

County of Comal TRANSMITTAL

To: TCEQ-Region 13
14250 Judson Road
San Antonio, TX 78233

From: Robert Boyd, P.E.
195 David Jonas Drive
New Braunfels, TX 78132



Attn: Lynn Bumguardner

Date: June 8, 2023

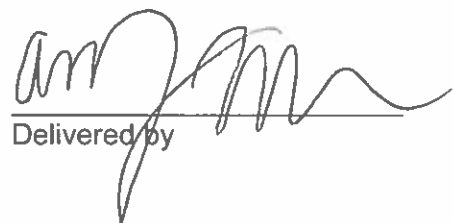
Re: WPAP Extension Request

We Are Sending You:

X Attached	Under separate cover via
Shop Drawings	Documents
Prints	Specifications
Copy of letter	Other:

RECEIVED
 TCEQ REGION 13
 2023 JUN -8 PM 1:16

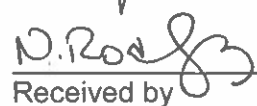
Quantity	Description
1	Original of Extension Request – Comal County Road Department
4	Copies of WPAP Extension Request – Comal County Road Department
1	Original WPAP – Morton Tract
4	Copies of WPAP – Morton Tract



Delivered by

6/8
Date

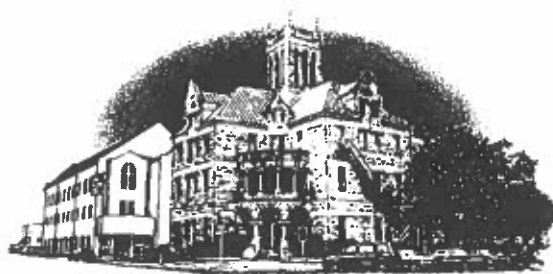
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Date

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Comal County

OFFICE OF COMAL COUNTY ENGINEER

June 8, 2023

Ms. Lynn Bumguardner
Water Section Manager
TCEQ San Antonio Regional Office
14250 Judson Road
San Antonio, TX 78233

Re: Water Pollution Abatement Plan – Morton Tract within Comal County, Texas

Dear Ms. Bumguardner:

Please find attached one original and four copies of the attached WPAP along with the \$10,000 application fee.

If you have any questions or need additional information, please contact our office.

Sincerely,

Robert Boyd, P.E.
Comal County Assistant Engineer

Water Pollution Abatement Plan Checklist

Edwards Aquifer Application Cover Page (TCEQ-20705)

General Information Form (TCEQ-0587)

Attachment A - Road Map

Attachment B - USGS / Edwards Recharge Zone Map

Attachment C - Project Description

Geologic Assessment Form (TCEQ-0585)

Attachment A - Geologic Assessment Table (TCEQ-0585-Table)

Comments to the Geologic Assessment Table

Attachment B - Soil Profile and Narrative of Soil Units

Attachment C - Stratigraphic Column

Attachment D - Narrative of Site Specific Geology

Site Geologic Map(s)

Table or list for the position of features' latitude/longitude (if mapped using GPS)

Water Pollution Abatement Plan Application Form (TCEQ-0584)

Attachment A - Factors Affecting Water Quality

Attachment B - Volume and Character of Stormwater

Attachment C - Suitability Letter from Authorized Agent (if OSSF is proposed)

Attachment D - Exception to the Required Geologic Assessment (if requesting an exception)

Site Plan

Temporary Stormwater Section (TCEQ-0602)

Attachment A - Spill Response Actions

Attachment B - Potential Sources of Contamination

Attachment C - Sequence of Major Activities

Attachment D - Temporary Best Management Practices and Measures

Attachment E - Request to Temporarily Seal a Feature, if sealing a feature

Attachment F - Structural Practices

Attachment G - Drainage Area Map

Attachment H - Temporary Sediment Pond(s) Plans and Calculations

Attachment I - Inspection and Maintenance for BMPs

Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices

Permanent Stormwater Section (TCEQ-0600)

Attachment A - 20% or Less Impervious Cover Waiver, if project is multi-family residential, a school, or a small business and 20% or less impervious cover is proposed for the site

Attachment B - BMPs for Upgradient Stormwater

Attachment C - BMPs for On-site Stormwater

Attachment D - BMPs for Surface Streams

Attachment E - Request to Seal Features (if sealing a feature)

Attachment F - Construction Plans

Attachment G - Inspection, Maintenance, Repair and Retrofit Plan

Attachment H - Pilot-Scale Field Testing Plan, if BMPs not based on Complying with the Edwards Aquifer Rules: Technical Guidance for BMPs

Attachment I -Measures for Minimizing Surface Stream Contamination

Agent Authorization Form (TCEQ-0599), if application submitted by agent

Application Fee Form (TCEQ-0574)

Check Payable to the "Texas Commission on Environmental Quality"

Core Data Form (TCEQ-10400)

Texas Commission on Environmental Quality

Edwards Aquifer Application Cover Page

Our Review of Your Application

The Edwards Aquifer Program staff conducts an administrative and technical review of all applications. The turnaround time for administrative review can be up to 30 days as outlined in 30 TAC 213.4(e). Generally administrative completeness is determined during the intake meeting or within a few days of receipt. The turnaround time for technical review of an administratively complete Edwards Aquifer application is 90 days as outlined in 30 TAC 213.4(e). Please know that the review and approval time is directly impacted by the quality and completeness of the initial application that is received. In order to conduct a timely review, it is imperative that the information provided in an Edwards Aquifer application include final plans, be accurate, complete, and in compliance with [30 TAC 213](#).

Administrative Review

1. [Edwards Aquifer applications](#) must be deemed administratively complete before a technical review can begin. To be considered administratively complete, the application must contain completed forms and attachments, provide the requested information, and meet all the site plan requirements. The submitted application and plan sheets should be final plans. Please submit one full-size set of plan sheets with the original application, and half-size sets with the additional copies.

To ensure that all applicable documents are included in the application, the program has developed tools to guide you and web pages to provide all forms, checklists, and guidance. Please visit the below website for assistance: <http://www.tceq.texas.gov/field/eapp>.

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.
3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.
4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

An appointment should be made to resubmit the application. The application is re-examined to ensure all deficiencies are resolved. The application will only be deemed administratively complete when all administrative deficiencies are addressed.

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.
6. If the geologic assessment was completed before October 1, 2004 and the site contains “possibly sensitive” features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

Technical Review

1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.

2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be clearly marked, features identified in the geologic assessment should be flagged, roadways marked and the alignment of the Sewage Collection System and manholes should be staked at the time the application is submitted. If the site is not marked the application may be returned.
3. We evaluate the application for technical completeness and contact the applicant and agent via Notice of Deficiency (NOD) to request additional information and identify technical deficiencies. There are two deficiency response periods available to the applicant. There are 14 days to resolve deficiencies noted in the first NOD. If a second NOD is issued, there is an additional 14 days to resolve deficiencies. If the response to the second notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, the application must be withdrawn or if not withdrawn the application will be denied and the application fee will be forfeited.
4. The program has 90 calendar days to complete the technical review of the application. If the application is technically adequate, such that it complies with the Edwards Aquifer rules, and is protective of the Edwards Aquifer during and after construction, an approval letter will be issued. Construction or other regulated activity may not begin until an approval is issued.

Mid-Review Modifications

It is important to have final site plans prior to beginning the permitting process with TCEQ to avoid delays.

Occasionally, circumstances arise where you may have significant design and/or site plan changes after your Edwards Aquifer application has been deemed administratively complete by TCEQ. This is considered a “Mid-Review Modification”. Mid-Review Modifications may require redistribution of an application that includes the proposed modifications for public comment.

If you are proposing a Mid-Review Modification, two options are available to you:

- You can withdraw your application, and your fees will be refunded or credited for a resubmittal.
- TCEQ can continue the technical review of the application as it was submitted, and a modification application can be submitted at a later time.

If the application is withdrawn, the resubmitted application will be subject to the administrative and technical review processes and will be treated as a new application. The application will be redistributed to the effected jurisdictions.

Please contact the regional office if you have questions. If your project is located in Williamson, Travis, or Hays County, contact TCEQ’s Austin Regional Office at 512-339-2929. If your project is in Comal, Bexar, Medina, Uvalde, or Kinney County, contact TCEQ’s San Antonio Regional Office at 210-490-3096

Please fill out all required fields below and submit with your application.

1. Regulated Entity Name: Comal County				2. Regulated Entity No.: 102460730					
3. Customer Name: Comal County				4. Customer No.: 600647275					
5. Project Type: (Please circle/check one)	<input checked="" type="radio"/> New	Modification			Extension		Exception		
6. Plan Type: (Please circle/check one)	<input checked="" type="radio"/> WPAP	<input type="radio"/> CZP	<input type="radio"/> SCS	<input type="radio"/> UST	<input type="radio"/> AST	<input type="radio"/> EXP	<input type="radio"/> EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: (Please circle/check one)	<input type="radio"/> Residential		<input checked="" type="radio"/> Non-residential			8. Site (acres):		290.25	
9. Application Fee:	\$10,000		10. Permanent BMP(s):			Vegetative Filter Strips			
11. SCS (Linear Ft.):	N/A		12. AST/UST (No. Tanks):			N/A			
13. County:	Comal		14. Watershed:			Guadalupe			

Application Distribution

Instructions: Use the table below to determine the number of applications required. One original and one copy of the application, plus additional copies (as needed) for each affected incorporated city, county, and groundwater conservation district are required. Linear projects or large projects, which cross into multiple jurisdictions, can require additional copies. Refer to the “Texas Groundwater Conservation Districts within the EAPP Boundaries” map found at:

http://www.tceq.texas.gov/assets/public/compliance/field_ops/eapp/EAPP%20GWCD%20map.pdf

For more detailed boundaries, please contact the conservation district directly.

Austin Region			
County:	Hays	Travis	Williamson
Original (1 req.)	—	—	—
Region (1 req.)	—	—	—
County(ies)	—	—	—
Groundwater Conservation District(s)	<input type="checkbox"/> Edwards Aquifer Authority <input type="checkbox"/> Barton Springs/ Edwards Aquifer <input type="checkbox"/> Hays Trinity <input type="checkbox"/> Plum Creek	<input type="checkbox"/> Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	<input type="checkbox"/> Austin <input type="checkbox"/> Buda <input type="checkbox"/> Dripping Springs <input type="checkbox"/> Kyle <input type="checkbox"/> Mountain City <input type="checkbox"/> San Marcos <input type="checkbox"/> Wimberley <input type="checkbox"/> Woodcreek	<input type="checkbox"/> Austin <input type="checkbox"/> Bee Cave <input type="checkbox"/> Pflugerville <input type="checkbox"/> Rollingwood <input type="checkbox"/> Round Rock <input type="checkbox"/> Sunset Valley <input type="checkbox"/> West Lake Hills	<input type="checkbox"/> Austin <input type="checkbox"/> Cedar Park <input type="checkbox"/> Florence <input type="checkbox"/> Georgetown <input type="checkbox"/> Jerrell <input type="checkbox"/> Leander <input type="checkbox"/> Liberty Hill <input type="checkbox"/> Pflugerville <input type="checkbox"/> Round Rock

San Antonio Region					
County:	Bexar	Comal	Kinney	Medina	Uvalde
Original (1 req.)	—	<u>X</u>	—	—	—
Region (1 req.)	—	<u>X</u>	—	—	—
County(ies)	—	<u>X</u>	—	—	—
Groundwater Conservation District(s)	<input type="checkbox"/> Edwards Aquifer Authority <input type="checkbox"/> Trinity-Glen Rose	<input checked="" type="checkbox"/> Edwards Aquifer Authority	<input type="checkbox"/> Kinney	<input type="checkbox"/> EAA <input type="checkbox"/> Medina	<input type="checkbox"/> EAA <input type="checkbox"/> Uvalde
City(ies) Jurisdiction	<input type="checkbox"/> Castle Hills <input type="checkbox"/> Fair Oaks Ranch <input type="checkbox"/> Helotes <input type="checkbox"/> Hill Country Village <input type="checkbox"/> Hollywood Park <input type="checkbox"/> San Antonio (SAWS) <input type="checkbox"/> Shavano Park	<input type="checkbox"/> Bulverde <input type="checkbox"/> Fair Oaks Ranch <input type="checkbox"/> Garden Ridge <input type="checkbox"/> New Braunfels <input type="checkbox"/> Schertz	NA	<input type="checkbox"/> San Antonio ETJ (SAWS)	NA

I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review.

Sherman Krause

Print Name of Customer/Authorized Agent

Signature of Customer/Authorized Agent

Date

MAY 25, 2023

FOR TCEQ INTERNAL USE ONLY			
Date(s) Reviewed:		Date Administratively Complete:	
Received From:		Correct Number of Copies:	
Received By:		Distribution Date:	
EAPP File Number:		Complex:	
Admin. Review(s) (No.):		No. AR Rounds:	
Delinquent Fees (Y/N):		Review Time Spent:	
Lat./Long. Verified:		SOS Customer Verification:	
Agent Authorization Complete/Notarized (Y/N):		Fee Check:	Payable to TCEQ (Y/N):
Core Data Form Complete (Y/N):			Signed (Y/N):
Core Data Form Incomplete Nos.:			Less than 90 days old (Y/N):

General Information Form
For Regulated Activities on the
Edwards Aquifer Recharge and Transition Zones
and Relating to 30 TAC §213.4(b) & §213.5(b)(2)(A), (B)
Effective June 1, 1999

REGULATED ENTITY NAME: Comal County
COUNTY: Comal STREAM BASIN: Guadalupe

EDWARDS AQUIFER: RECHARGE ZONE
 TRANSITION ZONE

PLAN TYPE: WPAP AST EXCEPTION
 SCS UST MODIFICATION

CUSTOMER INFORMATION

1. Customer (Applicant):

Contact Person: Sherman Krause
Entity: Comal County
Mailing Address: 195 David Jonas Drive
City, State: New Braunfels, Texas Zip: 78132
Telephone: (830) 221-1100 FAX: (830) 608-2026

Agent/Representative (If any):

Contact Person: Robert Boyd, P.E.
Entity: Comal County
Mailing Address: 195 David Jonas Drive
City, State: New Braunfels, Texas Zip: 78132
Telephone: (830) 608-2090 FAX: (830) 608-2009

2. This project is inside the city limits of _____.
 This project is outside the city limits but inside the ETJ (extra-territorial jurisdiction) of _____.
 This project is not located within any city's limits or ETJ.

3. The location of the project site is described below. The description provides sufficient detail and clarity so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.

From New Braunfels, take SH 46 west. Turn right on Hueco Springs Loop. Turn left on River Road. Drive approximately 6 miles and turn left on Bluff End Road which leads to project site.

4. **ATTACHMENT A - ROAD MAP.** A road map showing directions to and the location of the project site is attached at the end of this form.
5. **ATTACHMENT B - USGS / EDWARDS RECHARGE ZONE MAP.** A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached behind this sheet. The map(s) should clearly show:

- Project site.
- USGS Quadrangle Name(s).
- Boundaries of the Recharge Zone (and Transition Zone, if applicable).
- Drainage path from the project to the boundary of the Recharge Zone.

6. Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment. **The TCEQ must be able to inspect the project site or the application will be returned.**
7. **ATTACHMENT C - PROJECT DESCRIPTION.** Attached at the end of this form is a detailed narrative description of the proposed project.
8. Existing project site conditions are noted below:
- Existing commercial site
 - Existing industrial site
 - Existing residential site
 - Existing paved and/or unpaved roads
 - Undeveloped (Cleared)
 - Undeveloped (Undisturbed/Uncleared)
 - Other: _____

PROHIBITED ACTIVITIES

9. I am aware that the following activities are prohibited on the **Recharge Zone** and are not proposed for this project:
- (1) waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
 - (2) new feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
 - (3) land disposal of Class I wastes, as defined in 30 TAC §335.1;
 - (4) the use of sewage holding tanks as parts of organized collection systems; and
 - (5) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).
10. I am aware that the following activities are prohibited on the **Transition Zone** and are not proposed for this project:
- (1) waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);
 - (2) land disposal of Class I wastes, as defined in 30 TAC §335.1; and
 - (3) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

ADMINISTRATIVE INFORMATION


11. The fee for the plan(s) is based on:
- For a Water Pollution Abatement Plan and Modifications, the total acreage of the site where regulated activities will occur.
 - For an Organized Sewage Collection System Plans and Modifications, the total linear

- footage of all collection system lines.
 - For a UST Facility Plan or an AST Facility Plan, the total number of tanks or piping systems.
 - A request for an exception to any substantive portion of the regulations related to the protection of water quality.
 - A request for an extension to a previously approved plan.
12. Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:
- TCEQ cashier
 - Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
 - San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)
13. Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.
14. No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **GENERAL INFORMATION FORM** is hereby submitted for TCEQ review. The application was prepared by:

Sherman Krause

 Print Name of Customer/Agent



 Signature of Customer/Agent

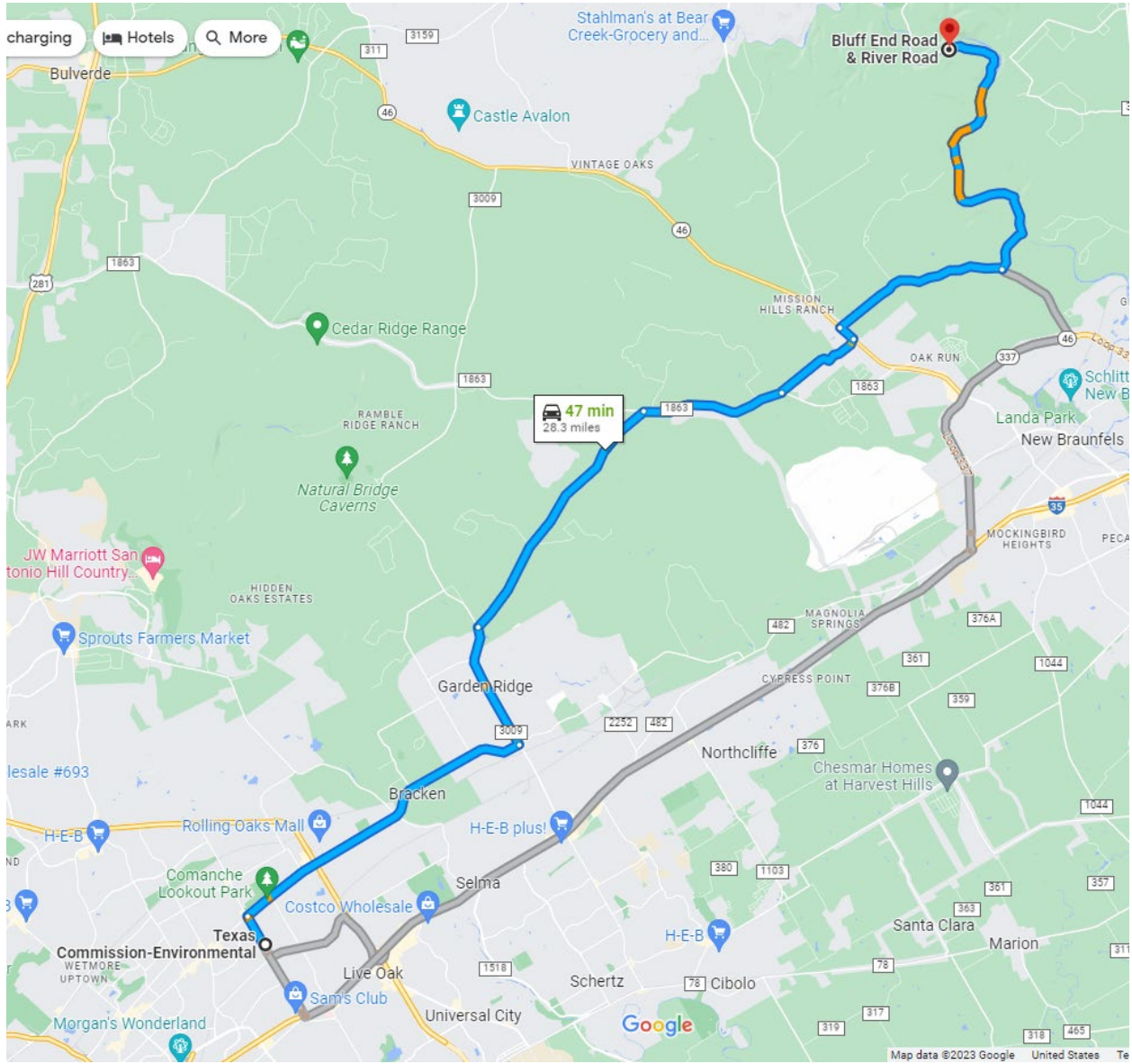
MAY 25, 2023

 Date

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

Attachment A: Road Map



North on Judson Road

Turn Right on Nacogdoches Rd for 6.0 Miles

Turn Left on FM 3009 for 2.4 Miles

Turn Right on Schoenthal Rd for 5.0 Miles

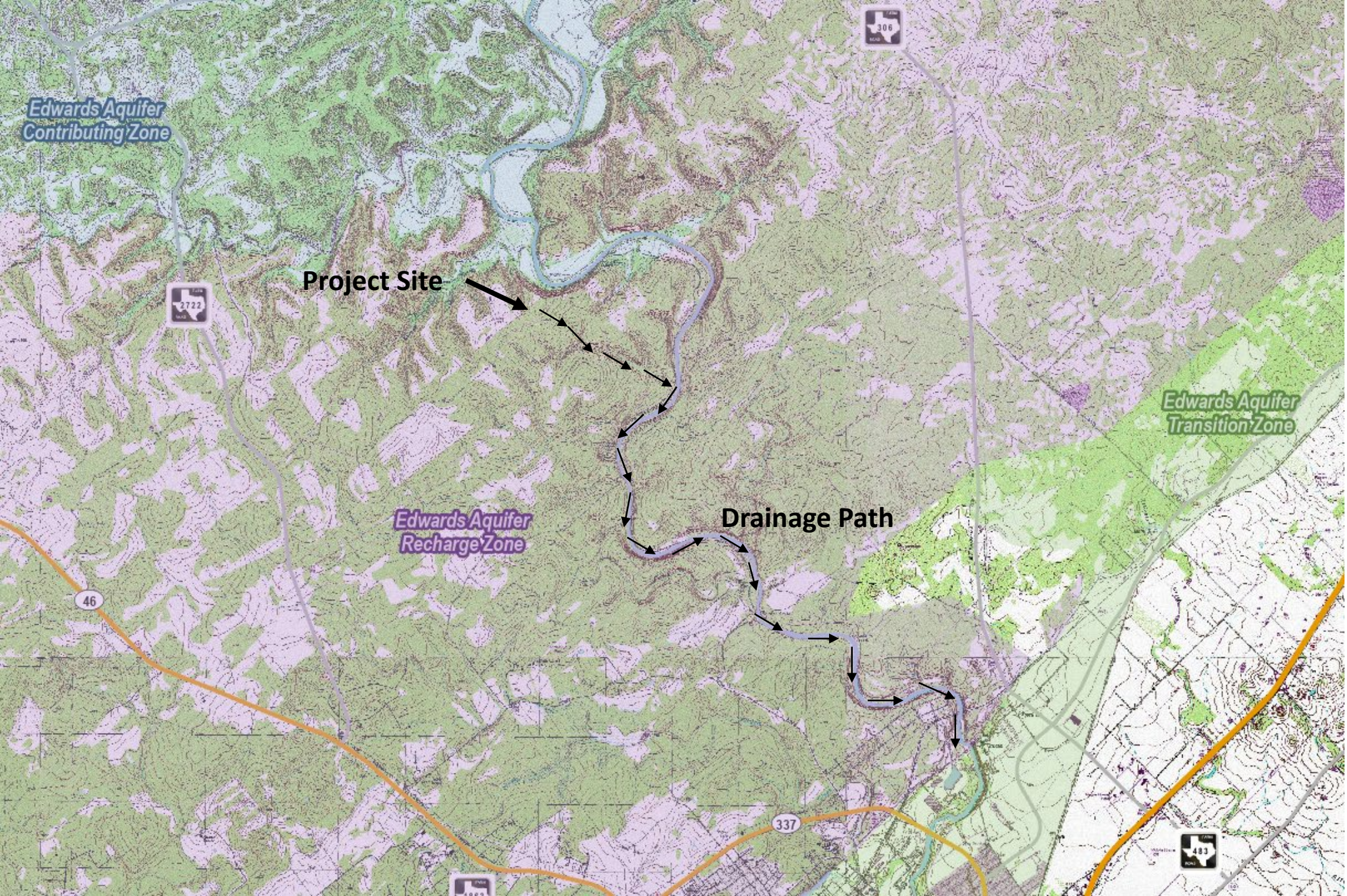
Turn Right on FM 1863 for 2.6 Miles

Turn Left on Mission Valley Rd for 1.7 Miles

Turn Left on SH 46 for 0.3 Miles

Turn Right on Hueco Springs Rd for 3.3 Miles

Turn Left on River Rd for 6.3 Miles



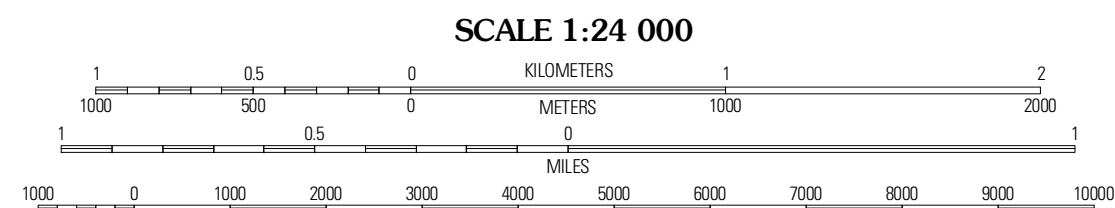
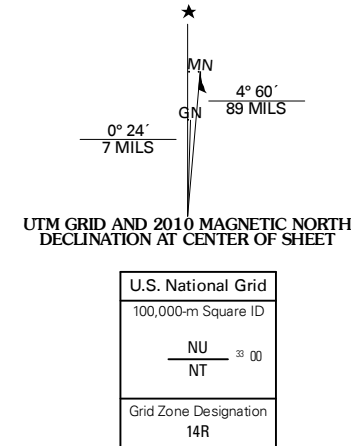
Quadrangles:
Sattler
Hunter
New Braunfels East



Project Site

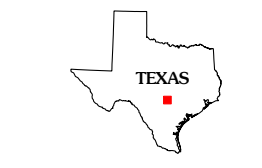
Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 14R
10 000-foot ticks: Texas Coordinate System of 1983
(south central zone)

Imagery.....N.A.I.P., July 2008
Roads.....US Census Bureau TIGER data
with limited USGS updates, 2006
Names.....GNIS, 2008
Hydrography.....National Hydrography Dataset, 1995
Contours.....National Elevation Dataset, 2003



CONTOUR INTERVAL 20 FEET

This map was produced to conform with version 0.5.10 of the
draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is also draft version 0.5.10



QUADRANGLE LOCATION

Fischer	Devils Backbone	Wimberley
Smithton Valley	Sattler	Hunter
Bat Cave	New Braunfels West	New Braunfels East

ADJOINING 7.5 QUADRANGLES
TX 2998-442

ROAD CLASSIFICATION

Interstate Route	State Route
US Route	Local Road
Ramp	4WD

SATTLER, TX
2010

Attachment C – Project Description

Comal County is proposing to construct a walking trail park on a 290.25 acre tract of land known as the Morton Tract. The project will include the removal of several old structures and the construction of an approximate 14,400 SF parking lot.



GEOLOGIC ASSESSMENT (WPAP)

COMAL COUNTY PARK ***BLUFF END ROAD (+/- 290 ACRES)*** ***COMAL COUNTY, TEXAS***

FROST GEOSCIENCES, INC. PROJECT NO.: FGS-E14155
AUGUST 21, 2014

Prepared exclusively for

Comal County
195 David Jones Drive
New Braunfels, Texas 78132

Frost GeoSciences

Geotechnical ▪ Construction Materials
Geologic ▪ Environmental

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APPENDIX A - Site Location Figures

 Figure 1: Site Layout

 Figure 2: Street Map

 Figure 3: USGS Topographic Map

 Figure 4: Official Edwards Aquifer Recharge Zone Map

 Figure 5: FEMA Flood Map

 Figure 6: USDA Soil Survey Aerial Photograph, 1 inch = 1,000 feet

 Figure 7: U.S. Geological Survey, Water Resources Investigation # 94-4117

 Figure 7A: Geologic Map of the New Braunfels, TX 30 X 60 Minute Quadrangle

 Figure 8: 2012 Aerial Photograph, 1 inch = 500 feet

 Figure 9: 2012 Aerial Photograph with PRFs, 1 inch = 500 feet

APPENDIX B - Site Photographs

APPENDIX C - Site Geologic Map

GEOLOGIC ASSESSMENT

For Regulated Activities
on The Edwards Aquifer Recharge/transition Zones
and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999

REGULATED ENTITY NAME: Comal County Park

TYPE OF PROJECT: WPAP AST SCS UST

LOCATION OF PROJECT: Recharge Zone Transition Zone Contributing Zone
within the Transition Zone

PROJECT INFORMATION

- Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE**.
- Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups* (*Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986*). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map.

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Comfort-Rock outcrop complex, undulating	D	0-1.0
Eckrant-Rock outcrop complex, steep	D	0-1.0
Rumple-Comfort Association, undulating	C/D	0-1.0

* Soil Group Definitions (Abbreviated)

A. Soils having a high infiltration rate when thoroughly wetted.

B. Soils having a moderate infiltration rate when thoroughly wetted.

C. Soils having a slow infiltration rate when thoroughly wetted.

D. Soils having a very slow infiltration rate when thoroughly wetted.

- A **STRATIGRAPHIC COLUMN** is attached at the end of this form that shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column.
- A **NARRATIVE DESCRIPTION OF SITE SPECIFIC GEOLOGY** is attached at the end of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.
- Appropriate **SITE GEOLOGIC MAP(S)** are attached:

The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1": 400'

Applicant's Site Plan Scale	1" = <u>200</u> '
Site Geologic Map Scale	1" = <u>200</u> '
Site Soils Map Scale (if more than 1 soil type)	1" = <u>1,000</u> '

- 6. Method of collecting positional data:
 Global Positioning System (GPS) technology.
 Other method(s). 2012 Aerial Photograph
- 7. The project site is shown and labeled on the Site Geologic Map.
- 8. Surface geologic units are shown and labeled on the Site Geologic Map.
- 9. Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
 Geologic or manmade features were not discovered on the project site during the field investigation.
- 10. The Recharge Zone boundary is shown and labeled, if appropriate.
- 11. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.):
 There are 3 (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
 The wells are not in use and have been properly abandoned.
 The wells are not in use and will be properly abandoned.
 The wells are in use and comply with 16 TAC Chapter 76.
 There are no wells or test holes of any kind known to exist on the project site.

ADMINISTRATIVE INFORMATION

- 12. One (1) original and three (3) copies of the completed assessment has been provided.

Date(s) Geologic Assessment was performed: May 2, 5, 9, 16 & 30, June 4, 6 & 10, July 23 & 24, 2014
Date(s)

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Chris Wickman, P.G.
Print Name of Geologist

210-372-1315
Telephone



210-372-1318
Fax

Signature of Geologist

August 21, 2014
Date

Representing: Frost Geosciences, Inc.
(Name of Company)

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

STRATIGRAPHIC COLUMN

[Hydrogeologic subdivisions modified from Maclay and Small (1976); groups, formations, and members modified from Rose (1972); lithology modified from Dunham (1962); and porosity type modified from Choquette and Pray (1970). CU, confining unit; AQ, aquifer]

Hydrogeologic subdivision	Group, formation, or member	Hydro-logic function	Thickness (feet)	Lithology	Field identification	Cavern development	Porosity/permeability type					
Upper Cretaceous	Upper confining units	Eagle Ford Group	CU	30 – 50	Brown, flaggy shale and argillaceous limestone	Thin flagstones; petroliferous	None	Primary porosity lost/ low permeability				
		Buda Limestone	CU	40 – 50	Buff, light gray, dense mudstone	Porcelaneous limestone with calcite-filled veins	Minor surface karst	Low porosity/low permeability				
		Del Rio Clay	CU	40 – 50	Blue-green to yellow-brown clay	Fossiliferous; <i>Ilymatogyra arietina</i>	None	None/primary upper confining unit				
Lower Cretaceous	Edwards Group	Edwards Group	Kainer Formation	I	Georgetown Formation	Karst AQ; not karst CU	2 – 20	Reddish-brown, gray to light tan marly limestone	Marker fossil; <i>Waconella wacoensis</i>	None	Low porosity/low permeability	
				II		Cyclic and marine members, undivided	AQ	80 – 90	Mudstone to packstone; <i>miliolid</i> grainstone; chert	Thin graded cycles; massive beds to relatively thin beds; crossbeds	Many subsurface; might be associated with earlier karst development	Laterally extensive; both fabric and not fabric/water-yielding
				III		Leached and collapsed members, undivided	AQ	70 – 90	Crystalline limestone; mudstone to grainstone; chert; collapsed breccia	Bioturbated iron-stained beds separated by massive limestone beds; stromatolitic limestone	Extensive lateral development; large rooms	Majority not fabric/one of the most permeable
				IV		Regional dense member	CU	20 – 24	Dense, argillaceous mudstone	Wispy iron-oxide stains	Very few; only vertical fracture enlargement	Not fabric/low permeability; vertical barrier
				V		Grainstone member	AQ	50 – 60	<i>Miliolid</i> grainstone; mudstone to wackestone; chert	White crossbedded grainstone	Few	Not fabric/ recrystallization reduces permeability
				VI		Kirschberg evaporite member	AQ	50 – 60	Highly altered crystalline limestone; chalky mudstone; chert	Boxwork voids, with neospar and travertine frame	Probably extensive cave development	Majority fabric/one of the most permeable
				VII		Dolomitic member	AQ	110 – 130	Mudstone to grainstone; crystalline limestone; chert	Massively bedded light gray, <i>Toucasia</i> abundant	Caves related to structure or bedding planes	Mostly not fabric; some bedding plane-fabric/water-yielding
				VIII		Basal nodular member	Karst AQ; not karst CU	50 – 60	Shaly, nodular limestone; mudstone and <i>miliolid</i> grainstone	Massive, nodular and mottled, <i>Exogyra texana</i>	Large lateral caves at surface; a few caves near Cibolo Creek	Fabric; stratigraphically controlled/large conduit flow at surface; no permeability in subsurface
					Lower confining unit	Upper member of the Glen Rose Limestone	CU; evaporite beds AQ	350 – 500	Yellowish tan, thinly bedded limestone and marl	Stair-step topography; alternating limestone and marl	Some surface cave development	Some water production at evaporite beds/relatively impermeable

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Comal County Park

PROJECT NUMBER: FGS-E14155

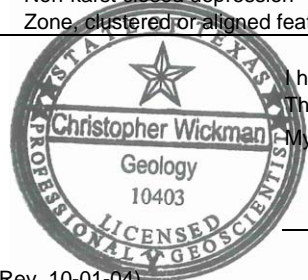
LOCATION			FEATURE CHARACTERISTICS											EVALUATION		PHYSICAL SETTING				
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11		12	
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATIO N	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)	TOPOGRAPHY	
						X	Y	Z		10						<40	>40	<1.6	>1.6	
S-1	29° 47' 31.26"	-98° 10' 47.22"	CD	5	Kek	10	15	2.5	-	-	-	-	CFO	10	15	15		YES		HILLTOP
S-2	29° 47' 31.44"	-98° 10' 54.60"	SC	20	Kek	1	1	1.5	-	-	-	-	F	15	35	35		YES		HILLTOP
S-3	29° 47' 27.06"	-98° 10' 52.86"	C	30	Kek	3	4	15	-	-	-	-	CF	20	50		50	YES		HILLSIDE
S-4	29° 47' 41.04"	-98° 10' 39.60"	SC	20	Kek	1.5	0.5	1.5	-	-	-	-	OF	10	30	30		YES		HILLSIDE
S-5	29° 47' 41.76"	-98° 10' 32.82"	SC	20	Kek	1	1	1	-	-	-	-	CFO	10	30	30		YES		HILLSIDE
S-6	29° 47' 41.82"	-98° 10' 32.58"	SC	20	Kek	0.5	0.5	0.5	-	-	-	-	CFO	10	30	30		YES		HILLSIDE
S-7	29° 47' 47.58"	-98° 10' 7.98"	O ^{VR}	5	Kek	30	15	-	-	-	3-6	.25-0.5	FO	10	15	15		YES		HILLSIDE
S-8	29° 47' 46.2"	-98° 10' 6.96"	SC	20	Kek	3	2.5	1	-	-	-	-	CFO	15	35	35		YES		STREAMBED
S-9	29° 47' 38.76"	-98° 10' 58.74"	SW	30	Kek	4	3	2.0	-	-	-	-	C	20	50		50	YES		STREAMBED
S-10	29° 47' 37.86"	-98° 10' 59.46"	F	20	Kek	2	100	-	50	10	-	-	C	20	50		50	YES		STREAMBED
S-11	29° 47' 36.84"	-98° 10' 39.24"	O ^{VFR}	5	Kek	15	35	-	-	-	3-6	0.25-0.5	C	20	25	25		YES		STREAMBED
S-12	29° 47' 36.24"	-98° 10' 40.92"	CD	5	Kek	10	15	2	-	-	-	-	FO	10	15	15		YES		HILLSIDE
S-13	29° 47' 38.86"	-98° 10' 41.1"	SC	20	Kek	1	1	2.5	-	-	-	-	FO	10	30	30		YES		HILLSIDE
S-14	29° 47' 25.08"	-98° 10' 50.64"	SC	20	Kek	1	0.25	1.25	-	-	-	-	FO	10	30	30		YES		HILLSIDE

Datum: NAD 83

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
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X	Other materials

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Floodplain, Streambed



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Date: August 21, 2014

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Comal County Park

PROJECT NUMBER: FGS-E14155

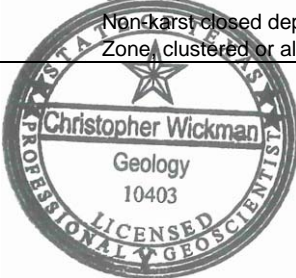
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						X	Y	Z								<40	>40		
S-15	29° 47' 26.88"	-98° 10' 51.18"	SC	20	Kek	1.5	15	1.5	-	-	-	-	FO	12	32	32		YES	HILLTOP
S-16	29° 47' 46.98"	-98° 10' 30.48"	O	5	Kek	3	50	-	-	-	1-2	0.1-0.25	F	10	15	15		YES	HILLSIDE
S-17	29° 47' 48.12"	-98° 10' 29.82"	SC	20	Kek	1.5	0.5	1.5	-	-	-	-	CF	15	35	35		YES	HILLSIDE
S-18	29° 47' 46.08"	-98° 10' 28.8"	SC	20	Kek	0.5	1	1	-	-	-	-	OF	10	30	30		YES	HILLSIDE
S-19	29° 47' 49.08"	-98° 10' 28.08"	SC	20	Kek	0.5	1	1.5	-	-	-	-	CFO	10	30	30		YES	HILLSIDE
S-20	29° 47' 49.02"	-98° 10' 25.14"	SC	20	Kek	0.5	1.0	1.5	-	-	-	-	CF	15	35	35		YES	HILLSIDE
S-21	29° 47' 47.88"	-98° 10' 25.14"	SC	20	Kek	2	1	4+	-	-	-	-	FO	25	45	45		YES	HILLSIDE
S-22	29° 47' 47.7"	-98° 10' 25.14"	SC	20	Kek	1	1	2	-	-	-	-	C	15	35	35		YES	HILLSIDE
S-23	29° 47' 47.76"	-98° 10' 25.02"	SC	20	Kek	0.5	0.5	1.0	-	-	-	-	CO	10	30	30		YES	HILLSIDE
S-24	29° 47' 48.66"	-98° 10' 24.6"	SF	20	Kek	0.5	5	3	-	-	-	-	C	15	35	35		YES	HILLTOP
S-25	29° 47' 55.56"	-98° 10' 16.08"	MB	30	Kek	7	7	20	-	-	-	-	C	5	35	35		YES	HILLTOP
S-26	29° 47' 54.54"	-98° 10' 16.02"	MB	30	Kek	0.25	0.25	-	-	-	-	-	X	5	35	35		YES	HILLTOP
S-27	29° 47' 53.64"	-98° 10' 16.5"	MB	30	Kek	5	5	-	-	-	-	-	FO	5	35	35		YES	HILLSIDE
S-28	29° 47' 48.6"	-98° 10' 15.78"	SC	20	Kek	0.75	0.75	2	-	-	-	-	FO	10	30	30		YES	HILLSIDE

Datum: NAD 83

2A TYPE	TYPE	2B POINTS
C	Cave	30
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C Coarse - cobbles, breakdown, sand, gravel
O Loose or soft mud or soil, organics, leaves, sticks, dark colors
F Fines, compacted clay-rich sediment, soil profile, gray or red colors
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FS Flowstone, cements, cave deposits
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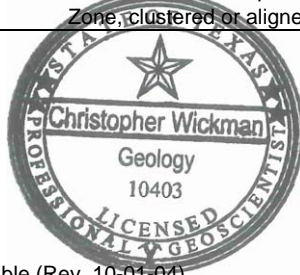
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S-29	29° 47' 47.52"	-98° 10' 12.24"	SC	20	Kek	4	8	2	-	-	-	-	CFO	15	35	35		YES		STREAMBED
S-30	29° 47' 53.28"	-98° 10' 17.7"	MB	30	Kek	0.3	0.3	-	-	-	-	-	FO	5	35	35		YES		HILLTOP
S-31	29° 47' 52.02"	-98° 10' 22.86"	SC	20	Kek	1.5	0.5	1.5	-	-	-	-	CFO	10	30	30		YES		HILLTOP
S-32	29° 47' 48.36"	-98° 10' 24.3"	SC	20	Kek	1	0.5	1	-	-	-	-	CFO	10	30	30		YES		HILLTOP
S-33	29° 47' 47.94"	-98° 10' 12.18"	SC	20	Kek	0.5	0.5	1.5	-	-	-	-	O	10	30	30		YES		HILLSIDE
S-34	29° 47' 49.62"	-98° 10' 10.68"	SC	20	Kek	2	3	2	-	-	-	-	O	15	35	35		YES		HILLSIDE
S-35	29° 47' 47.22"	-98° 10' 9.78"	SC	20	Kek	1	0.5	3	-	-	-	-	C	10	30	30		YES		HILLSIDE
S-36	29° 47' 43.2"	-98° 10' 18.42"	SF	20	Kek	1	6	2	-	-	-	-	CO	15	35	35		YES		HILLSIDE
S-37	29° 47' 43.32"	-98° 10' 18"	SF	20	Kek	0.5	10	1	-	-	-	-	CO	10	30	30		YES		HILLSIDE
S-38	29° 47' 39.72"	-98° 10' 7.02"	SC	20	Kek	1	1	1	-	-	-	-	OF	10	30	30		YES		HILLSIDE
S-39	29° 47' 39.84"	-98° 10' 15.54"	C	30	Kek	2.25	2	5	-	-	-	-	O	20	50		50	YES		HILLSIDE
S-40	29° 47' 39.9"	-98° 10' 26.94"	SC	20	Kek	1.5	0.75	2	-	-	-	-	O	15	35	35		YES		HILLSIDE
S-41	29° 47' 40.98"	-98° 10' 24.72"	SC	20	Kek	0.5	0.5	4	-	-	-	-	CO	5	25	25		YES		HILLSIDE
S-42	29° 47' 22.32"	-98° 10' 44.7"	SC	20	Kek	1.5	2	0.5	-	-	-	-	COF	5	25	25		YES		HILLSIDE

Datum: NAD 83

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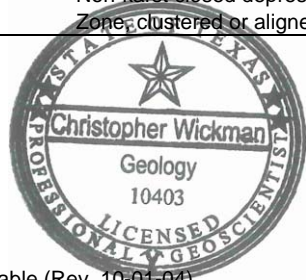
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S-43	29° 47' 21.66"	-98° 10' 41.4"	SC	20	Kek	2.5	1	2	-	-	-	-	OF	10	30	30		YES	HILLTOP
S-44	29° 47' 23.28"	-98° 10' 31.32"	SC	20	Kek	1	1	1	-	-	-	-	COF	5	25	25		YES	HILLTOP
S-45	29° 47' 22.98"	-98° 10' 30.84"	O	5	Kek	15	60	-	-	-	2-5	0.2-0.3	CF	10	15	15		YES	HILLSIDE
S-46	29° 47' 25.32"	-98° 10' 32.04"	SC	20	Kek	2.5	1	1.5	-	-	-	-	OF	10	30	30		YES	HILLSIDE
S-47	29° 47' 23.88"	-98° 10' 31.56"	SC	20	Kek	1.5	0.5	1.5	-	-	-	-	COF	10	30	30		YES	HILLSIDE
S-48	29° 47' 24.42"	-98° 10' 35.28"	SC	20	Kek	0.75	0.5	1.75	-	-	-	-	COF	10	30	30		YES	HILLSIDE
S-49	29° 47' 25.2"	-98° 10' 41.76"	SC	20	Kek	3	3	4.5	-	-			CFO	20	40	40	YES	HILLSIDE	
S-50	29° 47' 24.6"	-98° 10' 37.5"	SC	20	Kek	1.5	1.5	2	-	-	-	-	OF	10	30	30		YES	HILLSIDE
S-51	29° 47' 24.9"	-98° 10' 44.8"	CD	5	Kek	10	10	3	-	-	-	-	CFO	10	15	15		YES	HILLSIDE
S-52	29° 47' 24.12"	-98° 10' 38.58"	SC	20	Kek	2	.5	4	-	-	-	-	OF	15	35	35		YES	HILLSIDE
S-53	29° 47' 25.44"	-98° 10' 45.96"	SH	20	Kek	6	6	1.5	-	-	-	-	C	20	40	40	YES	HILLSIDE	
S-54	29° 47' 18.78"	-98° 10' 43.26"	SC	20	Kek	1	1	1.5	-	-	-	-	OF	15	35	35		YES	HILLSIDE
S-55	29° 47' 19.56"	-98° 10' 44.46"	SC	20	Kek	2	1	3	-	-	-	-	CO	5	25	25		YES	HILLSIDE
S-56	29° 47' 20.4"	-98° 10' 35.64"	SC	20	Kek	1	1	1	-	-	-	-	OF	15	35	35		YES	HILLSIDE

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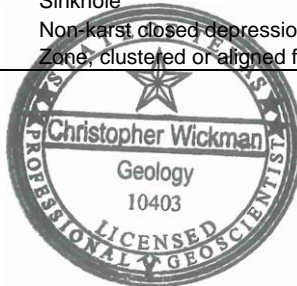
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S-57	29° 47' 20.4"	-98° 10' 27.6"	SC	20	Kek	2	1	2	-	-	-	-	OF	10	30	30		YES	HILLSIDE
S-58	29° 47' 19.2"	-98° 10' 27.6"	SC	20	Kek	1	1	2	-	-	-	-	OF	15	35	35		YES	HILLSIDE
S-59	29° 47' 18.6"	-98° 10' 36.42"	SC	20	Kek	4	4	1.5	-	-	-	-	CO	15	35	35		YES	HILLSIDE
S-60	29° 47' 17.82"	-98° 10' 34.56"	SH	20	Kek	10	12	3	-	-	-	-	CO	20	40	40		YES	STREAMBED
S-61	29° 47' 17.09"	-98° 10' 36.16"	O ^{VR}	5	Kek	15	50	-	-	-	2-3	0.1-0.25	-	10	10	15		YES	HILLSIDE
S-62	29° 47' 16.56"	-98° 10' 36"	SC	20	Kek	3	1	3	-	-	-	-	CO	15	35	35		YES	HILLSIDE
S-63	29° 47' 15.56"	-98° 10' 36"	SC	20	Kek	5	1.5	4	-	-	-	-	CO	15	35	35		YES	HILLSIDE
S-64	29° 47' 16.62"	-98° 10' 33.42"	O ^{FR}	5	Kek	5	10	-	-	-	1-2	0.1-0.25	F	20	25	25		YES	STREAMBED
S-65	29° 47' 18.54"	-98° 10' 25.32"	O ^{VR}	5	Kek	50	75	-	-	-	2-3	0.25-0.5	-	10	15	15		YES	HILLTOP
S-66	29° 47' 16.92"	-98° 10' 31.62"	SC	20	Kek	1	1	3	-	-	-	-	F	12	32	32		YES	HILLSIDE
S-67	29° 47' 14.34"	-98° 10' 32.94"	SC	20	Kek	.75	.5	-	-	-	-	-	OF	5	25	25		YES	HILLSIDE
S-68	29° 47' 16.92"	-98° 10' 31.62"	O ^{VR}	5	Kek	5	50	-	-	-	4-6	0.1-0.25	-	10	15	15		YES	HILLSIDE
S-69	29° 47' 15.72"	-98° 10' 43.14"	SH	20	Kek	10	3	3	-	-	-	-	C	20	40	40		YES	HILLSIDE
S-70	29° 47' 15.78"	-98° 10' 43.2"	SC	20	Kek	1	.5	1	-	-	-	-	C	5	25	25		YES	HILLTOP

Datum: NAD 83

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING
N None, exposed bedrock
C Coarse - cobbles, breakdown, sand, gravel
O Loose or soft mud or soil, organics, leaves, sticks, dark colors
F Fines, compacted clay-rich sediment, soil profile, gray or red colors
V Vegetation. Give details in narrative description
FS Flowstone, cements, cave deposits
X Other materials

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Floodplain, Streambed



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Chris Wickman

Chris Wickman, P.G.

Date: August 21, 2014

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Comal County Park

PROJECT NUMBER: FGS-E14155

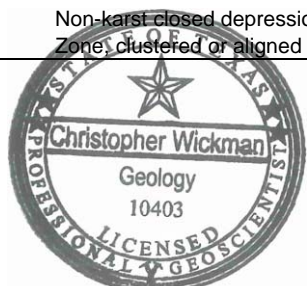
LOCATION			FEATURE CHARACTERISTICS											EVALUATION		PHYSICAL SETTING			
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATIO N	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY	CATCHMENT AREA (ACRES)	TOPOGRAPHY	
						X	Y	Z		10						<40	>40	<1.6	>1.6
S-71	29° 47' 15.54"	-98° 10' 31.44"	SC	20	Kek	1	1	3	-	-	-	-	FO	10	30	30		YES	HILLSIDE
S-72	29° 47' 15.6"	-98° 10' 31.56"	C	30	Kek	2	2	10	-	-	-	-	FO	15	45	45		YES	HILLSIDE
S-73	29° 47' 28.2"	-98° 10' 26.64"	SC	20	Kek	2	1	1.5	-	-	-	-	COF	8	28	28		YES	HILLSIDE
S-74	29° 47' 27.24"	-98° 10' 22.44"	SC	20	Kek	3	3	3	-	-	-	-	CO	20	40	40		YES	HILLSIDE
S-75	29° 47' 38.26"	-98° 10' 9.77"	SC	20	Kek	6	3	2	-	-	-	-	FC	15	35	35		YES	STREAMBED
S-76	29° 47' 33.96"	-98° 10' 22.32"	SC	20	Kek	1.5	1	1.5	-	-	-	-	OF	5	25	25		YES	HILLSIDE
S-77	29° 47' 32.76"	-98° 10' 27.48"	SC	20	Kek	1	1	1.5	-	-	-	-	CO	10	30	30		YES	HILLSIDE
S-78	29° 47' 30"	-98° 10' 30.84"	SC	20	Kek	1	1.5	1	-	-	-	-	CO	10	30	30		YES	HILLSIDE
S-79	29° 47' 37.2"	-98° 10' 25.08"	SC	20	Kek	1	.5	1	-	-	-	-	OF	5	25	25		YES	HILLSIDE
S-80	29° 47' 35.46"	-98° 10' 25.32"	O ^{VR}	5	Kek	25	100	-	-	-	2-6	0.1-0.25	-	10	15	15		YES	HILLSIDE
S-81	29° 47' 59.4"	-98° 10' 24.6"	SC	20	Kek	10	15	3	-	-	-	-	CF	15	35	35		YES	STREAMBED
S-82	29° 47' 37.44"	-98° 10' 18.12"	SC	20	Kek	0.5	1.0	1.5	-	-	-	-	COF	15	35	35		YES	HILLSIDE
S-83	29° 47' 34.26"	-98° 10' 26.88"	SH	20	Kek	3	4	1.5	-	-	-	-	CF	20	40	40		YES	STREAMBED
S-84	29°47' 39.6"	-98° 10' 24.66"	SC	20	Kek	2	1.5	3.5	-	-	-	-	OF	15	35	35		YES	HILLSIDE

Datum: NAD 83

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
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C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
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12 TOPOGRAPHY	
Cliff, Hilltop, Hillside, Floodplain, Streambed	



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Chris Wickman

Chris Wickman, P.G.

Date: August 21, 2014

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Comal County Park

PROJECT NUMBER: FGS-E14155

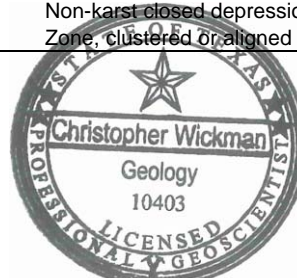
LOCATION			FEATURE CHARACTERISTICS											EVALUATION		PHYSICAL SETTING				
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11		12	
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATI N	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)	TOPOGRAPHY	
						X	Y	Z		10						<40	>40	<1.6	>1.6	
S-85	29° 47' 38.16"	-98° 10' 24.66"	SC	20	Kek	2.5	1	1.5	-	-	-	-	COF	10	30	30		YES		HILLSIDE
S-86	29° 47' 36.96"	-98° 10' 21.06"	SC	20	Kek	2.5	1.5	2.5	-	-	-	-	OF	10	30	30		YES		HILLSIDE
S-87	29° 47' 32.58"	-98° 10' 19.38"	SW	30	Kek	5	3	3	-	-	-	-	FC	20	50		50	YES		STREAMBED
S-88	29° 47' 33.36"	-98° 10' 18.72"	SH	20	Kek	15	10	4	-	-	-	-	CF	20	40		40	YES		STREAMBED
S-89	29° 47' 39.3"	-98° 10' 23.3"	SC	20	Kek	1	1	1	-	-	-	-	OF	10	30	30		YES		HILLSIDE
S-90	29° 47' 30.18"	-98° 10' 30.96"	O ^{VR}	5	Kek	15	75	-	-	-	3-6	0.1-0.5	CF	10	15	15		YES		HILLSIDE
S-91	29° 47' 39.08"	-98° 10' 22.08"	SC	20	Kek	1	1	1	-	-	-	-	OF	10	30	30		YES		HILLSIDE
S-92	29° 47' 39.12"	-98° 10' 13.12"	SC	20	Kek	1	1	1	-	-	-	-	OF	15	35	35		YES		HILLSIDE
S-93	29° 47' 37.68"	-98° 10' 20.78"	O ^{VR}	5	Kek	25	50	-	-	-	3-6	0.1-0.5	OF	20	25	25		YES		STREAMBED
S-94	29° 47' 36.84"	-98° 10' 34.14"	SC	20	Kek	1	2	1.5	-	-	-	-	OF	10	30	30		YES		HILLSIDE
S-95	29° 47' 46.61"	-98° 10' 20.57"	MB	30	Kek	0.25	0.25	-	-	-	-	-	X	5	35	35		YES		HILLTOP

Datum: NAD 83

2A TYPE	TYPE	2B POINTS
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Chris Wickman, P.G.

Date: August 21, 2014

LOCATION

The project site is located west of the intersection of Bluff End Road and River Road and southwest of the Guadalupe River in southeast Comal County. An overall view of the area is shown on copies of the site plan, a street map, the U.S.G.S. Topographic Map, the Official Edwards Aquifer Recharge Zone Map, the FIRM Map, the Bureau of Economic Geology Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle, U.S. Geological Survey Water Resources Investigations 94-4117 Map, a 2012 aerial photograph at a scale of 1"=1,000', a 2012 aerial photograph at a scale of 1"=600', and a 1973 aerial photograph at a scale of 1"=1,000', included as Figures 1 through 9 in Appendix A.

METHODOLOGY

The Geologic Assessment was performed by Mr. Chris Wickman, P.G., Senior Geologist with Frost GeoSciences, Inc. Mr. Wickman is a Licensed Professional Geoscientist in the State of Texas (License # 10403).

Frost GeoSciences, Inc. researched the geology of the area west of the intersection of Bluff End Road and River Road in southeast Comal County. The research included, but was not limited to, the Geologic Atlas of Texas, San Antonio Sheet, FEMA maps, Edwards Aquifer Recharge Zone Maps, U.S.G.S. 7.5 Minute Quadrangle Maps, the Bureau of Economic Geology-Geologic Atlas of Texas, the Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle, the U.S.G.S. Water-Resources Investigations Report 94-4117, and the U.S.D.A. Soil Survey of Comal and Hays Counties, Texas.

After reviewing the available information, a field investigation was performed to identify any geologic or man-made potential recharge features. A transect spacing of approximately 50 feet, or less depending on vegetation thickness, was used to inspect the project area. A 2012 aerial photograph, in conjunction with a hand held Garmin GPS 72H Global Positioning System with an Estimated Potential Error ranging from 10 to 14 feet, was used to navigate around the property and identify the locations of potential recharge features (PRFs), as recommended in the "Instructions to Geologists", TCEQ-0585-Instructions (Rev. 10-1-04). The locations of any PRFs noted in the field were marked with blue and white flagging. The flagging is numbered with the same PRF I.D. # that is used on the Site Geologic Map. The Site Geologic Map, indicating the limits of the project site, and the locations of PRFs and rock outcrops noted on the project site, is included in Appendix C. A copy of a 2012 Aerial Photograph at an approximate scale of 1"=700' indicating the limits of the project site, and the locations of PRFs and rock outcrops noted on the project site, is included on Figure 9 in Appendix A. The Geologic Assessment Form TCEQ-0585, (Rev. 10-1-10), Stratigraphic Column, and the Geologic Assessment Table have been filled with the appropriate information for this project site and are included on pages 1-4 of this report.

RESEARCH & OBSERVATIONS

7.5 Minute Quadrangle Map Review

According to the U.S.G.S. 7.5 Minute Quadrangle Map, Sattler, Texas Sheet (1994), the elevation across the project site ranges from 800 to 1120 feet above mean sea level. The project site has a total relief of approximately 320 feet. Runoff from the project site flows to the southeast into Guadalupe Tributary 16 and 13. The topographic map depicts the project site as hilly undeveloped wooded land. An unimproved road (Bluff End Road) was evident crossing the northwestern portion of the project site in the vicinity of the northwestern boundary. The Guadalupe River is located north and east of the project site. River Road is evident north and east of the project site following the Guadalupe River. A copy of the U.S.G.S. 7.5 Minute Quadrangle Map indicating the location of the project site is included on Figure 3 in Appendix A.

Recharge/Transition Zone

The Official Edwards Aquifer Recharge Zone Map, Sattler, Texas Quadrangle (1973), the project site is located within the Recharge Zone of the Edwards Aquifer. A copy of the Official Edwards Aquifer Recharge Zone Map indicating the location of the project site is included on Figure 4 in Appendix A.

100-Year Floodplain

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for the Bexar County, Texas, Community Panel Number 48091C0270F (Revised September 2, 2009) was reviewed to determine if the project site is located in areas prone to flooding. A review of the above mentioned Panel No. indicates that the project site is located within "Zone X". According to the Panel Legend, Zone X represents areas determined to be outside the 0.2% annual chance floodplain. A copy of the above referenced FIRM panel indicating the location of the project site is included on Figure 5 in Appendix A.

Soils

According to the United States Department of Agriculture, Soil Conservation Service, Soil Survey of Comal and Hays Counties, Texas, issued (1984), the project site is located on the Comfort-Rock outcrop complex, undulating (CrD), the Eckrant-Rock outcrop complex, steep (ErG) and the Rumble-Comfort association, undulating (RUD). A copy of the 1973 aerial photo (approximate scale: 1"=1,000') from the U.S.D.A. Soil Survey of Comal and Hays Counties, Texas indicating the location of the project site and the soil types is included on Figure 6 in Appendix A.

- Comfort-Rock outcrop complex, undulating consists of shallow, clayey soils and Rock outcrops on the side slopes, hilltops, and ridgetops in the uplands area of the Edwards Plateau. This soil complex is composed of the Comfort extremely stony clay (49% to 95% of the complex), the Rock outcrop (5-36% of the complex), and small amounts of the Rumble, Purves, Eckert, and Real soils. Typically, the surface layer of the Comfort soil is dark brown extremely stony clay about 6" thick. Stones and cobbles (some as much as 4' across) cover approximately 45% of the surface. The subsoil extends to a depth of 13". It

is dark reddish brown extremely stony clay. The underlying material is indurated fractured limestone. The soil is mildly alkaline and non-calcareous throughout. The soil is well drained, surface runoff is slow to medium, permeability is slow, and the available water capacity is very low. Water erosion is a slight hazard. Typically, the Rock outcrop is dolomitic limestone that is barren of soil except in narrow fractures in the rock. Some areas may have as much as 3" of soil on top of the outcrop. This soil has a USDA Texture Classification of extremely stony clay, stony clay, very stony clay and weathered bedrock. The Unified Classification is CH, GC, CL or SC. The AASHO Classification is A-2-7 and A-7-6. This soil has an average permeability from 0.06 to 0.2 inches/hour.

- Eckrant-Rock outcrop complex, steep (ErG) consists of shallow, clayey soils and rock outcrops on uplands in the Edwards Plateau Land Resource Area. The Eckrant soil makes up 50 to 80 percent of the complex, but on the average it makes up to 70 percent. Rock outcrop makes up 9 to 30 percent of the complex, but the average is 20 percent. Typically, the surface layer of the Eckrant soil is very dark gray extremely stony clay about 10 inches thick. It is about 35 percent by volume, cobbles and stones in the upper part and about 75 percent, by volume in the lower part. The underlying layer is indurated fractured limestone. The soil is moderately alkaline and noncalcareous throughout. Typically, the rock outcrop consists of barren exposures of indurated limestone. In a few areas as much as 4 inches of clayey soil material overlies the bedrock. Dark colored clay is in the cracks and fractures. The Eckrant soil is well drained. Surface runoff is rapid. Permeability is moderately slow and the available water capacity is very low. Water erosion is a severe hazard. This soil has a USDA Texture Classification of extremely stony clay and unweathered bedrock. The Unified Classification is GC, SC or CH. The AASHO Classification is A-7-6 and A-2-7. This soil has an average permeability from 0.6 to 2.0 inches/hour.
- The Rumple-Comfort association, undulating consists of shallow and moderately deep soils on uplands in the Edwards Plateau Land Resource Area. The surface layer of the Rumple Soil is dark reddish brown very cherty clay loam about 10 inches thick. Rounded chert and limestone cobbles and gravel cover about 20 percent of the surface. The subsoil to a depth of 14 inches is dark reddish-brown very cherty clay, and to a depth of 28 inches it is dark reddish-brown extremely stony clay. The underlying material is indurated fractured limestone. The Comfort Soil is dark brown, neutral, extremely stony clay about 7 inches thick. The subsoil to a depth of 12 inches is dark reddish-brown, mildly alkaline, extremely stony clay. The underlying material is indurated fractured limestone. The soil is noncalcareous throughout. The soils in this association are well drained. Surface runoff is medium, but varies due to the occurrence of caves, fracture zones, and sinks. Permeability is moderately slow. Water erosion is a moderate hazard. This soil has a USDA Texture Classification of very cherty clay loam, very cherty clay,

extremely stony clay, very stony clay and unweathered bedrock. The Unified Classification is GC, CL, SC and or CH. The AASHO Classification is A-2-6, A-6, A-2-7 and A-7-6. This soil has an average permeability from 0.06 to 0.6 inches/hour.

Narrative Description of the Site Geology

Based on a visual inspection of the ground surface, the overall potential for fluid flow from the project site into the Edwards Aquifer appears to be low to high. The locations of the PRFs are identified on the 2012 aerial photograph on Figure 9 in Appendix A, and on the Site Geologic Map provided in Appendix C. Color photos of the project site and some of the potential recharge features are included in Appendix B.

Potential Recharge Feature S-1, S-12 and S-51 appear to be excavations into the soil of the hillside. Large piles of soil and rock were observed adjacent to the excavations. The excavations were approximately 10 feet wide, 15 to 17 feet long and approximately 2 to 2 ½ feet in depth. Frost GeoSciences, Inc. rates these features as low on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The non-karst closed depressions score a 15 on the sensitivity scale, column 10 in the Geologic Assessment Table of this report. Frost GeoSciences, Inc. does not consider the excavations to be sensitive features.

Potential Recharge Feature #s S-2, S-4 through S-6, S-8, S-13 through S-15, S-17 through S-20, S-22, S-23, S-28, S-29, S-31 through S-35, S-38, S-40 through S-44, S-46 through S-48, S-50, S-52, S-54 through S-59, S-62, S-63, S-66, S-67, S-70, S-71, S-73, S-76 through S-79, S-84 through S-86, S-89, S-91, S-92 and S-94 are solution cavities of varying dimensions that are filled in with clay, fine sediments, gravel and/or leaves. The solution cavities occur on hillsides and hilltops located under rock ledges and at the bases of trees. Potential recharge features S-8 and S-29 were observed within intermittent streambeds. In addition, a portion of these solution cavities appeared to have been excavated by burrowing animals. Frost GeoSciences rates these features as low on figure 1 of the TNRCC-0585-Instructions (Rev. 5-01-02). These features score 25 to 35 points on the sensitivity scale, column 10 in the Geologic Assessment Table on pages 4 through 10 of this report.

Potential Recharge Features S-7, S-16, S-45, S-61, S-65, S-68, S-80, S-90 are outcrops of fractured and/or vuggy gray limestone. The outcrops of limestone had small fractures, and vugs. The majority of the observed vugs ranged in density from 3 to 6 per foot, however, small vugs were observed within the outcrop area occurring at a density of 5 to 8 per foot. The vugs ranged from 1 to 8 inches in width. The majority of the observed fractures ranged in density from 3 to 6 per foot, however, smaller fractures observed within the outcrop area occurring at a density of 4 to 8 per foot. The fractures ranged from 1 to 4 inches in width. The vugs and fractures observed within the outcrops appeared to be confined to the surface and did not appear to extend into the subsurface. Frost GeoSciences, Inc. rates the outcrops of gray fractured and/or vuggy limestone as low on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The outcrops score a 15 on the sensitivity scale, column 10 in the Geologic Assessment Table on Pages 4 through 10 of this report. Frost GeoSciences, Inc. does not consider the outcrops to be sensitive features.

Potential Recharge Feature #s S-11, S-64, and S-93 are outcrops of fractured and/or vuggy gray limestone much like the above mentioned outcrops of fractured and/or vuggy gray limestone observed on the hillsides and hilltops of the project site; however, these outcrops were noted within intermittent stream channels. Due to the location of the fractured and/or vuggy rock outcrops within the intermittent stream channels, the potential for rapid infiltration does exist. Frost GeoSciences, Inc. rates these features as low to potentially intermediate on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The outcrops of fractured and/or vuggy rock score a 25 on the sensitivity scale, column 10 in the Geologic Assessment Table on Pages 4 through 10 of this report. Frost GeoSciences, Inc. does not consider the outcrops to be sensitive features.

Potential Recharge Feature #s S-24, S-36 and S-37 consisted of solution enlarged fractures. PRF#s S-36 and S-37 were observed on hillsides of the project site. The solution enlarged fracture (S-36) was approximately 6 feet long, 1 foot wide and about 2 feet deep. The fracture was partially in-filled with soil, gravel and leaves. The fracture appears to have resulted from vegetation expanding a fracture between boulders. Close observation of the fracture does not reveal obvious indications the fracture has the capacity for direct rapid infiltration to the subsurface. PRF # S-37 consists of a solution enlarged fracture resulting from limestone blocks fracturing from a slightly higher ledge of outcropping limestone. The fracture gap increased through dissolution and vegetative growth. Close examination of the fracture and probing with a machete did not indicate the fracture extends to the subsurface. Frost GeoSciences, Inc. rates these features as low on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The features score between a 30 and 35 on the sensitivity scale, column 10 in the Geologic Assessment Table on page 6 of this report. Frost GeoSciences, Inc. does not consider the solution enlarged fractures to be sensitive features.

Potential Recharge Feature #S-25 is a manmade excavation in bedrock. The feature is an approximate 7 feet circular hole excavated approximately 20 feet into the bedrock. The excavation was covered by a wooden cover constructed of cedar poles. The excavation did not appear to be backfilled. The excavation was located in close proximity of a 200 to 300 feet cliff. FGS was of the opinion that any water entering the excavation would likely discharge via the cliff to the north. Frost GeoSciences, Inc. rates the feature as low on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The feature scores a 35 on the sensitivity scale, column 10 in the Geologic Assessment Table on page 5 of this report. Frost GeoSciences, Inc. does not consider the excavation to be a sensitive feature.

Potential Recharge Feature #s S-26, S-30 and S-95 consist of water wells located in the northeastern portion of the project site among a group of abandoned structures and in the north-central portion of the project site adjacent to an occupied rural residence. The water wells in the northeastern portion of the project site did not appear to be in use at the time of the site reconnaissance; however the water well observed near the occupied residence did appear to be in operation and good repair at the time of the site inspection. If the water wells are not intended for use, then the wells should be properly plugged and abandoned according to all local, state and federal laws and regulations. Frost GeoSciences, Inc., rates the relative infiltration rate of these features as low on figure 1 of the TCEQ-

0585-Instructions (Rev. 10-01-04). These features score a 35 on the sensitivity scale, column 10 in the Geologic Assessment Table on pages 5, 6 and 10 of this report. Frost GeoSciences, Inc. does not consider the water wells to be sensitive features.

Potential Recharge Feature S-27 is a manmade feature in bedrock. The feature appears to be a septic tank in the vicinity of an abandoned residence. Frost GeoSciences rates this feature as low on figure 1 of the TNRCC-0585-Instructions (Rev. 5-01-02). The feature scores a 35 on the sensitivity scale, column 10 in the Geologic Assessment Table on page 5 of this report. Frost GeoSciences, Inc. does not consider the apparent septic system to be a sensitive feature.

Potential Recharge Feature #S-59, S-75 and S-81 consist of a large erosion scars or plunge pools. PRF # S-59 is approximately 4 feet wide, 4 feet long and 1.5 feet deep, PRF S-75 is approximately 6 feet wide, 3 feet long and 2 feet deep and PRF # S-81 is approximately 10 feet wide, 15 feet long and 3 feet deep. The features were located within intermittent drainage paths. The floor of the erosion scar/plunge pools S-59 and S-75 is limestone covered in fine soils, clay and leaves and sticks. The floor of the erosion scar/plunge pool S-81 was limestone, sand, and gravel covered in leaves and sticks. Probing of the features with a machete did not reveal any fractures or cavities that could potentially lead to the subsurface. Frost GeoSciences, Inc. rates the features as low on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The features score a 35 on the sensitivity scale, column 10 in the Geologic Assessment Table in this report. Frost GeoSciences, Inc. does not consider the features be sensitive.

Potential Recharge Feature #S-71 is large horizontal solution cavity observed on a steep hillside within a limestone ledge on the project site adjacent to a drainage path. The cavity extends horizontally into the and under the limestone ledge. It is approximately 1 foot wide as well as long and approximately 3 feet deep. The feature floor is covered by fine soil and clay with a scattering of leaves. Frost GeoSciences, Inc. rates the feature as low on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The feature scores a 30 on the sensitivity scale, column 10 in the Geologic Assessment Table on Page 9 of this report. Frost GeoSciences, Inc. does not consider the solution cavity to be a sensitive feature.

Potential Recharge Feature #S-82 is small solution cavity observed on a hillside of the project site. The cavity extends vertically into ground surface approximately 1 to 2 feet. It is approximately 6 inches wide and 1 foot long. The feature is infilled with fine soils, clay and leaves. The bottom of the feature appears to be clay lined. Frost GeoSciences, Inc. rates the feature as low on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The feature scores a 35 on the sensitivity scale, column 10 in the Geologic Assessment Table on Page 9 of this report. Frost GeoSciences, Inc. does not consider the solution cavity to be a sensitive feature.

Potential Recharge Feature #s S-3, S-39 and S-72 are small caves observed on the project site. The cave opening of PRF #S-3 is approximately 3 feet wide, 4 feet long and approximately 15 feet deep. The cave appeared to extend vertically into the subsurface. The cave was partially infilled with large boulders, gravel and sand. PRF #S-39 was a cave that had three openings all within close proximity

of each other. The largest opening was approximately 2.25 feet wide, 5 feet long and approximately 5 feet deep. The two other openings were smaller and were 1 to 2 feet in diameter. The cave was observed on a low hillside. Rocks and gravel as well as fine soils were observed in the cave. The cave may have opened laterally beyond the cave openings; however, due to the size of the cave openings investigation of the interior of the cave was limited. The floor of the cave appeared to be covered with sand and gravel breakdown material. PRF #S-72 was a small horizontal cave observed along a bedding plane in a very steep slope adjacent to a drainage path. The opening of the cave was approximately 2 feet wide, 2 feet long and appeared to extend horizontally into the Cliffside along a bedding plane pinching closed as it extended into the limestone rock. The cave may have been formed from erosion during heavy rainfall events or is a discharge point to the intermittent stream. Frost GeoSciences, Inc. rates these features as intermediate on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The features score a 50, 50 and 45, respectively on the sensitivity scale, column 10 in the Geologic Assessment Table on Pages 4, 5 and 9 of this report. Frost GeoSciences, Inc. does consider the caves to be sensitive features.

Potential Recharge Feature #S-9 and S-87 consisted of small swallow holes located within the floor of a steep sided stream channels. PRF # S-9 was approximately 4 feet wide, 3 feet long and 2 feet deep. The swallow hole was infilled with small boulders, gravel and sand. PRF #S-87 was approximately 5 feet wide, 3 feet long and 3 feet deep. The swallow hole was infilled with gravel and sand. Due to the location of the small swallow holes within the intermittent stream channel, the potential for rapid infiltration does exist. Frost GeoSciences, Inc. rates these features as intermediate on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The features score a 50 on the sensitivity scale, column 10 in the Geologic Assessment Table on Pages 4 and 10 of this report. Frost GeoSciences, Inc. does consider the swallow holes to be sensitive features.

Potential Recharge Feature # S-10 was identified on the geologic map as a Fault located in the southwestern corner of the project site, near the site boundary. Evidence of the fault, (i.e. lithology changes and fracturing) was observed in the stream channel located equivalent to the indicated fault. The fracture was approximately 2 feet wide and approximately 100 feet long. The fracture was observed at the base of a cliff along a rock bottomed stream channel. Based on review of the geologic maps of the area, the upwardly displaced formation to the southeast of the fault is the Edwards Person Limestone and the downward displaced formations, to the northwest of the fault, are Edwards Kainer Limestone. Frost GeoSciences, Inc. rates this feature as intermediate on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The feature scores a 50 on the sensitivity scale, column 10 in the Geologic Assessment Table on Page 4 of this report. Frost GeoSciences, Inc. does consider this to be a sensitive feature.

Potential Recharge Feature #s S-21, S-49 and S-74 are large solution cavities of varying dimensions that are filled in with clay, fine sediments, gravel and/or leaves. The solution cavities occur on hillsides and hilltops located under rock ledges and at the bases of trees. Frost GeoSciences rate these features as intermediate on figure 1 of the TNRCC-0585-Instructions (Rev. 5-01-02). These features score 40 to 45 points on the sensitivity scale, column 10 in the Geologic Assessment Table on pages 5, 7 and 9 of this report.

Potential Recharge Feature #S-60, S-83 and S-88 appear to be sink holes located within the floor of steep sided stream channels. The sink holes were infilled with limestone boulders, gravel and sand. PRF # S-60 is approximately 10 feet wide, 12 feet long and 3 feet deep. PRF # S-83 is approximately 3 feet wide, 4 feet long and 1.5 feet deep. PRF # S-88 is approximately 15 feet wide, 10 feet long and 4 feet deep. Due to the location of the sink holes within the intermittent stream channel, the potential for rapid infiltration does exist. Frost GeoSciences, Inc. rates these features as intermediate on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The features score a 40 on the sensitivity scale, column 10 in the Geologic Assessment Table on Pages 4 and 10 of this report. Frost GeoSciences, Inc. does consider the swallow holes to be sensitive features.

Potential Recharge Feature #s S-53 and S-69 appear to be a sink holes. PRF #S-53 is approximately 6 feet wide, 6 feet long and about 1.5 feet deep. This sink hole appears to have been an area of collapse or a low-lying area that has been back-filled with limestone boulders and gravel. Close examination of the area did not indicate obvious preferential channels or drainage paths leading into the infilled sink hole or surrounding low-lying area. PRF #69 is approximately 10 feet wide, 3 feet long and about 3 feet deep. The sink hole appears to be an area collapse in a small drainage path on a low hillside. Frost GeoSciences, Inc. rates the features as intermediate on Figure 1 of the TCEQ-0585-Instructions (Rev. 10-01-04). The features score a 40 on the sensitivity scale, column 10 in the Geologic Assessment Table on Pages 7 and 8 of this report. Frost GeoSciences, Inc. does consider the sink holes to be sensitive features.

The project site is covered by moderately dense to very dense stand of vegetative cover with numerous open grassy areas. Site visit photos indicating the condition of the property at the time of the on-site inspection are included in Appendix B. Overall vegetation on the project site consists of ashe juniper (*Juniperus ashei*), live oak (*Quercus virginiana*), and cedar elm (*Ulmus crassifolia*), with Texas persimmon (*Diospyros texana*), agarita (*Berberis trifoliolata*), yucca (*Yucca treculeana*), and prickly pear cactus (*Opuntia lindheimeri*). The variations in the vegetative cover on the property are visible in the 2012 aerial photo on Figures 9 and 10 in Appendix A. A copy of the site layout indicating the boundary of the project site and the elevations is included on the Site Geologic Map in Appendix C of this report.

According to the Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle and U.S. Geological Survey Water Resources Investigations 94-4117 (WRI), the project site is located almost entirely on the Cretaceous Edwards Kainer Limestone (Kk) with a small area of the Cretaceous Walnut formation (Kw) outcropping in the southeastern portion of the project site. The WRI Map subdivides the Edwards Kainer into four separate geologic members. The USGS WRI Report Map indicates the Site is located on the lower two geologic members of the Edwards Kainer formation (Kek), the Dolomitic and Basal Nodular Members. In addition, according to the USGS WRI Map an outcrop of the Cretaceous Upper Glen Rose formation (Kgru) is located in the southeastern portion of the project site south of the Guadalupe Tributary 16. The Walnut formation is often referred to as the Basal Nodular Member of the Edwards Kainer limestone. Based on our observations in the field and experience in the area, FGS is of the opinion that the Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle better represents what was observed on the project site at the time of the on-

site reconnaissance. A copy of the WRI map and the Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle are included on Figures 7 and 7A in Appendix A. A copy of the Stratigraphic Column highlighting the outcropping formations is included on Page 3 of this report.

The Dolomitic Member of the Edwards Kainer Limestone consists of mudstone to grainstone with crystalline limestone and chert. This member is massively bedded and light gray with abundant fossils of *Toucasia*. Karst features within this member are typically related to structure or bedding planes. Overall thickness ranges from 110 to 130 feet.

The Basal Nodular Member of the Edwards Kainer Limestone consists of shaly, nodular limestone, mudstone, and milliolid grainstone. This member is massive, nodular, and mottled with fossils of *Exogyra texana*. This member typically forms large lateral caves at the surface.

BEST MANAGEMENT PRACTICES

Based on a visual inspection of the ground surface, the overall potential for fluid flow from the project site into the Edwards Aquifer appears to range from low to moderate. The potential always exists to encounter solution cavities within the subsurface during excavating activities. Frost GeoSciences, Inc. is of the opinion that it is very important for construction personnel to be informed of the potential to encounter cavities in the subsurface that lack a surface expression. Construction personnel should also be informed of the proper protocol to follow in the event a karst feature is encountered during the development of the project site.

DISCLAIMER

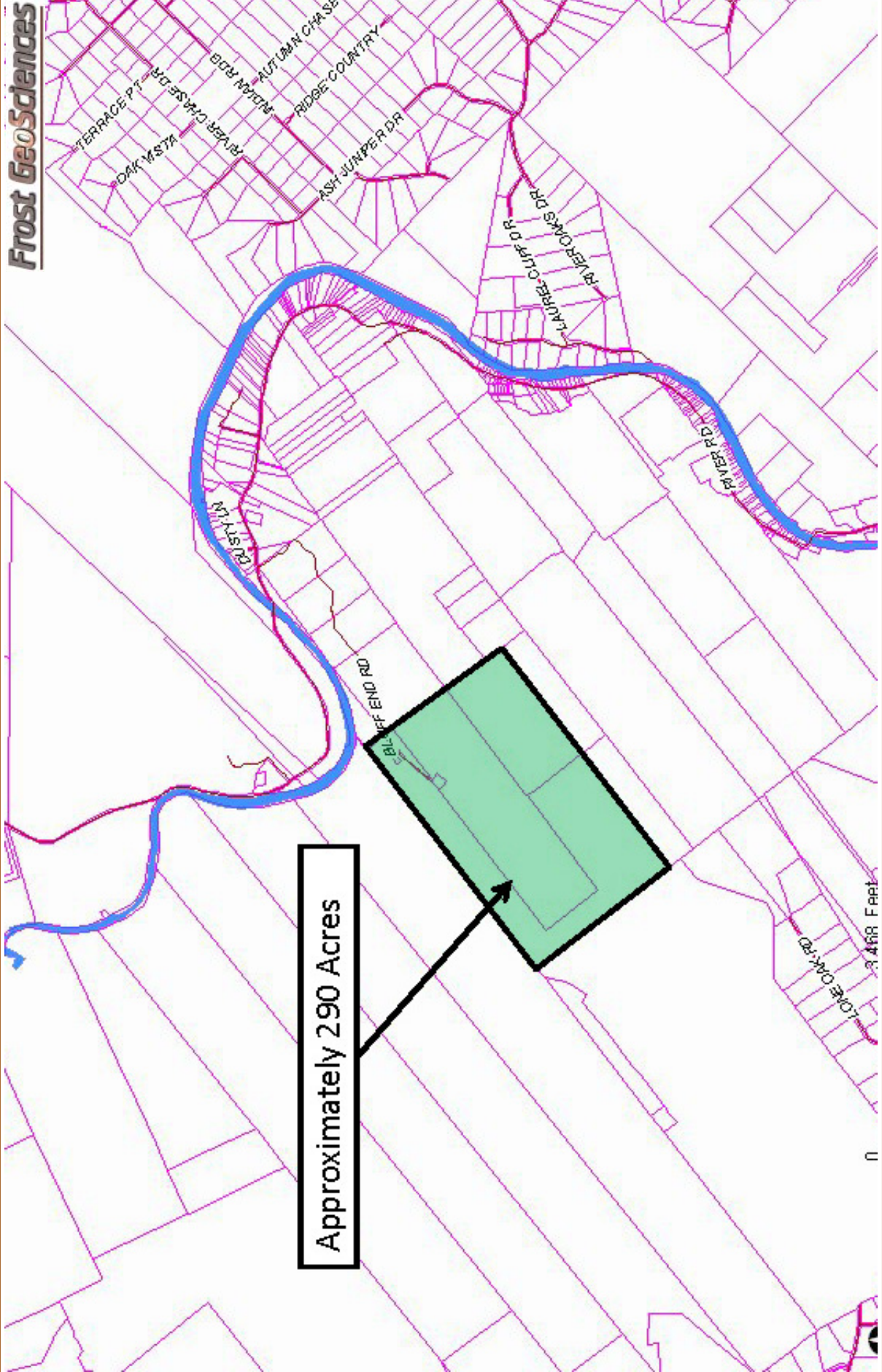
This report has been prepared in general accordance with the "Instructions to Geologists", TCEQ-0585-Instructions (Rev. 10-1-04) by a Licensed Texas Professional Geoscientist. All areas of the project site were carefully inspected for features that could contribute to the recharge of the Edwards Aquifer, however, this survey cannot preclude the presence of subsurface karst features that lack surface expression. This report is not intended to be a definitive investigation of all possible geologic or karst features at this site. All conclusions, opinions, and recommendations for Best Management Practices (BMP's) in this report are based on information obtained while researching the project and on the site conditions at the time of our field investigation.

This report has been prepared for the exclusive use of Comal County. This report is based on available known records, a visual inspection of the project site, and the work generally accepted for a Geologic Assessment for Regulated Activities / Developments on the Edwards Aquifer Recharge / Transition Zone, relating to 30 TAC §213.5(b)(3), effective June 1, 1999.

REFERENCES

1. USGS - 7.5 Minute Topographic Quadrangle of Sattler, Texas, 1994
2. Edwards Underground Water District Reference Map, March 1988
3. Official Edwards Aquifer Recharge Zone Map, Sattler, Texas, 1994
4. Small, Ted A. and Hanson, John A., 1994, Geologic Framework and Hydrogeologic Characteristics of the Edwards Aquifer Outcrop, Comal County, Texas. U.S. Geological Survey Water Resources Investigations 94-4117.
5. Barnes, V.L., 1983, Geologic Atlas of Texas Sheet, Bureau of Economic Geology and University of Texas at Austin, Geologic Atlas of Texas.
6. Federal Emergency Management Agency, Federal Insurance Administration, National Flood Insurance Program, Flood Insurance Map, Community Panel Number 48091C0270F, dated September 2, 2009.
7. United States Department of Agriculture Soil Conservation Service Soil Survey of Comal and Hays County 1984.
8. TCEQ-0585-Instructions (Rev. 10-1-04), "Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zone".
9. Collins, Edward, W., 2000, Geologic Map of the New Braunfels 30 X 60 Minute Quadrangle, Bureau of Economic Geology, The University of Texas at Austin, Texas.

APPENDIX A
SITE LOCATION FIGURES



Approximately 290 Acres

Site Layout

PROJECT NAME:
Geologic Site Assessment (WPAP)
for Regulated Activities / Development on the
Edwards Aquifer Recharge / Transition Zone
Comal County Park
Comal County

PROJECT NO.: FGS-E14155

DATE: August 21, 2014



PROJECT NAME:

Geologic Site Assessment (WPAP)
for Regulated Activities / Development on the
Edwards Aquifer Recharge / Transition Zone
Comal County Park
Comal County, Texas

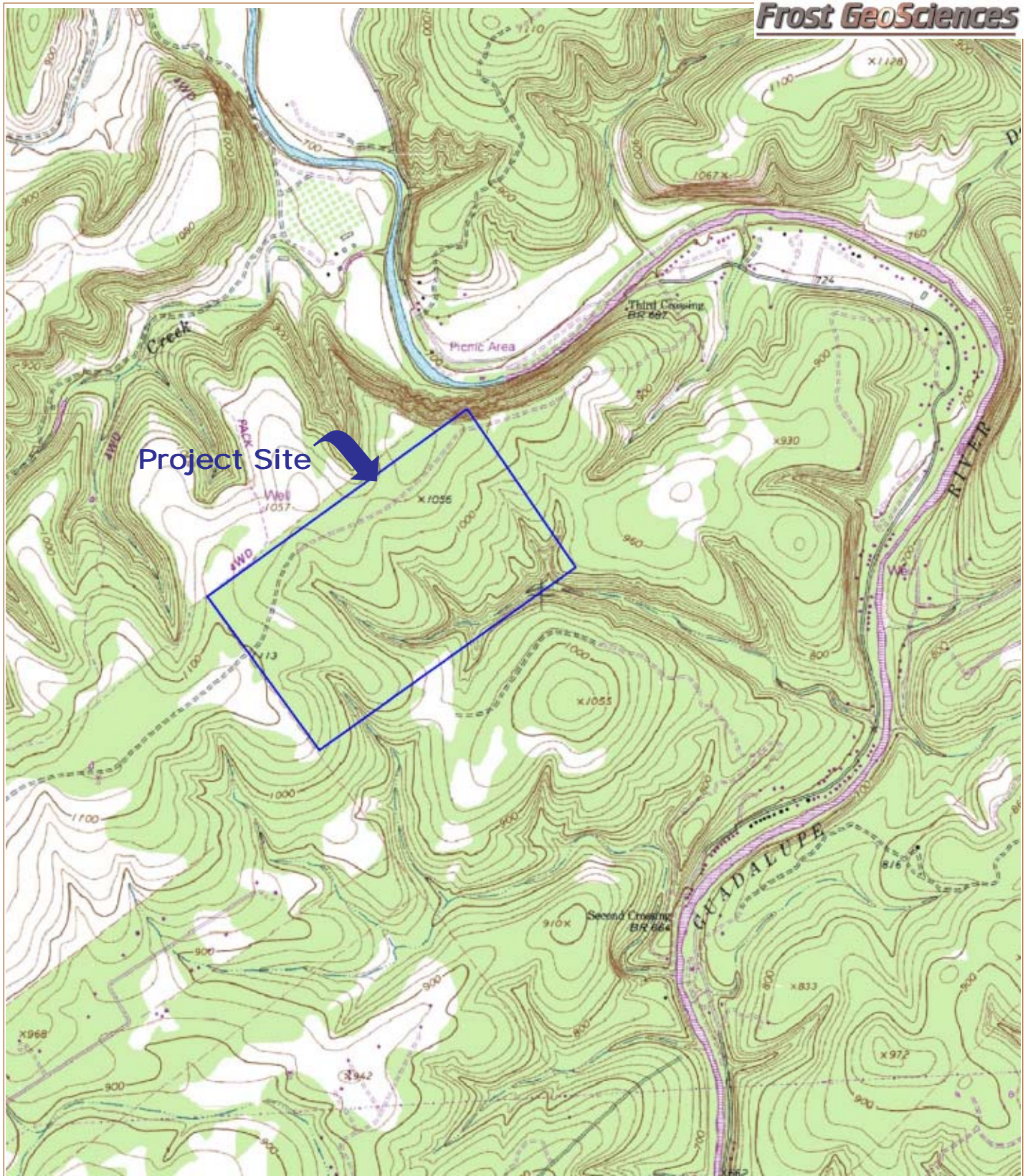
Street Map

PROJECT NO.:

FGS-E14155

DATE:

August 21, 2014



PROJECT NAME:

Geologic Site Assessment (WPAP)
for Regulated Activities / Development on the
Edwards Aquifer Recharge / Transition Zone
Comal County Park
Comal County, Texas

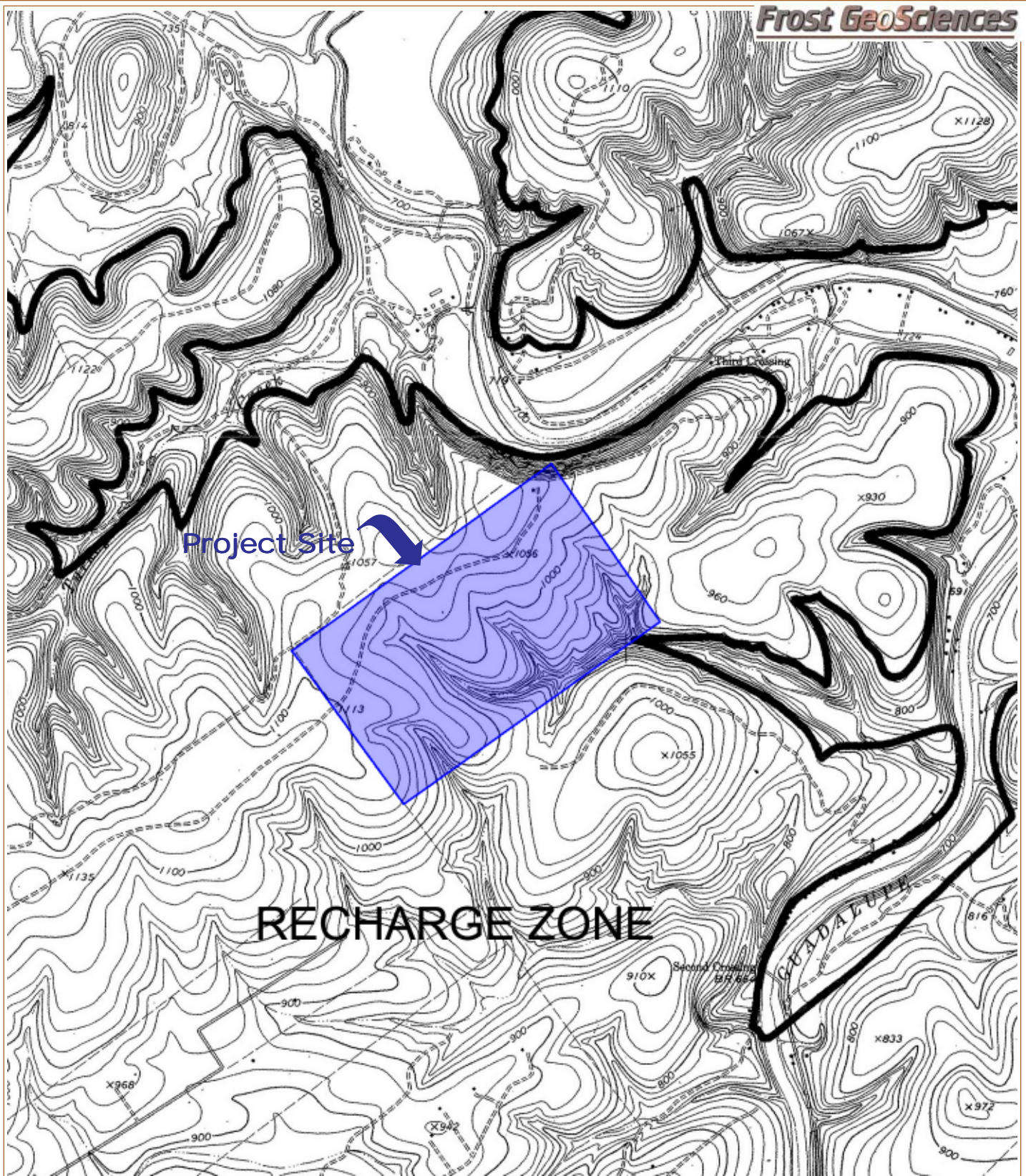
U.S.G.S. 7.5 Minute Quadrangle Map
Sattler, Texas Sheet (1994)

PROJECT NO.:

FGS-E14155

DATE:

August 21, 2014



PROJECT NAME:

Geologic Site Assessment (WPAP)
for Regulated Activities / Development on the
Edwards Aquifer Recharge / Transition Zone
Comal County Park
Comal County, Texas

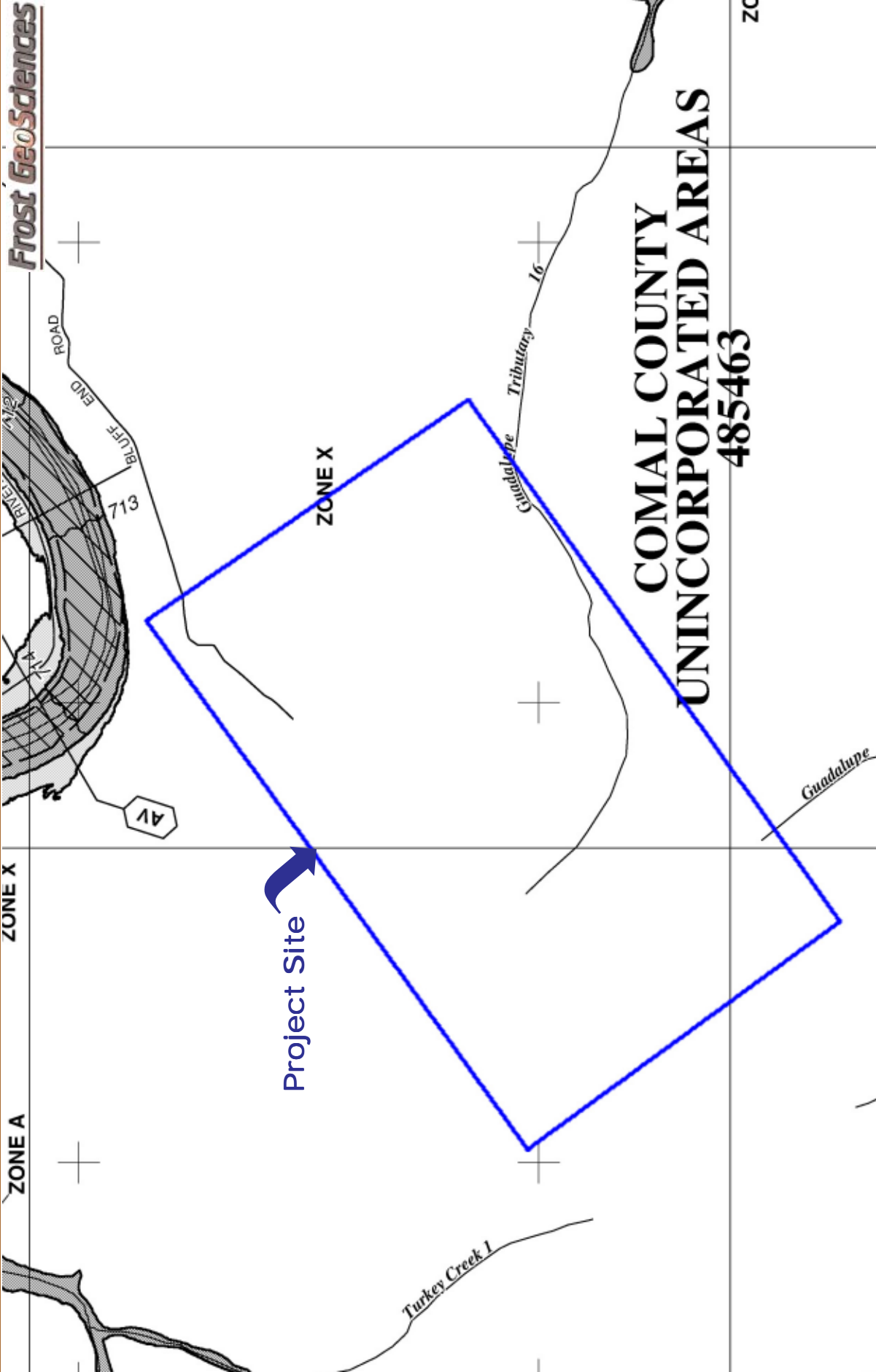
Official Edwards Aquifer Recharge Zone Map
Sattler, Texas (1973)

PROJECT NO.:

FGS-E14155

DATE:

August 21, 2014

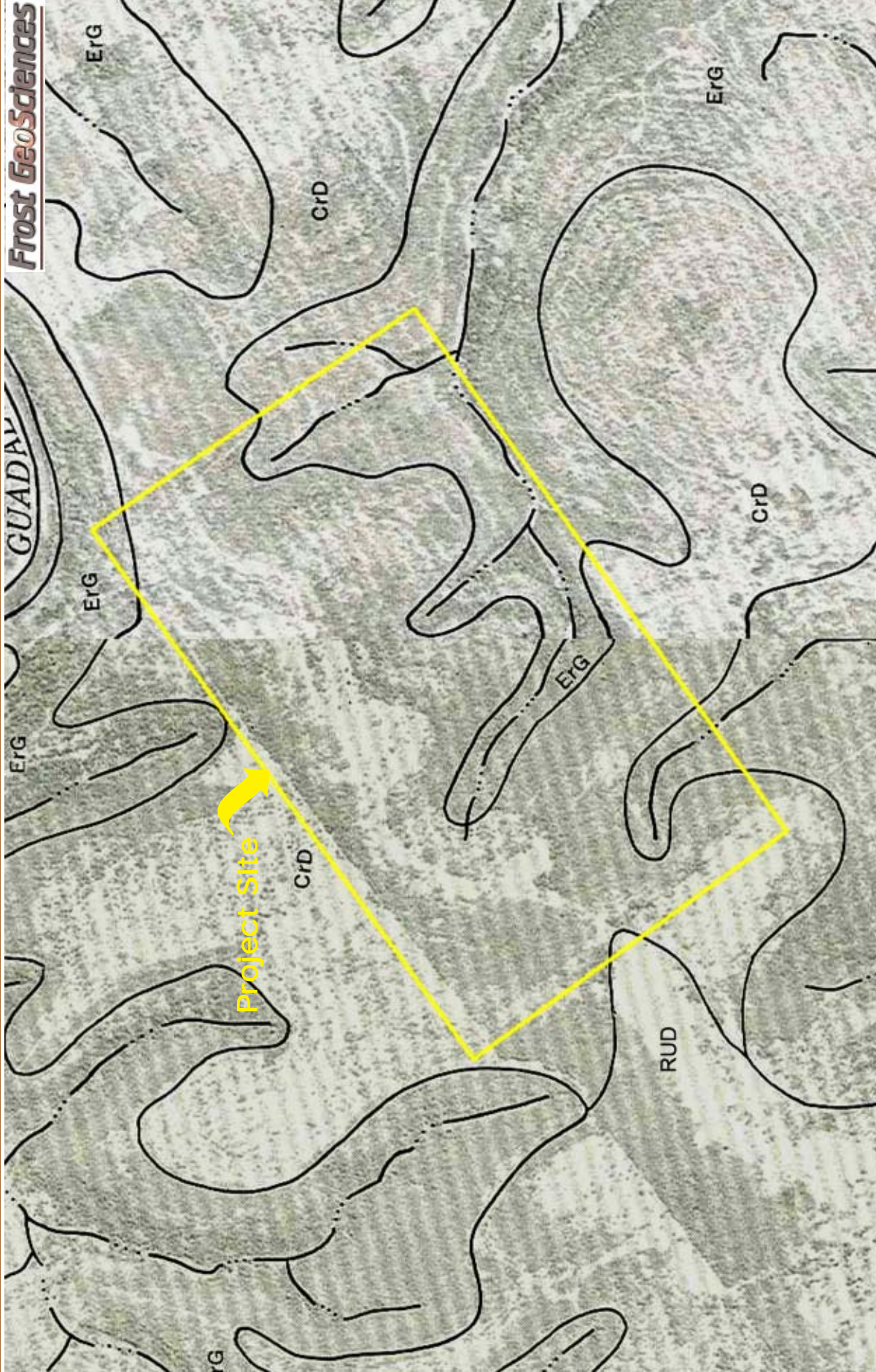


PROJECT NAME:
 Geologic Site Assessment (WPAP)
 for Regulated Activities / Development on the
 Edwards Aquifer Recharge / Transition Zone
 Comal County Park
 Comal County

Flood Insurance Rate Map (FIRM)
 Community Panel # 48091C0270F (September 2, 2009)

PROJECT NO.: FGS-E14155

DATE: August 21, 2014

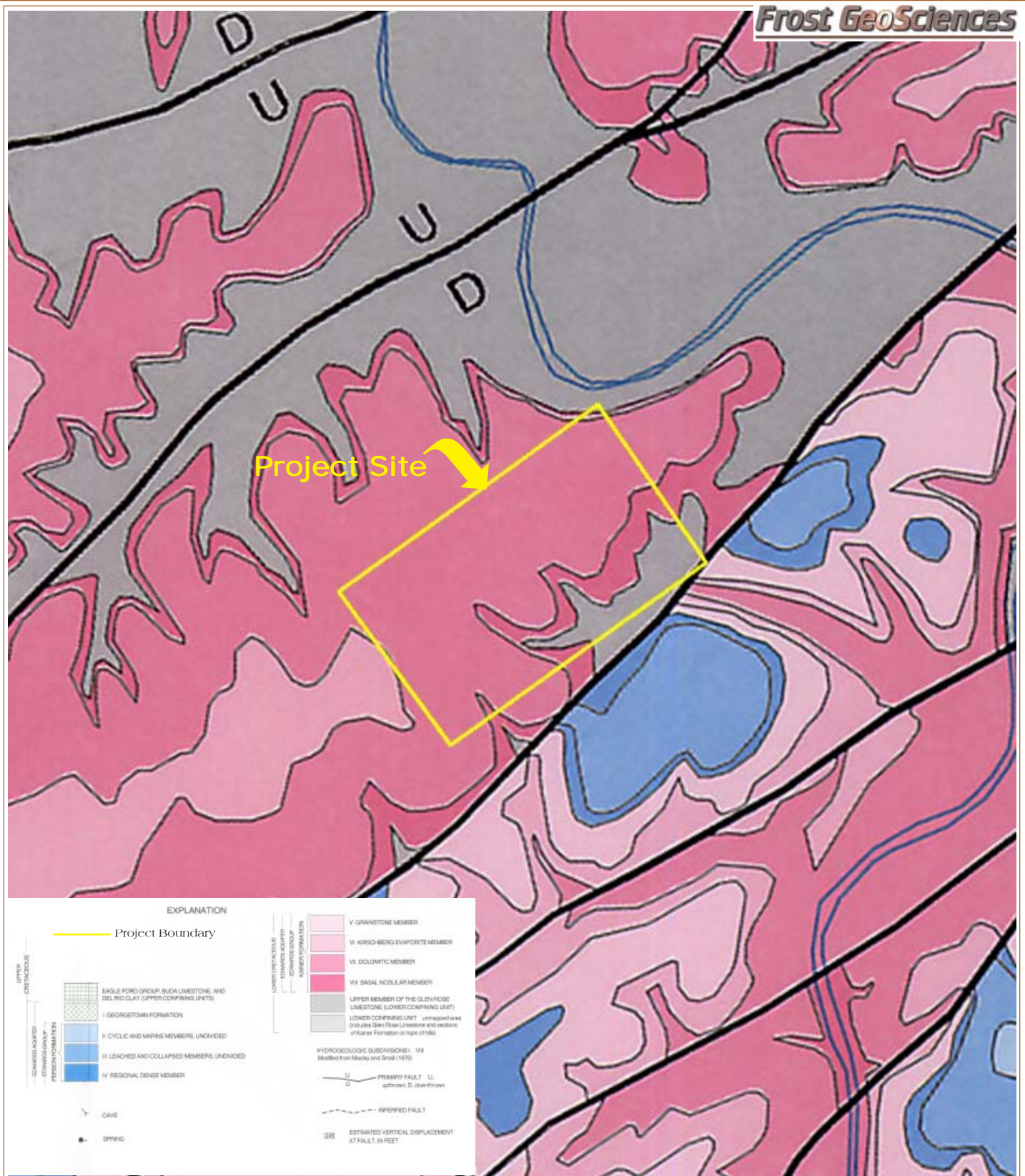


PROJECT NAME:
 Geologic Site Assessment (WPAP)
 for Regulated Activities / Development on the
 Edwards Aquifer Recharge / Transition Zone
 Comal County Park
 Comal County, Texas

1973 Aerial Photograph
 U.S.D.A. Soil Survey of Comal & Hays County, Texas

PROJECT NO.: FGS-E14155

DATE: August 21, 2014



EXPLANATION

— Project Boundary

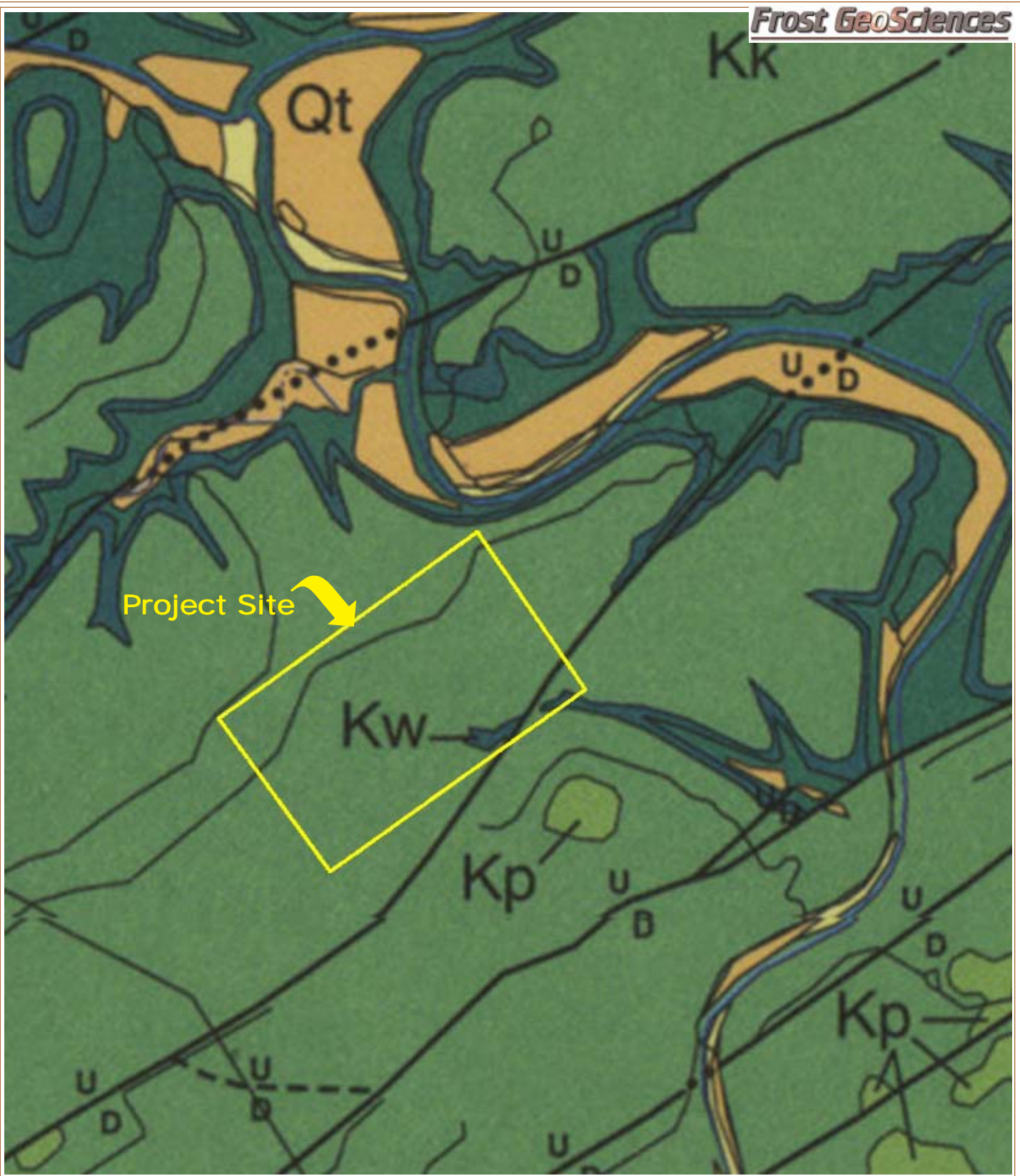
<p>UPPER CRETACEOUS</p> <p>EAGLE FORD GROUP (BUDA LIMESTONE, AND DEL RIO CLAY (UPPER CONFINING UNITS))</p> <p>GEORGETOWN FORMATION</p> <p>II CYCLIC AND MARINE MEMBERS, UNDIVIDED</p> <p>III LEACHED AND COLLAPSED MEMBERS, UNDIVIDED</p> <p>IV REGIONAL DENSE MEMBER</p> <p>CAVE</p> <p>SPRING</p>	<p>LOWER CRETACEOUS</p> <p>COMAL GROUP</p> <p>VI GRANDTONE MEMBER</p> <p>VII KRISO-BERG EVAPORITE MEMBER</p> <p>VIII DOLOMITIC MEMBER</p> <p>IX BASAL NODULAR MEMBER</p> <p>UPPER MEMBER OF THE GLASS MOUNTAIN LIMESTONE (LOWER CONFINING UNIT)</p> <p>LOWER CONFINING UNIT (unconformable and includes Glen Rose Limestone and sections of Kainer Formation on top of 18B)</p> <p>HYDROGEOLOGIC SUBREGIONS: VII Modified from Massey and Small (1978)</p> <p>PRIMARY FAULT (L) (after S. S. Woodruff)</p> <p>RIPPED FAULT</p> <p>ESTIMATED VERTICAL DISPLACEMENT AT FAULT, IN FEET</p>
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PROJECT NAME:
 Geologic Site Assessment (WPAP)
 for Regulated Activities / Development on the
 Edwards Aquifer Recharge / Transition Zone
 Comal County Park
 Comal County, Texas

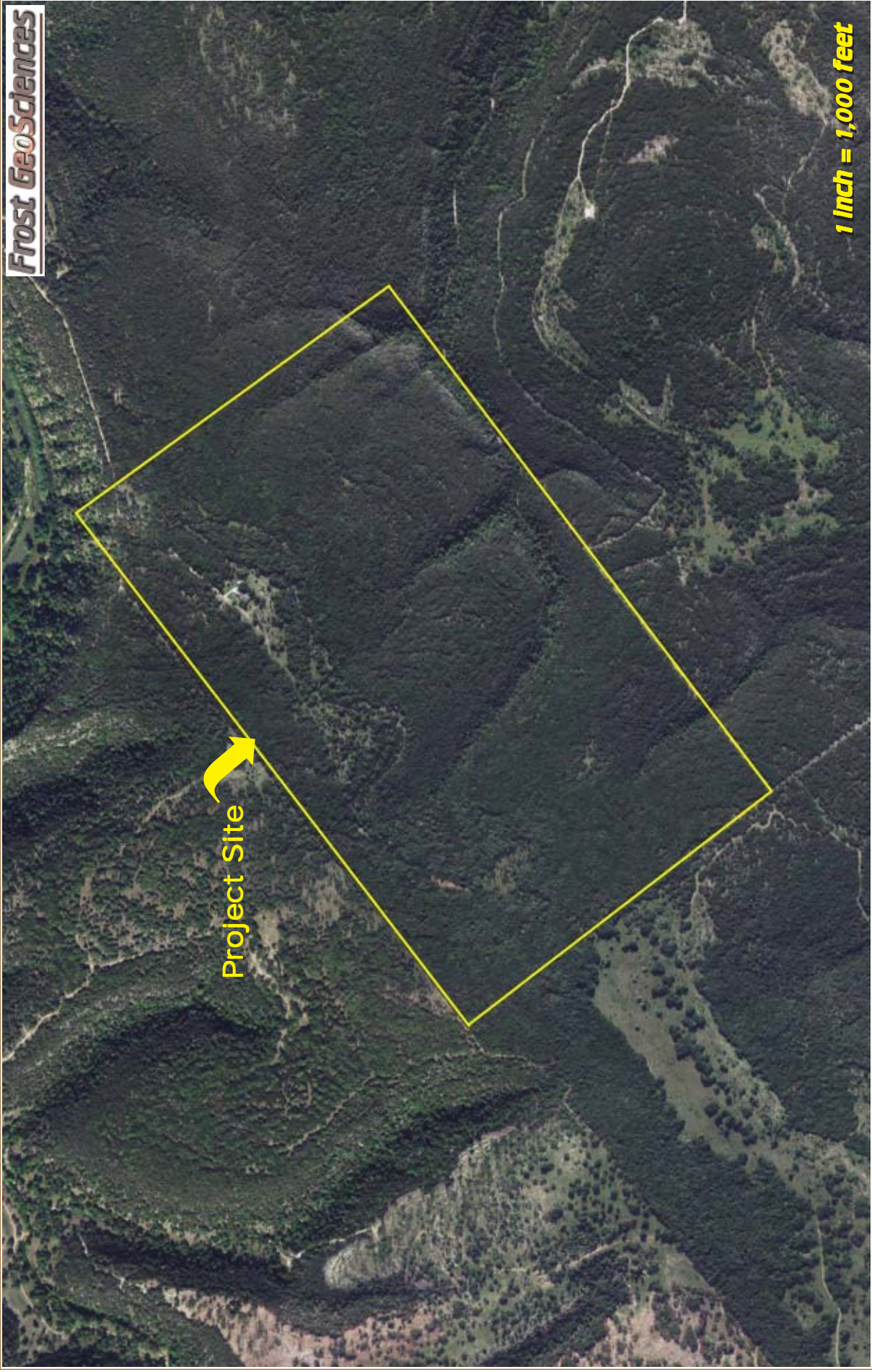
United States Geologic Survey
 Water Resources Investigations #4030-95
 Geologic Map of Bexar County, Texas

PROJECT NO.:
 FGS-E14155

DATE:
 August 21, 2014



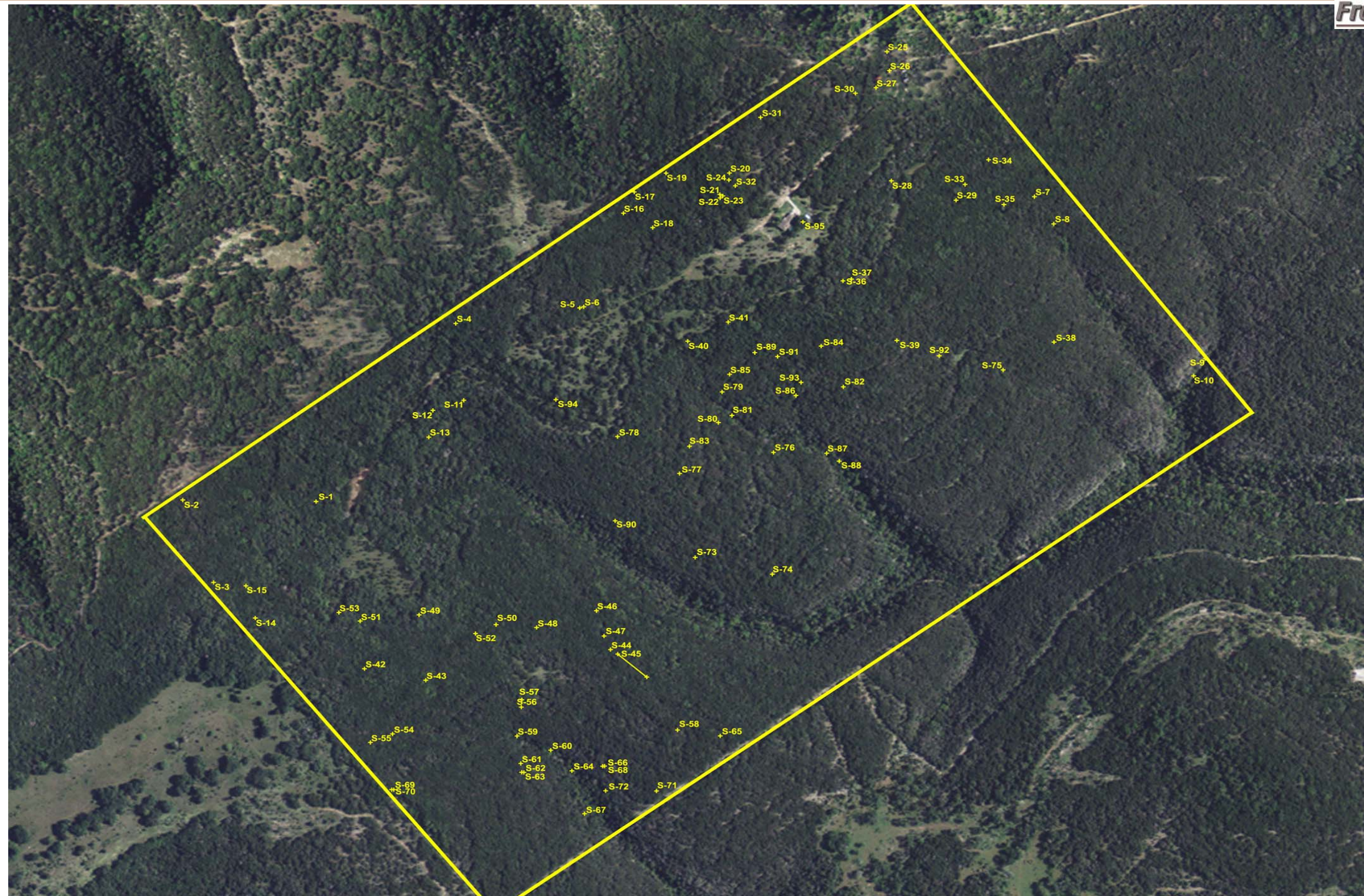
PROJECT NAME: Geologic Site Assessment (WPAP) for Regulated Activities / Development on the Edwards Aquifer Recharge / Transition Zone Comal County Park Comal County, Texas	Bureau of Economic Geology Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle (2000)	
	PROJECT NO.: FGS-E14155	DATE: May 25, 2014



PROJECT NAME:
Geologic Site Assessment (WPAP)
for Regulated Activities / Development on the
Edwards Aquifer Recharge / Transition Zone
Comal County Park
Comal County

2012 Aerial Photograph
National Agricultural Imagery Program

PROJECT NO.: FGS-E14155	DATE: August 21, 2014
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PROJECT NAME:
 Geologic Site Assessment (WPAP)
 for Regulated Activities / Development on the
 Edwards Aquifer Recharge / Transition Zone
 Comal County Park
 Comal County, Texas

2012 Aerial Photograph with Potential Recharge Features (PRFs)
 National Agricultural Imagery Program

PROJECT NO.:	FGS-E14155	DATE:	August 21, 2014
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APPENDIX B
SITE PHOTOGRAPHS



Photo #1 – View of PRF #S-1.



Photo #2 – View of a large pile of soil adjacent to PRF #S-1.



Photo #3 – View of the vegetative cover in the vicinity of PRF #S-1.



Photo #4 – View of the vegetative cover in the vicinity of PRF #S-1.



Photo #5 – View of PRF #S-2.



Photo #6 – View of the vegetative cover in the vicinity of PRF #S-2.



Photo #7 – View of PRF #S-3.



Photo #8 – Additional view of PRF #S-3.



Photo #9 – View of the vegetative cover in the vicinity of PRF #S-3.



Photo #10 – View of the vegetative cover in the vicinity of PRF #S-3.



Photo #11 – View of PRF #S-4.



Photo #12 – View of the vegetative cover in the vicinity of PRF #S-4.



Photo #13 – View of PRF #S-5.



Photo #14 – View of PRF #S-6.



Photo #15 – View of the vegetative cover in the vicinity of PRF #s S-5 and S-6.



Photo #16 – View of the vegetative cover in the vicinity of PRF #s S-5 and S-6.



Photo #17 – View of PRF #S-7.



Photo #18 – Additional view of PRF #S-7.



Photo #19 – View of the vegetative cover in the vicinity of PRF #S-7.



Photo #20 – View of the vegetative cover in the vicinity of PRF #S-7.



Photo #21 – View of PRF #S-8.



Photo #22 – View upstream of PRF #8.



Photo #23 – View downstream of PRF #8



Photo #24 – View of PRF #S-9.



Photo #25 – View downstream of PRF #9.



Photo #26 – View upstream of PRF #9.



Photo #27 – View of PRF #S-10.



Photo #28 – Additional view of PRF #S-10.



Photo #29 – View of PRF #S-11.



Photo #30 – Additional view of PRF #S-11.



Photo #31 – View of the vegetative cover in the vicinity of PRF #S-11.



Photo #32 – View of the vegetative cover in the vicinity of PRF #S-11.



Photo #33 – View of PRF #S-12.



Photo #34 – View of a large pile of soil adjacent to PRF #S-12.



Photo #35 – View of the vegetative cover in the vicinity of PRF #S-12.



Photo #36 – View of the vegetative cover in the vicinity of PRF #S-12.



Photo #37 – View of PRF #S-13.



Photo #38 – View of the vegetative cover in the vicinity of PRF #S-13.



Photo #39 – View of PRF #S-14.



Photo #40 – View of the vegetative cover in the vicinity of PRF #S-14.



Photo #41 – View of PRF #S-15.



Photo #42 – View of the vegetative cover in the vicinity of PRF #S-15.



Photo #43 – View of PRF #S-16.



Photo #44 – View of the vegetative cover in the vicinity of PRF #S-16.



Photo #45 – View of PRF #S-17.



Photo #46 – View of the vegetative cover in the vicinity of PRF #S-17.



Photo #47 – View of PRF #S-18.



Photo #48 – View of the vegetative cover in the vicinity of PRF #S-18.



Photo #49 – View of PRF #S-19.



Photo #50 – View of the vegetative cover in the vicinity of PRF #S-19.



Photo #51 – View of PRF #S-20.



Photo #52 – View of the second opening associated with PRF #S-20.



Photo #53 – View of the vegetative cover in the vicinity of PRF #S-20.



Photo #54 – View of the vegetative cover in the vicinity of PRF #S-20.



Photo #55 – View of PRF #S-21.



Photo #56 – Additional view of the opening into PRF #S-21.



Photo #57 – View of PRF #S-22.



Photo #58 – View of PRF #S-23.



Photo #59 – View of the vegetative cover in the vicinity of PRF #s S-21, S-22 and S-23.



Photo #60 – View of the vegetative cover in the vicinity of PRF #s S-21, S-22 and S-23.



Photo #61 – View of PRF #S-24.



Photo #62 – View of the vegetative cover in the vicinity of PRF #S-24.



Photo #63 – View of PRF S-25.



Photo #64 – View of the vegetative cover in the vicinity of PRF #S-25.



Photo #65 – View of the cliff-side approximately 15 to 20 feet north of PRF #S-25.



Photo #66 – View of PRF #S-26.



Photo #67 – View of the windmill associated with PRF #S-26 and an adjacent structure.



Photo #68 – View of PRF #S-27.



Photo #69 – View an apparently uninhabited residence in the vicinity of PRF #S-27.



Photo #70 – View to the east of the surrounding area near PRF #S-27.



Photo #71 – View of PRF #S-28.



Photo #72 – View of the vegetative cover in the vicinity of PRF #S-28.



Photo #69 – View of PRF #S-29.



Photo #70 – View upstream of PRF #S-29.



Photo #71 – View downstream of PRF #S-29.



Photo #72 – View of the vegetative cover in the vicinity of PRF #S-29.



Photo #73 – View of PRF #S-30.



Photo #74 – View of the windmill associated with PRF #S-30.



Photo #75 – View of PRF #S-31.



Photo #76 – View of the vegetative cover in the vicinity of PRF #S-31.



Photo #77 – View of PRF #S-32.



Photo #78 – View of the vegetative cover in the vicinity of PRF #S-32.



Photo #79 – View of PRF #S-33.



Photo #80 – View of the vegetative cover in the vicinity of PRF #S-33.



Photo #81 – View of PRF #S-34.



Photo #82 – View of the vegetative cover in the vicinity of PRF #S-34.



Photo #83 – View of PRF #S-35.



Photo #84 – View of the vegetative cover in the vicinity of PRF #S-35.



Photo #85 – View of PRF #S-36.



Photo #86 – Additional view of PRF #S-36.



Photo #87 – View of PRF #S-37.



Photo #88 – Additional view of PRF #S-37.



Photo #89 – Additional view of PRF #S-37.



Photo #90 – View of the vegetative cover in the vicinity of PRF #S-37.



Photo #91 – View of PRF #S-38.



Photo #92 – View of the vegetative cover in the vicinity of PRF #S-38.



Photo #93 – View of PRF # S-39.



Photo #94 – View of the vegetative cover in the vicinity of PRF #S-39.



Photo #95 – View of PRF # S-39.



Photo #96 – View of the vegetative cover in the vicinity of PRF #S-39.



Photo #97 – View of PRF #S-40.



Photo #98 – View of the vegetative cover in the vicinity of PRF #S-40.



Photo #99 – View of PRF # S-41.



Photo #100 – View of the vegetative cover in the vicinity of PRF #S-41.



Photo #101 – View of PRF # S-42.



Photo #102 – View of the vegetative cover in the vicinity of PRF #S-42.



Photo #103 – View of PRF # S-43.



Photo #104 – View of the vegetative cover in the vicinity of PRF # S-43.



Photo #105 – View of PRF # S-44.



Photo #106 – View of the vegetative cover in the vicinity of PRF #S-44.



Photo #107 – View of PRF # S-45.



Photo #108 – Additional view of PRF #S-45.



Photo #109 – View of PRF #S-46.



Photo #110 – View of the vegetative cover in the vicinity of PRF #S-46.



Photo #111 – View of PRF #S-47.



Photo #112 – View of the vegetative cover in the vicinity of PRF #S-47.



Photo #113 – View of PRF #S-48.



Photo #114 – View of the vegetative cover in the vicinity of PRF #S-48.



Photo #115 – View of PRF # S-49.



Photo #116 – View of the vegetative cover in the vicinity of PRF #S-49.



Photo #117 – View of PRF #S-50.



Photo #118 – View of the vegetative cover in the vicinity of PRF #S-50.



Photo #119 – View of PRF #S-51.



Photo #120 – View of the pile of soil removed from the excavation of PRF #S-51.



Photo #121 – View of PRF #S-52.



Photo #122 – View of the vegetative cover in the vicinity of PRF #S-52.



Photo #123 – View of PRF #S-53.



Photo #124 – Additional view of PRF #S-53.



Photo #125 – View of the vegetative cover in the vicinity of PRF #S-53.



Photo #126 – View of the vegetative cover in the vicinity of PRF #S-53.



Photo #127 – View of PRF #S-54.



Photo #128 – View of the vegetative cover in the vicinity of PRF #S-54.



Photo #129 – View of PRF #S-55.



Photo #130 – View of the vegetative cover in the vicinity of PRF #S-55.



Photo #131 – View of PRF #S-56.



Photo #132 – View of the vegetative cover in the vicinity of PRF #S-56.



Photo #133 – View of PRF #S-57.



Photo #134 – View of the vegetative cover in the vicinity of PRF #S-57.



Photo #135 – View of PRF #S-58.



Photo #136 – View of the vegetative cover in the vicinity of PRF #S-58.



Photo #137 – View of PRF #S-59.



Photo #138 – Additional view of PRF #S-59.



Photo #139 – View upstream of PRF #S-59.



Photo #140 – View downstream of PRF #S-59.



Photo #141 – View of PRF #S-60.



Photo #142 – Additional view of PRF #S-60.



Photo #143 – View upstream of PRF #S-60.



Photo #144 – View downstream of PRF #S-60.



Photo #145 – View of PRF #S-61.



Photo #146 – Additional view of PRF #S-61.



Photo #147 – View of the vegetative cover in the vicinity of PRF #S-61.



Photo #148 – View of the vegetative cover in the vicinity of PRF #S-61.



Photo #149 – View of PRF #S-62.



Photo #150 – View of the vegetative cover in the vicinity of PRF #s S-62 and S-63.



Photo #151 – View of PRF #S-63.



Photo #152 – View of the vegetative cover in the vicinity of PRF #s S-62 and S-63.



Photo #153 – View of PRF #S-64.



Photo #154 – View of the vegetative cover in the vicinity of PRF #S-64.



Photo #155 – View upstream of PRF #S-64.



Photo #156 – View upstream of PRF #S-64.



Photo #157 – View of PRF #S-65.



Photo #158 – Additional view of PRF #S-65.



Photo #159 – View of PRF #S-66.



Photo #160 – View of the vegetative cover in the vicinity of PRF #S-66.



Photo #161 – View of PRF #S-67.



Photo #162 – View of the vegetative cover in the vicinity of PRF #S-67.



Photo #163 – View of PRF #S-68.



Photo #164 – Additional view of PRF #S-68.



Photo #165 – View of PRF #S-69.



Photo #166 – Additional view of PRF #S-69.



Photo #167 – Additional view of PRF #S-69.



Photo #168 – View of the vegetative cover in the vicinity of PRF #S-69.



Photo #169 – View of PRF #S-70.



Photo #170 – Additional view of PRF #S-70



Photo #171 – View of PRF #S-71.



Photo #172 – View of the vegetative cover in the vicinity of PRF #S-71.



Photo #173 – View of PRF #S-72.



Photo #174 – View of the vegetative cover in the vicinity of PRF #S-72.



Photo #175 – View of PRF # S-73.



Photo #176 – Additional view of PRF # S-73.



Photo #177 – View of PRF #S-74.



Photo #178 – View of the vegetative cover in the vicinity of PRF #S-74.



Photo #179 – View of PRF #S-75.



Photo #180 – View of the vegetative cover in the vicinity of PRF #S-75.



Photo #181 – View of PRF #S-76.



Photo #182 – View of the vegetative cover in the vicinity of PRF #S-76.



Photo #183 – View of PRF #S-77.



Photo #184 – View of the vegetative cover in the vicinity of PRF #S-77.



Photo #185 – View of PRF #S-78.



Photo #186 – View of the vegetative cover in the vicinity of PRF #S-78.



Photo #187 – View of PRF #S-79.



Photo #188 – View of the vegetative cover in the vicinity of PRF #S-79.



Photo #189 – View of PRF #S-80.



Photo #190 – Additional view of PRF #S-80.



Photo #191 – View of the vegetative cover in the vicinity of PRF #S-80.



Photo #192 – View of the vegetative cover in the vicinity of PRF #S-80.



Photo #193 – View of PRF #S-81.



Photo #194 – View of the vegetative cover in the vicinity of PRF #S-81.



Photo #195 – View of PRF # S-82.



Photo #196 – View of the vegetative cover in the vicinity of PRF #S-82.



Photo #197 – View of PRF # S-83.



Photo #198 – View of a small solution cavity within the floor of PRF #S-83.



Photo #199 – View of the vegetative cover in the vicinity of PRF #S-83.



Photo #200 – View of the vegetative cover in the vicinity of PRF #S-83.



Photo #201 – View of PRF # S-84.



Photo #202 – View of the vegetative cover in the vicinity of PRF #S-84.



Photo #203 – View of PRF # S-85.



Photo #204 – View of the vegetative cover in the vicinity of PRF #S-85.



Photo #205 – View of PRF # S-86.



Photo #206 – View of the vegetative cover in the vicinity of PRF #S-86.



Photo #207 – View of PRF # S-87.



Photo #208 – Additional view of S-87.



Photo #209 – View upstream of PRF #S-87.



Photo #210 – View downstream of PRF #S-87.



Photo #211 – View of PRF # S-88.



Photo #212 – Additional view of S-88.



Photo #213 – View of the immediate vicinity of PRF #S-88, including the typical vegetative cover.



Photo #214 – View of the immediate vicinity of PRF #S-88, including the typical vegetative cover and stream channel.



Photo #215 – View of PRF # S-89.



Photo #216 – View of the vegetative cover in the vicinity of PRF #S-89



Photo #217 – View of PRF # S-90.



Photo #218 – Additional view of PRF #S-90.



Photo #219 – View of the vegetative cover in the vicinity of PRF #S-90.



Photo #220 – View of the vegetative cover in the vicinity of PRF #S-90.



Photo #221 – View of PRF # S-91.



Photo #222 – View of the vegetative cover in the vicinity of PRF #S-91.



Photo #223 – View of PRF # S-92.



Photo #224 – View of the vegetative cover in the vicinity of PRF #S-92.



Photo #225 – View of PRF # S-93.



Photo #226 – Additional view of PRF #S-93.



Photo #227 – View of the vegetative cover in the vicinity of PRF #S-93.



Photo #228 – View of the vegetative cover in the vicinity of PRF #S-93.



Photo #229 – View of PRF # S-94.



Photo #230 – View of the vegetative cover in the vicinity of PRF #S-94.

APPENDIX C

SITE GEOLOGIC MAP

Water Pollution Abatement Plan Application
 for Regulated Activities
 on the Edwards Aquifer Recharge Zone
 and Relating to 30 TAC §213.5(b), Effective June 1, 1999

REGULATED ENTITY NAME: Comal County

REGULATED ENTITY INFORMATION

1. The type of project is:
 Residential: # of Lots: _____
 Residential: # of Living Unit Equivalents: _____
 Commercial
 Industrial
 Other: Park
2. Total site acreage (size of property): 290.25
3. Projected population: 50
4. The amount and type of impervious cover expected after construction are shown below:

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	0	÷ 43,560 =	0
Parking	14,400	÷ 43,560 =	0.330
Other paved surfaces	0	÷ 43,560 =	0
Total Impervious Cover	14,400	÷ 43,560 =	0.330
Total Impervious Cover ÷ Total Acreage x 100 =			0.114%

5. **ATTACHMENT A - Factors Affecting Water Quality.** A description of any factors that could affect surface water and groundwater quality is provided at the end of this form.
6. Only inert materials as defined by 30 TAC §330.2 will be used as fill material.

FOR ROAD PROJECTS ONLY

Complete questions 7-12 if this application is exclusively for a road project.

7. Type of project:
 TXDOT road project.
 County road or roads built to county specifications.
 City thoroughfare or roads to be dedicated to a municipality.
 Street or road providing access to private driveways.
8. Type of pavement or road surface to be used:
 Concrete
 Asphaltic concrete pavement
 Other: _____

9. Length of Right of Way (R.O.W.): N/A feet.
 Width of R.O.W.: N/A feet.
 L x W = _____ Ft² ÷ 43,560 Ft²/Acre = N/A acres.
10. Length of pavement area: 320 feet.
 Width of pavement area: 45 feet.
 L x W = 14,400 Ft² ÷ 43,560 Ft²/Acre = 0.330 acres.
 Pavement area _____ acres ÷ R.O.W. area _____ acres x 100 = 0.114% impervious cover.
11. A rest stop will be included in this project.
X A rest stop will **not** be included in this project.
12. X Maintenance and repair of existing roadways that do not require approval from the TCEQ Executive Director. Modifications to existing roadways such as widening roads/adding shoulders totaling more than one-half (1/2) the width of one (1) existing lane require prior approval from the TCEQ.

STORMWATER TO BE GENERATED BY THE PROPOSED PROJECT

13. X **ATTACHMENT B - Volume and Character of Stormwater.** A description of the volume and character (quality) of the stormwater runoff which is expected to occur from the proposed project is provided at the end of this form. The estimates of stormwater runoff quality and quantity should be based on area and type of impervious cover. Include the runoff coefficient of the site for both pre-construction and post-construction conditions.

WASTEWATER TO BE GENERATED BY THE PROPOSED PROJECT

14. The character and volume of wastewater is shown below:
0% Domestic _____ gallons/day
0% Industrial _____ gallons/day
0% Commingled _____ gallons/day
 TOTAL _____ gallons/day
15. Wastewater will be disposed of by:
N/A **On-Site Sewage Facility (OSSF/Septic Tank):**
N/A **ATTACHMENT C - Suitability Letter from Authorized Agent.** An on-site sewage facility will be used to treat and dispose of the wastewater. The appropriate licensing authority's (authorized agent) written approval is provided at the end of this form. It states that the land is suitable for the use of an on-site sewage facility or identifies areas that are not suitable.
N/A Each lot in this project/development is at least one (1) acre (43,560 square feet) in size. The system will be designed by a licensed professional engineer or registered sanitarian and installed by a licensed installer in compliance with 30 TAC Chapter 285.
N/A Sewage Collection System (Sewer Lines):
N/A Private service laterals from the wastewater generating facilities will be connected to an existing SCS.
N/A Private service laterals from the wastewater generating facilities will be connected to a proposed SCS.
N/A The SCS was previously submitted on _____.

- N/A The SCS was submitted with this application.
- N/A The SCS will be submitted at a later date. The owner is aware that the SCS may not be installed prior to Executive Director approval.

The sewage collection system will convey the wastewater to the _____
 (name) Treatment Plant. The treatment facility is:
 existing.
 proposed.

- 16. N/A All private service laterals will be inspected as required in 30 TAC §213.5.

SITE PLAN REQUIREMENTS

Items 17 through 27 must be included on the Site Plan.

- 17. The Site Plan must have a minimum scale of 1" = 400'.
 Site Plan Scale: 1" = 30'.
- 18. 100-year floodplain boundaries
 Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
 No part of the project site is located within the 100-year floodplain.

The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s):

Flood Insurance Rate Map Number 48091C0270F (September 2, 2009)

- 19. The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Show lots, recreation centers, buildings, roads, etc.
 The layout of the development is shown with existing contours. Finished topographic contours will not differ from the existing topographic configuration and are not shown.
- 20. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):
 There are 1 (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply)
 The wells are not in use and have been properly abandoned.
 The wells are not in use and will be properly abandoned.
 The wells are in use and comply with 16 TAC §76.
 There are no wells or test holes of any kind known to exist on the project site.

- 21. Geologic or manmade features which are on the site:
 All **sensitive** geologic or manmade features identified in the Geologic Assessment are shown and labeled.
 No **sensitive** geologic or manmade features were identified in the Geologic Assessment.
 ATTACHMENT D - Exception to the Required Geologic Assessment. An exception to the Geologic Assessment requirement is requested and explained at the end of this form.

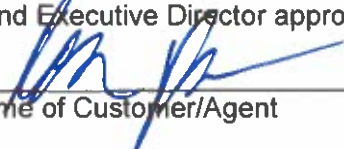
- 22. The drainage patterns and approximate slopes anticipated after major grading activities.

- 23. X Areas of soil disturbance and areas which will not be disturbed.
- 24. X Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.
- 25. X Locations where soil stabilization practices are expected to occur.
- 26. N/A Surface waters (including wetlands).
- 27. Locations where stormwater discharges to surface water or sensitive features.
X There will be no discharges to surface water or sensitive features.

ADMINISTRATIVE INFORMATION

- 28. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.
- 29. Any modification of this WPAP will require Executive Director approval, prior to construction, and may require submission of a revised application, with appropriate fees.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **WATER POLLUTION ABATEMENT PLAN APPLICATION FORM** is hereby submitted for TCEQ review and Executive Director approval. The form was prepared by:



 Print Name of Customer/Agent

Robert Boyd, P.E.

 Signature of Customer/Agent

5/25/23

 Date

Attachment A - Factors Affecting Water Quality

Factors that could affect surface water and groundwater quality are oils and fuels that may leak from vehicles on the site.

Attachment B - Volume and Character of Stormwater

The site lies within the watershed of the Guadalupe River and the entire tract is uniformly sloped in a general northwesterly direction.

The following stormwater runoff estimates were calculated using the Rational Method and standard engineering practices for time of concentration and runoff coefficient values. Flowrates are based on a 10-year rainfall event.

$$Q=CIA \quad I=b/(T_c +d)^e \quad T_c = \text{Length/Velocity (Min } T_c = 10 \text{ Minutes)}$$

Where:

Q=Flow (cfs)

C=Runoff Coefficients (ASCE 1960)

I=Rainfall Intensity

A=Drainage Area

T_c=Time of Concentration

b, d and e = County Constants (TxDOT)

Comal County 10-year → b=78, d = 8.6, e=0.775

Pre-Construction Flow-Total Onsite Flow Leaving Boundary

Area = 0.67 Acres Homestead (C=0.40)

289.58 Acres Steep Grassed Slopes (C=0.70)

Weighted C = 0.699

Time of Concentration = 20.91 Minutes

I₁₀ = 5.66 In/Hour

$$Q_{10} = CIA = (0.699)(5.66)(290.25) = 1148.33 \text{ CFS}$$

Post-Construction Flow-Total Onsite Flow Leaving Boundary

Area = 0.30 Acres Parking Lot (C=0.90)

289.95 Acres Steep Grassed Slopes (C=0.70)

Weighted C = 0.700

Time of Concentration = 20.91 Minutes

I₁₀ = 5.66 In/Hour

$$Q_{10} = CIA = (0.700)(5.66)(290.25) = 1149.97 \text{ CFS}$$

There is essentially no since there is so little impervious cover being developed in relation to the vast amount of untouched land.

The character of the stormwater is sheet flow and into natural concentrated flow leaving the site onto adjacent properties.

Attachment C – Suitability Letter

Not Applicable

Attachment D – Exception to Required Geologic Assessment

Not Applicable

Temporary Stormwater Section
for Regulated Activities
on the Edwards Aquifer Recharge Zone
and Relating to 30 TAC §213.5(b)(4)(A), (B), (D)(I) and (G); Effective June 1, 1999

REGULATED ENTITY NAME: Comal County

POTENTIAL SOURCES OF CONTAMINATION

Examples: Fuel storage and use, chemical storage and use, use of asphaltic products, construction vehicles tracking onto public roads, and existing solid waste.

1. Fuels for construction equipment and hazardous substances which will be used during construction:
 - Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year.
 - Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
 - Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An **Aboveground Storage Tank Facility Plan** application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
 - Fuels and hazardous substances will not be stored on-site.
2. **ATTACHMENT A - Spill Response Actions.** A description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is provided at the end of this form.
3. Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
4. **ATTACHMENT B - Potential Sources of Contamination.** Describe in an attachment at the end of this form any other activities or processes which may be a potential source of contamination.
 - There are no other potential sources of contamination.

SEQUENCE OF CONSTRUCTION

5. **ATTACHMENT C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is provided at the end of this form. For each activity described, an estimate of the total area of the site to be disturbed by each activity is given.
6. Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: Guadalupe River

TEMPORARY BEST MANAGEMENT PRACTICES (TBMPs)

Erosion control examples: tree protection, interceptor swales, level spreaders, outlet stabilization, blankets or matting, mulch, and sod. Sediment control examples: stabilized construction exit, silt fence, filter dikes, rock berms, buffer strips, sediment traps, and sediment basins. Please refer to the Technical Guidance Manual for guidelines and specifications. **All structural BMPs must be shown**

on the site plan.

7. **ATTACHMENT D - Temporary Best Management Practices and Measures.** A description of the TBMPs and measures that will be used during and after construction are provided at the end of this form. For each activity listed in the sequence of construction, include appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented.

TBMPs and measures will prevent pollution of surface water, groundwater, and stormwater. The construction-phase BMPs for erosion and sediment controls have been designed to retain sediment on site to the extent practicable. The following information has been provided in the attachment at the end of this form

a. A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.

b. A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.

c. A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.

d. A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.

8. The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.

ATTACHMENT E - Request to Temporarily Seal a Feature. A request to temporarily seal a feature is provided at the end of this form. The request includes justification as to why no reasonable and practicable alternative exists for each feature.

There will be no temporary sealing of naturally-occurring sensitive features on the site.

9. **ATTACHMENT F - Structural Practices.** Describe the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site. Placement of structural practices in floodplains has been avoided.

10. **ATTACHMENT G - Drainage Area Map.** A drainage area map is provided at the end of this form to support the following requirements.

For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.

For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.

For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.

X There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

11. N/A **ATTACHMENT H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure has been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are provided as at the end of this form.
12. X **ATTACHMENT I - Inspection and Maintenance for BMPs.** A plan for the inspection of temporary BMPs and measures and for their timely maintenance, repairs, and, if necessary, retrofit is provided at the end of this form. A description of documentation procedures and recordkeeping practices is included in the plan.
13. X All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.
14. X If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).
15. X Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.
16. X Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

SOIL STABILIZATION PRACTICES

Examples: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, or preservation of mature vegetation.


17. X **ATTACHMENT J - Schedule of Interim and Permanent Soil Stabilization Practices.** A schedule of the interim and permanent soil stabilization practices for the site is attached at the end of this form.
18. X Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.
19. X Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

ADMINISTRATIVE INFORMATION

- 20. X All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.
- 21. X If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.
- 22. X Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **TEMPORARY STORMWATER SECTION** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Sherman Krause
Print Name of Customer/Agent


Signature of Customer/Agent

MAY 25, 2023
Date

Attachment A - Spill Response Actions

In addition to good housekeeping and material management practices, the following practices will be followed for spill prevention and cleanup:

- Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash container specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept isolated by perimeter berm, contained by absorbent material applied, and well ventilated. Personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Contaminated soil will be removed and properly disposed of at a designated hazardous materials receiver.
- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of size.
- The spill prevention will be adjusted to include measures to prevent this type of spill of reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
- Comal County will be the spill prevention and cleanup coordinator. It will designate other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup.

Attachment B - Potential Sources of Contamination

The proposed project will have some activities and construction generated pollution that might be a source of contamination. Soil disturbing activities will include clearing and grubbing; installing a stabilized construction exit, installation of silt fence, grading of site for pavement and slab, and preparation for final re-vegetation. The materials, substances and activities that are expected to be present onsite are listed below:

- Concrete/Concrete Wash Water
- Tar
- Petroleum Based Products
- Cleaning Solvents
- Movement of Equipment On and Off Site
- Soil Disturbance

Attachment C - Sequence of Major Activities

The proposed project will consist of construction of a 230' x 45' parking lot and a 94' x 45' parking lot.

The sequence of construction activities should be as follows:

- Installation of temporary BMPs – Silt Fence
- Removal of existing structures
- Removal of trees in area of parking lot
- Grubbing area and removing debris
- Building base pad for parking lot
- Installing asphalt for parking lot
- Final Finishing, stabilizing site
- Installation of permanent BMPs (vegetative filter strips)

Attachment D -Temporary BMPs and Measures

The proposed project will consist of construction of a 230' x 45' parking lot and a 94' x 45' parking lot.

The main erosion and sediment control practices should be as follows:

- Installation of silt fence as shown on the plans will be implemented prior to any construction. The perimeter silt fence will trap sediment and retain it onsite and allow the water to continue down gradient with less suspended soil.
- Stockpiled spoils and excavated material from excavation phase not immediately hauled offsite will have a perimeter sediment fence installed to trap sediment during rain events.

The installation of the silt fence will be sufficient to treat the 0.30 acres of potential soil and prevent pollutants from entering any down gradient sensitive feature or the aquifer. The silt fence will remain until the site has been permanently stabilized.

Attachment E – Request to Seal a Feature

Not Applicable

Attachment F - Temporary Structural Practices

At the beginning of construction, a 4" to 8" open graded aggregate construction exit will be installed at the point of access suitable for the site. The construction exit will limit tracking of sediment onto roadway and reduce movement of sediment within the county right-of-way. Silt fence will be installed adjacent to the construction site to prevent disturbed earth from leaving the site and will remain in place until permanent BMPs have been built and stabilized.

Attachment G – Drainage Area Map



Attachment H – Temporary Sediment Pond Plans and Calculations

Not Applicable

Attachment I - Inspection and Maintenance of BMPs

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- The construction exit should be maintained in a condition which will prevent tracking/flowing of sediment onto public rights of way. Additional stone may be required to keep exist functioning properly.
- Built up sediment will be removed from the sediment fence when it has reached one-third the height of the fence.
- Sediment fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.

Attachment J - Schedule of Interim and Permanent Soil Stabilization

- Sustain a manageable area of construction activities by limiting the area of erodible soil exposed during the excavation of for parking area.
- Stabilize area where grading is complete or work has ceased for 21 days within 14 days after the stoppage.
- Maintain the maximum amount of existing vegetation as practical to assist in the control and minimize the exposed erodible area.
- After major construction portions are complete and concrete and parking rock pavement is in place, the perimeter of the parking area will be re-established with ground cover and or sodded.
- Areas disturbed by equipment for the construction of the project area will be seeding or sodding.
- Areas designated for landscaping will be landscaped and areas of right of way disturbed by construction will be re-established with grass by seeding and/or sodding.
- After all areas of disturbed soil have been stabilized, the temporary BMPs will be removed and those areas be stabilized with sod and/or mulching/seeding combination.

Permanent Stormwater Section

Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(C), (D)(ii), (E), and (5), Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Permanent Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Print Name of Customer/Agent: Sherman Krause

Date: MAY 25, 2023

Signature of Customer/Agent



Regulated Entity Name: Comal County

Permanent Best Management Practices (BMPs)

Permanent best management practices and measures that will be used during and after construction is completed.

- Permanent BMPs and measures must be implemented to control the discharge of pollution from regulated activities after the completion of construction.
 N/A
- These practices and measures have been designed, and will be constructed, operated, and maintained to insure that 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site caused by the regulated activity is removed. These quantities have been calculated in accordance with technical guidance prepared or accepted by the executive director.
 The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.

A technical guidance other than the TCEQ TGM was used to design permanent BMPs and measures for this site. The complete citation for the technical guidance that was used is: _____

N/A

3. Owners must insure that permanent BMPs and measures are constructed and function as designed. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the appropriate regional office within 30 days of site completion.

N/A

4. Where a site is used for low density single-family residential development and has 20 % or less impervious cover, other permanent BMPs are not required. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.

The site will be used for low density single-family residential development and has 20% or less impervious cover.

The site will be used for low density single-family residential development but has more than 20% impervious cover.

The site will not be used for low density single-family residential development.

5. The executive director may waive the requirement for other permanent BMPs for multi-family residential developments, schools, or small business sites where 20% or less impervious cover is used at the site. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.

Attachment A - 20% or Less Impervious Cover Waiver. The site will be used for multi-family residential developments, schools, or small business sites and has 20% or less impervious cover. A request to waive the requirements for other permanent BMPs and measures is attached.

The site will be used for multi-family residential developments, schools, or small business sites but has more than 20% impervious cover.

The site will not be used for multi-family residential developments, schools, or small business sites.

6. **Attachment B - BMPs for Upgradient Stormwater.**

- A description of the BMPs and measures that will be used to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site is attached.
 - No surface water, groundwater or stormwater originates upgradient from the site and flows across the site, and an explanation is attached.
 - Permanent BMPs or measures are not required to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site, and an explanation is attached.
7. **Attachment C - BMPs for On-site Stormwater.**
- A description of the BMPs and measures that will be used to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site is attached.
 - Permanent BMPs or measures are not required to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff, and an explanation is attached.
8. **Attachment D - BMPs for Surface Streams.** A description of the BMPs and measures that prevent pollutants from entering surface streams, sensitive features, or the aquifer is attached. Each feature identified in the Geologic Assessment as sensitive has been addressed.
- N/A
9. The applicant understands that to the extent practicable, BMPs and measures must maintain flow to naturally occurring sensitive features identified in either the geologic assessment, executive director review, or during excavation, blasting, or construction.
- The permanent sealing of or diversion of flow from a naturally-occurring sensitive feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed.
 - Attachment E - Request to Seal Features.** A request to seal a naturally-occurring sensitive feature, that includes, for each feature, a justification as to why no reasonable and practicable alternative exists, is attached.
10. **Attachment F - Construction Plans.** All construction plans and design calculations for the proposed permanent BMP(s) and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer, and are signed, sealed, and dated. The plans are attached and, if applicable include:
- Design calculations (TSS removal calculations)
 - TCEQ construction notes
 - All geologic features
 - All proposed structural BMP(s) plans and specifications
- N/A

11. **Attachment G - Inspection, Maintenance, Repair and Retrofit Plan.** A plan for the inspection, maintenance, repairs, and, if necessary, retrofit of the permanent BMPs and measures is attached. The plan includes all of the following:
- Prepared and certified by the engineer designing the permanent BMPs and measures
 - Signed by the owner or responsible party
 - Procedures for documenting inspections, maintenance, repairs, and, if necessary retrofit
 - A discussion of record keeping procedures
- N/A
12. **Attachment H - Pilot-Scale Field Testing Plan.** Pilot studies for BMPs that are not recognized by the Executive Director require prior approval from the TCEQ. A plan for pilot-scale field testing is attached.
- N/A
13. **Attachment I -Measures for Minimizing Surface Stream Contamination.** A description of the measures that will be used to avoid or minimize surface stream contamination and changes in the way in which water enters a stream as a result of the construction and development is attached. The measures address increased stream flashing, the creation of stronger flows and in-stream velocities, and other in-stream effects caused by the regulated activity, which increase erosion that results in water quality degradation.
- N/A

Responsibility for Maintenance of Permanent BMP(s)

Responsibility for maintenance of best management practices and measures after construction is complete.

14. The applicant is responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. Such entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred.
- N/A
15. A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days of the transfer if the site is for use as a multiple single-family residential development, a multi-family residential development, or a non-residential development such as commercial, industrial, institutional, schools, and other sites where regulated activities occur.
- N/A

Attachment A – 20% or Less Impervious Cover Waiver

Not Applicable

Attachment B – BMPs for Upgradient Stormwater

Permanent BMPs or measures are not required to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site because the upgradient stormwater is directed across natural vegetation prior to entering the project site.

Attachment C – BMPs for On-Site Stormwater

Proposed on-site BMPs include engineered filter strips adjacent to the parking areas designed in accordance with TCEQ's Technical Guidance Manual (TGM) RG-348. The parking areas that feed into the engineered filter strips will be 45' wide, well below the maximum of 72', and the engineered filter strips will be a minimum of 15' in the direction of flow.

Attachment D -BMPs for Surface Streams

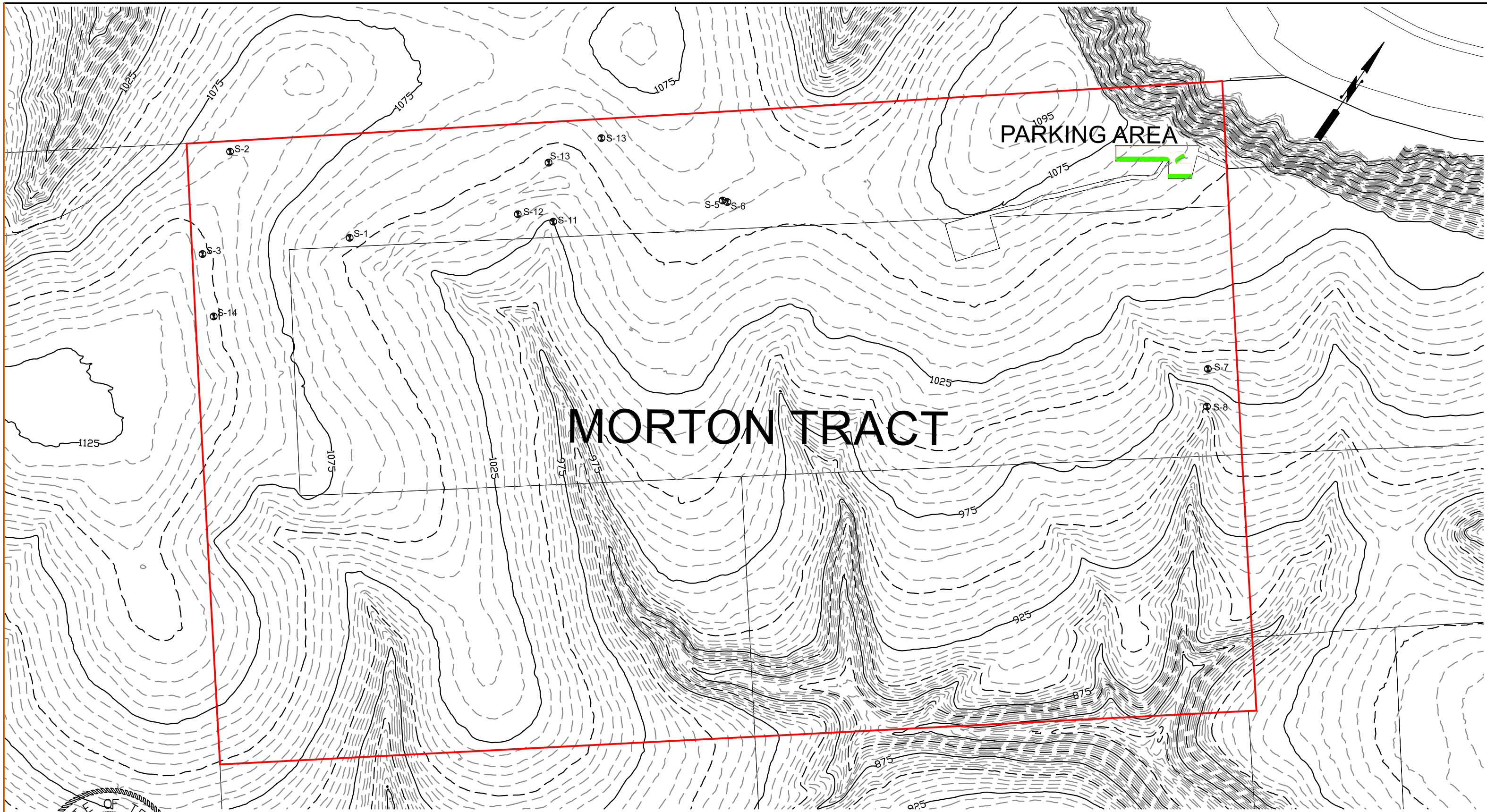
Not Applicable

Attachment E – Request to Seal Feature

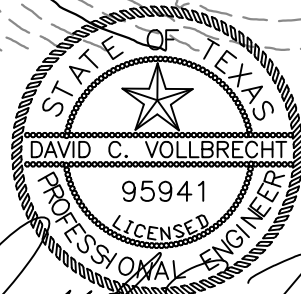
Not Applicable

Attachment F – Construction Plans

BMPs and TSS Removal Calculations shown on the attached site plan.



MORTON TRACT



- LEGEND:**
- 560.0- - EXISTING CONTOURS
 - MORTON TRACT BOUNDARY
 - ASPHALT PAVING LIMITS
 - S-14 SENSITIVE FEATURE

David C. Vollbrecht

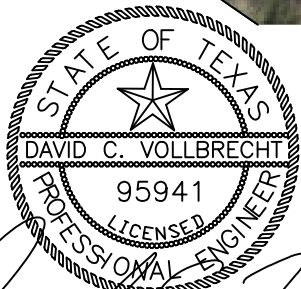
COMAL COUNTY
 ROAD DEPARTMENT
 195 DAVID JONAS DRIVE
 NEW BRAUNFELS, TX 78132
 PHONE: (830) 608-2090
 FAX: (830) 608-2009

MORTON TRACT
 PARKING PROJECT
 OVERALL SITE PLAN

DATE: 5-2-2023
 DRAWN BY: DCV
 CHECKED BY: RB

REVISIONS	
NO.	DATE:

SCALE: 1" = 400'
 FINAL
 SHEET 1 OF 1



David C. Vollbrecht

- LEGEND:**
- 560.0' EXISTING CONTOURS
 - FINISHED DRAINAGE PATH
 - ASPHALT PAVING LIMITS
 - VEGETATIVE FILTER STRIP
 - SEDIMENT CONTROL FENCE

COMAL COUNTY
 ROAD DEPARTMENT
 195 DAVID JONAS DRIVE
 NEW BRAUNFELS, TX 78132
 PHONE: (830) 608-2090
 FAX: (830) 608-2009

MORTON TRACT
 PARKING PROJECT
 SITE PLAN

DATE: 5-2-2023
 DRAWN BY: DCV
 CHECKED BY: RB

REVISIONS	
NO.	DATE:

SCALE: 1" = 30'
 FINAL
 SHEET 1 OF 1

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: **Morton Tract**
 Date Prepared: **5/4/2023**

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
 Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348
 Characters shown in red are data entry fields.
 Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_w = 27.2(A_w \times P)$

where L_w TOTAL PROJECT = Required TSS removal resulting from the proposed development = 80% of increased load
 A_w = Net increase in impervious area for the project
 P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County = **Comal**
 Total project area included in plan = **290.25** acres
 Predevelopment impervious area within the limits of the plan = **0.67** acres
 Total post-development impervious area within the limits of the plan = **0.30** acres
 Total post-development impervious cover fraction = **0.00**
 P = **33** inches

L_w TOTAL PROJECT = -332 lbs.

* The values entered in these fields should be for the total project area.

Number of drainage basins / outfalls areas leaving the plan area = **3**

2. Drainage Basin Parameters (This information should be provided for each basin):

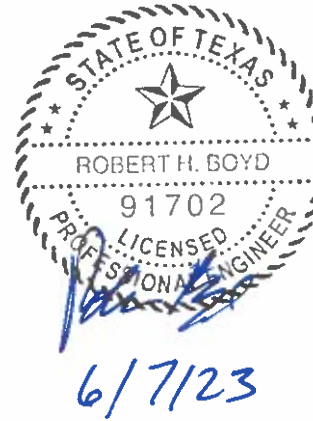
Drainage Basin/Outfall Area No. = **1**
 Total drainage basin/outfall area = **46.89** acres
 Predevelopment impervious area within drainage basin/outfall area = **0.67** acres
 Post-development impervious area within drainage basin/outfall area = **0.30** acres
 Post-development impervious fraction within drainage basin/outfall area = **0.01**
 L_w THIS BASIN = -332 lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
 Removal efficiency = **85** percent

- Aqualogic Cartridge Filter
- Bioretention
- Contech StormFilter
- Constructed Wetland
- Extended Detention
- Grassy Swale
- Retention / Irrigation
- Sand Filter
- Stormceptor
- Vegetated Filter Strips
- Vortechs
- Wet Basin
- Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.



RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
 A_I = Impervious area proposed in the BMP catchment area
 A_P = Pervious area remaining in the BMP catchment area
 L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **46.89** acres
 A_I = **0.30** acres
 A_P = **46.59** acres
 L_R = **997** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M \text{ THIS BASIN}}$ = **997** lbs.

F = **1.00**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area.

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = **4.00** inches
Post Development Runoff Coefficient = **0.03**
On-site Water Quality Volume = **18920** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP = **0.00** acres
Off-site Impervious cover draining to BMP = **0.00** acres
Impervious fraction of off-site area = **0**
Off-site Runoff Coefficient = **0.00**
Off-site Water Quality Volume = **0** cubic feet

Storage for Sediment = **3784**

Total Capture Volume (required water quality volume(s) x 1.20) = 22704 cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System

Designed as Required in RG-348

Pages 3-42 to 3-46

Required Water Quality Volume for retention basin = **NA** cubic feet

Irrigation Area Calculations:

Soil infiltration/permeability rate = **0.1** in/hr **Enter determined permeability rate or assumed value of 0.1**
Irrigation area = **NA** square feet
NA acres

8. Extended Detention Basin System

Designed as Required in RG-348

Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = **NA** cubic feet

9. Filter area for Sand Filters

Designed as Required in RG-348

Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin = **NA** cubic feet

Minimum filter basin area = **NA** square feet

Maximum sedimentation basin area = **NA** square feet **For minimum water depth of 2 feet**
 Minimum sedimentation basin area = **NA** square feet **For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins = **NA** cubic feet
 Minimum filter basin area = **NA** square feet
 Maximum sedimentation basin area = **NA** square feet **For minimum water depth of 2 feet**
 Minimum sedimentation basin area = **NA** square feet **For maximum water depth of 8 feet**

10. Bioretention System

Designed as Required in RG-348 Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins

Designed as Required in RG-348 Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
 Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands

Designed as Required in RG-348 Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System

Designed as Required in RG-348 Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
 Filter canisters (FCs) to treat WQV = **NA** cartridges
 Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales

Designed as Required in RG-348 Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = **8.00** acres
 Impervious Cover in Drainage Area = **4.00** acres
 Rainfall intensity = i = **1.1** in/hr
 Swale Slope = **0.01** ft/ft
 Side Slope (z) = **3**
 Design Water Depth = y = **0.33** ft
 Weighted Runoff Coefficient = C = **0.54**

A_{CS} = cross-sectional area of flow in Swale = **13.17** sf
 P_W = Wetted Perimeter = **40.62** feet
 R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = **0.32** feet
 n = Manning's roughness coefficient = **0.2**

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49 A_{CS} R_H^{2/3} S^{0.5}}{n}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy = 38.51 \text{ feet}$

$Q = CiA = 4.71 \text{ cfs}$

To calculate the flow velocity in the swale:

$V \text{ (Velocity of Flow in the swale)} = Q/A_{CS} = 0.36 \text{ ft/sec}$

To calculate the resulting swale length:

$L = \text{Minimum Swale Length} = V \text{ (ft/sec)} \times 300 \text{ (sec)} = 107.24 \text{ feet}$

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

$\text{Design } Q = CiA = 4.71 \text{ cfs}$

Manning's Equation $Q = 0.76 \text{ cfs}$
Swale Width = 6.00 ft

Error 1 = 3.95

Instructions are provided to the right (green comments).

Flow Velocity = 0.36 ft/s
Minimum Length = 107.24 ft

Instructions are provided to the right (blue comments).

Design Width = 6 ft
Design Discharge = 0.76 cfs
Design Depth = 0.33 ft
Flow Velocity = 0.32 cfs
Minimum Length = 97.48 ft

Error 2 = 3.95

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun. If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

16. Vegetated Filter Strips

Designed as Required in RG-348

Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.

The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

17. Wet Vaults

Designed as Required in RG-348

Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 = NA lbs

First calculate the load removal at 1.1 in/hour

To solve for bottom width of the trapezoidal swale (b) using the Excel solver: Excel can simultaneously solve the "Design Q" (C217) vs "Manning's Q" (C219) by varying the "Swale Width" (C220). The required "Swale Width" occurs when the "Design Q" = "Manning's Q"

First, highlight Cell F219 (Error 1 value). The equation showing in the fx screen for Cell F219 should be "=\$C\$217-\$C\$219". Then click on "Tools" and "Solver". The "Solver Parameters" screen pops up. The value in the "Set Target cell" should be \$F\$219 "Error 1 =". The value in the "By Changing Cells" should be \$C\$220 "Swale Width". Click on solve.

The resulting "Swale Width" must be less than 10 feet to meet the requirements of the TGM. If the resulting "Swale Width" exceeds 10 feet then the design parameters must be revised and the solver run again.

If there is not the option for "Solver" under "Tools" Click on "Tools" and "Add Ins" and then check "Solver Add-in" Then proceed as instructed above.

If you would like to increase the bottom width of the trapezoidal swale (b): Excel can simultaneously solve the "Design Q" (C217) vs "Design Discharge" (C232) by varying the "Design Depth" (C233). The required "Design Depth" for a 10-foot bottom width occurs when the "Design Q" (C217) = the "Design Discharge" (C232).

First set the desired bottom width in Cell C231. Highlight Cell F232. The equation showing in the fx screen for Cell F232 should be "=\$C\$217-\$C\$232"

Click on "Tools" and "Solver". The "Solver Parameters" screen pops up. The value in the "Set Target cell" should be \$F\$232 "Error 2". The value in the "By Changing Cells" should be \$C\$233 "Design Depth". Click on solve.

The resulting "Design Depth" must be equal to or less than 0.33 feet to meet the requirements of the TGM. If the resulting "Design Depth" exceeds 0.33 feet then the design parameters must be revised and the solver run again. First set the desired bottom width in Cell C231.

Highlight Cell F232. The equation showing in the fx screen for Cell F232 should be "=\$C\$217-\$C\$232". Click on "Tools" and "Solver". The "Solver Parameters" screen pops up. The value in the "Set Target cell" should be \$F\$232 "Error 2". The value in the "By Changing Cells" should be \$C\$233 "Design Depth". Click on solve.

The resulting "Design Depth" must be equal to or less than 0.33 feet to meet the requirements of the TGM. If the resulting "Design Depth" exceeds 0.33 feet then the design parameters must be revised and the solver run again.

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area = 0.03 **C = Runoff Coefficient = 0.546 (IC)² + 0.328 (IC) + 0.03**
 i = design rainfall intensity = 1.1 in/hour
 A = drainage area in acres = 1 acres

Q = flow rate in cubic feet per second = 0.04 cubic feet/sec

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above = 0.04 cubic feet/sec
 A = Water surface area in the wet vault = 150 square feet

V_{OR} = Overflow Rate = 0.00 feet/sec

Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) = 53 percent

Load removed by Wet Vault = #VALUE! lbs

**If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
 Calculate the efficiency reduction for the actual rainfall intensity rate**

Actual Rainfall Intensity at which Wet Vault bypass Occurs = 0.5 in/hour

Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 = 0.75 percent
 Efficiency Reduction for Actual Rainfall Intensity = 0.83 percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete

Designed as Required in RG-348

Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series

Designed as Required in RG-348

Pages 3-32

Michael E. Barrett, Ph.D., P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) \times (1 - 0.65E_2) \times (1 - 0.25E_3))] \times 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = $E_1 =$ 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = $E_2 =$ 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = $E_3 =$ 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
 (A_i AND A_p VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} \times P \times (A_i \times 34.6 \times A_p \times 0.54) =$ 1012.98 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area= **NA** lbs
 Impervious Cover Overtreatment= 0.0000 ac
 TSS Removal for Uncaptured Area = 0.00 lbs

BMP Sizing

Effective Area = NA EA
 Calculated Model Size(s) = #N/A
 Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) = 0 Model Size
 Surface Area = #N/A ft²

Overflow Rate = #VALUE! V_{or}
Rounded Overflow Rate = #VALUE! V_{or}
BMP Efficiency % = #VALUE! %
L_R Value = #VALUE! lbs

TSS Load Credit = #VALUE! lbs

Is Sufficient Treatment Available? (TSS Credit ≥ TSS Uncapt.) #VALUE!

TSS Treatment by BMP (LM + TSS Uncapt.) = #VALUE!

21. Vortech

BMP Sizing

Required TSS Removal in BMP Drainage Area= **NA** lbs
Impervious Cover Overtreatment= **0.0000** ac
TSS Removal for Uncaptured Area = 0.00 lbs

Effective Area = NA EA
Calculated Model Size(s) = #N/A

Actual Model Size (if choosing larger model size) = **Vx1000** Pick Model Size

Surface Area = 7.10 ft²
Overflow Rate = #VALUE! V_{or}
Rounded Overflow Rate = #VALUE! V_{or}
BMP Efficiency % = #VALUE! %
L_R Value = #VALUE! lbs

TSS Load Credit = #VALUE! lbs

Is Sufficient Treatment Available? (TSS Credit ≥ TSS Uncapt.) #VALUE!

TSS Treatment by BMP (LM + TSS Uncapt.) = #VALUE!

Attachment G – Inspection, Maintenance, Repair and Retrofit Plan

The party responsible for the maintenance of the filter strip shall develop an Integrated Pest Management (IPM) for the filter strip area.

Pest Management: An integrated Pest Management (IPM) Plan should be developed for vegetated areas. The plan shall specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.

Seasonal Mowing and Lawn Care: If the filter strip is made up of turf grass, it should be mowed as needed to limit vegetation height to 18 inches, using a mulching mower (or removal of clippings). If native grasses are used, the filter may require less frequent mowing, but a minimum of twice annually. Grass clippings and brush debris should not be deposited on vegetated filter strip areas. Regular mowing should also include weed control practices; however, herbicide use should be kept to a minimum.

Inspection: Inspect filter strips at least twice annually for erosion or damage to vegetation; however, additional inspection after periods of heavy runoff shall be made. The strip shall be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. More frequent inspections of the grass cover during the first few years after establishment will help to determine if any problems are developing, and to plan for long-term restorative maintenance needs. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and restored to meet specifications. After all inspections results shall be written and records maintained and made available upon request by TCEQ officials.

Debris and Litter Removal: The filter strip shall be kept free of trash and accumulation to reduce floatables being flushed downstream, and for aesthetic reasons. The need for this practice is determined through periodic inspection but should be performed no less than 4 times per year.

Sediment Removal: Sediment removal is not normally required in filter strips since the vegetation normally grows through it and binds to the soil. However, sediment may accumulate along the upstream boundary of the strip preventing uniform overland flow. Excess sediment shall be removed by hand or with flat-bottomed shovels.

Grass Reseeding and Mulching: A healthy dense grass shall be maintained on the filter strip. If areas are eroded, they should be filled, compacted, and reseeded so that the final grade is level. Grass damaged during the sediment removal process shall be promptly replaced using the same seed mix used during filter strip establishment. If possible, flow should be diverted from the damaged areas until the grass is firmly established. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and restored to meet specifications. Corrective maintenance, such as weeding, or replanting should be done more frequently in the first two to three years after installation to ensure stabilization. Dense vegetation may require irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established.

General Information

Upon transfer of ownership or maintenance responsibility, the seller must inform the buyer of all requirements of the BMP maintenance. TCEQ must be notified and receive the form "TCEQ-10623 Change in Responsibility for Maintenance on Permanent Best Management Practices and Measures". In addition, TCEQ shall receive a signed, dated copy of this maintenance plan from the new owner.

An amended copy of this document will be provided to the Texas Commission on Environmental Quality within thirty (30) days of any changes in the following information.

Responsible Party for Maintenance: Comal County
Address: 199 Main Plaza
City, State, Zip: New Braunfels, TX 78130
Telephone Number: 830-608-8505

Signature of Representative:

Print Name:



Judge Sherman Krause

Attachment H – Pilot-Scale Field Testing Plan

Not Applicable

Attachment I - Inspection and Maintenance of BMPs

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- The construction exit should be maintained in a condition which will prevent tracking/flowing of sediment onto public rights of way. Additional stone may be required to keep exist functioning properly.
- Built up sediment will be removed from the sediment fence when it has reached one-third the height of the fence.
- Sediment fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.

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

I _____ Sherman Krause _____,
Print Name
_____ County Judge _____,
Title - Owner/President/Other
of _____ Comal County _____,
Corporation/Partnership/Entity Name
have authorized _____ Robert Boyd, P.E. _____
Print Name of Agent/Engineer
of _____ Comal County _____
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:

[Handwritten Signature]
Applicant's Signature

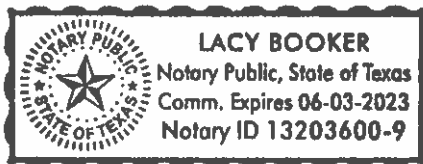
MAY 25 2023
Date

THE STATE OF Texas §
County of Comal §

BEFORE ME, the undersigned authority, on this day personally appeared Sherman Krause 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 25th day of May, 2023.

Lacy Booker
NOTARY PUBLIC
Lacy Booker
Typed or Printed Name of Notary



MY COMMISSION EXPIRES: 6/3/2023



TCEQ Use Only

TCEQ Core Data Form

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

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided.)		
<input type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input checked="" type="checkbox"/> Other Time Extension	
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 600647275		RN 102460730

SECTION II: Customer Information

4. General Customer Information	5. Effective Date for Customer Information Updates (mm/dd/yyyy)		
<input type="checkbox"/> New Customer <input type="checkbox"/> Update to Customer Information <input type="checkbox"/> Change in Regulated Entity Ownership <input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)			
<i>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).</i>			
6. Customer Legal Name (If an individual, print last name first: eg: Doe, John)		If new Customer, enter previous Customer below:	
7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number (if applicable)
11. Type of Customer:	<input type="checkbox"/> Corporation	<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input type="checkbox"/> City <input checked="" type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Other	<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Other:	
12. Number of Employees		13. Independently Owned and Operated?	
<input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input checked="" type="checkbox"/> 501 and higher		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
14. Customer Role (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following			
<input type="checkbox"/> Owner <input type="checkbox"/> Operator <input type="checkbox"/> Owner & Operator <input type="checkbox"/> Occupational Licensee <input type="checkbox"/> Responsible Party <input type="checkbox"/> Voluntary Cleanup Applicant <input type="checkbox"/> Other:			
15. Mailing Address:	150 N. Seguin St.		
	City	New Braunfels	State TX ZIP 78130 ZIP + 4
16. Country Mailing Information (if outside USA)		17. E-Mail Address (if applicable)	
		krause@co.comal.tx.us	
18. Telephone Number		19. Extension or Code	20. Fax Number (if applicable)
(830) 221-1100			(830) 608-2026

SECTION III: Regulated Entity Information

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

23. Street Address of the Regulated Entity: <i>(No PO Boxes)</i>	195 David Jonas Drive						
	City	N.B.	State	TX	ZIP	78132	ZIP + 4
24. County							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	Located on SH 46 approximately 1 mile west of past FM 2722 to the Comal County Road Dpement on the south side of SH 46.						
26. Nearest City	New Braunfels			State	TX	Nearest ZIP Code	78132
27. Latitude (N) In Decimal:	Degrees		Minutes	Seconds	28. Longitude (W) In Decimal:	Degrees	
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)				
9199		92111					
33. What is the Primary Business of this entity? <i>(Do not repeat the SIC or NAICS description.)</i>							
34. Mailing Address:							
	City		State		ZIP		ZIP + 4
35. E-Mail Address:							
36. Telephone Number		37. Extension or Code			38. Fax Number <i>(if applicable)</i>		
() -					() -		

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


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

SECTION IV: Preparer Information

40. Name:	Sherman Krause	41. Title:	County Judge
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(830) 221-1100		(830) 608-2026	krause@co.comal.tx.us

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:	COMAL COUNTY	Job Title:	COUNTY JUDGE
Name <i>(In Print)</i> :	SHERMAN KRAUSE	Phone:	(830) 221-1100
Signature:		Date:	July 1, 2023

Application Fee Form

Texas Commission on Environmental Quality

Name of Proposed Regulated Entity: Comal County

Regulated Entity Location: 150 N. Seguin New Braunfels, TX 78130

Name of Customer: Comal County

Contact Person: Sherman Krause

Phone: 830-221-1100

Customer Reference Number (if issued): CN 600647275

Regulated Entity Reference Number (if issued): RN 102460730

Austin Regional Office (3373)

Hays

Travis

Williamson

San Antonio Regional Office (3362)

Bexar

Medina

Uvalde

Comal

Kinney

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment.** This payment is being submitted to:

Austin Regional Office

San Antonio Regional Office

Mailed to: TCEQ - Cashier

Overnight Delivery to: TCEQ - Cashier

Revenues Section

12100 Park 35 Circle

Mail Code 214

Building A, 3rd Floor

P.O. Box 13088

Austin, TX 78753

Austin, TX 78711-3088

(512)239-0357

Site Location (Check All That Apply):

Recharge Zone

Contributing Zone

Transition Zone

<i>Type of Plan</i>	<i>Size</i>	<i>Fee Due</i>
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	\$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	\$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	290.25 Acres	\$ 10,000
Sewage Collection System	L.F.	\$
Lift Stations without sewer lines	Acres	\$
Underground or Aboveground Storage Tank Facility	Tanks	\$
Piping System(s)(only)	Each	\$
Exception	Each	\$
Extension of Time	Each	\$

Signature: 

Date: MAY 25, 2023

Application Fee Schedule

Texas Commission on Environmental Quality

Edwards Aquifer Protection Program 30 TAC Chapter 213 (effective 05/01/2008)

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

<i>Project</i>	<i>Project Area in Acres</i>	<i>Fee</i>
One Single Family Residential Dwelling	< 5	\$650
Multiple Single Family Residential and Parks	< 5	\$1,500
	5 < 10	\$3,000
	10 < 40	\$4,000
	40 < 100	\$6,500
	100 < 500	\$8,000
	≥ 500	\$10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1	\$3,000
	1 < 5	\$4,000
	5 < 10	\$5,000
	10 < 40	\$6,500
	40 < 100	\$8,000
	≥ 100	\$10,000

Organized Sewage Collection Systems and Modifications

<i>Project</i>	<i>Cost per Linear Foot</i>	<i>Minimum Fee- Maximum Fee</i>
Sewage Collection Systems	\$0.50	\$650 - \$6,500

Underground and Aboveground Storage Tank System Facility Plans and Modifications

<i>Project</i>	<i>Cost per Tank or Piping System</i>	<i>Minimum Fee- Maximum Fee</i>
Underground and Aboveground Storage Tank Facility	\$650	\$650 - \$6,500

Exception Requests

<i>Project</i>	<i>Fee</i>
Exception Request	\$500

Extension of Time Requests

<i>Project</i>	<i>Fee</i>
Extension of Time Request	\$150