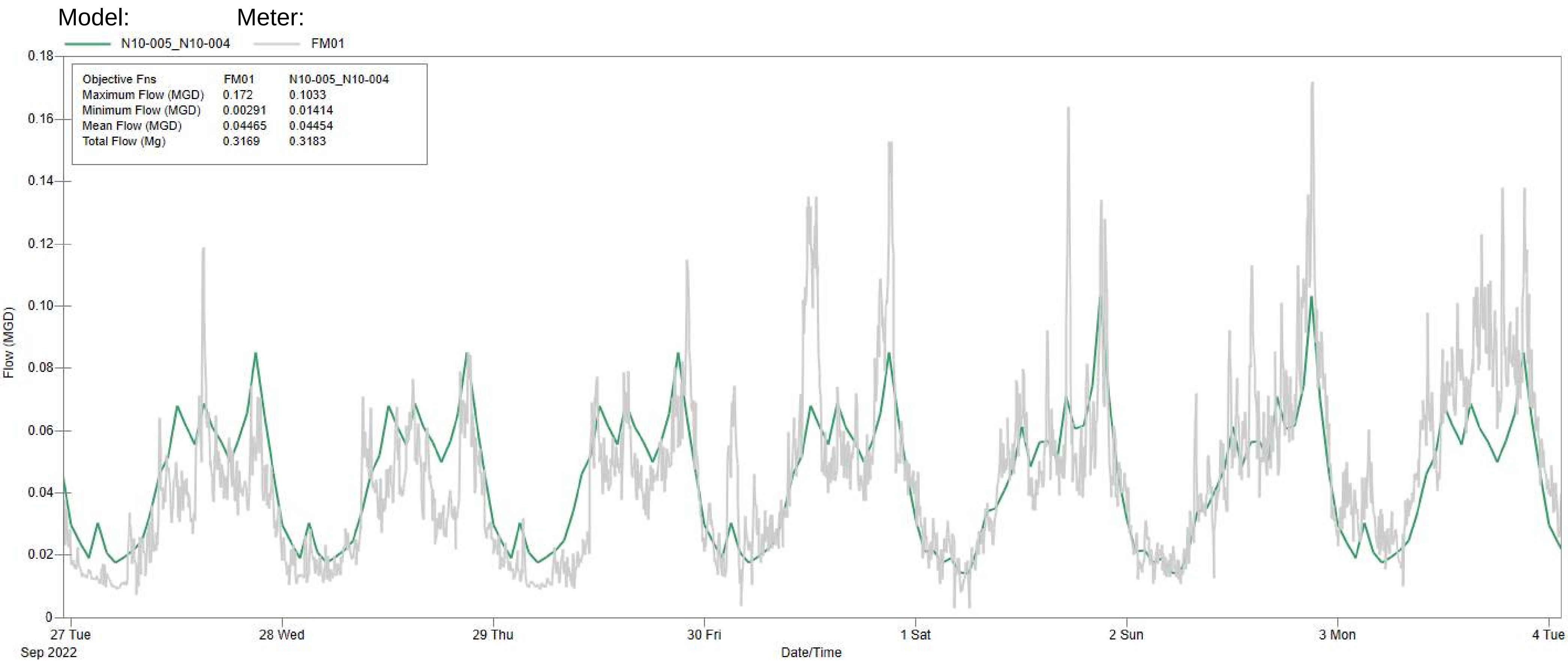
Manor, TX - Manhole Inspection Status; O-10



Manor, TX - Manhole Inspection Status; O-13
Legend
Lift Station
Surveyed Pipe
Manhole Inspection Status
Broken Lid
Could Not Locate
Could Not Open
Complete
N-13
O-13
P-13
Pine Needle St
Forest Sage St
High Sierra St
Ring Dr
Ring Dr
Carillon Way
Carillon Way
Snow Ln
Casting Dr
Tinker St
Pealing Way
Old TX-20
Old TX-20
O13-001
O13-002
O13-004
0
175
350
700
Feet

Appendix B: Dry Weather Calibration Summary

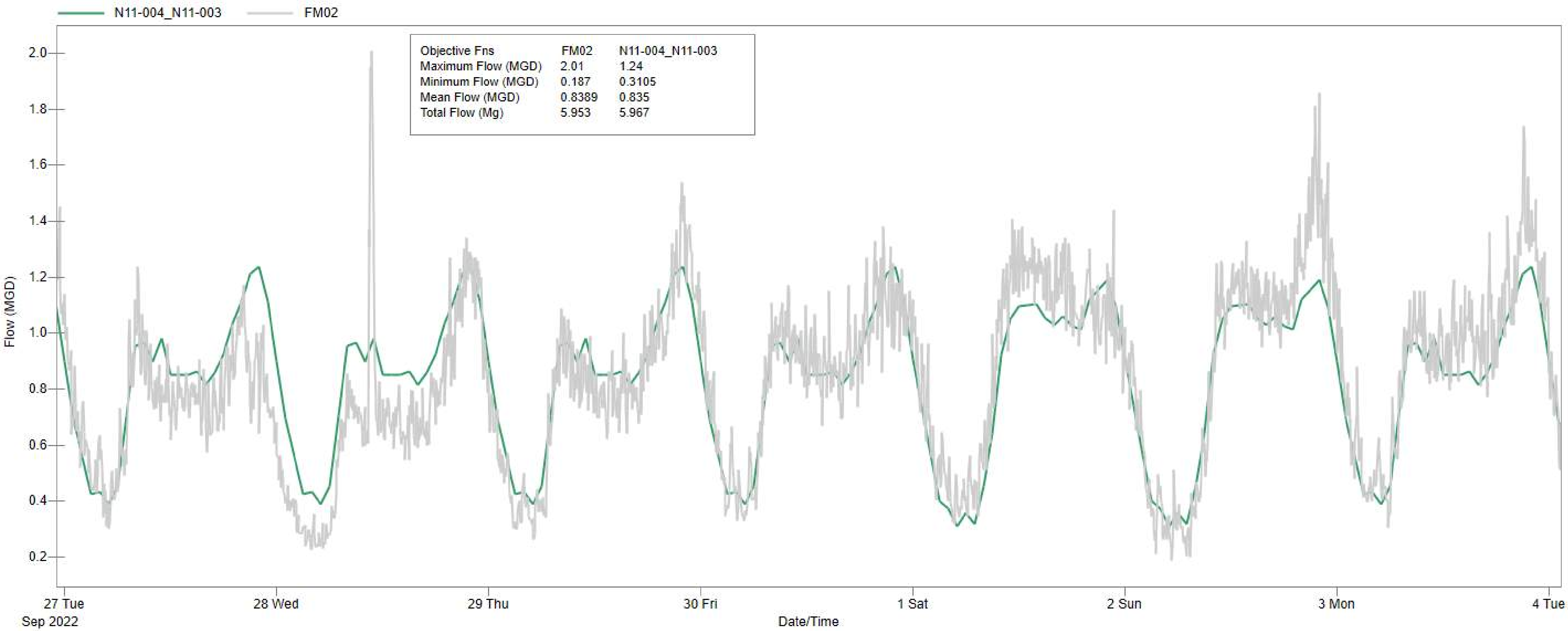
FM 01



Model:
Meter:
N10-005_N10-004
FM01
Objective Fns FM01 N10-005_N10-004
Maximum Flow (MGD) 0.172 0.1033
Minimum Flow (MGD) 0.00291 0.01414
Mean Flow (MGD) 0.04465 0.04454
Total Flow (Mg) 0.3169 0.3183
Flow (MGD)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0
27 Tue
Sep 2022
28 Wed
29 Thu
30 Fri
1 Sat
2 Sun
3 Mon
4 Tue
Date/Time

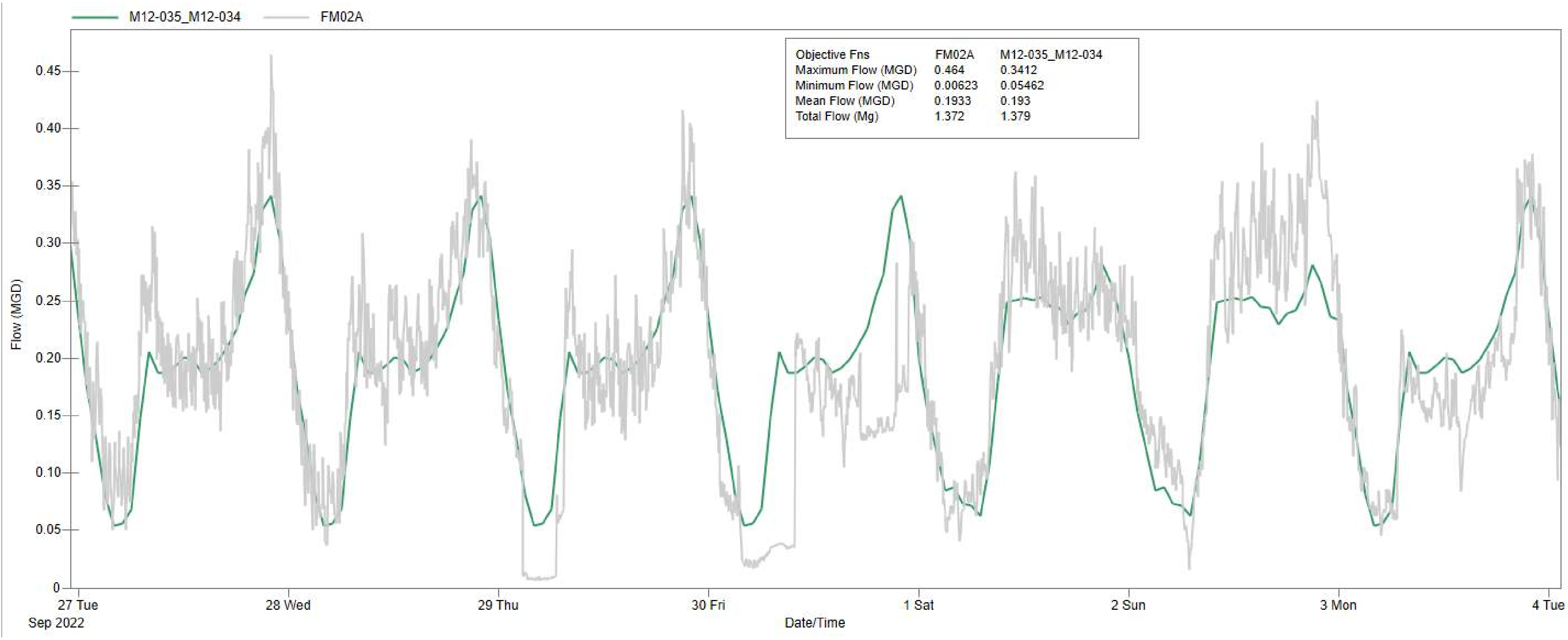
FM 02

Model: Meter:

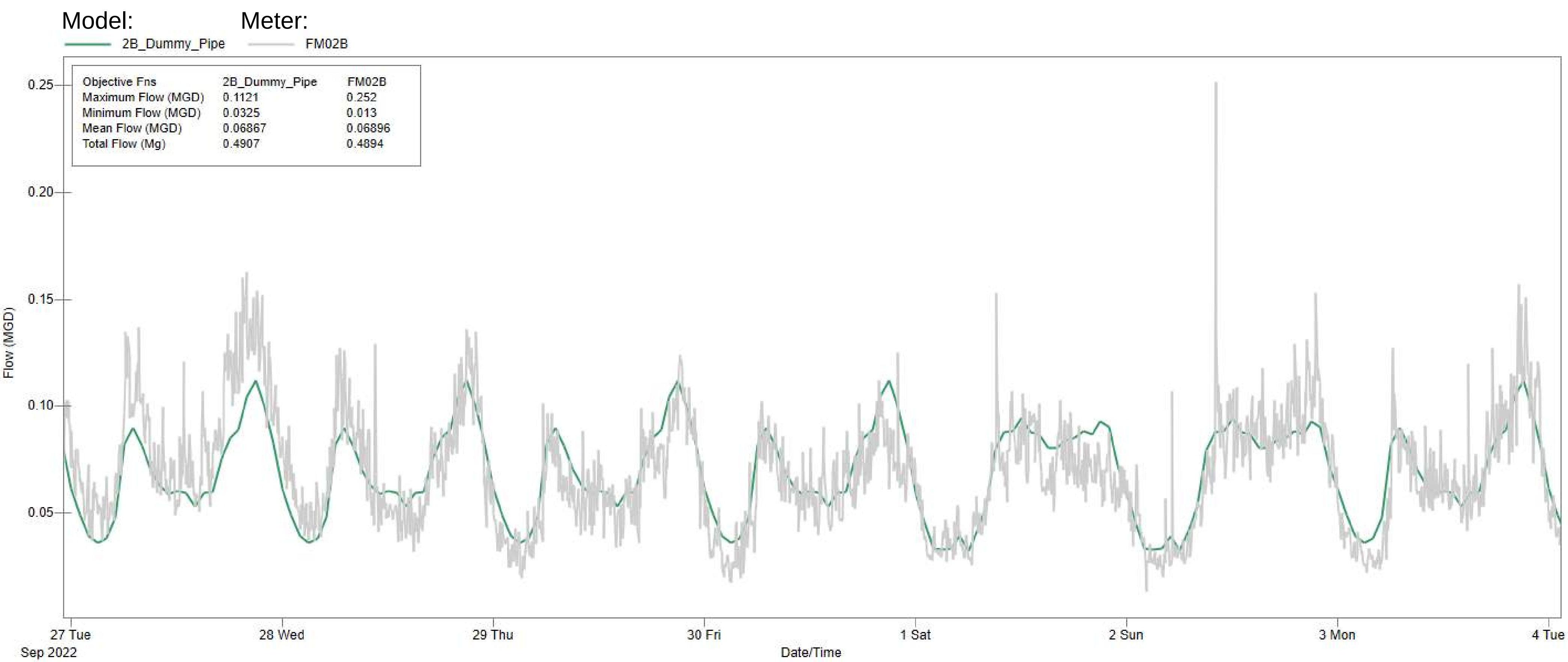


FM 02A

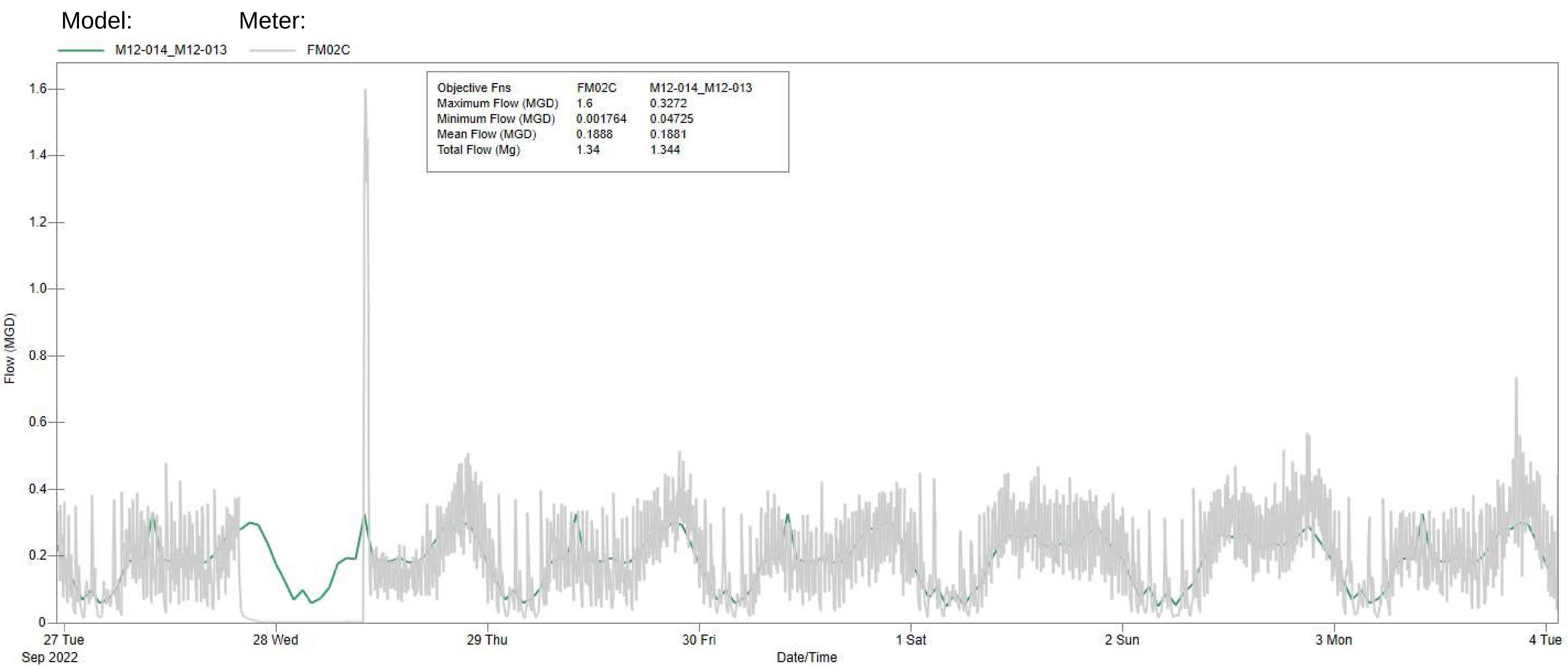
Model: Meter:



FM 02B

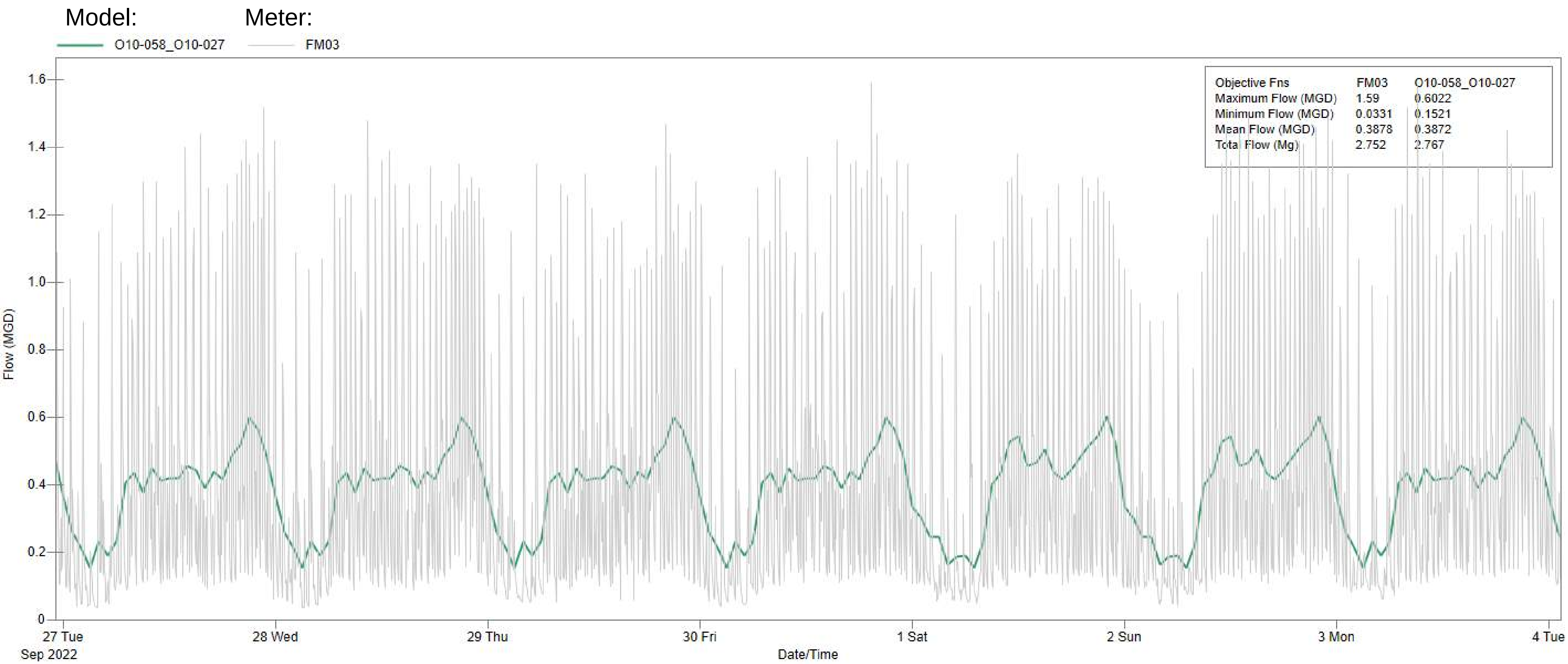

Model:
Meter:
2B_Dummy_Pipe
FM02B
Objective Fns 2B_Dummy_Pipe FM02B
Maximum Flow (MGD) 0.1121 0.252
Minimum Flow (MGD) 0.0325 0.013
Mean Flow (MGD) 0.06867 0.06896
Total Flow (Mg) 0.4907 0.4894
0.25
0.20
0.15
0.10
0.05
Flow (MGD)
27 Tue
Sep 2022
28 Wed
29 Thu
30 Fri
1 Sat
2 Sun
3 Mon
4 Tue
Date/Time

FM 02C



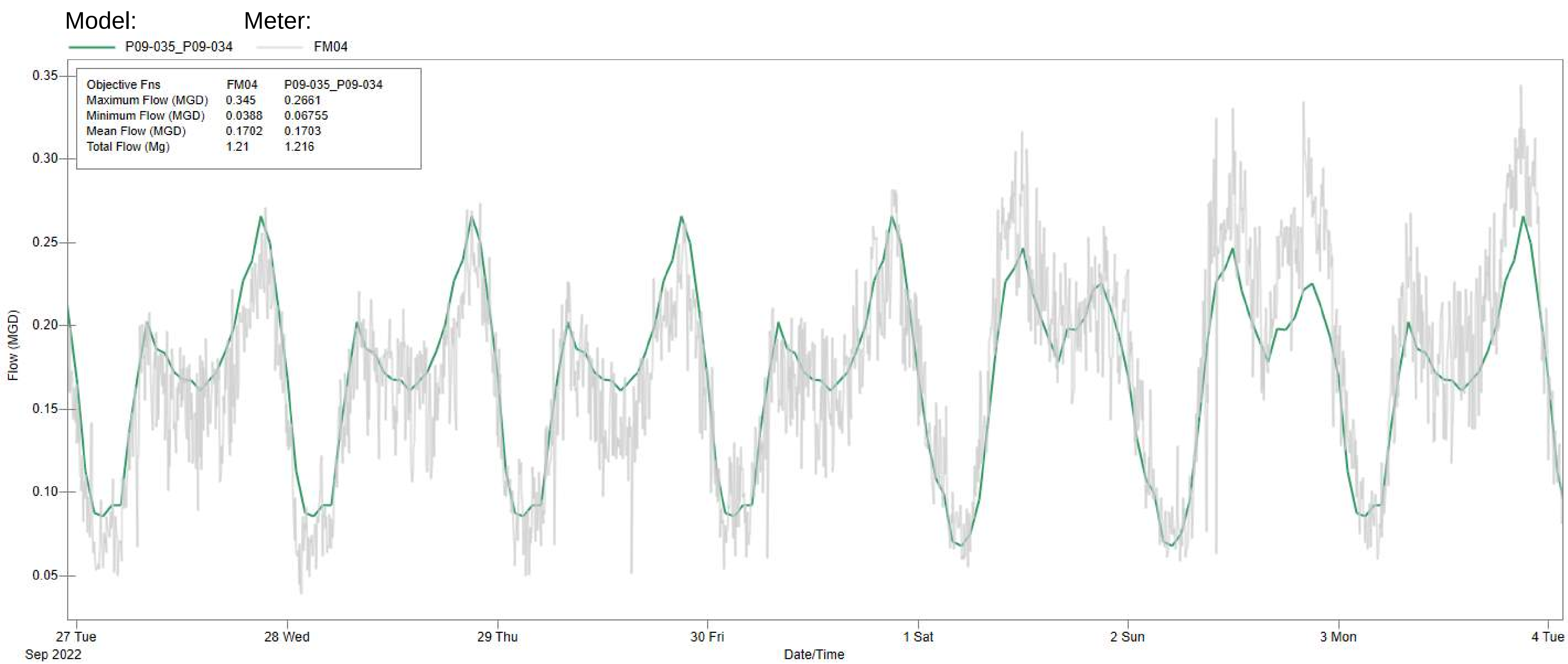
Objective Fns	FM02C	M12-014_M12-013
Maximum Flow (MGD)	1.6	0.3272
Minimum Flow (MGD)	0.001764	0.04725
Mean Flow (MGD)	0.1888	0.1881
Total Flow (Mg)	1.34	1.344

FM 03

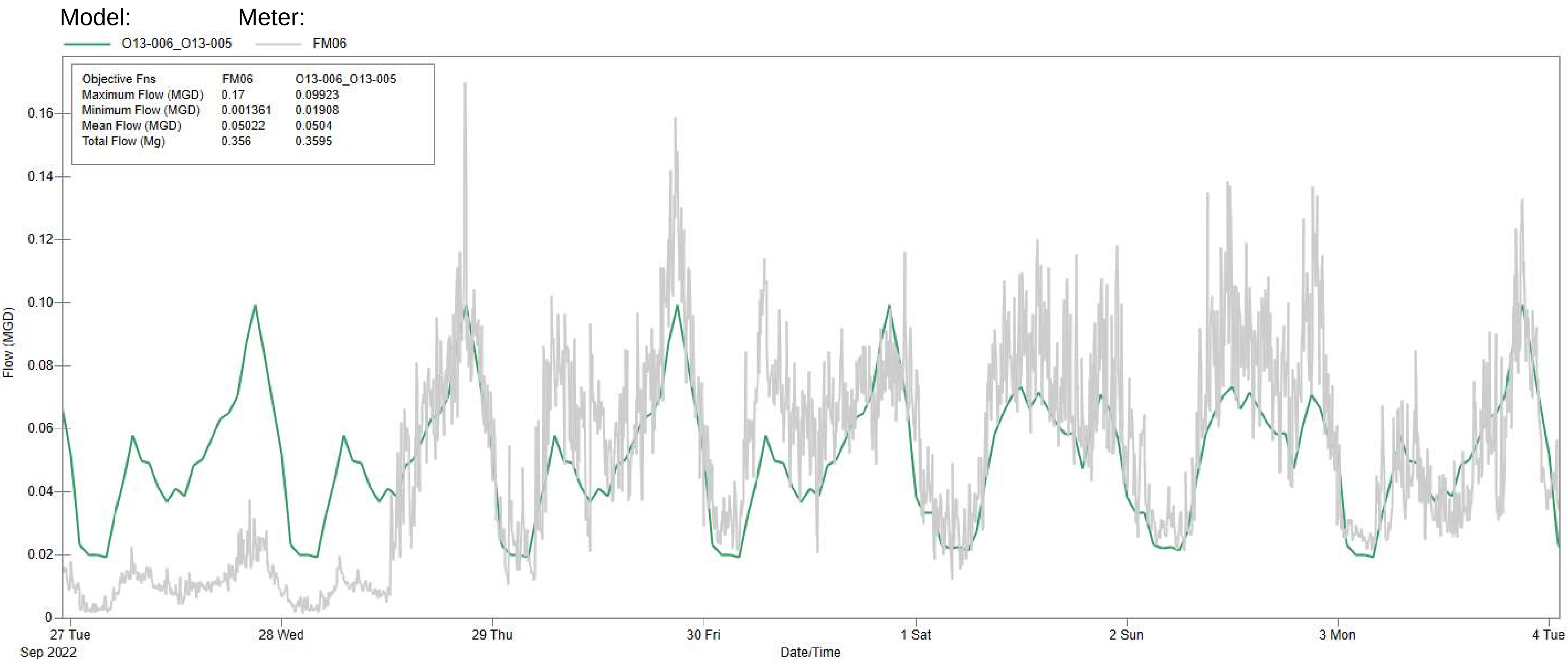


*Spikes in metered flows are indicative of lift station flow characteristics. FM03 is located downstream of several lift stations, namely LS03 (Wildhorse Creek LS) and LS11 (Carrie Manor LS). Model are reflective of average flows rather than erratic spikes.

FM 04

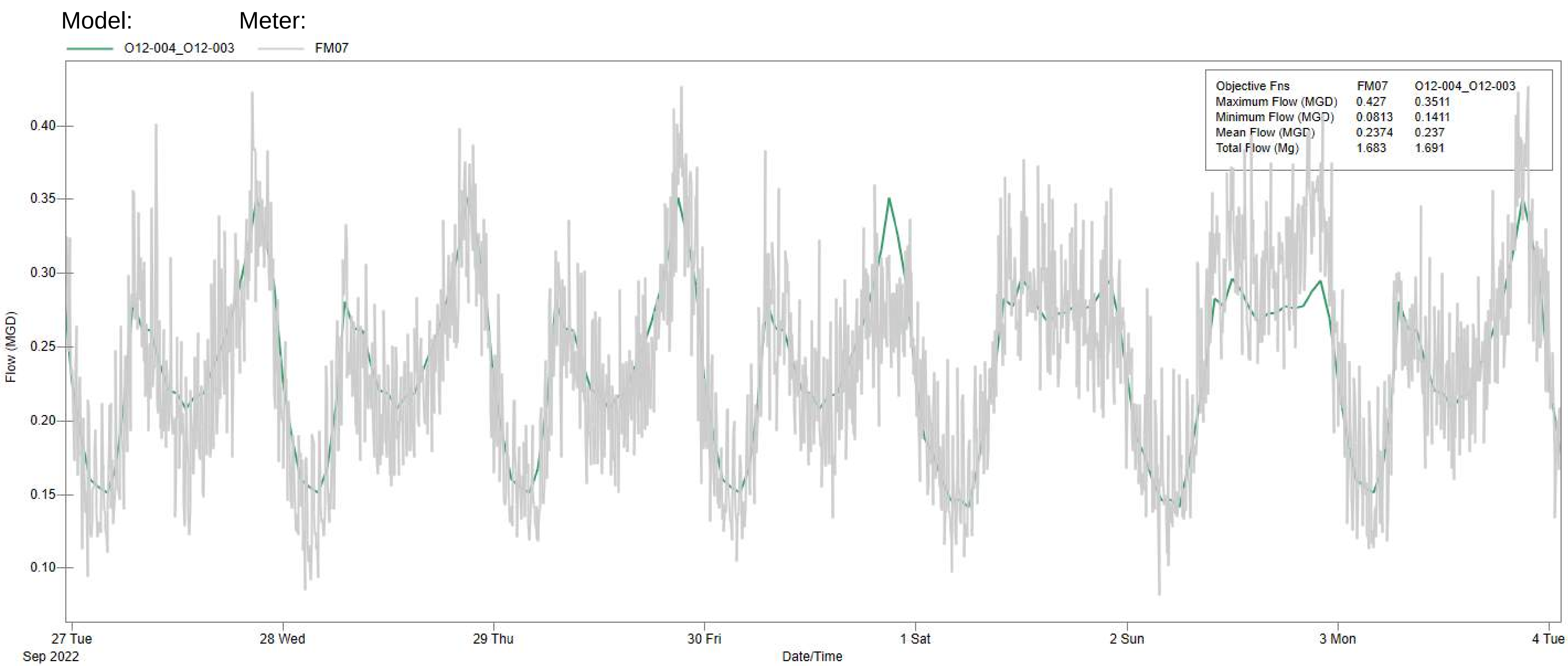

Model:
Meter:
P09-035_P09-034
FM04
Objective Fns FM04 P09-035_P09-034
Maximum Flow (MGD) 0.345 0.2661
Minimum Flow (MGD) 0.0388 0.06755
Mean Flow (MGD) 0.1702 0.1703
Total Flow (Mg) 1.21 1.216
Flow (MGD)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
27 Tue
Sep 2022
28 Wed
29 Thu
30 Fri
1 Sat
2 Sun
3 Mon
4 Tue
Date/Time

FM 06



Model:
Meter:
O13-006_O13-005
FM06
Objective Fns
FM06
O13-006_O13-005
Maximum Flow (MGD)
0.17
0.09923
Minimum Flow (MGD)
0.001361
0.01908
Mean Flow (MGD)
0.05022
0.0504
Total Flow (Mg)
0.356
0.3595
Flow (MGD)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0
27 Tue
Sep 2022
28 Wed
29 Thu
30 Fri
1 Sat
2 Sun
3 Mon
4 Tue
Date/Time

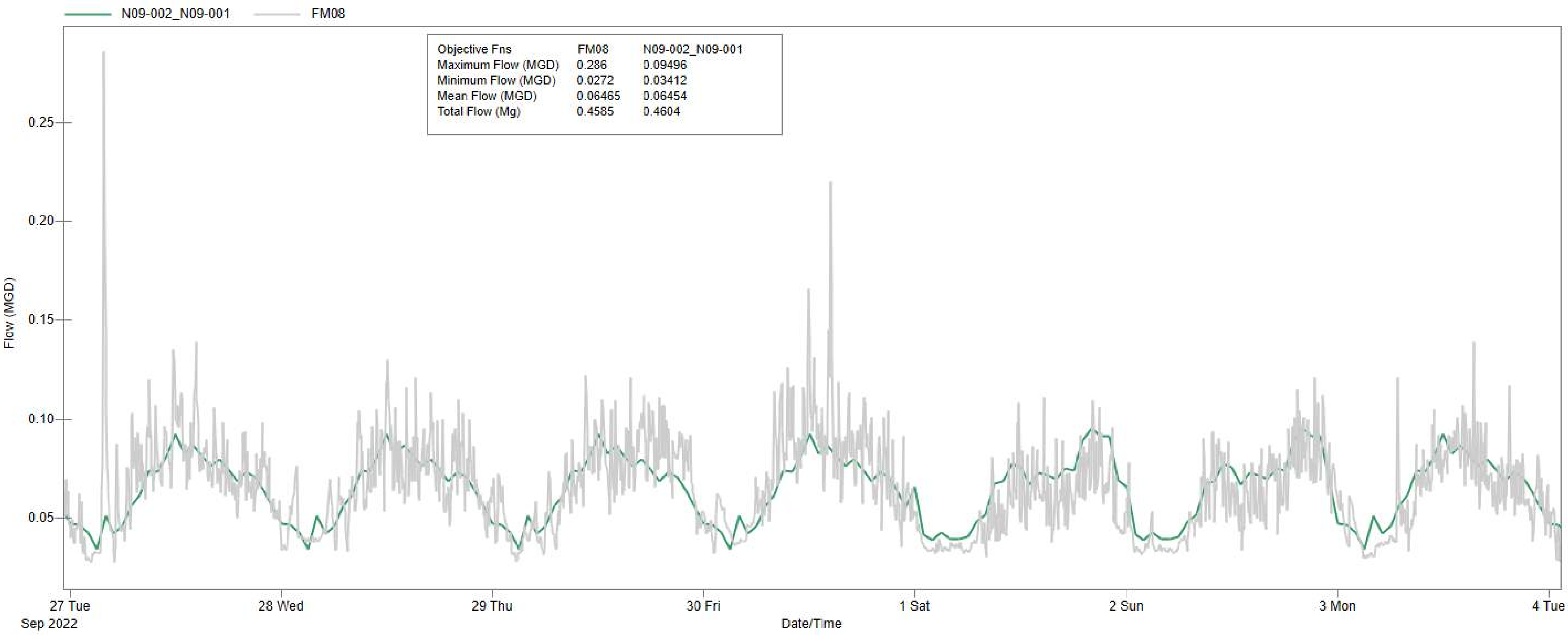
FM 07



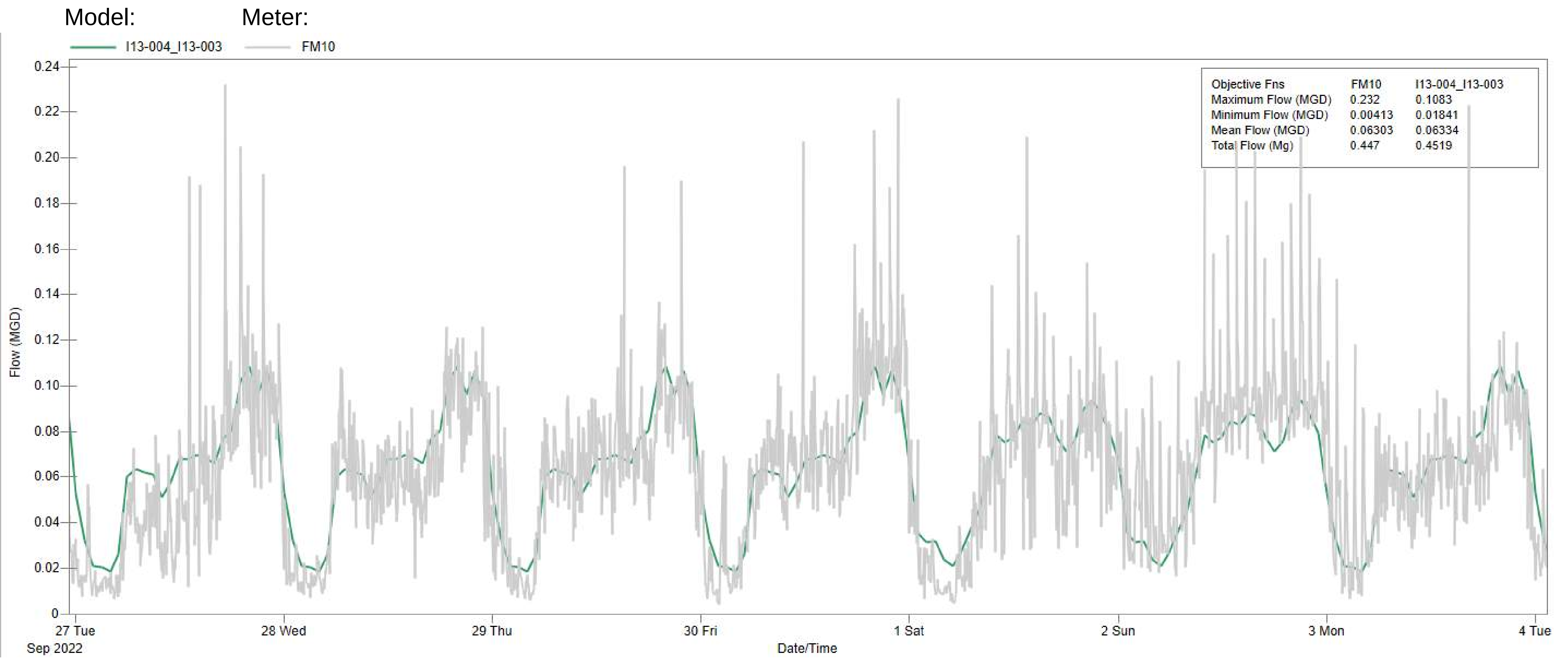
Model:
Meter:
O12-004_O12-003
FM07
Objective Fns FM07 O12-004_O12-003
Maximum Flow (MGD) 0.427 0.3511
Minimum Flow (MGD) 0.0813 0.1411
Mean Flow (MGD) 0.2374 0.237
Total Flow (Mg) 1.683 1.691
Flow (MGD)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
27 Tue
Sep 2022
28 Wed
29 Thu
30 Fri
1 Sat
2 Sun
3 Mon
4 Tue
Date/Time

FM 08

Model: Meter:



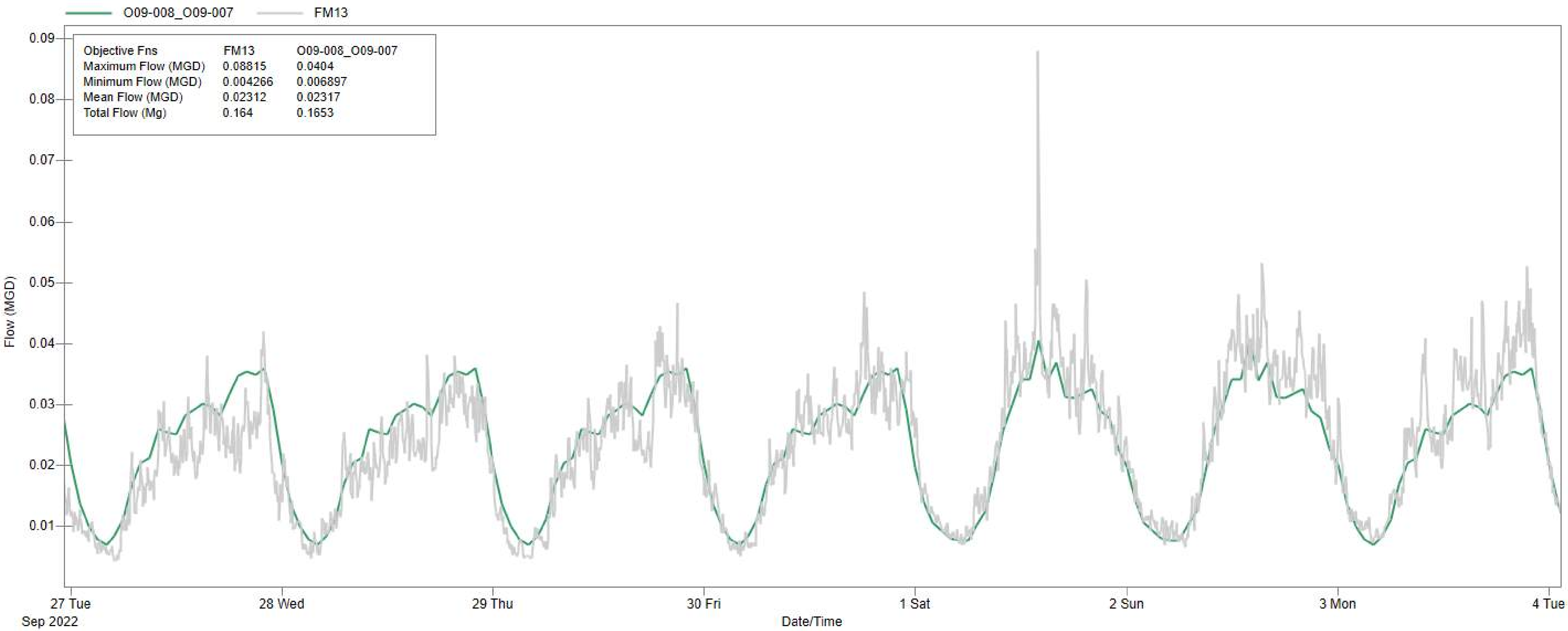
FM 10



Model:
Meter:
I13-004_I13-003
FM10
Flow (MGD)
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0
27 Tue
Sep 2022
28 Wed
29 Thu
30 Fri
1 Sat
2 Sun
3 Mon
4 Tue
Date/Time
Objective Fns FM10 I13-004_I13-003
Maximum Flow (MGD) 0.232 0.1083
Minimum Flow (MGD) 0.00413 0.01841
Mean Flow (MGD) 0.06303 0.06334
Total Flow (Mg) 0.447 0.4519

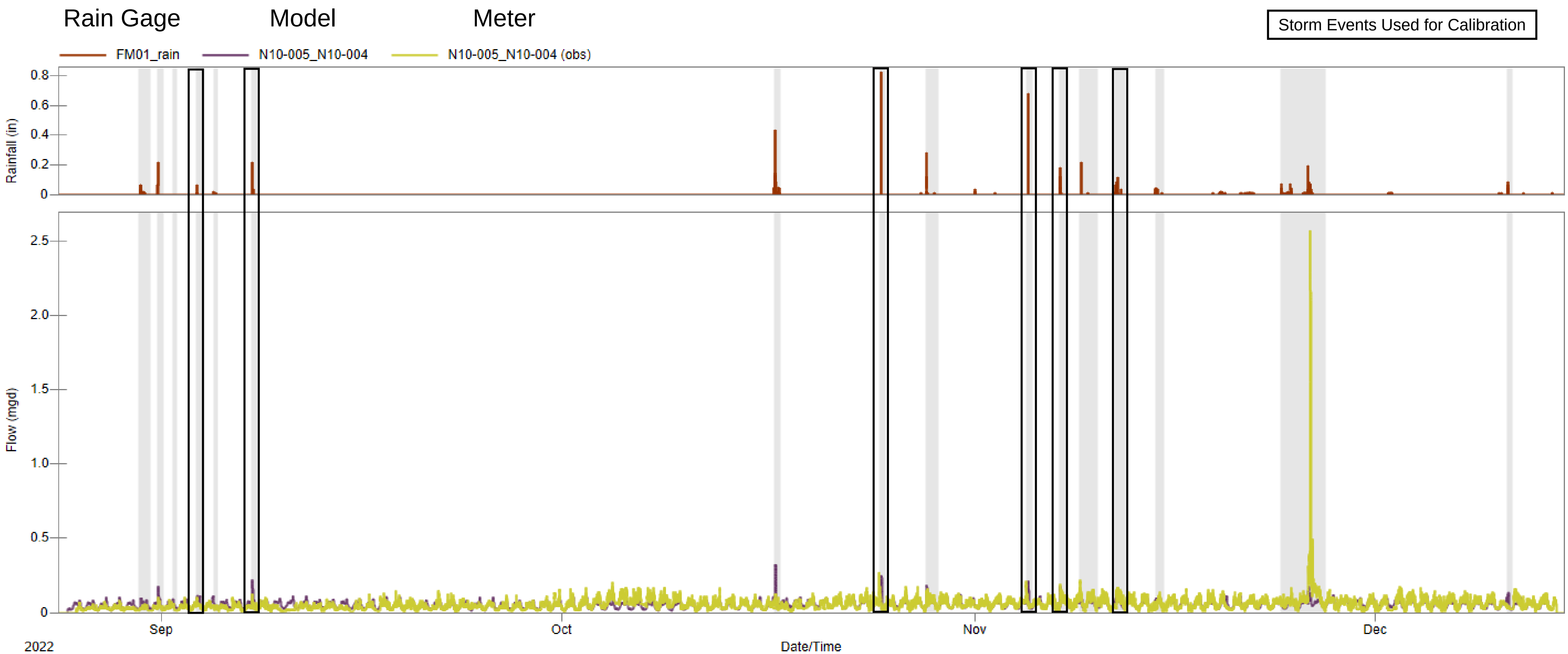
FM 13

Model: Meter:

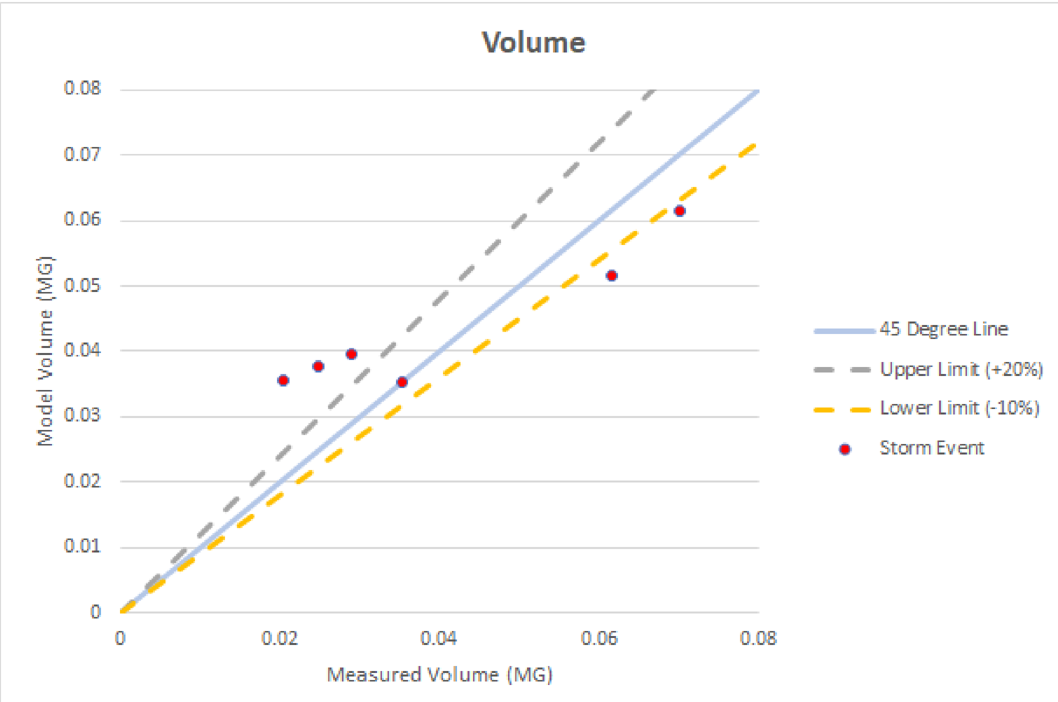


Appendix C: Wet Weather Calibration Summary

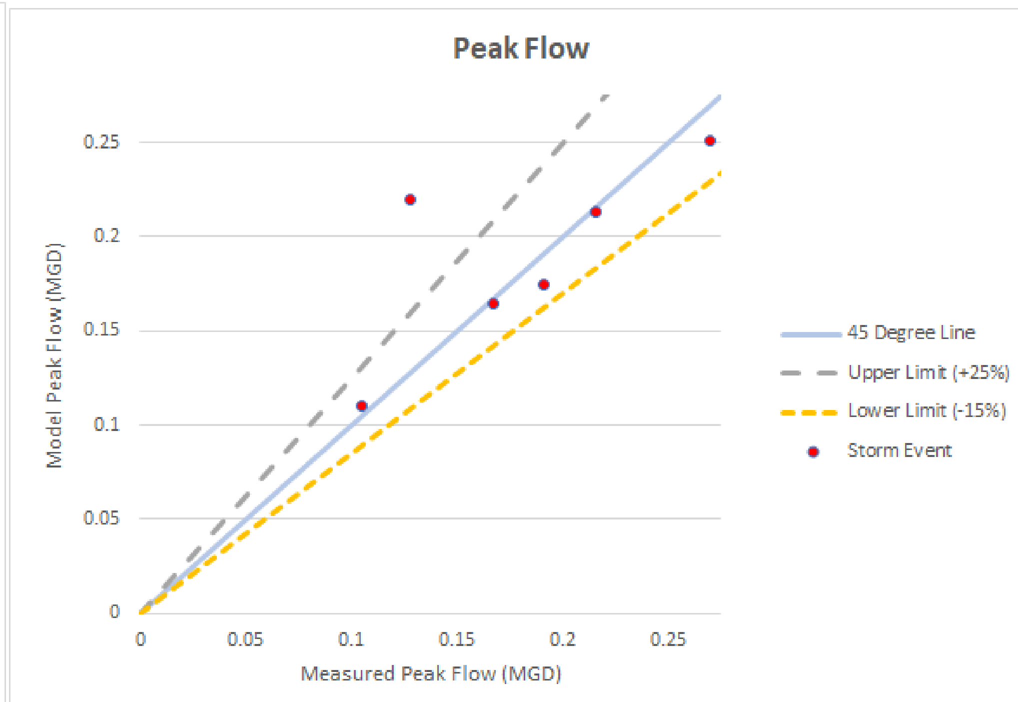
FM01



Rain Gage
Model
Meter
Storm Events Used for Calibration
FM01_rain
N10-005_N10-004
N10-005_N10-004 (obs)
Rainfall (in)
0.8
0.6
0.4
0.2
0
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0
Sep
Oct
Nov
Dec
2022
Date/Time

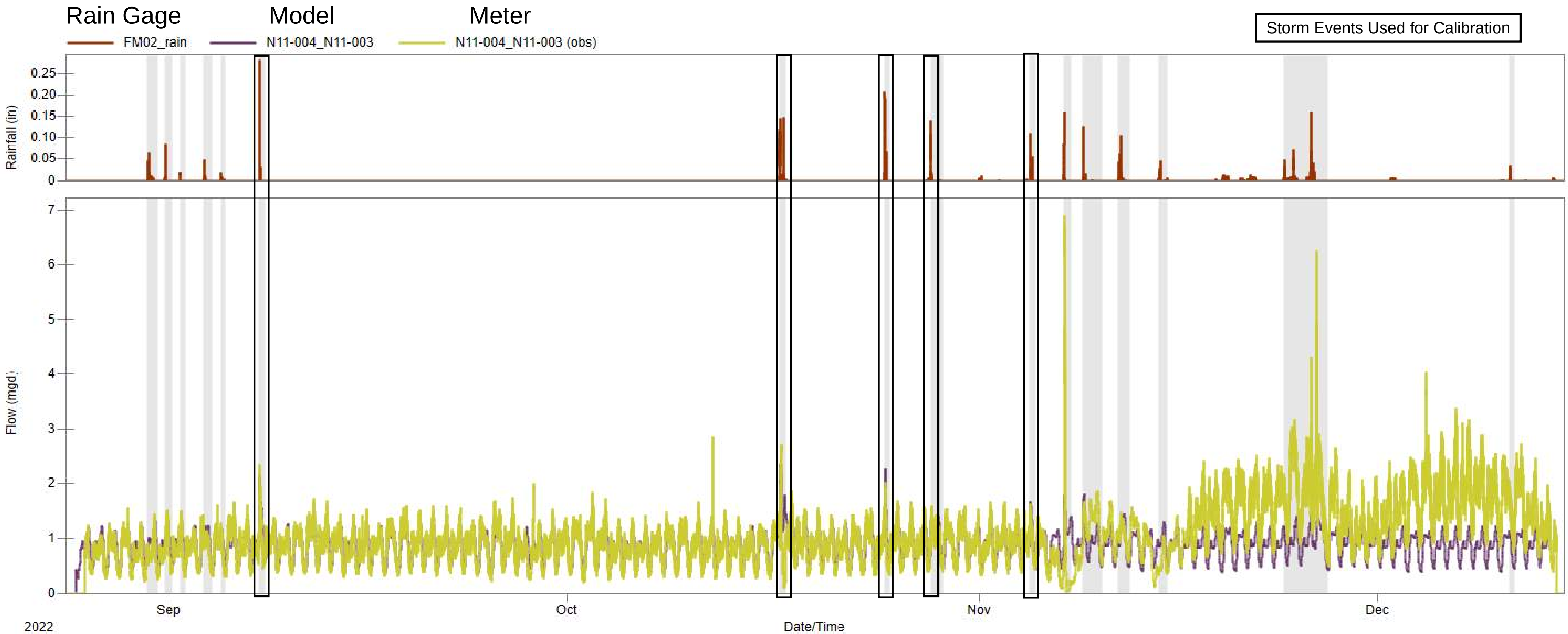


Volume
Model Volume (MG)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0.02
0.04
0.06
0.08
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event

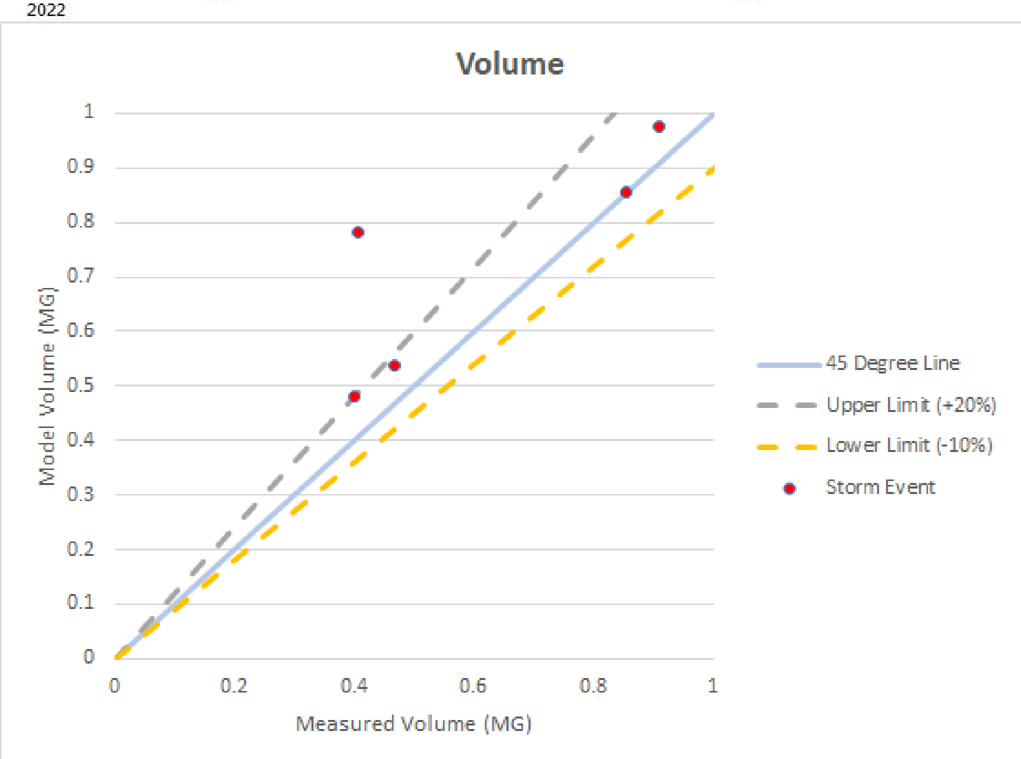


Peak Flow
Model Peak Flow (MGD)
0.25
0.2
0.15
0.1
0.05
0
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

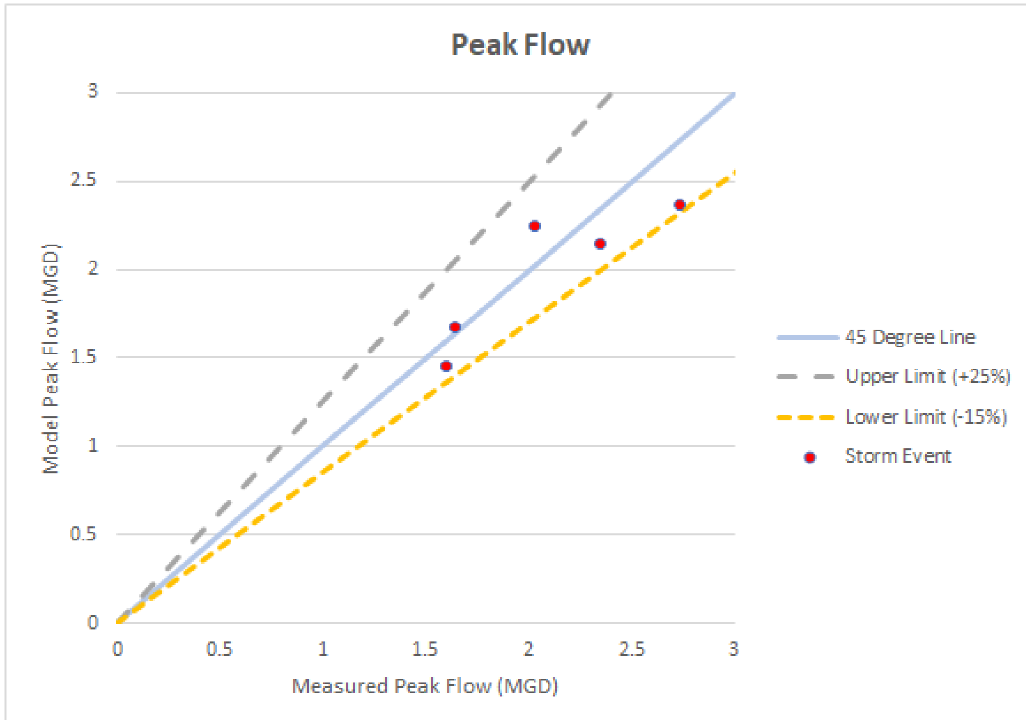
FM02



Rain Gage
Model
Meter
FM02_rain
N11-004_N11-003
N11-004_N11-003 (obs)
Storm Events Used for Calibration
Rainfall (in)
0.25
0.20
0.15
0.10
0.05
0
Flow (mgd)
7
6
5
4
3
2
1
0
Sep
Oct
Nov
Dec
2022
Date/Time

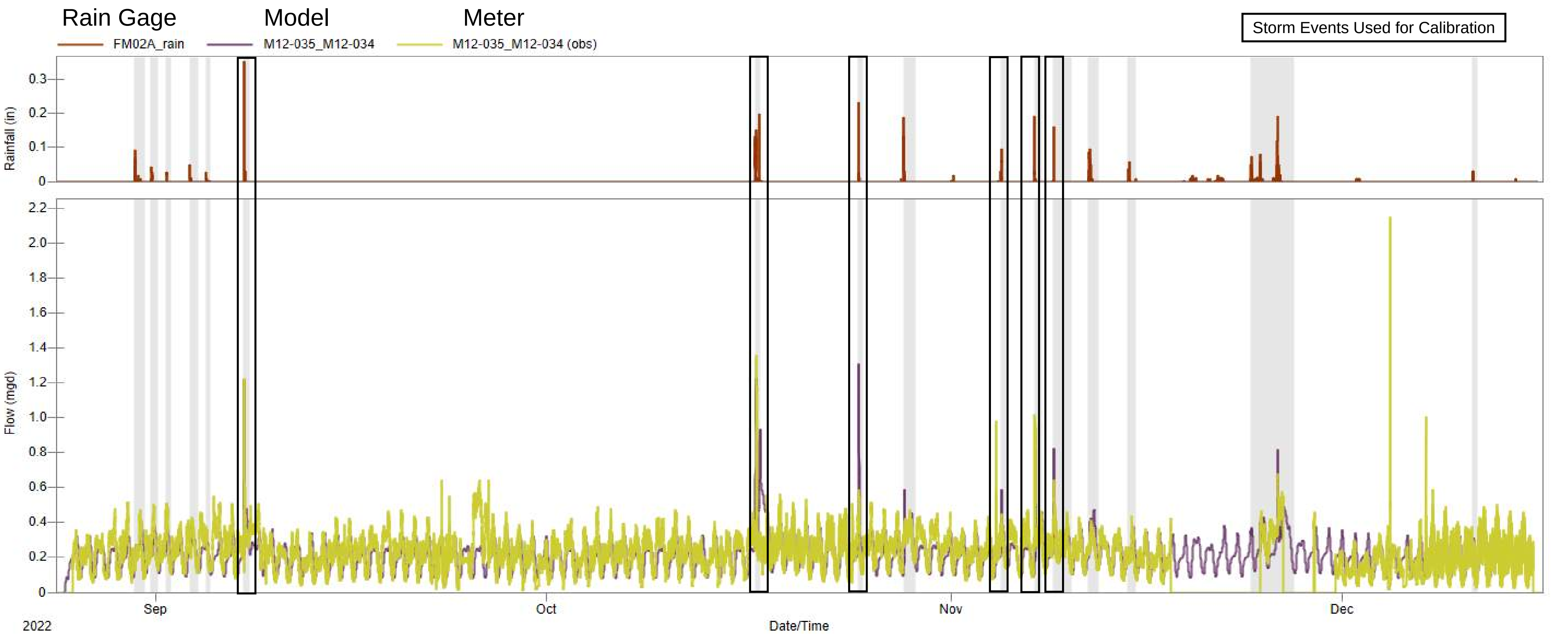


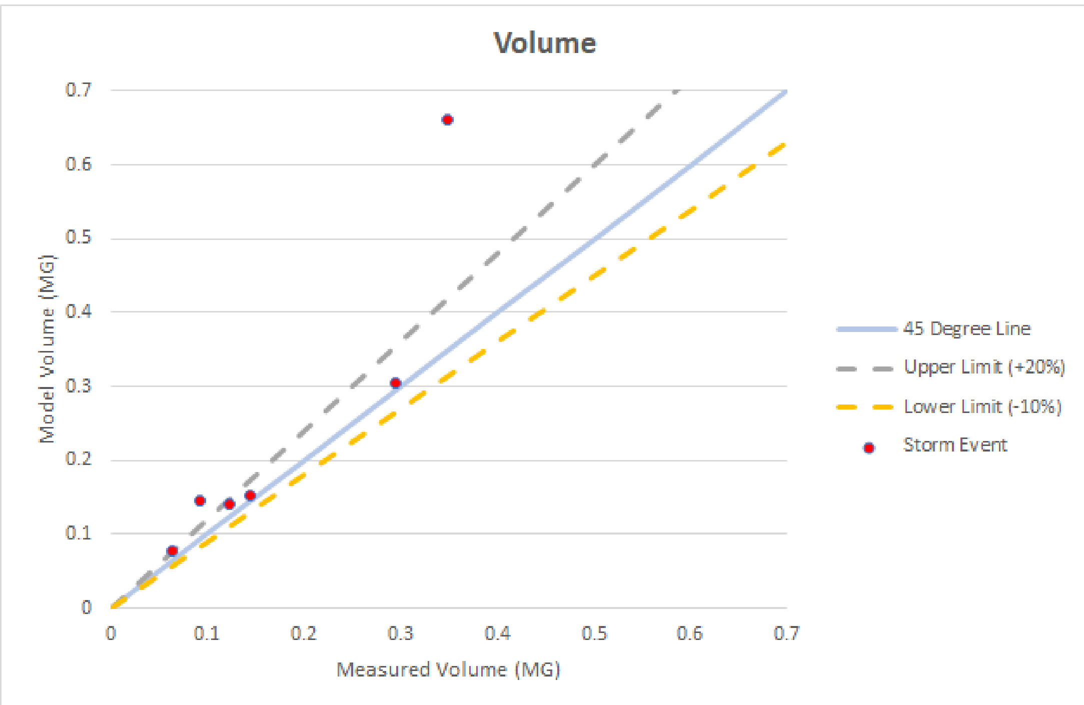
Volume
Model Volume (MG)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.2
0.4
0.6
0.8
1
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event

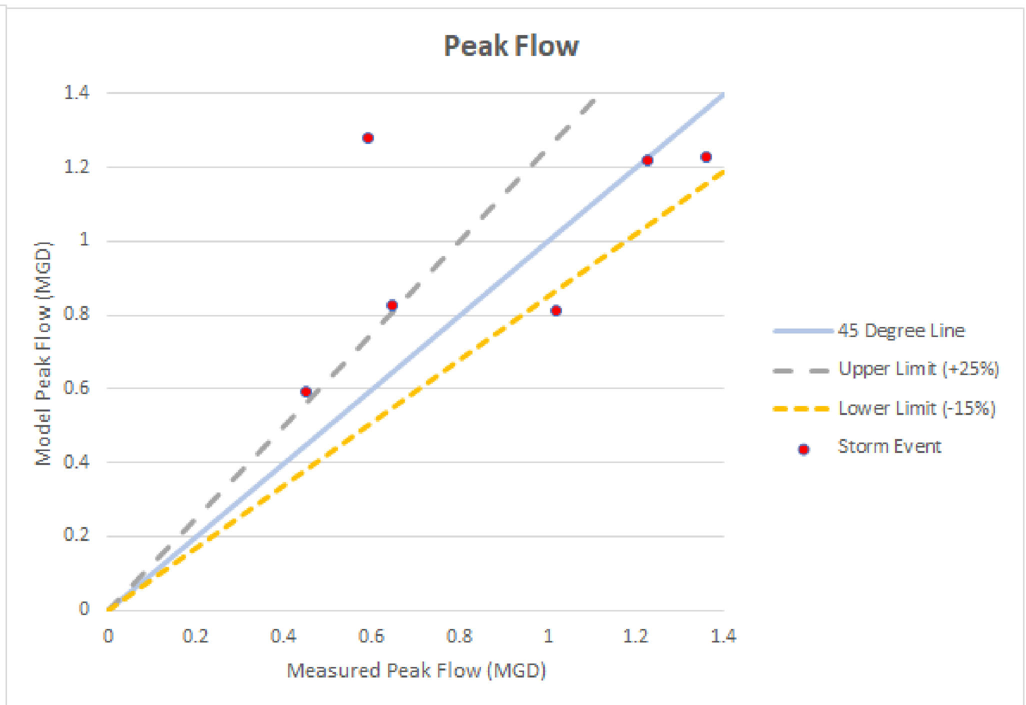


Peak Flow
Model Peak Flow (MGD)
3
2.5
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

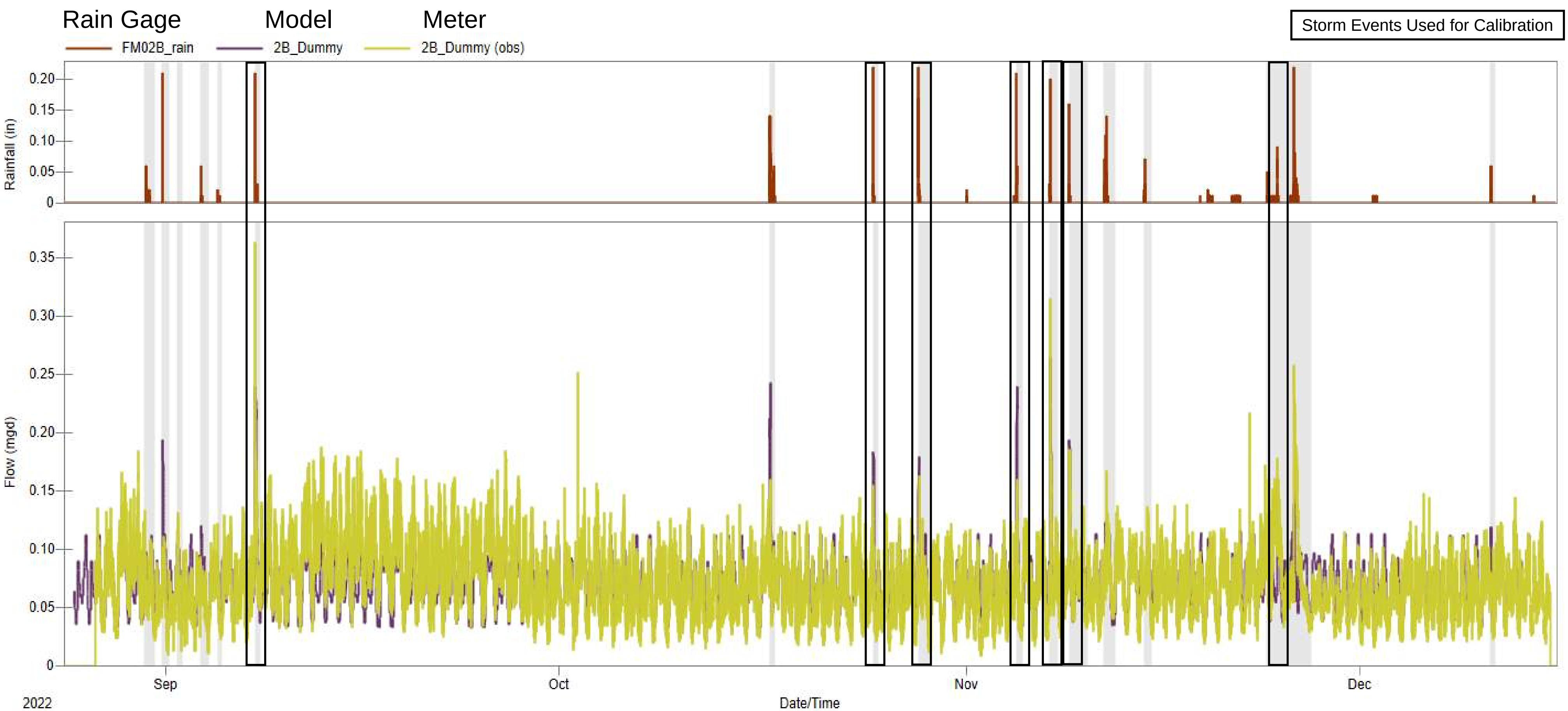
FM02A


Rain Gage
Model
Meter
FM02A_rain
M12-035_M12-034
M12-035_M12-034 (obs)
Storm Events Used for Calibration
Rainfall (in)
0.3
0.2
0.1
0
Flow (mgd)
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
Sep
Oct
Nov
Dec
2022
Date/Time

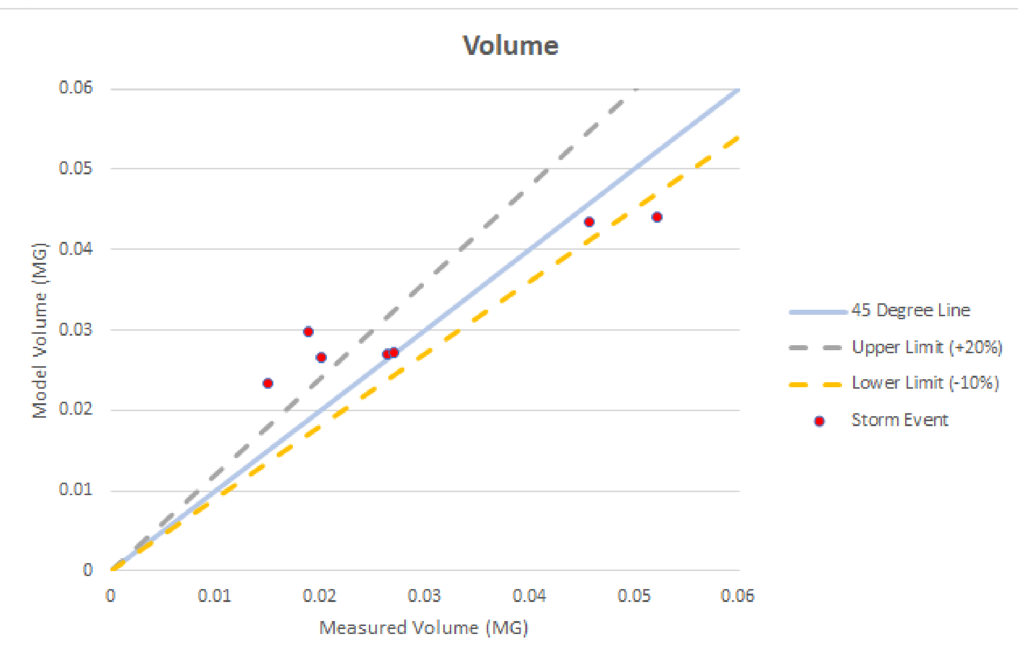

Volume
Model Volume (MG)
Measured Volume (MG)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event


Peak Flow
Model Peak Flow (MGD)
Measured Peak Flow (MGD)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

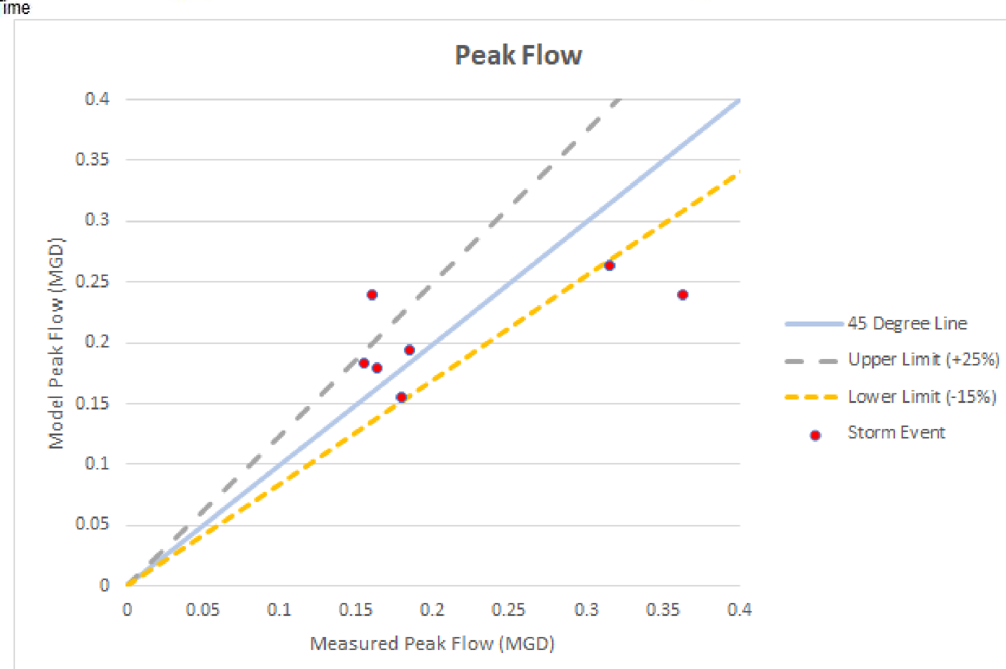
FM02B



Rain Gage
Model
Meter
FM02B_rain
2B_Dummy
2B_Dummy (obs)
Storm Events Used for Calibration
Rainfall (in)
Flow (mgd)
Sep
Oct
Nov
Dec
2022
Date/Time

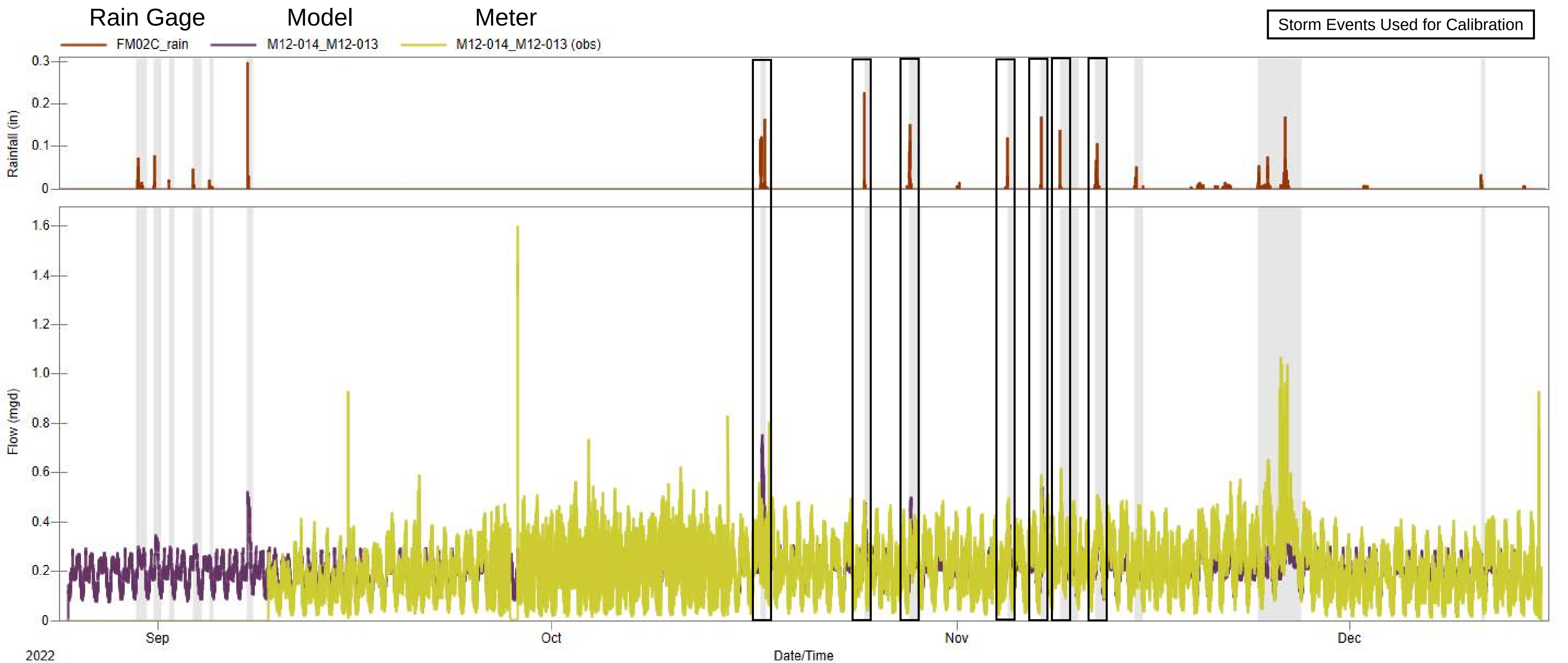


Volume
Model Volume (MG)
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event

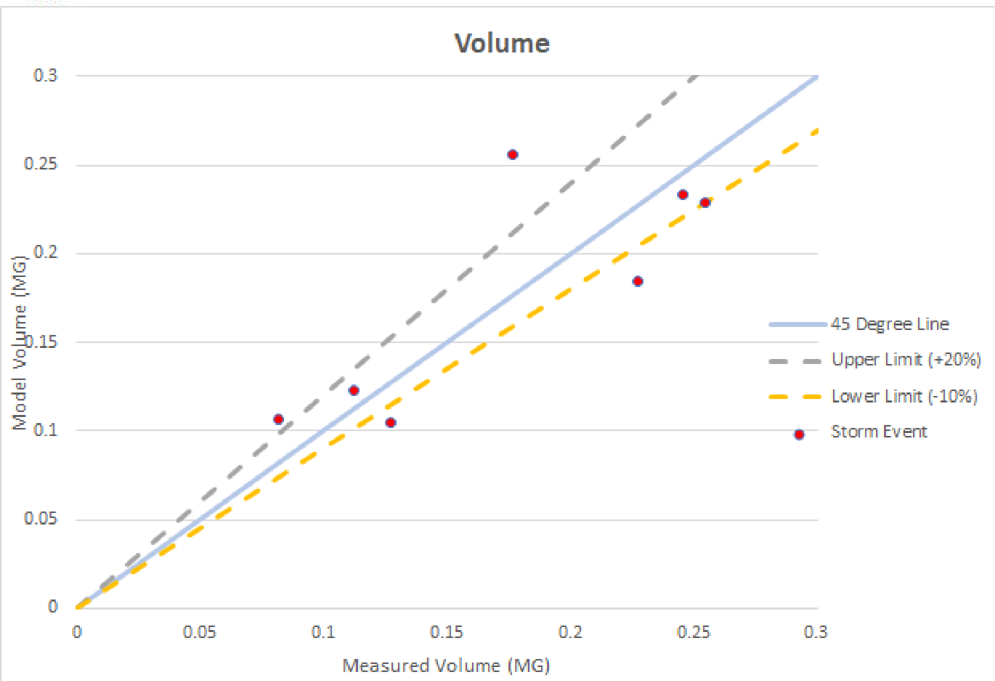


Peak Flow
Model Peak Flow (MGD)
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

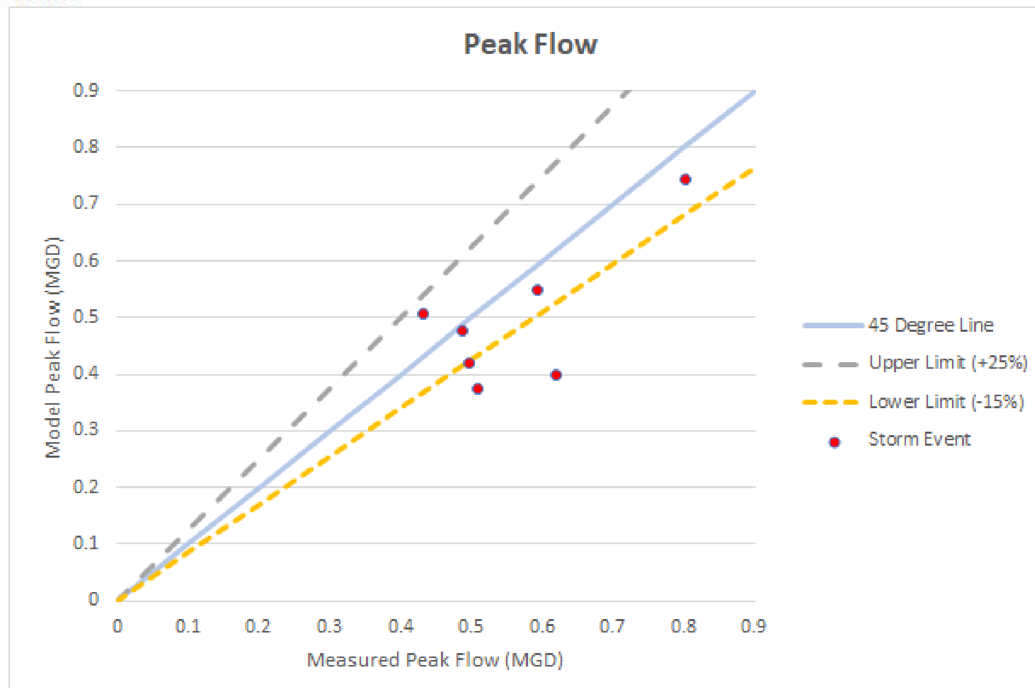
FM02C



Rain Gage
Model
Meter
FM02C_rain
M12-014_M12-013
M12-014_M12-013 (obs)
Storm Events Used for Calibration
Rainfall (in)
0.3
0.2
0.1
0
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
Sep
Oct
Nov
Dec
2022
Date/Time

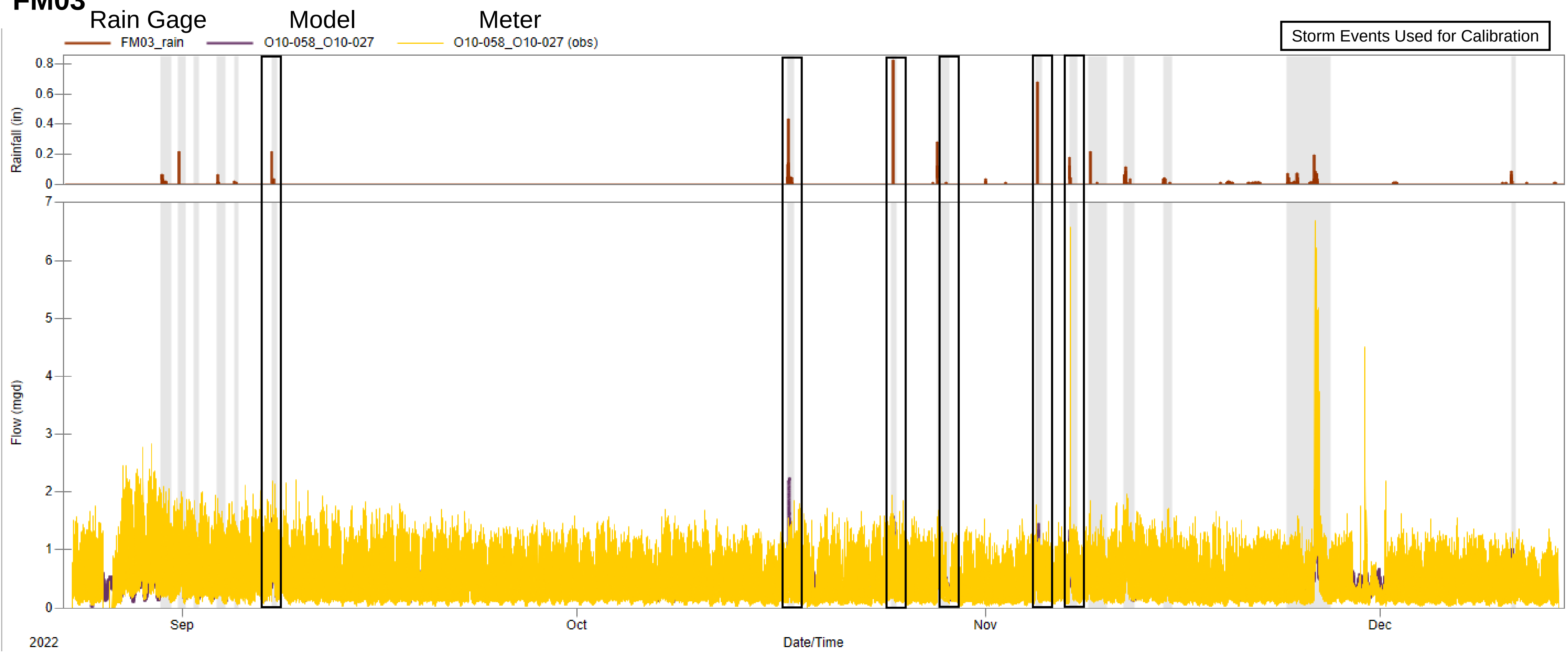


Volume
Model Volume (MG)
Measured Volume (MG)
0
0.05
0.1
0.15
0.2
0.25
0.3
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event

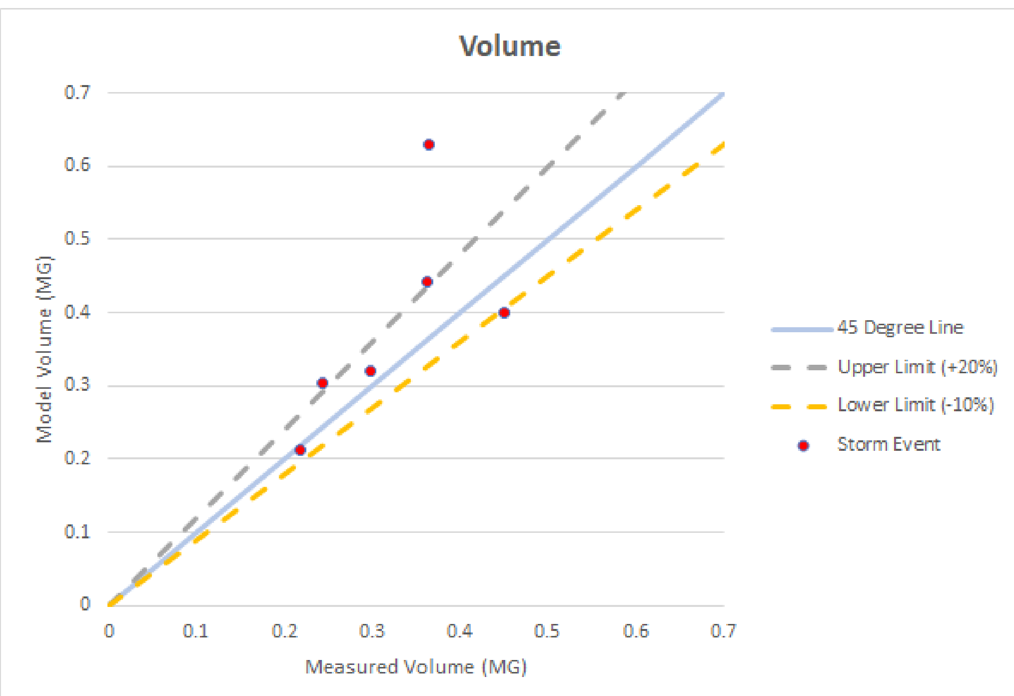


Peak Flow
Model Peak Flow (MGD)
Measured Peak Flow (MGD)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

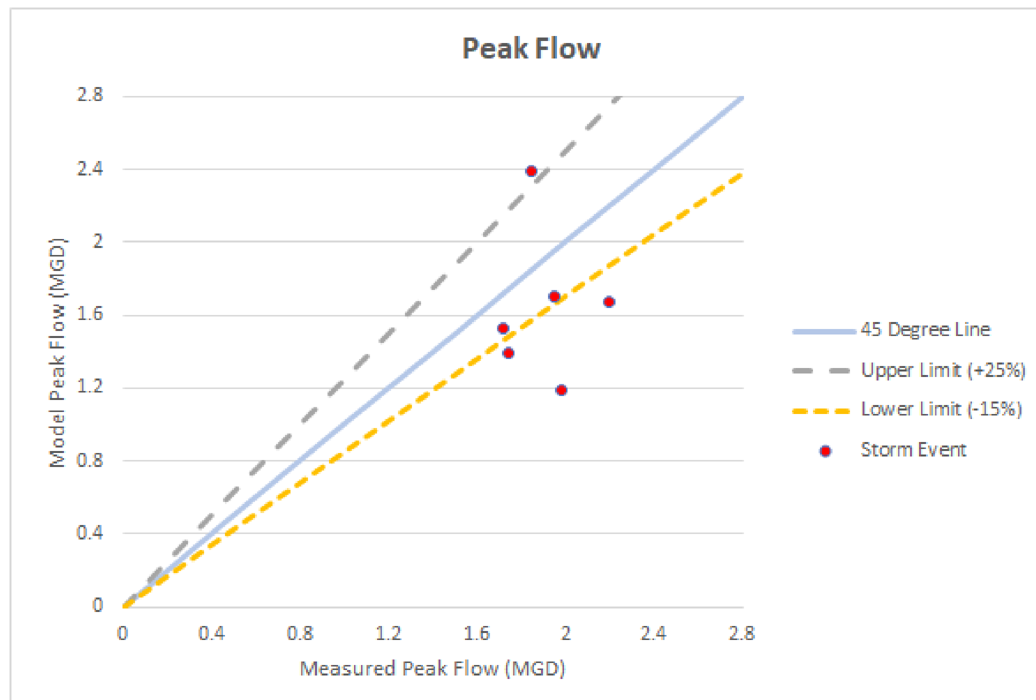
FM03



Rain Gage
Model
Meter
FM03_rain
O10-058_O10-027
O10-058_O10-027 (obs)
Storm Events Used for Calibration
Rainfall (in)
0.8
0.6
0.4
0.2
0
Flow (mgd)
7
6
5
4
3
2
1
0
Sep
Oct
Nov
Dec
2022
Date/Time

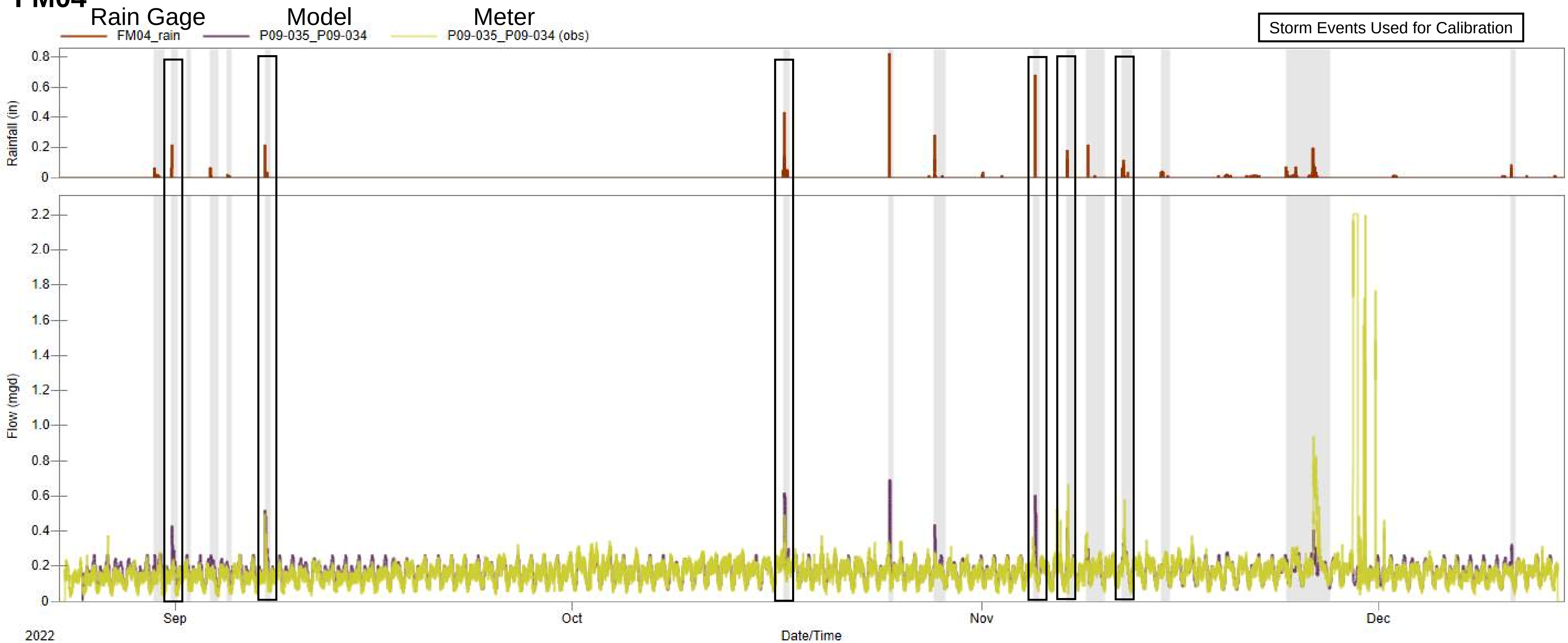


Volume
Model Volume (MG)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event

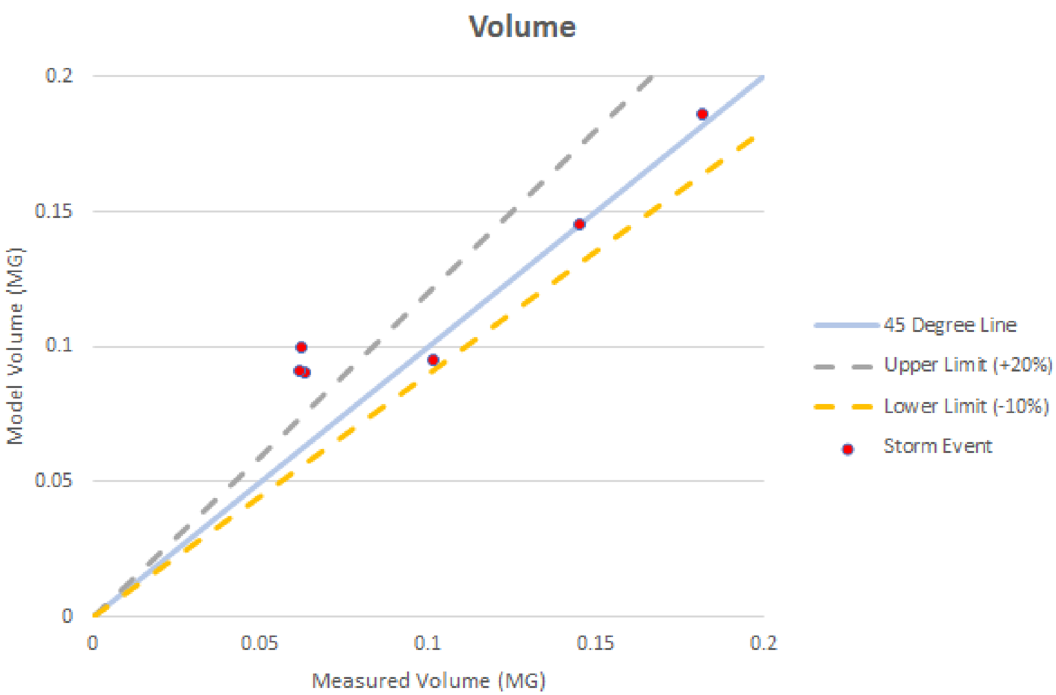


Peak Flow
Model Peak Flow (MGD)
2.8
2.4
2
1.6
1.2
0.8
0.4
0
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

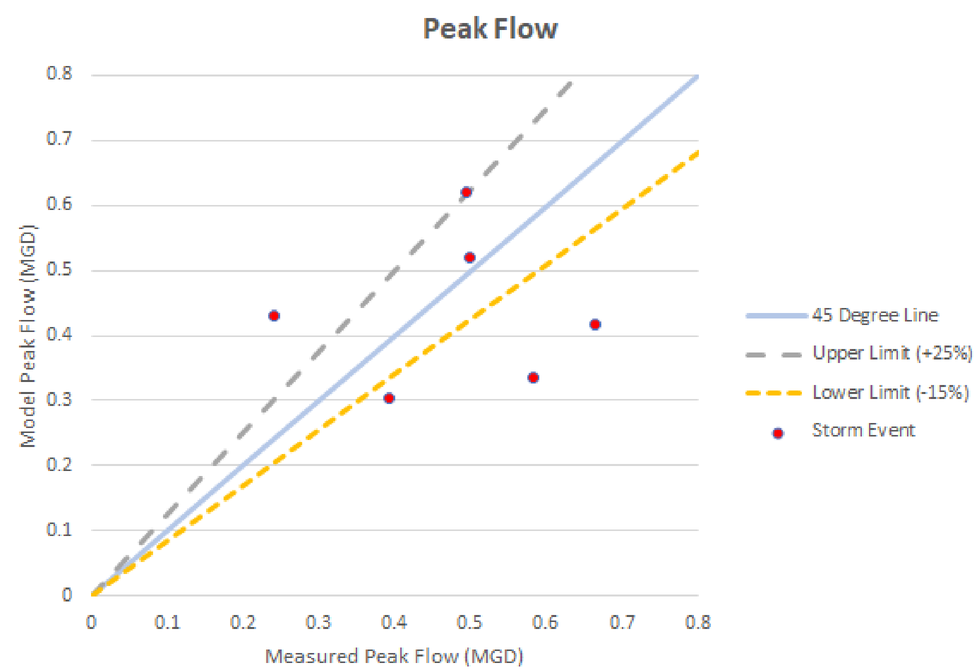
FM04



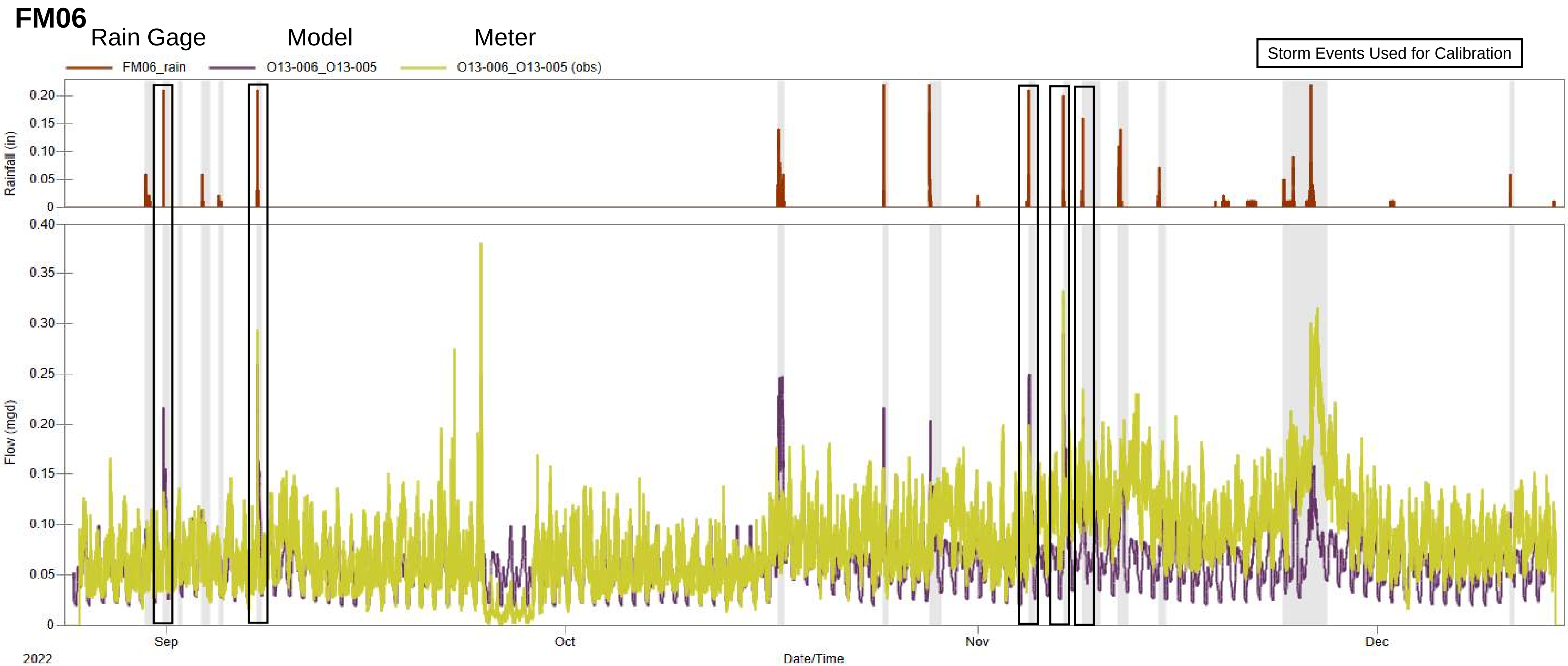
Rain Gage
FM04_rain
Model
P09-035_P09-034
Meter
P09-035_P09-034 (obs)
Storm Events Used for Calibration
Rainfall (in)
0.8
0.6
0.4
0.2
0
Flow (mgd)
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
Sep
Oct
Nov
Dec
2022
Date/Time

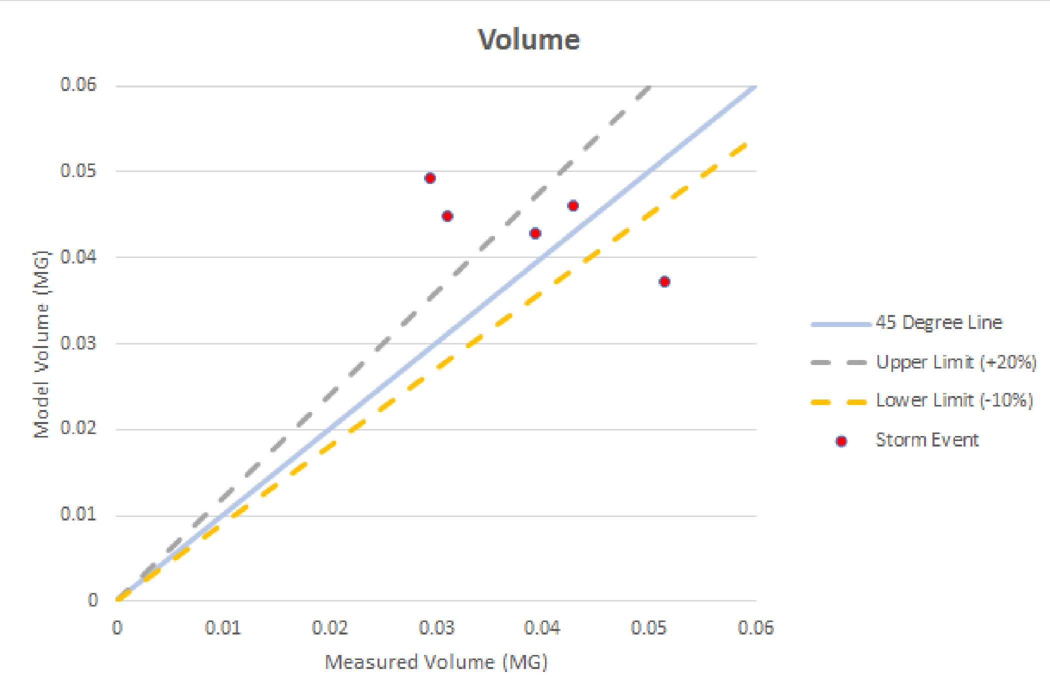


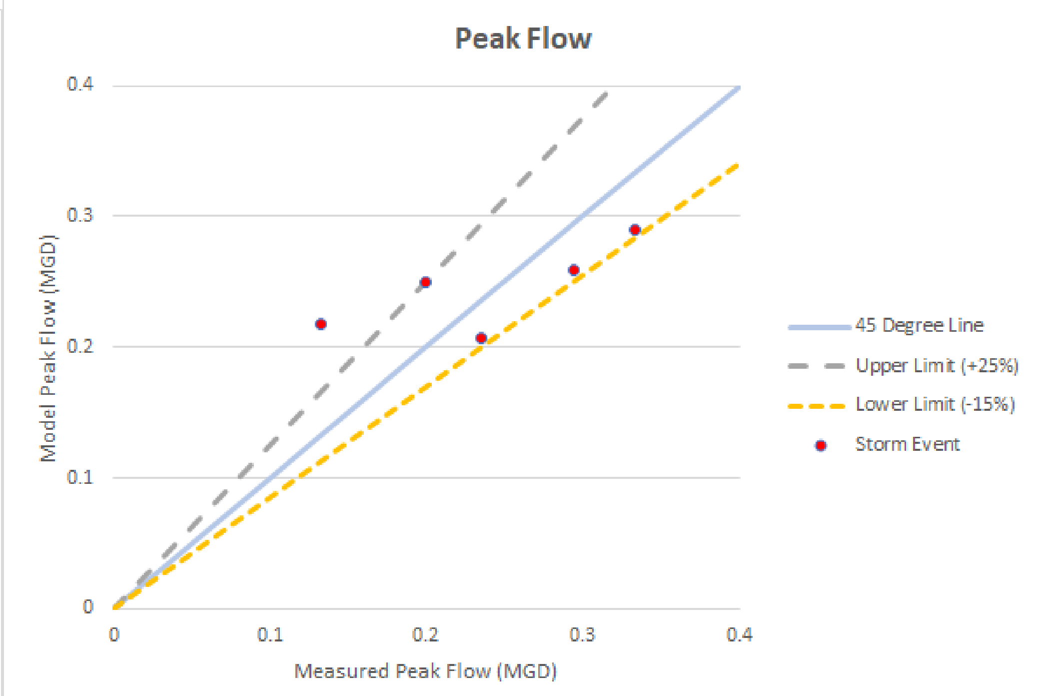
Volume
Model Volume (MG)
0.2
0.15
0.1
0.05
0
0
0.05
0.1
0.15
0.2
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event



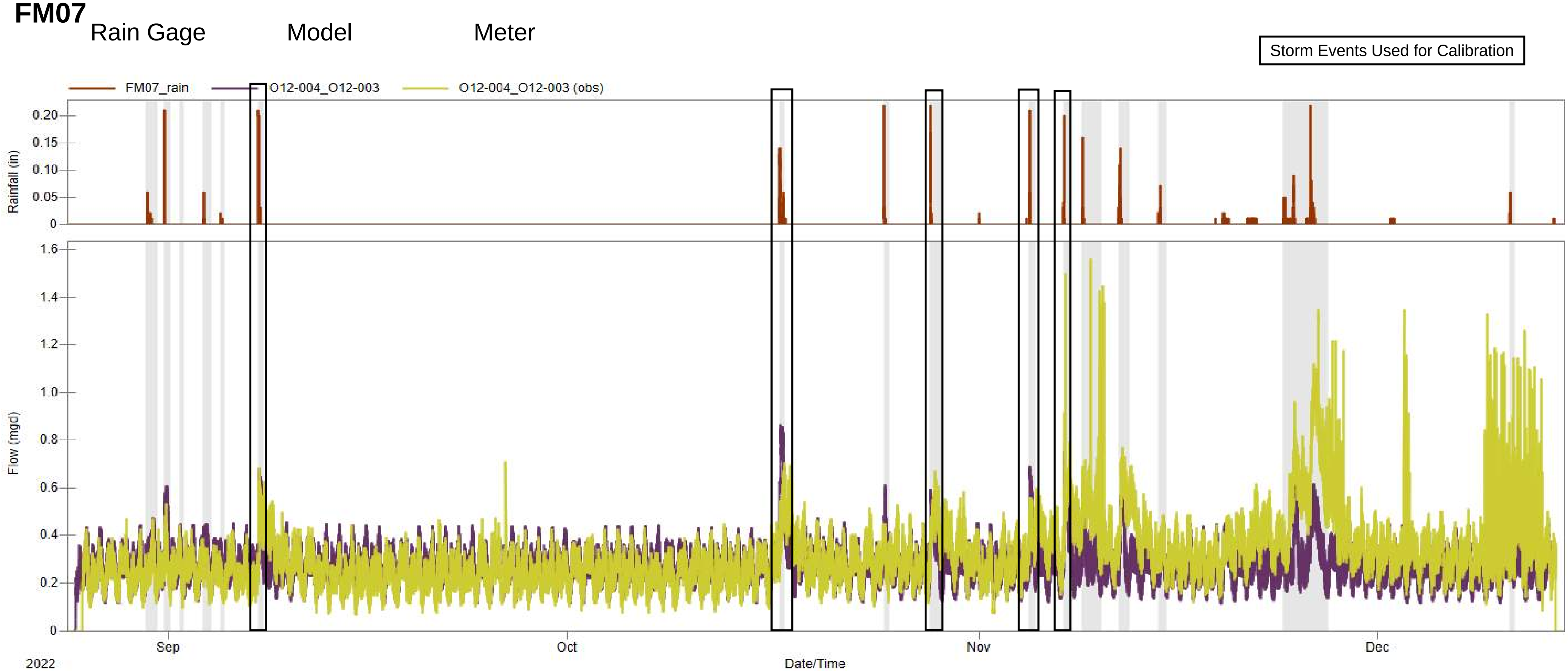
Peak Flow
Model Peak Flow (MGD)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event


FM06
Rain Gage
Model
Meter
FM06_rain
O13-006_O13-005
O13-006_O13-005 (obs)
Storm Events Used for Calibration
Rainfall (in)
Flow (mgd)
Sep
Oct
Nov
Dec
2022
Date/Time

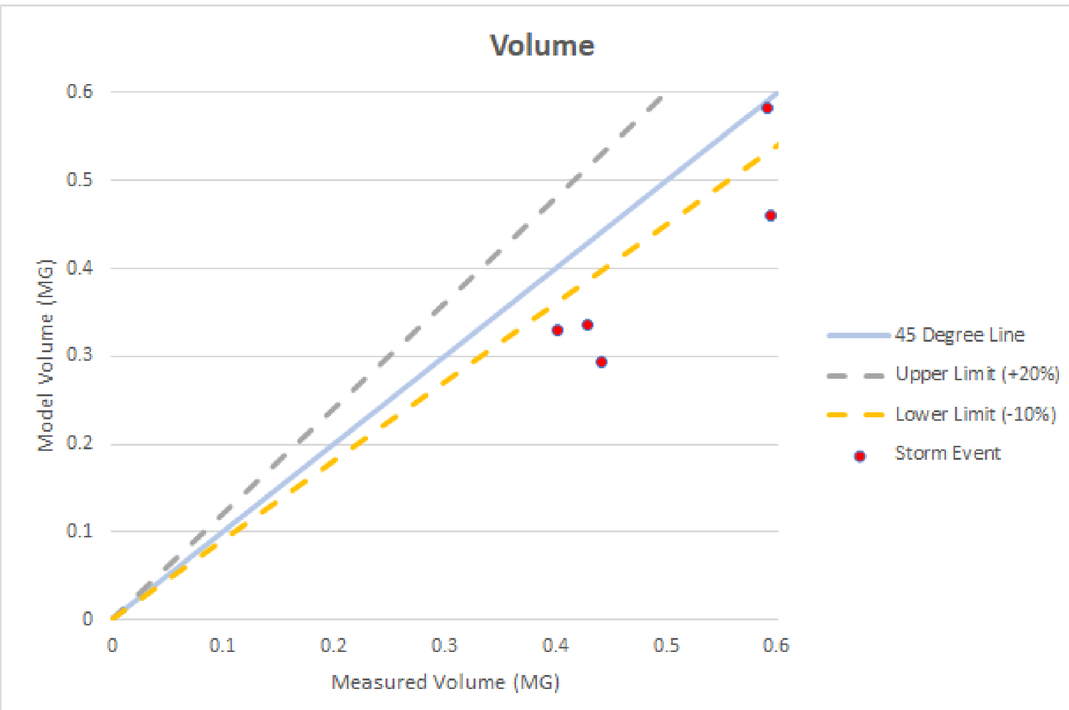

Volume
Model Volume (MG)
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event


Peak Flow
Model Peak Flow (MGD)
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

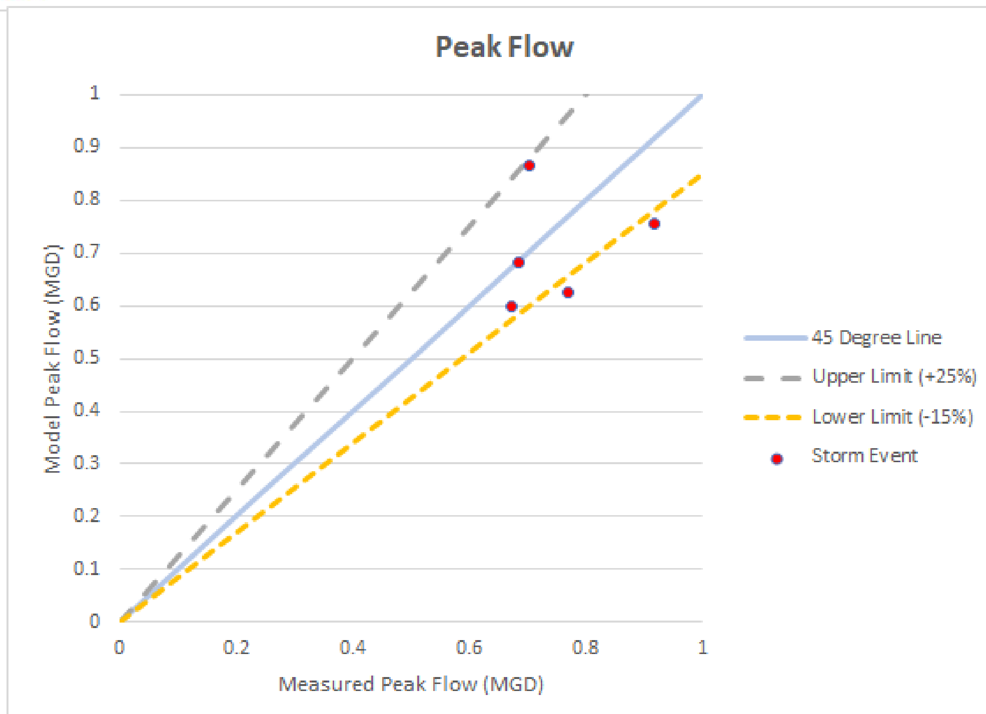
FM07



Rain Gage
Model
Meter
Storm Events Used for Calibration
FM07_rain
O12-004_O12-003
O12-004_O12-003 (obs)
Rainfall (in)
0.20
0.15
0.10
0.05
0
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
Sep
Oct
Nov
Dec
2022
Date/Time

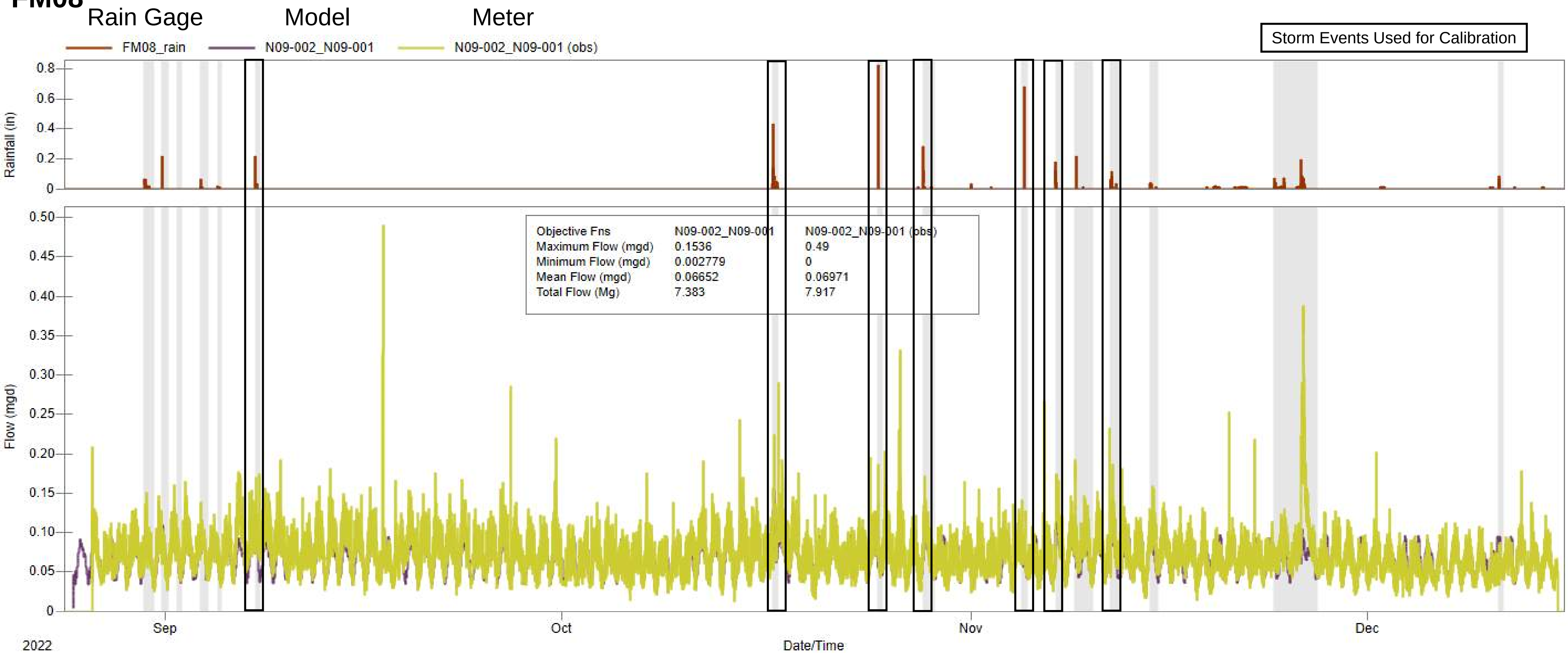


Volume
Model Volume (MG)
Measured Volume (MG)
0
0.1
0.2
0.3
0.4
0.5
0.6
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event

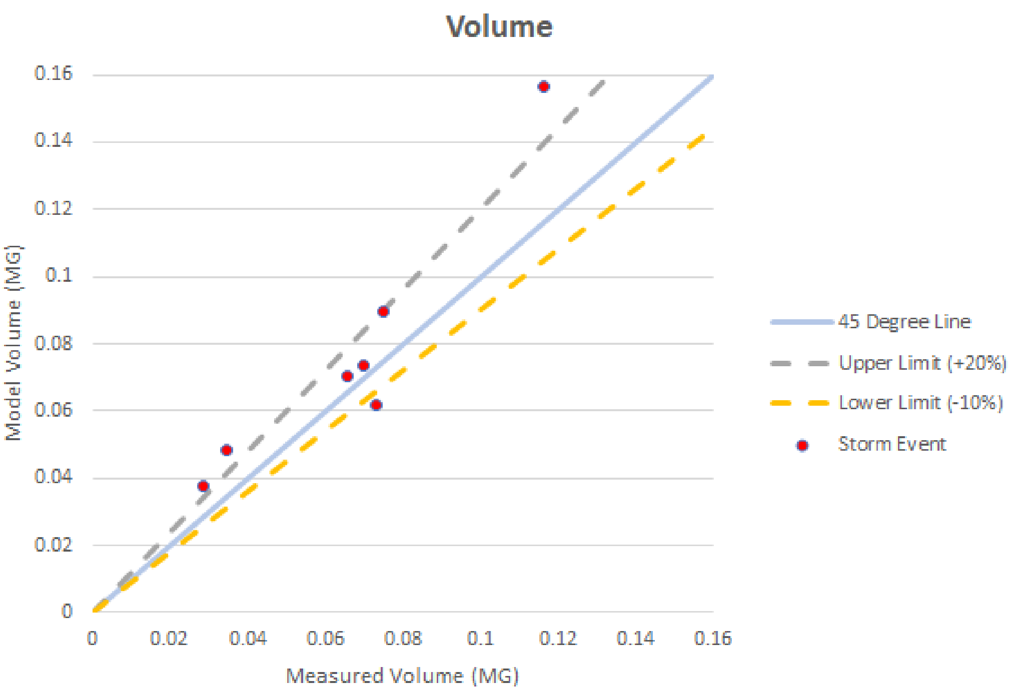


Peak Flow
Model Peak Flow (MGD)
Measured Peak Flow (MGD)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

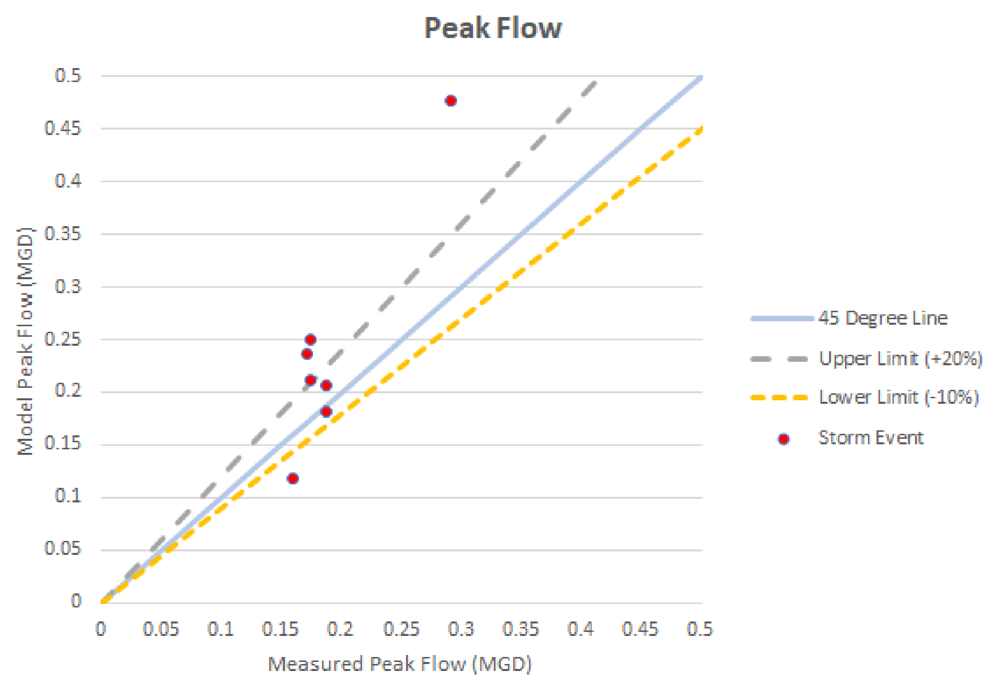
FM08



Rain Gage
Model
Meter
FM08_rain
N09-002_N09-001
N09-002_N09-001 (obs)
Storm Events Used for Calibration
Rainfall (in)
Flow (mgd)
Objective Fns | N09-002_N09-001 | N09-002_N09-001 (obs)
Maximum Flow (mgd) | 0.1536 | 0.49
Minimum Flow (mgd) | 0.002779 | 0
Mean Flow (mgd) | 0.06652 | 0.06971
Total Flow (Mg) | 7.383 | 7.917
Sep
Oct
Nov
Dec
2022
Date/Time

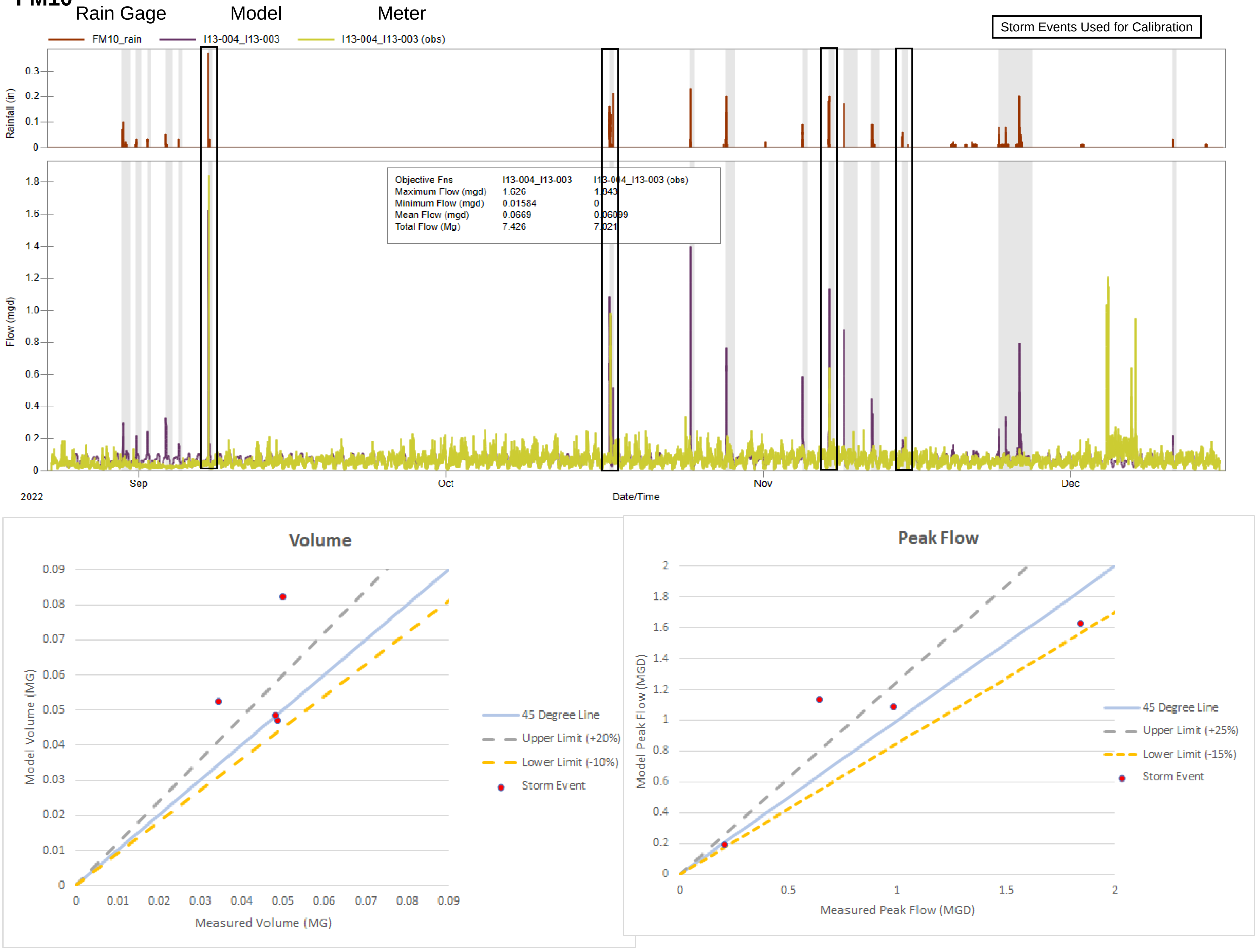


Volume
Model Volume (MG)
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event



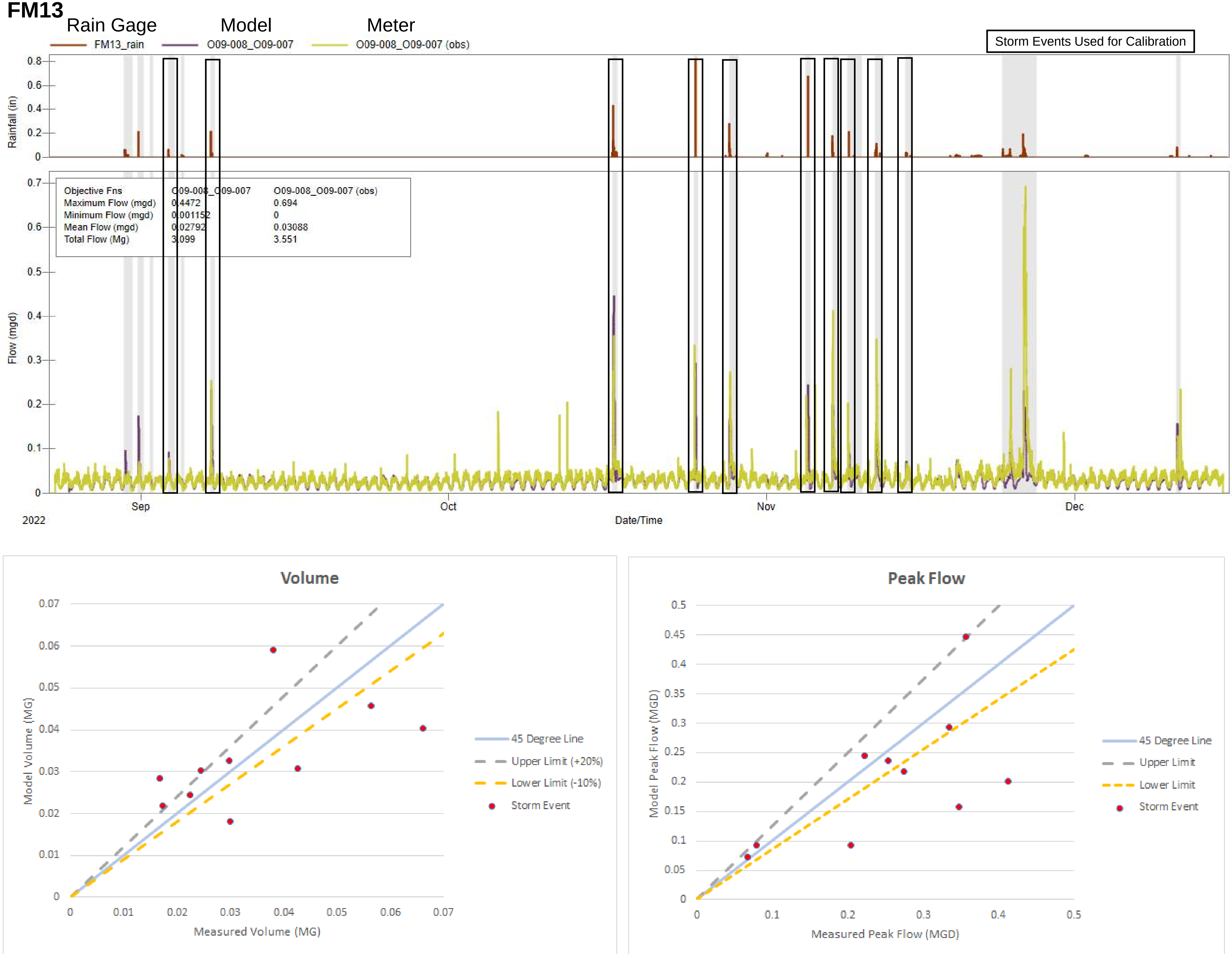
Peak Flow
Model Peak Flow (MGD)
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event

FM10



Rain Gage
Model
Meter
FM10_rain
I13-004_I13-003
I13-004_I13-003 (obs)
Storm Events Used for Calibration
Rainfall (in)
Flow (mgd)
Objective Fns | I13-004_I13-003 | I13-004_I13-003 (obs)
Maximum Flow (mgd) | 1.626 | 1.843
Minimum Flow (mgd) | 0.01584 | 0
Mean Flow (mgd) | 0.0669 | 0.06099
Total Flow (Mg) | 7.426 | 7.021
Sep
Oct
Nov
Dec
2022
Date/Time
Volume
Model Volume (MG)
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event
Peak Flow
Model Peak Flow (MGD)
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit (+25%)
Lower Limit (-15%)
Storm Event

FM13


Rain Gage
Model
Meter
FM13_rain
O09-008_O09-007
O09-008_O09-007 (obs)
Storm Events Used for Calibration
Rainfall (in)
0.8
0.6
0.4
0.2
0
Objective Fns
Maximum Flow (mgd)
Minimum Flow (mgd)
Mean Flow (mgd)
Total Flow (Mg)
O09-008_O09-007
0.4472
0.001152
0.02792
3.099
O09-008_O09-007 (obs)
0.694
0
0.03088
3.551
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Sep
Oct
Nov
Dec
2022
Date/Time
Volume
Model Volume (MG)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Measured Volume (MG)
45 Degree Line
Upper Limit (+20%)
Lower Limit (-10%)
Storm Event
Peak Flow
Model Peak Flow (MGD)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0.1
0.2
0.3
0.4
0.5
Measured Peak Flow (MGD)
45 Degree Line
Upper Limit
Lower Limit
Storm Event

Appendix D: Overall Projects Map (24”x36”) and Project List (11”x17”)

OVERALL PROJECTS MAP

G:\15320\GIS\WWMP Report Figures\15320_ReportFigures.aprx

Table 7-2: Overall Project List

Project ID	Infrastructure Type	Time Horizon	Current CIP Project ID	Project Name	Type of Improvement	Pipe Diameter (in)(1)	Total Length of Pipe (ft)	Lift Station or WWTP Flow Rate (mgd)	Planning-Level Construction OPCC without Contingency	Capital Cost (30% Contingency, 20% Engr./Survey,)(3)
WW.00.01	Existing/Relief	Present Day	-	Llano St and Lampasas St Interceptors(2)	Exist. Gravity Relief/Upsizing	18"-36"	4,060	-	$3,405,040	$5,652,000
WW.00.02	Existing/Relief	Present Day	-	Pyrite Rd Gravity Sewer (upstream of LS06) - *I/I Mitigation Potential*	Exist. Gravity Relief/Upsizing	18"	930	-	$584,010	$911,000
WW.00.03	Existing/Relief	Present Day	CIP-4	US 290 Interceptor (Still Necessary even if LS06/08/09 are Decommissioned)	Exist. Gravity Relief/Upsizing	24"	2,030	-	$1,596,488	$2,491,000
WW.00.04	Existing/Relief	Present Day	-	Rehabilitation and I/I Mitigation in Existing Sewers	Rehabilitation	-	40,440	-	$7,279,200	$11,356,000
WW.05.01	Treatment	5-Year	S-31	Cottonwood WWTP Expansion Ph. 3 (Expansion from 0.4 to 0.6 MGD)	Exist. WWTP Expansion	-	-	0.2	$3,260,000	$5,086,000
WW.05.02	Treatment	5-Year	-	Wilbarger WWTP Expansion (Expansion from 1.33 to 2.0 MGD)	Exist. WWTP Expansion	-	-	0.67	$16,750,000	$26,130,000
WW.05.03	New/Extension	5-Year	S-36	Manor Springs Lift Station Improvements	New LS to Serve Growth	6"(F)	3,760(F)	0.5	$1,606,289	$2,506,000
WW.05.04	New/Extension	5-Year	S-23	Voelker Ln. Wastewater Improvements	New Gravity to Serve Growth	12"	6,560	-	$4,595,771	$7,169,000
WW.15.01	Treatment	15-Year	S-39/40/41	East Travis Regional WWTP	New WWTP to Serve Growth	-	-	1.5	$37,403,000	$58,349,000
WW.15.02	Existing/Relief	15-Year	Dev. Agr.	Lift Station 1 (Las Entradas) and O09-006_O09-005	Exist. LS Expansion	18"	260	-	$164,430	$257,000
WW.15.03	Existing/Relief	15-Year	S-18	West Cottonwood Creek Existing Interceptor	Exist. Gravity Relief/Upsizing	24"-27"	8,500	-	$8,236,967	$12,850,000
WW.15.04	Existing/Relief	15-Year	S-16	East Cottonwood Creek Existing Interceptor	Exist. Gravity Relief/Upsizing	27"-33"	3,070	-	$3,392,810	$5,293,000
WW.15.05	Existing/Relief	15-Year	-	FM973 Interceptor (Not Necessary if LS06 is Decommissioned)	Exist. Gravity Relief/Upsizing	18"	4,220	-	$2,658,600	$4,147,000
WW.15.06	New/Extension	15-Year	S-38	South Cottonwood Creek Wastewater Interceptor Improvements Phase 1(2)	New Gravity to Serve Growth	39"-45"	7,960	-	$15,366,210	$25,508,000
WW.15.07	New/Extension	15-Year	S-38	South Cottonwood Creek Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	36"	8,910	-	$13,811,117	$21,545,000
WW.15.08	New/Extension	15-Year	S-23	Willow Creek Wastewater and Lift Station Improvements	New Gravity/LS to Serve Growth	24"(G), 6"(F)	2,160(G/F)	0.65	$1,642,456	$2,562,000
WW.15.09	New/Extension	15-Year	-	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	24"	5,210	-	$5,424,105	$8,462,000
WW.15.10	New/Extension	15-Year	-	Willow Creek West Tributary Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	15"-21"	7,710	-	$6,455,271	$10,070,000
WW.15.11	New/Extension	15-Year	-	East US290 Wastewater Improvements	New Gravity to Serve Growth	15"	2,920	-	$2,219,654	$3,463,000
WW.15.12	New/Extension	15-Year	-	North Cottonwood Creek East Tributary Wastewater Interceptor Improvements	New Gravity to Serve Growth	15"-18"	8,480	-	$6,720,382	$10,484,000
WW.15.13	New/Extension	15-Year	-	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	27"	7,390	-	$8,791,977	$13,715,000
WW.15.14	New/Extension	15-Year	-	South Cottonwood Creek West Tributary Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	27"	3,590	-	$4,424,675	$6,902,000
WW.15.15	New/Extension	15-Year	-	Littig Rd. Wastewater Improvements(2)	New Gravity to Serve Growth	12"	8,510	-	$5,961,816	$9,897,000
WW.15.16	New/Extension	15-Year	-	North Cottonwood Creek Wastewater Interceptor Improvements Phase 1	New Gravity to Serve Growth	21"-24"	7,238	-	$7,379,755	$11,512,000
WW.15.17	New/Extension	15-Year	-	North Cottonwood Creek Wastewater Interceptor Improvements Phase 2	New Gravity to Serve Growth	12"-18"	10,367	-	$8,035,168	$12,535,000
WW.15.18	New/Extension	15-Year	-	South Wilbarger Creek Lift Station Improvements	New LS to Serve Growth	4"(F)	5,040(F)	0.25	$1,287,296	$2,008,000
WW.15.19	New/Extension	15-Year	-	Lift Station #6 (Stonewater) Decommissioning	New Gravity to Abandon LS	18"	3,300	-	$3,134,355	$4,890,000
WW.15.20	New/Extension	15-Year	-	Lift Station #8 (Presidential Glen Ph. 4B) Decommissioning	New Gravity to Abandon LS	12"	1,400	-	$1,281,253	$1,999,000
WW.15.21	New/Extension	15-Year	-	Lift Station #9 (Presidential Heights) Decommissioning	New Gravity to Abandon LS	12"	500	-	$650,448	$1,015,000

Notes:
1) For pipe diameters and lengths, gravity main is assumed, except where (F) indicates force main, and (G) indicates gravity main.
2) Select projects include an additional 10% contingency for railroad crossings to account for additional costs (permitting, extra boring length, etc.).
3) For new/extension projects not within the ROW or an exisitng easement, a unit cost of $87,900/acre was utilized for easement cost estimates.
The easement unit cost includes survey, easement acquisition, engineering fees, condemnation/attorney fees, and ROW agent fees.
LS06, LS08, and LS09 are recommended to be decommissioned and re-routed by gravity towards East Travis Regional WWTP once it is built. This reduces burden on Wilbarger WWTP and the FM973 interceptor, and reduces LS O&M costs.
Projects Not Included: The above list does not include Bell Farms LS upgrades (LS04), Carriage Hills LS or interceptor upgrades, Cottonwood Cr. WWTP Ph. 2 expansion to 0.4 MGD (developer-funded), or other projects currently in-progress.

Time Horizon	Capital Cost
Present Day	$ 20,410,000
5-Year	$ 40,891,000
15-Year	$ 227,463,000
Total, All Projects	**$ 288,764,000**

Appendix E: Recommendations for Updating and Leveraging the Sanitary Sewer Model

Appendix E: Recommendations for Updating and Leveraging the Sanitary Sewer Model

Introduction and Background:
Computer capacity models provide the means to evaluate sanitary sewer systems in many ways, such as determining system strengths and weaknesses as they relate to system operation, analyzing development inquiries, and future growth master planning. Computer capacity models can be leveraged for sanitary sewer CIP development to identify, size, and schedule necessary system improvements.

This document provides recommendations to maintain and utilize the sanitary sewer model developed for the City of Manor's Wastewater Master Plan. The model was developed utilizing the PCSWMM software. Geographical Information Systems (GIS), project records, and field data were collected and utilized to input physical attribute data into the model. Because of the complexity of the model and the investment made by the City, this document was created to identify a practical approach to maintain the hydraulic model of the City's wastewater collection system. The recommended work tasks were developed with the understanding that the City may not have the required resources in-house to complete them, at least initially. Also, some of the recommendations may differ from the City's current practice for GIS maintenance and record keeping. The model will need to be consistently maintained, however, to realize its full value.

The model requires consistency in its structure, including how model network additions and changes are implemented. Initial development of the model included gravity sewers with a diameter of 12-inches or greater, and most lift stations and force mains. Extensive fieldwork was conducted to collect the piping and manhole information used in the model. Not all manholes could be located or opened, however, creating gaps in the data. These gaps in elevations were generally filled using interpolated estimates or best-available information (such as LiDAR elevation data). Estimated drainage areas (basins) were assigned to manholes to distribute flows in the model. Dry- and wet-weather calibrations were conducted using recorded rainfall and flow data at previous flow monitoring sites throughout the City's system. Future growth planning documents and discussions with City planners were conducted to project and spatially distribute growth for the five and fifteen-year model scenarios.

As scoped for the modeling effort, GBA used a combination of existing GIS data and newly collected manhole data to create the network for the sewer model. The GIS layer was created to provide the data in an optimal format for the model. This GIS layer included most of the model set-up information needed for the project. The field survey provided information for approximately 250 manholes and 100,000 feet of pipe. Ten of the City's thirteen active lift stations were included in the model. Lift station data was provided by the City.

Three model scenarios were developed for the project to inform the Master Plan. These modeled time horizons are listed below and are recommended to be updated when re-calibration is conducted:

- Existing Conditions (approximately 2023)
- 5-Year Growth Conditions (2028)
- 15-Year Growth Conditions (2038)

There are numerous approaches for maintaining and leveraging a sanitary sewer model. The activities detailed in this memo are recommended as a starting place. First, it is recommended that the City maintain information in GIS as specified below on a consistent annual basis. Also, a complete re-calibration of the model should be conducted at least every 5 years, or at the time of a master plan update. The re-calibration should utilize the best-available flow monitoring data in the City's repository. Five distinct tasks are recommended and described below:

1. Sanitary Sewer GIS Network Maintenance – Annual
2. Flow Monitoring and Data Repository – 5 Year Cycle (Systemwide)
3. Future Growth Planning – Annual
4. Model Updates – Annual
5. Model Calibration – 5 Year Cycle

1. Sanitary Sewer GIS Network Maintenance – Annual

GIS network maintenance plays a significant role in the maintenance of the hydraulic model. Specific data gaps, when filled via field work/investigations, should be consistently and regularly updated in GIS. There are specific GIS attribute fields that were captured during field investigations by GBA that are critical to the model input. The attributes shown below will need to be maintained and updated in the City's GIS, to ensure efficient updates to the model. Specific additions and modifications to the GIS database schema are detailed below.

Manhole Attributes:	**Pipe Attributes:**	**Lift Station Attributes:**
MH ID	Pipe ID	Lift Station ID
MH Rim Elevation	US Manhole ID	Wet Well Cross-Section Area
MH Invert Elevation	DS Manhole ID	Rim Elevation
MH Diameter	Pipe Size	Invert Elevation
Surcharge Evidence Flag	Pipe Material	Pump "On" Depth
	Pipe Length	Pump "Off" Depth
	US Invert Elevation	Pump Curve
	DS Invert Elevation	Record Drawings

Recommendations for maintaining GIS data to ensure efficient integration into the model are outlined below:

- Establish or adopt a GIS database schema that includes all the attributes shown above that are necessary to the upkeep of the hydraulic model;
- Perform a gap analysis to identify areas, features, and attributes missing from the current database as well as those that should be included for modeling activities to consolidate all wastewater data into a single geodatabase;
- Continue using the wastewater infrastructure ID system developed by GBA;
- Provide developers and consultants with a blank file geodatabase containing the wastewater asset schema and require them to populate the file with all necessary "as-built" data and submit it for review before project closeout;
- Develop a process for integrating/appending newly provided "as-built" GIS data provided by developers/consultants into the City's master GIS database.

2. Flow Monitoring and Data Repository

Flow monitoring is necessary for evaluating sanitary sewer performance and flow conditions. Flow monitoring can provide answers and insights for the following questions and scenarios:

- ***Does the system have surcharge issues?*** Flow monitoring can be used to assess the risk or occurrence of surcharge. It can also help identify the cause of the surcharge. For example, if backup surcharge is occurring, then there is likely a downstream capacity restriction.
- ***Does the system have excessive I/I?*** Flow monitoring can also establish the relative leakiness of the sewer system, and when strategically located, it can isolate I/I issues.
- ***Utilize in modeling to calibrate existing system.*** Observed base flows and reactions to storm events can be used to calibrate model flows at monitoring sites.
- ***Utilize in modeling to project peak design flows.*** Once the model is calibrated to flow data, it can be used to project peak flows and simulate system responses for various design storms.
- ***Utilize in modeling to verify locations that have capacity issues.*** The model results can be compared to monitoring site flow levels to verify if there is a problem. For example, if the flow monitoring data shows there has been surcharge, the model can be reviewed to verify if it also identifies this problem.

As the City collects more flow monitoring data for use in studies and designs, a central repository can be created to store and organize that data. The *Flow Monitoring Data Repository* can be linked to GIS. It is recommended that both the data and any reports be kept in the repository to help with evaluations of the data for modeling needs. (i.e., If the meters were in during a dry year, then the meter data for that session should not be used for wet weather calibration). The flow data will also be used to recalibrate the model as recommended on a 5-year basis. An example of a *Flow Monitoring Data Repository* in GIS is shown in **Figure 1**. It should be noted that flow data can be utilized for many aspects of sanitary sewer surveillance besides modeling and is recommended to be conducted as an independent program.

Targeted Flow Monitoring for Relief Sewer Evaluation

A single targeted flow monitoring session is recommended for investigating problem areas identified in the existing conditions wastewater model. This would allow the City to confirm the necessity of sanitary sewer improvements in areas identified in the model as critically surcharged. **Figure 2** shows the recommended locations for this targeted flow monitoring investigation. The rationale for the 5 temporary flow meters are described as follows:

- FM02E will be placed along the US Highway 290 interceptor, downstream of where the FM973 interceptor ties in. This line was shown to surcharge in the existing system wastewater model, and a flow meter would help confirm capacity issues.
- FM03A will be placed at the downstream end of the Llano Street interceptor, near the Wilbarger WWTP, to confirm the presence and extent of surcharge predicted by the model. This will help determine if improvements will be necessary.
- FM03B will be placed along Lampasas Street to confirm the presence and extent of surcharge shown in the wastewater model. This will help determine if improvements will be necessary.
- FM03C will be placed in a manhole on the upstream end of the Lampasas Street interceptor, near the discharge point of the combined force main from LS3 and LS11. This flowmeter is necessary to evaluate how much flow is entering these interceptors from the force main.
- FM10 will be placed along Pyrite Road, farther upstream than the Fall 2022 location, to help evaluate the extent and cause of surcharging.

Systemwide Flow Monitoring for Model Calibration

It is recommended that systemwide flow monitoring be conducted at least every 5 years, if not more often if need arises. A comprehensive metering session once every 5 years will provide flow data necessary for re-calibrating the model and evaluating system performance. However, it should be noted that flow monitoring during particularly dry conditions may not be usable in model calibration and would therefore require an extended or additional meter session. The flow meter locations should be similar to those used during the Fall 2022 flow monitoring session, with some adjustments, such as the addition of flow meters in the Cottonwood Creek Basin. **Figure 3** shows the recommended locations for the 5-year flow monitoring effort. Targeted flow metering will also be required in the future to quantify the flow to be redirected when lift stations 6, 8, and 9 are decommissioned.

3. Future Growth Planning – Annual

Documents pertaining to future growth should be compared to documents used in the Master Plan report on an annual basis. Also, as development occurs and sewers are built, the master plan should be annotated accordingly. New planning documents and an updated Master Plan sewer map should be maintained in a *Future Growth Repository* to be utilized for updating the model and master plan.

New Development Impacts. The model can be used to evaluate new development impacts. It is recommended that new development impact analyses are conducted when the new development has differed from the City's current plan. Aspects of development to consider are:

- Is the development within the drainage basin? If so, have the flows from the development already been accounted for (i.e., large industries or multi-family projects can add significant daily volumes versus subdivision flows)?
- If not in the watershed, will the sewage be pumped into a basin and does the system have sufficient capacity?
- How will flows be assigned to the new development?
- What is the timing of the development relative to other planned developments and system demands/improvements?

Once the evaluation process has been established, the model is available to determine the impact on the modeled downstream system. It is important to note that the model currently only includes those pipes of 12-inch diameter or greater, so only those sewers that are modeled can be assessed in this way. A method for modeling new developments should be established that adheres to City development requirements. The model can help predict available capacity in the sewer segments downstream of the development to evaluate the need for any improvements. The peak flow from the new development can then be added in to determine how much available capacity will be used under existing and future scenarios. The City can then make decisions about potential upgrades and/or developer cost sharing to implement.

4. Model Updates – Annual Checks

Generally, the model should be updated annually, but only when significant changes have occurred, and the model is needed for specific development evaluations. Potential updates should be listed and checked to see if model updates are prudent. Detailed scenarios where model updates are necessary and how to perform the updates are outlined below:

- New developments:
  - Assign sewershed area, number of contributing LUEs (or estimate wastewater generation quantities) and flow patterns to the nearest downstream receiving manhole
- New infrastructure:
  - For new gravity lines greater than or equal to 12 inches in diameter, import updated GIS data as shapefiles into the PCSWMM model and ensure connectivity

    - For new lift stations, import updated GIS data into the PCSWMM model including wet well and force main details; manually add pump information (pump curve, start-up, and shut-off depths) to the model
  - Changes to existing gravity lines:
    - Update the pipe size, pipe material, and manhole rim and invert elevations
  - Changes to existing lift stations:
    - Update wet well area, wet well depth, pump curve, start-up and shut-off depths, force main size, force main material, and force main alignment as applicable

5. Model Calibration

There are two types of calibration situations that are recommended. One is for partial re-calibration and the other is total re-calibration of the model. Partial re-calibrations would be based on significant growth in an isolated area of the system. It is recommended that the system be monitored on a case-by-case basis to measure increases in base flow to identify where model changes are needed in the short term. The flow monitoring plan shown in **Figure 3** should generally be followed for base flow checks of each basin and re-calibration should be considered for basins that exceed a 20 percent increase in base flow.

Total re-calibration of the model should be conducted on a set schedule and is usually not conducted every year. For the City of Manor, it is recommended that re-calibration of the entire modeled collection system be conducted on a 5-year cycle because of the anticipated rapid development of the City's sewer. The model re-calibration will utilize the *Flow Monitoring Data Repository*. The recommended re-calibration method is provided below:

- Partial Re-calibration:
  - When new flow meter data becomes available and varies +/- 20% from 2022 Flow Monitoring Data used for original calibration (See Figure 3)
    - Compare flow metering data for dry weather flow to the modeled average dry weather flow at that location
    - Collect at least 3 months of representative flow metering data capturing both dry and wet weather conditions with flow meters and rain gages appropriately placed
    - Update average daily dry-weather flows (ADDFs) and time patterns for dry weather calibration
    - Recalibrate unit hydrographs for wet weather events
  - Changes to land use
    - If land within a flow meter basin undergoes significant changes impacting wastewater generation, perform flow monitoring and recalibrate that specific basin
  - Observed deficiencies (backups, surcharging, etc.)

        - If deficiencies are observed in the field but not predicted in the model, perform flow monitoring and recalibrate that specific area
- Total Re-Calibration:
    - On a cycle appropriate for the overall city growth (Every 5 years recommended).
        - Objective: Update the City Wastewater Master Plan and re-calibrate the model
        - Add changes to model network – Manholes, pipes, lift stations, etc.
            - Use city GIS that has been updated annually
            - Create new GIS model layer and compare to previous model layer
        - Select most recent and usable year of flow data (use *Flow Monitoring Data Repository*)
        - Distribute average dry weather flows throughout the system
        - Update time patterns for dry weather conditions
        - Re-calibrate R, T, K hydrographs to selected storm events
        - Update future growth models
            - Review plans from *Future Growth Repository*.
        - Analyze model results and update plan

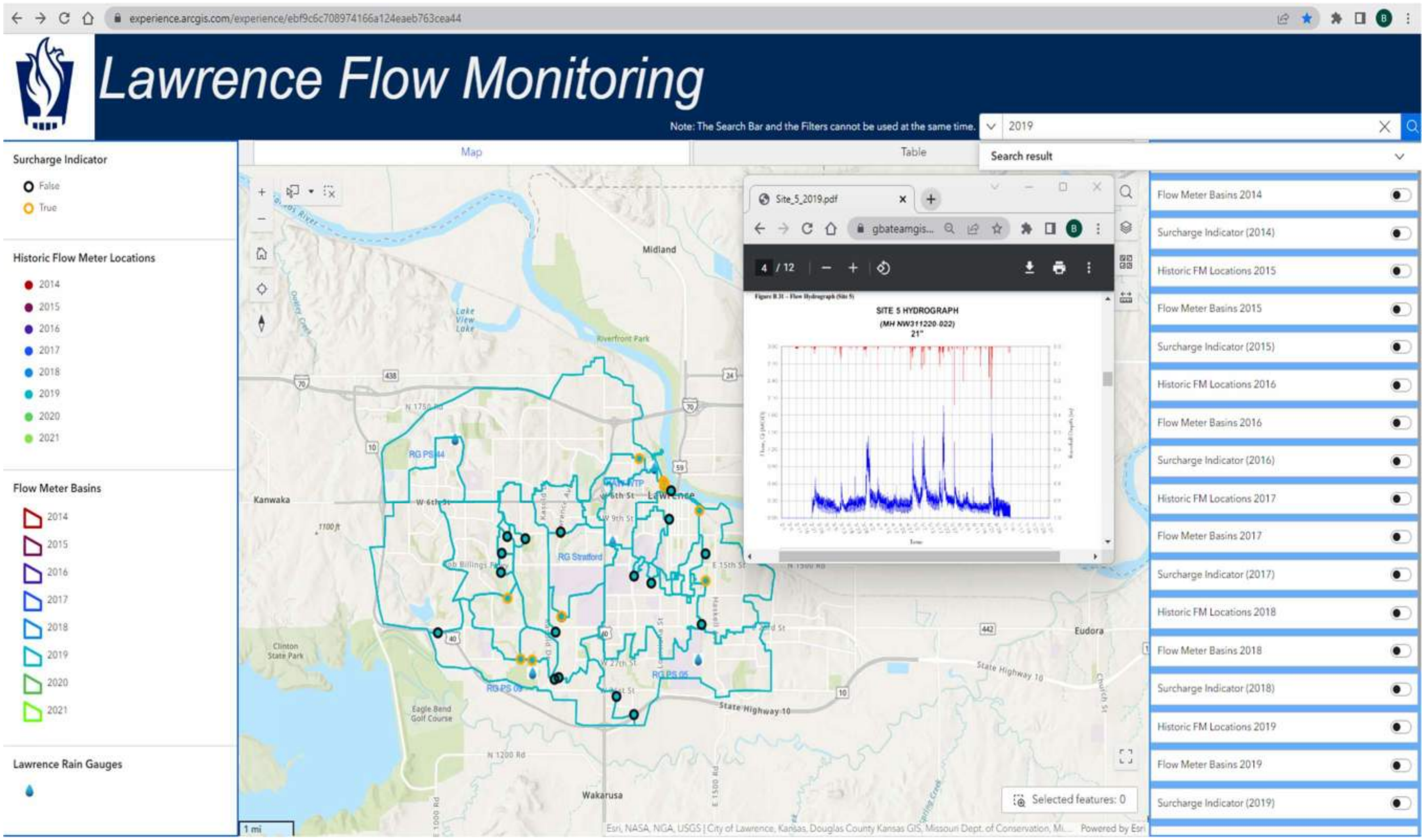


Figure 1: Web-Based Flow Monitoring Repository Example

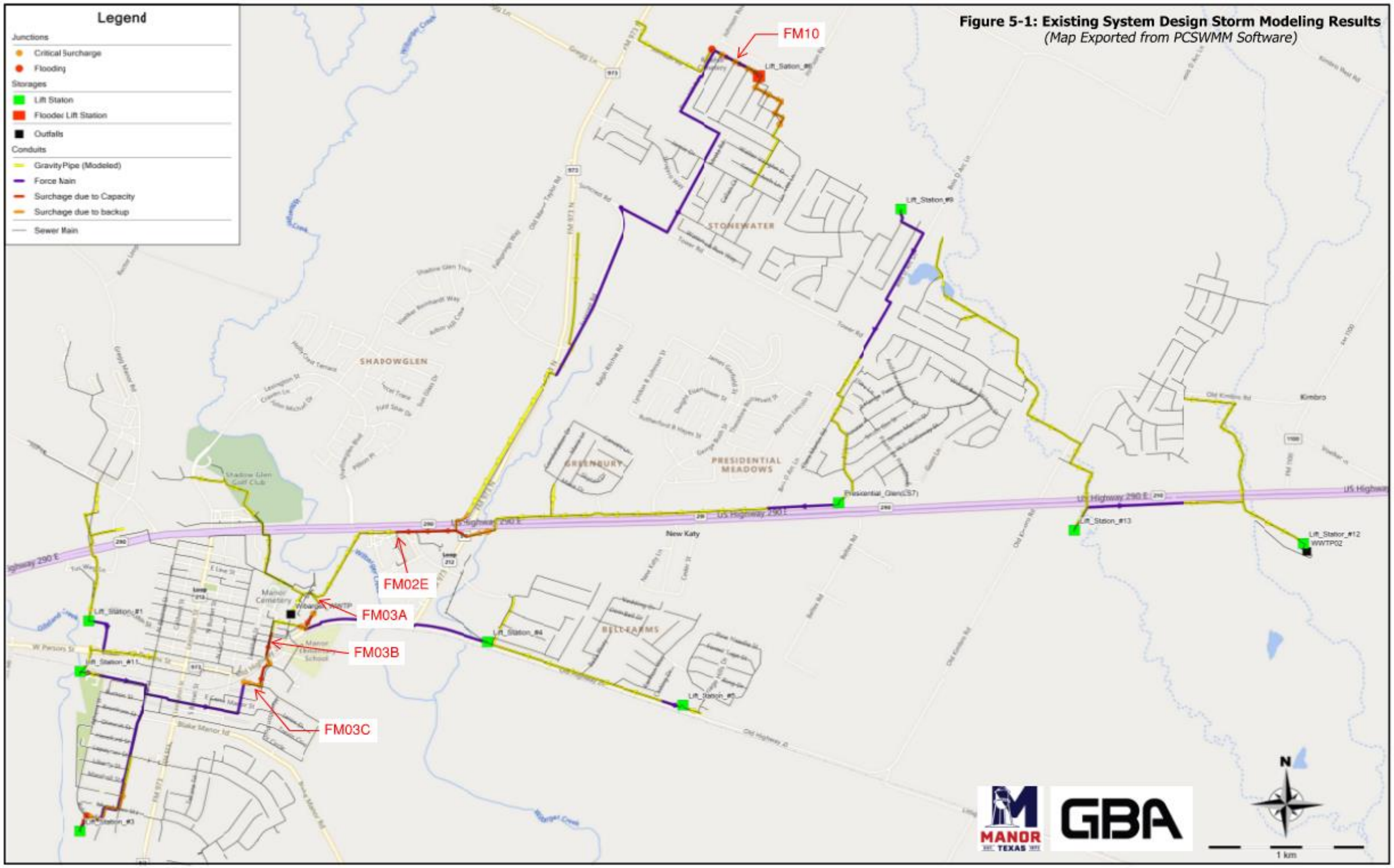


Figure 2: Recommended Targeted Flow Monitoring Plan (for Investigating Potential Relief Projects)

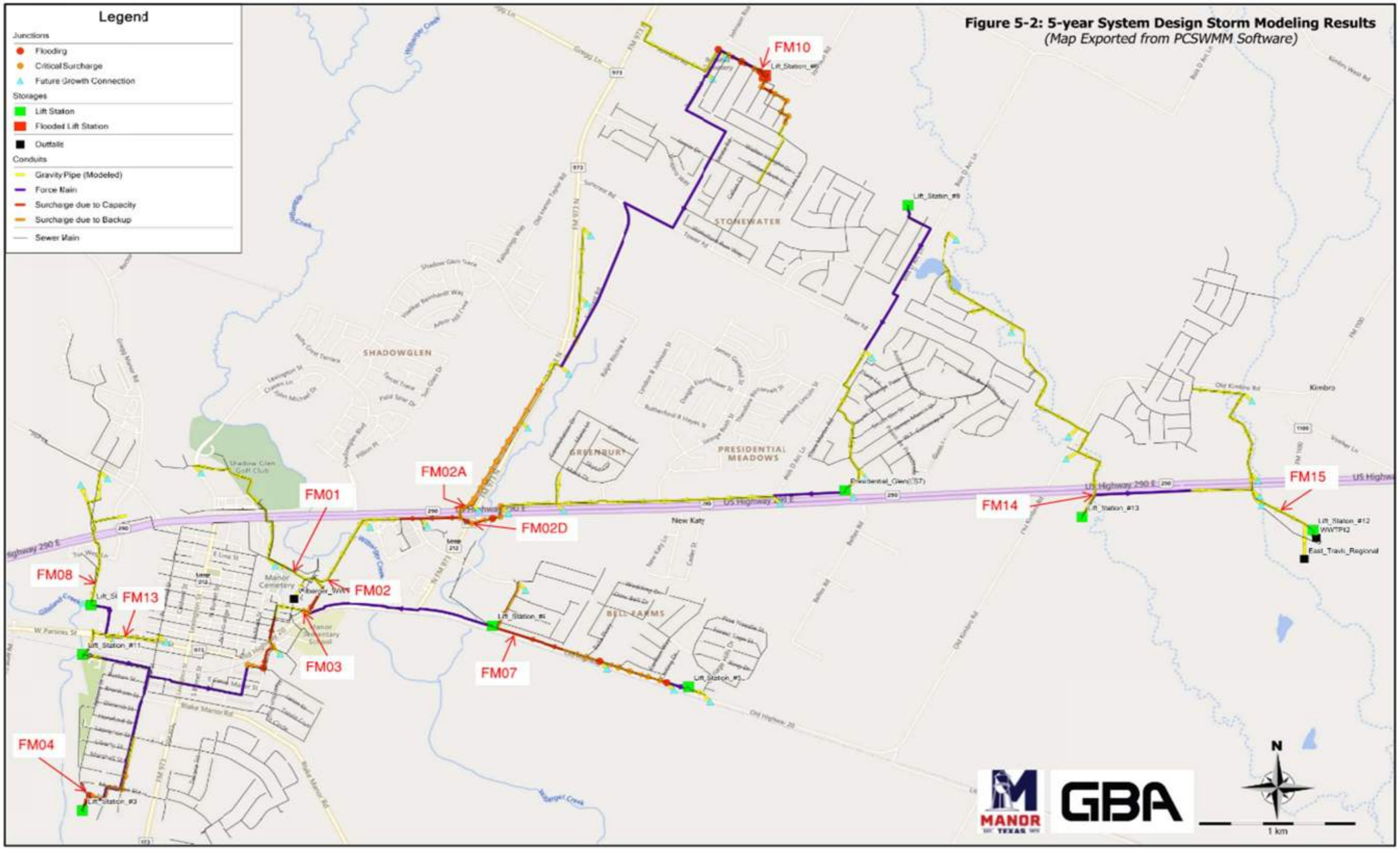


Figure 3: Recommended 5-Year Flow Monitoring Plan (for Model Updates and Re-Calibration)

Model Maintenance Budget:

Preliminary budget estimates for GBA to perform the outlined work are shown in Table 1. Actual costs will vary depending on scope and timing. With a 7% growth rate, it is estimated that approximately 30 to 50 pipe and manhole structures for pipes 12 inches or larger will be added to the system each year and subsequently incorporated into the model. Flow monitoring is estimated to cost $10,000 per meter, per three-month session. Future growth planning involves analyzing the impact of future developments on the sewer system, at a cost of $5,000 per development. Model updates include integrating the updated GIS dataset into the model. Model calibration is estimated to cost approximately $10,000 per basin.

Table 1: Estimated Budget to Perform Outlined Work

Task	Low Unit Range	High Unit Range	Low Cost	High Cost
1. Sanitary Sewer GIS Network Maintenance (Segments)	30	50	$1,000	$2,000
2. Flow Monitoring Repository (Flow Meters)	5	12	$50,000	$120,000
3. Future Growth Planning (New Development Review)	1	3	$5,000	$15,000
4. Model Updates From GIS Network (Segments)	30	50	$3,000	$5,000
5. Model Calibration – Targeted Basins	1	3	$10,000	$30,000
		Total Annual Costs	$69,000	$172,000
5. Model Calibration – Entire System (All Basins)	12		$120,000 (every five years)	
		5-Year Total Costs	$189,000	$292,000

Candice Calhoun

From:	Andrea Mendoza <amendoza@gbateam.com>
Sent:	Tuesday, January 28, 2025 2:40 PM
To:	Candice Calhoun
Cc:	Paige Reddehase; Jose Castillo
Subject:	RE: Application for Proposed Permit No. WQ0016712001 - City of Manor - Notice of Deficiency Letter
Attachments:	wq0016712001-nod Response.pdf; AFFECTED LANDOWNER LIST LABELS.doc

Good afternoon, Ms. Courville,

Please see attached our response to the Notice of Deficiency.

Thank you,

Andrea Mendoza Staff AES | Water Environment Group
d 737.247.7539

From: Candice Calhoun <Candice.Calhoun@tceq.texas.gov>
Sent: Monday, January 27, 2025 11:37 AM
To: Jose Castillo <jcastillo@gbateam.com>
Subject: Application for Proposed Permit No. WQ0016712001 - City of Manor - Notice of Deficiency Letter
Importance: High

Good morning, Mr. Castillo,

The attached Notice of Deficiency (NOD) letter dated January 27, 2025, requests additional information needed to declare the application administratively complete. Please send complete response by February 10, 2025.

Please let me know if you have any questions.

Regards,

Candice Calhoun

From:	Andrea Mendoza <amendoza@gbateam.com>
Sent:	Friday, January 31, 2025 8:30 AM
To:	Candice Calhoun
Cc:	Paige Reddehase; Jose Castillo
Subject:	RE: Application for Proposed Permit No. WQ0016712001 - City of Manor - Notice of Deficiency Letter
Attachments:	Municipal Discharge New Spanish NORI.docx

Good morning, Ms. Courville,

I hope you are feeling better now. Please see the attached Spanish NORI as a Microsoft Word Document.

Thank you,

Andrea Mendoza Staff AES | Water Environment Group
d 737.247.7539

From: Candice Calhoun <Candice.Calhoun@tceq.texas.gov>
Sent: Friday, January 31, 2025 7:17 AM
To: Andrea Mendoza <amendoza@gbateam.com>
Cc: Paige Reddehase <preddehase@gbateam.com>; Jose Castillo <jcastillo@gbateam.com>
Subject: RE: Application for Proposed Permit No. WQ0016712001 - City of Manor - Notice of Deficiency Letter
Importance: High

Good morning, Ms. Mendoza,

My apologies for the delayed response, I have been out sick the past few days.

Your response to items 1, 2, 3, and 4 is sufficient. However, for item 5, the Spanish NORI, the document is needed as a Microsoft Word document. Please submit the Spanish NORI as a Microsoft Word Document.

Thank you,

9601 Amberglen Blvd. #109
Austin, TX 78729

January 28, 2025

Ms. Candice Calhoun-Courville
Applications Review and Processing Team (MC 148)
Water Quality Division
Texas Commission of Environmental Quality

Re: Application for Proposed Permit No.: WQ0016712001 (EPA I.D. No. TX0147346)
Applicant Name: City of Manor (CN600632111)
Site Name: East Travis Regional Plant (RN112124433)
Type of Application: New

Dear Ms. Calhoun-Courville,

We received your Notice of Deficiency (NOD) and voicemail response to questions asked on January 27, 2025. Please find out below our responses to the NOD letter:

1. The original paper copy was sent through certified mail on January 24, 2025, to the Texas Commission on Environmental Quality, Water Quality Division, Application Review and Processing Team (MC 148), P.O. Box 13087, Austin, Texas 78711-3087. Please notify us if the original paper copy has not been received by the end of this week. Please see Attachment A.
2. 2.i Section 9, Items E and F from the Administrative Report 1.0 have been updated and are attached. We do not intend to propose to have a disposal or sludge land application site. Please see Attachment B.

3.i.ii.iii The Landowner Map, Landowner List, and Landowner List Mailing Labels (Avery 5160) are attached. Please see Attachment C and landlord list in word format (attached).

4. The NORI provided does not contain any errors or omissions.

5. Attached is the Spanish NORI. Please see attachment D.

Please let me know if you have any questions. My email is amendoza@gbateam.com and my phone number is (737) 247-7539.

Thank you,

Andrea Mendoza, MEngCE

Attachment A

Copy of mail receipt

9589 0710 5270 1548 9891 13

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OFFICIAL USE

Certified Mail Fee
$
Extra Services & Fees (check box, add fee as appropriate)
- ☐ Return Receipt (hardcopy) $ 4.85
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $ 4.10
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage
$
Total Postage and Fees
$ 25.40

Postmark Here

MCNEIL STATION AUSTIN, TX 78729 JAN 24 2025

Sent To
Texas Commission on Env. Quality
Street and Apt. No., or PO Box No.
Applications Review & Processing Team MC148
City, State, ZIP+4®
P.O. Box 13087 Austin, TX 78711-3087

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

UNITED STATES POSTAL SERVICE.

MCNEIL
10109 LAKE CREEK PKWY
AUSTIN, TX 78729-1711
(800)275-8777

01/24/2025 11:00 AM

Product	Qty	Unit Price	Price
Priority Mail®	1		$16.45
Austin, TX 78711			
Weight: 10 lb 8.4 oz			
Expected Delivery Date			
Mon 01/27/2025			
Shipment may be delayed due to weather conditions.			
Insurance			$0.00
Up to $100.00 included			
Certified Mail®			$4.85
Tracking #:			
9589 0710 5270 1548 9891 13			
Return Receipt			$4.10
Tracking #:			
9590 9402 4731 8344 8764 65			
Total			$25.40

Grand Total: $25.40

Credit Card Remit $25.40
Card Name: VISA
Account #: XXXXXXXXXXXX3278
Approval #: 09139G
Transaction #: 038
AID: A0000000031010 Chip
AL: VISA CREDIT
PIN: Not Required

Text your tracking number to 28777 (2USPS) to get the latest status. Standard Message and Data rates may apply. You may also visit www.usps.com USPS Tracking or call 1-800-222-1811.

Save this receipt as evidence of insurance. For information on filing an insurance claim go to https://www.usps.com/help/claims.htm or call 1-800-222-1811

Preview your Mail
Track your Packages
Sign up for FREE @
https://informeddelivery.usps.com

All sales final on stamps and postage.
Refunds for guaranteed services only.
Thank you for your business.

Tell us about your experience.
Go to: https://postalexperience.com/Pos
or scan this code with your mobile device,

~~or call 1-800-410-7420.~~

Attachment B

Section 9, Items E and F from the Administrative Report 1.0

E. Owner of effluent disposal site:

Prefix: Click to enter text. Last Name, 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 Code: Click to enter text.

Phone No.: E-mail Address: Click to enter text.

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: Click to enter text.

F. Owner sewage sludge disposal site (if authorization is requested for sludge disposal on property owned or controlled by the applicant)::

Prefix: Click to enter text. Last Name, 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 Code: Click to enter text.

Phone No.: Click to enter text. E-mail Address: Click to enter text.

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: Click to enter text.

Section 10. TPDES Discharge Information (Instructions Page 31)

A. Is the wastewater treatment facility location in the existing permit accurate?

☐ Yes ☐ No

If **no, or a new permit application**, please give an accurate description:

The proposed wastewater treatment facility is situated in southeastern Manor, approximately 0.82 miles northeast of the intersection of Hog Eye Rd and Hibbs Ln, in eastern Travis County.

B. Are the point(s) of discharge and the discharge route(s) in the existing permit correct?

☐ Yes ☐ No

If **no, or a new or amendment permit application**, provide an accurate description of the point of discharge and the discharge route to the nearest classified segment as defined in 30 TAC Chapter 307:

The point of discharge is located at the confluence of Wilbarger Creek and Cottonwood Creek, upstream of where Willow Creek and Dry Creek join Wilbarger Creek. This discharge point lies within stream segment 1434D.

City nearest the outfall(s): Manor, TX

County in which the outfalls(s) is/are located: Travis

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

Attachment C

The Landowner Map, Landowner List, and Landowner List Mailing Labels

ATTACHMENT A.6

GBA

EAST TRAVIS REGIONAL WASTEWATER TREATMENT PLANT PERMIT

AFFECTED LAND OWNER MAP (1 OF 2)

PROJECT NUMBER
16619

DATE
1/9/25

SHEET NUMBER
A.5

AFFECTED LANDOWNERS LIST						
ATTACHMENT __						
REF #	ID NUMBER	NAME	ADDRESS	CITY	STATE	ZIP CODE
1	567612	PIPE DREAM LLC &	11318 JONES RD	MANOR	TX	78653-5205
2	708869	TRAVIS COUNTY	PO BOX 1748	AUSTIN	TX	78767-1748
3	724522	BEALL JONATHAN M	2503 FLORA CV	AUSTIN	TX	78746-6902
4	567611	TRAVIS COUNTY	PO BOX 1748	AUSTIN	TX	78767-1748
5	214510	TRAVIS COUNTY	10901 HIBBS LN	MANOR	TX	78653-5207
6	227343	ENRIQUEZ MICHELLE & DANNY ALBA	11123 HIBBS LN	MANOR	TX	78653-5526
7	214413	WEST THOMAS W & DORY WEST	10900 HIBBS LN	MANOR	TX	78653-5207
8	567614	LETOURNEAU DAVIS F & SARA M	1203 KEESHOND PL	ROUND ROCK	TX	78664-3438
9	214544	SOUTHWEST STALLION STATION LLC	PO BOX 468	ELGIN	TX	78621-0468

GBA

EAST TRAVIS REGIONAL WASTEWATER TREATMENT PLANT PERMIT

AFFECTED LAND OWNER MAP (2 OF 2)

PROJECT NUMBER
16619

DATE
12/3/24

SHEET NUMBER
2

PIPE DREAMS LLC &
11318 JONES RD
MANOR TX 78653-5205

TRAVIS COUNTY
PO BOX 1748
AUSTIN TX 78767-1748

BEALL JONATHAN M
2503 FLORA CV
AUSTIN TX 78746-6902

TRAVIS COUNTY
10901 HIBBS LN
MANOR TX 78653-5207

ENRIQUEZ MICHELLE & DANNY ALBA
11123 HIBBS LN
MANOR TX 78653-5526

WEST THOMAS W & DORY WEST
10900 HIBBS LN
MANOR TX 78653-5207

LETOURNEAU DAVIS F & SARA M
1203 KEESHOND PL
ROUND ROCK TX 78664-3438

SOUTHWEST STALLION STATION LLC
PO BOX 468
ELGIN TX 78621-0468

Attachment D

Attached is the Spanish NORI