WATER POLLUTION ABATEMENT PLAN

FOR

RIVER'S EDGE AT GRUENE CONDOS

JANUARY 29, 2025

Prepared For: River's Edge at Gruene LP 6 Gruene Wald New Braunfels, Texas 78130

Prepared By:

LJA ENGINEERING, INC. TBPE Firm Registration No. F-1386 9830 Colonnade Blvd Ste 300 San Antonio, Texas 78256 Phone (210) 503-2700



LJA FILE NO. SA3856-0401-0402

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 <u>30 TAC 213</u>.

Administrative Review

1. <u>Edwards Aquifer applications</u> 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: <u>http://www.tceq.texas.gov/field/eapp</u>.

- 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 will be denied. Please note that because the technical review is underway, whether the application is withdrawn or denied **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:

- If the technical review has begun your application can be denied/withdrawn, your fees will be forfeited, and the plan will have to be resubmitted.
- 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 denied/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 affected 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: River's Edge at Gruene Condos			2. Regulated Entity No.:					
3. Customer Name: River's Edge at Gruene, LP			4. Customer No.:					
5. Project Type: (Please circle/check one)	New	Modification Extension		Exception				
6. Plan Type: (Please circle/check one)	WPAP CZP	SCS	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: (Please circle/check one)	Residential	Non-r	Non-residential 8. Sit		e (acres):	124.79		
9. Application Fee:	\$8,000	10. P	10. Permanent BMP(s):		Batch Detention Filter Strips	on Pond & Vegetative		
11. SCS (Linear Ft.):		12. AST/UST (No. Tanks):			nks):			
13. County:	Comal	14. Watershed:				Comal River-G	Guadalupe River	

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)	Edwards Aquifer Authority Barton Springs/ Edwards Aquifer Hays Trinity Plum Crook	Barton Springs/ Edwards Aquifer	NA		
City(ies) Jurisdiction	Prum Creek Austin Buda Dripping Springs Kyle Mountain City San Marcos Wimberley Woodcreek	Austin Bee Cave Pflugerville Rollingwood Round Rock Sunset Valley West Lake Hills	Austin Cedar Park Florence Georgetown Jerrell Leander Liberty Hill Pflugerville 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)	Edwards Aquifer Authority Trinity-Glen Rose	Edwards Aquifer Authority	Kinney	EAA Medina	EAA Uvalde
City(ies) Jurisdiction	Castle Hills Fair Oaks Ranch Helotes Hill Country Village Hollywood Park San Antonio (SAWS) Shavano Park	Bulverde Fair Oaks Ranch Garden Ridge X_New Braunfels Schertz	NA	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.			
Seamus MacFarland, PE			
Print Name of Customer/Authorized Agent			
Seemus MacFarland	10/08/24		
Signature of Customer/Authorized Agent	Date		

FOR TCEQ INTERNAL USE ONL	.Y			
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):		Payable to TCEQ (Y/N):		
Core Data Form Complete (Y/N):		Check: Signed (Y/N):		
Core Data Form Incomplete Nos.:			Less than 90 days old (Y/N):	

General Information Form

Texas Commission on Environmental Quality

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

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 **General Information Form** is hereby submitted for TCEQ review. The application was prepared by:

Print Name of Customer/Agent: Seamus MacFarland, PE.

Date: 10/04/2024

Signature of Customer/Agent:

Seamus MacFarland

Project Information

- 1. Regulated Entity Name: River's Edge at Gruene Condos
- 2. County: Comal
- 3. Stream Basin: Guadalupe River
- 4. Groundwater Conservation District (If applicable): _____
- 5. Edwards Aquifer Zone:

Χ	Recharge Zone
	Transition Zone

6. Plan Type:

X WPAP	AST
SCS	🗌 UST
Modification	Exception Request

7. Customer (Applicant):

Contact Person: <u>Clint</u> Jones Entity: <u>River</u>'s Edge at Gruene, LP Mailing Address:<u>6 Gru</u>ene Wald City, State: <u>Grue</u>ne, Texas Zip: <u>78130</u> Telephone: _____ FAX: ____ Email Address: clint@regallanddevelopment.com

8. Agent/Representative (If any):

Contact Person:Seamus Macfarland, PE.Entity:LJA Engineering, LLCMailing Address:9830 Colonnade Blvd Ste 300City, State:San Antonio, TXZip:78230Telephone:210-503-2700Email Address:SMacFarland@lja.com

9. Project Location:

The project site is located inside the city limits of _____

The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of ______.

- X The project site is not located within any city's limits or ETJ.
- 10. X 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.

On west side of FM 306, approximately 3500 LF north of intersection with Hunter Rd.

- 11. X Attachment A Road Map. A road map showing directions to and the location of the project site is attached. The project location and site boundaries are clearly shown on the map.
- 12. X 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. The map(s) clearly show:
 - X Project site boundaries.
 - X USGS Quadrangle Name(s).
 - X Boundaries of the Recharge Zone (and Transition Zone, if applicable).

X Drainage path from the project site to the boundary of the Recharge Zone.

13. X The TCEQ must be able to inspect the project site or the application will be returned. 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.

Survey staking will be completed by this date: _____

- 14. X Attachment C Project Description. Attached at the end of this form is a detailed narrative description of the proposed project. The project description is consistent throughout the application and contains, at a minimum, the following details:
- Area of the site
 Offsite areas
 Impervious cover
 Permanent BMP(s)
 Proposed site use
 Site history
 Previous development
 N/A Area(s) to be demolished
 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

- 16. \overline{X} 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).
 - (6) New municipal and industrial wastewater discharges into or adjacent to water in the state that would create additional pollutant loading.
- 17. X 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

- 18. The fee for the plan(s) is based on:
 - X For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
 - For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
 - For a UST Facility Plan or Modification or an AST Facility Plan or Modification, 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.
- 19. X 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:

- Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
- X San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)
- 20. 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.
- 21. X 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.





Attachment C – Project Narrative

The proposed site is located on the west side of FM 306, approximately 3500 LF north of the intersection with Hunter Road. The site is located in Comal County, outside of the New Braunfels ETJ. The River's Edge at Gruene Condos is approximately 24.34 acres which consists of a residential development and an access road. The total impervious cover for the 124.79-acre tract will be 5.73 acres (4.59%). We are treating the impervious cover with an extended batch detention water quality pond and vegetative filter strips.

The site consists of 7 drainage areas. Drainage Area A1 consists of approximately 14.80 acres which contains 3.21 acres of impervious cover and generates 2881 lbs of TSS. Drainage Area A2 consists of approximately 0.50 acres which contains 0.22 acres of impervious cover and generates 197 lbs of TSS. Drainage Area A3 consists of approximately 0.60 acres which contains 0.25 acres of impervious cover and generates 224 lbs of TSS. Drainage Area B1 consists of approximately 2.60 acres which contains 1.13 acres of impervious cover and generates 1014 lbs of TSS. Drainage Area C1 consists of approximately 0.80 acres which contains 0.34 acres of impervious cover and generates 305 lbs of TSS. Drainage Area C2 consists of approximately 0.80 acres which contains 0.50 acres which contains 0.43 acres of impervious cover and generates 305 lbs of TSS. Drainage Area C4 consists of approximately 0.80 acres which contains 0.50 acres which contains 0.50 acres of impervious cover and generates 305 lbs of TSS. Drainage Area C5 consists of approximately 0.80 acres which contains 0.43 acres of impervious cover and generates 305 lbs of TSS. Drainage Area C6 consists of approximately 0.80 acres which contains 0.43 acres of impervious cover and generates 305 lbs of TSS. Drainage Area C7 consists of approximately 0.80 acres which contains 0.43 acres of impervious cover and generates 305 lbs of TSS. Drainage Area C7 consists of approximately 0.80 acres which contains 0.43 acres of impervious cover and generates 305 lbs of TSS. Drainage Area Untreated consists of approximately 10.90 acres which contains 0.50 acres of impervious cover and generate 449 lbs of TSS.

The total TSS needed to be treated by the permanent BMPs is 5359 lbs. The extended batch detention pond and vegetative filter strips are treating 5359 lbs of TSS.



GEOLOGIC ASSESSMENT APPROXIMATELY 125-ACRE GRUENE TRACT FARM-TO-MARKET ROAD 306 AND BRETZKE LANE GRUENE, COMAL COUNTY, TEXAS HJN 24085 GA

PREPARED FOR:

REGAL, LLC NEW BRAUNFELS, TEXAS

PREPARED BY:

HORIZON ENVIRONMENTAL SERVICES A BRANCH OF LJA ENVIRONMENTAL SERVICES, LLC TBPG FIRM REGISTRATION NO. 50679



AUGUST 2024

24085-001GA_Report

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Geologic Assessment

Texas Commission on Environmental Quality

For Regulated Activities on The Edwards Aquifer Recharge/transition Zones and Relating to 30 TAC §213.5(b)(3), 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. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: James Killian

Telephone: 512 328-2430

Date: 22 August 2024

Fax: <u>512 328-1804</u>

Representing: <u>Horizon Environmental Services and TBPG Firm Registration No. 50679</u> (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:



Regulated Entity Name: <u>125-acre Gruene Tract, FM 306 and Bretzke Lane, Gruene, Comal</u> County, Texas

Project Information

- 1. Date(s) Geologic Assessment was performed: <u>18, 19, and 27 April; 18, 29, and 30 May; 1</u> <u>and 3 June 2024.</u>
- 2. Type of Project:

3.

🔀 WPAP	🗌 AST
\boxtimes SCS	🗌 UST
Location of Project:	

Recharge Zone Transition Zone

Contributing Zone within the Transition Zone

- 4. X Attachment A Geologic Assessment Table. Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached.
- 5. 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 Name	Group*	Thickness(feet)
Boerne fine sandy loam, 1 to 3% slopes		
(BoB)	В	3 to 5
Comfort-Rock outcrop complex, undulating (CrD)	D	0.5 to 1
Krum clay, 1 to 3% slopes (KrB)	D	3 to 5

Table 1 - Soil Units, InfiltrationCharacteristics and Thickness

		1
Soil Name	Group*	Thickness(feet)
Medlin-		
Eckrant		
association		
association,		
hilly (MED)	D	2 to 4
Oakalla soils,		
frequently		
flaceded (Ob)	_	
TIOOded (OK)	В	4 t0 6

* 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.
- 6. Attachment B Stratigraphic Column. A stratigraphic column showing formations, members, and thicknesses is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.
- 7. Attachment C Site Geology. A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.
- 8. Attachment D Site Geologic Map(s). 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>400</u> '
Site Geologic Map Scale: 1" = <u>400</u> '
Site Soils Map Scale (if more than 1 soil type): 1" = 700'

9. Method of collecting positional data:

Global Positioning System (GPS) technology.

Other method(s). Please describe method of data collection:

- 10. The project site and boundaries are clearly shown and labeled on the Site Geologic Map.
- 11. Surface geologic units are shown and labeled on the Site Geologic Map.
- 12. 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.
- 13. The Recharge Zone boundary is shown and labeled, if appropriate.
- 14. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section.

There are $\underline{2}$ (#) 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.

ig 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

15. 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.



Table 1 – Soil Units, Infiltration Characteristics and Thickness (Continued)

Soil Name	Group*	Thickness (feet)
Purves clay, 1 to 5% slopes (PuC)	D	1 to 2
Rumple-Comfort association, undulating (RUD)	C & D	1 to 2

* 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.



ATTACHMENT A

GEOLOGIC ASSESSMENT TABLE

GEO	PROJECT NAME: 125-acre Gruene Tract, FM 306 and Bretzke Lane, Gruene, Comal County, Texas																			
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	FORMATION	DIME	NSIONS	(FEET)	TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENS	ITIVITY	CATCHM (AC	ENT AREA RES)	TOPOGRAPHY
						Х	Y	Z		10						<40	<u>>40</u>	<1.6	<u>>1.6</u>	
F-1	29.748906	-98.1128417	SF	20	Kpcm	2	2	2	N67E	10			C,F,O	30	60		Х	Х		Hillside
F-2	29.748451	-98.112502	SC	20	Kpcm	1	0.2	1					C,F,O	25	45		Х	Х		Hillside
F-3	29.748166	-98.110775	SF	20	Kpcm	3	0.1	0.5	N3E	10			C,F,O	15	45		Х	Х		Hillside
F-4	29.748323	-98.110422	SC	20	Kpcm	5	4	3					C,F,O	30	50		Х	Х		Hillside
F-5	29.749194	-98.106213	SH	20	Kdr	7	7	4					C,F,O	20	40		Х	Х		Hillside
F-6	29.749684	-98.110503	SH/SF	20	Kpcm	4	2	0.5	N3E	10			C,F,O	15	45		Х	Х		Hillside
F-7	29.749061	-98.109497	SH/SF	20	Kpcm	5	5	0.5	N57E	10			C,F,O	15	45		Х	Х		Hillside
F-8	29.750163	-98.108788	SC	20	Kpcm	1	1	1.5					C,F,O	20	40		Х	Х		Hillside
F-9	29.750437	-98.10797	SH/SC	20	Kg	3.5	2.5	0.5					C,F,O	20	40		Х	Х		Hillside
F-10	29.751556	-98.108345	SC	20	Kdr	1.5	1	1.5					C,F,O	20	40		Х	Х		Hillside
F-11	29.753295	-98.108079	SC	20	Kdr	1	0.5	1					C,F,O	20	40		Х	Х		Hillside
F-12	29.752912	-98.107765	SH/SC	20	Kdr	5	2	0.5					C,F,O	20	40		Х	Х		Hillside
F-13	29.746268	-98.109731	F	20	Kpcm/Kprd	400	75		N75E	10			C,F,O	8	38	Х		Х		Floodplain
F-14	29.754713	-98.106627	F	20	Kg/Kpcm	1000	75		N50E	10			C,F,O	8	38	Х		Х		Hillside
F-15	29.75455	-98.107637	F	20	Kg/Kpcm	380	75		N335W				C,F,O	6	26	Х		Х		Hillside
M-1	29.749085	-98.106071	MB	30	Kdr	1.5	1	1					Х	5	35	Х		Х		Hillside
M-2	29.74965	-98.105826	MB	30	Kdr	6	6						Х	5	35	Х		Х		Hilltop
M-3	29.749175	-98.106252	MB	30	Kdr	0.5	0.5						X	5	35	X		X		Hillside
* DATU	* DATUM:																			

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

8A INFILLING

None, exposed bedrock

N

My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

C Coarse - cobbles, breakdown, sand, gravel

O Loose or soft mud or soil, organics, leaves, sticks, dark colors

Fines, compacted clay-rich sediment, soil profile, gray or red colors

V Vegetation. Give details in narrative description

FS Flowstone, cements, cave deposits

I have read, I understood, and I have followed the Texas Commission on Environmental Quality's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field.

Other materials: concrete and/or casing

12 TOPOGRAPHY								
Cliff, Hilltop, Hillside, Drainage, Floodplain, S	Streambed							

JAMES P. KILLIAN GEOLOGY No. 10281

James P. Hillen

Sheet <u>1</u> of <u>1</u>

Date: 12 August 2024

TCEQ-0585-Table (Rev. 10-01-04)





ATTACHMENT B

STRATIGRAPHIC COLUMN

Geologic Unit	Geologic Member	Hydrologic Unit	Approx. Thickness at Project Site (ft)	Elevation (ft msl)	Depth (ft)
Del Rio Clay (Kdr)		Edwards Aquifer	50	754	0
Georgetown Formation (Kg)		Edwards Aquifer	30	704	50
	Cyclic & Marine (Kpcm)	Edwards Aquifer	90	674	80
	Leached & Collapsed (Kplc)	Edwards Aquifer	70	584	170 <u></u>
Edwards	Regional Dense (Kprd)	Confining Unit	20	514	240
Group	Grainstone (Kkg)	Edwards Aquifer	50	494	260
	Kirschberg Evaporite (Kkke)	Edwards Aquifer	50	444	310 —
	Dolomitic (Kkd)	Edwards Aquifer	120	394	360
	Basal Nodular (Kkbn)	Edwards Aquifer	50	274	480 —

Note: Unit elevation and thickness given with respect to a ground surface elevation of 754 ft along the southeastern boundary of the subject site.



Date:	05/20/2024
Drawn:	KRW
HJN NO:	24085.001 GA

Attachment B

Stratigraphic Column Gruene 125-Acre Tract FM 306 & Bretzke Lane Gruene, Comal County, Texas





ATTACHMENT C

DESCRIPTION OF SITE GEOLOGY



Geologic information for the subject site obtained via literature review is provided in Attachment E, Supporting Information.

A geologic assessment of approximately 125 acres located adjacent to the southwest corner of the intersection of Farm-to-Market Road (FM) 306 and Bretzke Lane in Gruene, Comal County, Texas, was conducted pursuant to Texas rules for regulated activities in the Edwards Aquifer Recharge Zone (EARZ) (30 TAC 213). The subject site consists of mixed rangeland and woodlands with pastureland. Assessment findings were used to develop recommendations for site construction measures intended to be protective of water resources at the subject site and adjacent areas.

The entire subject site is located within the EARZ, as defined by the Texas Commission on Environmental Quality (TCEQ). The EARZ occurs where surface water enters the subsurface through exposed limestone bedrock containing faults, fractures, sinkholes, and caves.

The subject site is underlain by the Del Rio Clay (Kdr), the Georgetown Formation (Kg), and 2 geologic members of the Edwards Group-Person Formation (Cyclic and Marine member [Kpcm] and Regional Dense member [Kprd]) (Clark, 2016). The estimated maximum thicknesses are 50 feet, 30 feet, 90 feet, and 20 feet, respectively.

A total of 15 geologic features (F-1 to F-15) and 3 man-made features (M-1 to M-3) were identified at the subject site. Further information pertaining to the geologic and man-made features is presented in the following Attachments D, E, and F. Photographs of the subject site and the geologic and man-made features are presented in Attachment G.



ATTACHMENT D

SITE GEOLOGIC MAP





Kkg

400

Legend





Kainer Formation-Grainstone (Kkg)

Kkg

Date: 05/20/2024 Drawn: KRW HJN NO: 24085.001 GA Source: Clark, 2016; Nearmap, 2023

Attachment D

Site Geologic Map Gruene 125-Acre Tract FM 306 & Bretzke Lane Gruene, Comal County, Texas



W24085--Gruen_140_Acre_Tract\Graphics\24085-001GA_06A_SGM

Environmental Services



en 140 Acre Tra A_06A_SGM



ATTACHMENT E

SUPPORTING INFORMATION



1.0 INTRODUCTION AND METHODOLOGY

This report and any proposed abatement measures are intended to fulfill Texas Commission on Environmental Quality (TCEQ) reporting requirements (TCEQ, 2005). This geologic assessment includes a review of the subject site for potential aquifer recharge and documentation of general geologic characteristics for the subject site. Horizon Environmental Services (Horizon) conducted the necessary field and literature studies according to TCEQ *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones* (TCEQ, 2004).

Horizon walked transects spaced 50 feet apart, mapped the locations of features using a sub-foot accurate Trimble Geo HX handheld GPS, and posted processed data utilizing GPS Pathfinder Office software, topographic maps, and aerial photographs. Horizon also searched the area around any potential recharge features encountered to look for additional features. When necessary, Horizon removed loose rocks and soil (by hand) to preliminarily assess each feature's subsurface extent while walking transects. However, labor-intensive excavation was not conducted during this assessment. Features that did not meet the TCEQ definition of a potential recharge feature (per TCEQ, 2004), such as surface weathering, karren, or animal burrows, were evaluated in the field and omitted from this report.

The results of this survey do not preclude the possibility of encountering subsurface voids or abandoned test or water wells during the clearing or construction phases of the proposed project. If a subsurface void is encountered during any phase of the project, work should be halted until the TCEQ (or appropriate agency) is contacted and a geologist can investigate the feature.

2.0 ENVIRONMENTAL SETTING

2.1 LOCATION AND GENERAL DESCRIPTION

The subject site consists of approximately 125 acres of mixed rangeland and woodlands with pastureland located adjacent to the southwest corner of the intersection of Farm-to-Market Road (FM) 306 and Bretzke Lane in Comal County, Texas (Appendix F, Figure 1).

2.2 LAND USE

The subject site is reportedly vacant with no apparent use. No habitable structures were observed on the site. FM 306 borders the site to the northeast and the Guadalupe River forms the southern border of the site. Surrounding lands are generally used for rural residences, farming, and raising livestock.

2.3 TOPOGRAPHY AND SURFACE WATER

The subject site is situated on gently to steeply sloping terrain within the Guadalupe River watershed (Appendix F, Figures 2 and 3). Surface elevations on the subject site vary from a minimum of approximately 616 feet above mean sea level (amsl) along the Guadalupe River



near the southern property boundary to a maximum of approximately 754 feet amsl near the eastern property boundary (USGS, 1994a, 1994b). Drainage on the site occurs primarily by sheet flow in multiple directions depending on proximity to a few unnamed tributaries of the Guadalupe River near the center and southwestern portions of the site.

2.4 EDWARDS AQUIFER ZONE

The entire subject site is found within the Edwards Aquifer Recharge Zone (TCEQ, 2024) (Attachment F, Figure 2).

2.5 SURFACE SOILS

Seven soil units are mapped within the subject site (NRCS, 2024) (Appendix F, Figure 4). Generally, the soil series are similar in their physical, chemical, and engineering properties, with the principal exception being rock fragment content and thickness. The soil units are described in further detail below.

Boerne fine sandy loam, 1 to 3% slopes (BoB), is a deep, gently sloping soil on convex slopes of low stream terraces near rivers and large creeks. Typically, the surface layer is grayish brown, moderately alkaline, fine sandy loam about 17 inches thick. The subsoil extends to a depth of 41 inches and is pale brown and very pale brown, moderately alkaline, fine sandy loam. It is about 50% calcium carbonate (lime). The underlying material to a depth of 65 inches is very pale brown, moderately alkaline, fine sandy loam. This soil is well-drained. Surface runoff is slow. Permeability is moderately rapid, and the available water capacity is medium. Water erosion is a slight to moderate hazard. This soil is flooded only rarely. Seepage and corrosivity to uncoated steel are limitations for urban uses. These limitations can be overcome through good design and careful installation. Flooding, although rare, is a limitation that must be considered in planning permanent installations.

Comfort-Rock outcrop complex, undulating (CrD), consists of shallow, clayey soils and Rock outcrop on side slopes and on hilltops and ridgetops on uplands. Comfort extremely stony clay makes up 49 to more than 95% of the complex, but on average, it makes up 70%. Rock outcrop and areas of soil less than 4 inches deep make up 5 to 36%, but the average is 15%. Rumple, Purves, Eckrant, and Real soils make up less than 5 to 30%, but the average is 15%. The areas of Rock outcrop are long, narrow horizontal bands on hill slopes and along small drains. The Comfort soil is between the bands of Rock outcrop. The soils and Rock outcrop are in areas so small or so intricately mixed that it was not practical to map them separately at the scale used. Typically, the surface layer of the Comfort soil is dark brown, extremely stony clay about 6 inches thick. Cobbles and stones as much as 4 feet across cover about 45% of the surface. The subsoil extends to a depth of 13 inches. It is dark reddish-brown, extremely stony clay. The underlying material is indurated fractured limestone. The soil is mildly alkaline and noncalcareous throughout. The Comfort soil is well-drained. Surface runoff is slow to medium. Permeability is slow, and the available water capacity is very low. The rooting zone is shallow. Water erosion is a slight hazard. Typically, rock outcrop is dolomitic limestone that is barren of soil except in narrow fractures in the rock. In some areas the rock is flat and has as much as 3 inches of soil



material on the surface. The stony surface layer, shallowness to bedrock, and corrosivity to uncoated steel are severe limitations to use of the soils for recreation purposes.

Krum clay, 1 to 3% slopes (KrB), is a deep, gently sloping soil on stream terraces and valley fills. Typically, the surface layer is dark gray clay about 16 inches thick. The subsoil to a depth of 58 inches is grayish-brown clay, and to a depth of 66 inches it is brown clay. The underlying material to a depth of 80 inches is pale brown clay. The soil is moderately alkaline and calcareous throughout. The soil is well drained. Surface runoff is medium. Permeability is moderately slow. Cracks form when the soil is dry. Water enters rapidly when the soil is dry and cracked and very slowly when it is wet. The available water capacity is high. The rooting zone is deep. However, the clay impedes root penetration. Water erosion is a moderate hazard. For urban uses, the clay content, shrink-swell potential, moderately slow permeability, and corrosivity to uncoated steel are limitations which can be partly overcome through good design and careful installation.

Medlin-Eckrant association, hilly (MED), consists of very shallow to shallow and deep soils on uplands. The Medlin and Eckrant soils each make up 20 to 80% of a mapped area. Together, on the average, they make up about 95% of a mapped area. A typical area is 50% Medlin soil and 45% Eckrant soil. The Medlin soil is on lower side slopes, and the Eckrant soil is on the upper side slopes and on the crest of narrow ridges. Krum soils on toe slopes below the Medlin soil and rock outcrops on the upper side slopes make up less than 20% of the mapped areas. The Medlin soil is eroded in about 15% of the areas. Typically, the Medlin soil has a gravish-brown surface layer about 11 inches thick that is stony clay in the upper part and clay in the lower part. The subsoil, from 11 to 50 inches, is light yellowish-brown clay that has yellowishbrown and olive yellow mottles. The underlying material to a depth of 80 inches is light gray shaly clay that has yellow and olive yellow mottles. The soil is moderately alkaline and calcareous throughout. The Medlin soil is well-drained. Surface runoff is rapid. Permeability is very slow. Water enters rapidly when the soil is dry and cracked and very slowly when it is wet. The available water capacity is high. The rooting zone is deep. However, the clay impedes root penetration. Water erosion is a severe hazard. Typically, the surface layer of the Eckrant soil is very dark gray, extremely stony clay about 16 inches thick. The underlying material is fractured limestone bedrock. The soil is moderately alkaline and noncalcareous throughout. The Eckrant soil is welldrained. Surface runoff is rapid. Permeability is moderately slow. The available water capacity is very low. The rooting zone is very shallow to shallow. Water erosion is a severe hazard.

Oakalla soils, frequently flooded (Ok) are deep, nearly level soils on plane, smooth to slightly undulating floodplains. The surface texture of these soils is loam, clay loam, silty clay, or silty clay loam and does not vary in a uniform or regular pattern. Typically, the upper layer to a depth of 40 inches is dark grayish-brown clay loam. The subsoil to a depth of 49 inches is light yellowish-brown clay loam. The underlying material to a depth of 80 inches is very pale brown clay loam. These soils are moderately alkaline and calcareous throughout. They are about 60% calcium carbonate (lime) throughout. These soils are well-drained. They are flooded more than once every 2 years for very brief periods. Surface runoff is slow. Permeability is moderate, and the available water capacity is high. The rooting zone is deep. Water erosion is a slight hazard.



Purves clay, 1 to 5% slopes (PuC) is a shallow, gently sloping soil on uplands. Slopes are plane to slightly convex. Areas are long and narrow in shape and range from 5 to 300 acres in size. Typically, the surface layer is very dark gray clay about 10 inches thick. The layer below that to a depth of 16 inches is dark gray clay, and to a depth of 19 inches it is dark grayish-brown clay that is about 10%, by volume, coarse fragments of limestone. The underlying layer is fractured indurated limestone bedrock. This soil is well-drained. Surface runoff is medium. Permeability is moderately slow. The available water capacity is very low. The rooting zone is shallow. Water erosion is a moderate hazard.

Rumple-Comfort association, undulating (RUD), consists of shallow and moderately deep soils on uplands. Rumple soil makes up about 60% of the association, Comfort soil makes up 20%, and other soils, mainly Tarpley soils, make up 20%. The Rumple soil makes up 39 to 82% of the individual areas, the Comfort soil makes up 5 to 42%, and the other soils make up less than 5 to 34%. The Rumple soil is on broad ridgetops and side slopes. It is mainly gently sloping. The Comfort soil is mainly in the more sloping areas near drainageways and near outcrops of rock. Typically, 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% 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 that is about 75%, by volume, limestone fragments. The underlying material is indurated fractured limestone. The soil is mildly alkaline and noncalcareous throughout. The texture of the surface layer ranges to very cherty loam and cherty clay. Typically, the surface layer of the Comfort soil is dark brown, neutral, extremely stony clay about 7 inches thick. The subsoil to a depth of 12 inches is dark reddishbrown, mildly alkaline, extremely stony clay. The underlying material is indurated fractured limestone. The soil is noncalcareous throughout. The soils in this association are welldrained. Surface runoff is medium. However, runoff from large areas is much slower than from local areas because some of the water enters caves, sinks, rock crevices, and streambeds. Permeability is moderately slow in the Rumple soil and slow in the Comfort soil. The available water capacity is very low. The rooting zone is shallow in Comfort soil and moderately deep in Rumple soil. Water erosion is a moderate hazard.

2.6 WATER WELLS

A review of TCEQ and Texas Water Development Board (TWDB) records revealed no water wells on the subject site and approximately 25 wells within 0.5 miles of the subject site (TCEQ, 2024; TWDB, 2024). The off-site wells are reportedly completed within the Edwards Aquifer at depths ranging from 148 to 432 feet below surface grade. Additionally, Horizon observed 2 private water wells (M-1 and M-3) on the subject site. M-1 appears to be an abandoned well with capped steel piping inside steel casing. M-3 appears to be part of a former windmill well that had been upgraded to use without the windmill; however, the well appeared to be inoperable at time of site visit. M-2 is an old steel water storage tank that appears to have been used in the past to store water from these well(s).

If the on-site wells are not intended for future use, they should be capped or properly abandoned according to the Administrative Rules of the Texas Department of Licensing and Regulation (TDLR), 16 Texas Administrative Code (TAC), Chapter 76. TCEQ publication RG-



347, "Landowner's Guide to Plugging Abandoned Water Wells," provides specific guidance. If a well is intended for use, it must comply with 16 TAC §76.

The results of this assessment do not preclude the existence of additional undocumented/abandoned wells on the site. If a water well or casing is encountered during construction, work should be halted near the feature until the TCEQ is contacted.

2.7 GEOLOGY

Literature Review

A review of existing literature shows the subject site is underlain by the Del Rio Clay (Kdr), the Georgetown Formation (Kg), and 2 geologic members of the Edwards Group-Person Formation (Cyclic and Marine member [Kpcm] and Regional Dense member [Kprd]) (Clark, 2016). The estimated maximum thicknesses are 50 feet, 30 feet, 90 feet, and 20 feet, respectively.

The Del Rio Clay (Kdr) is a fossiliferous blue-green to yellow-brown clay and packstone with iron nodules and the fossil *llymatogyra arietina*. The Georgetown Formation (Kg) is a reddish-brown, gray to light tan, shaley mudstone and wackestone with black dendrites, iron nodules, and iron staining; fossils include *Plesioturrilites brazoensis* and *Waconella wacoensis*. The Cyclic and Marine member (Kpcm) comprises pelletal limestone, mudstone, miliolid grainstone, packstone with chert (bedded and large nodules), caprinids, and is crossbedded. The Regional Dense member (Kprd) is dense, shaly, mudstone, wackestone, oyster-shell mudstone and wackestone with iron staining and chert (Clark, 2016). In general, the rock strata beneath the site dip to the southeast at about 10 to 30 feet per mile.

The site Stratigraphic Column is provided as Attachment B, and the Site Geologic Map is Attachment D. The subject site is located within the Balcones Fault Zone. Available geologic reports indicate the nearest mapped (inactive) faults (geologic features F-13 and F-14) are located within the southeastern and northwestern portions of the site, trending from southwest to northeast. Another smaller fault (F-15) is located within the northwestern portion of the site and trends from southeast to northwest (Clark, 2016).

Field Assessment

A field survey was conducted by support staff under the supervision of a licensed Horizon geologist on 18, 19, and 27 April; 18, 29, and 30 May; and 1 and 3 June 2024. Approximately 15 geologic features (F-1 to F-15) and 3 man-made features (M-1 to M-3, private water wells/cistern; previously described) were identified at the subject site. The Geologic Assessment Table (Attachment A) describes those features observed on the subject site that meet the TCEQ definition of a potential recharge feature.

The geologic features are described as follows:



Geologic feature F-1 consists of 2 solution-enlarged cross joint fractures (N67°E and N352°W), with the larger (primary) fracture measuring 2 feet long by 2 feet wide by 2 feet deep. After limited hand excavation, small rocks and loose soil were encountered. Moderate airflow was noted at the opening after hand excavation. Horizon staff excavated the feature (~11 feet long by 7 feet wide by 8.5 feet deep) on 1 and 3 June 2024 using a backhoe with hoe ram attachment. However, only 1 small bedding plane void (3 feet wide by 0.5 feet high) was found on the excavation wall at about 6 feet below the surface that extended laterally approximately 5 feet to the northwest. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.4 acres.



Geologic feature F-2 is a solution cavity that measures approximately 1 foot long by 0.2 feet wide by 1 foot deep, with a large rock over the top of the opening. After limited hand excavation, small rocks and loose soil were encountered to a depth of about 2 feet. Slight airflow was noted at the opening after hand excavation. Water infiltration of this feature is low to intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-3 is a solution-enlarged fracture (N3°E) that measures approximately 3 feet long by 0.1 foot wide by 0.5 feet deep. After limited hand excavation, small rocks and loose soil were encountered to about 1 foot deep. Slight airflow was noted at the opening after hand excavation. Water infiltration of this feature is low to intermediate and has an apparent surface runoff catchment of less than 0.4 acres.



Geologic feature F-4 is a solution cavity (previously hand excavated with spoil piles surrounding feature) that measures approximately 5 feet long by 4 feet wide by 3 feet deep and drops into a small room about 9 feet in diameter by 3 feet high. Slight airflow was noted at the opening. Horizon staff excavated the feature (9 feet long by 6 feet wide by 10.5 feet deep) on 29 and 30 May 2024 using a backhoe with hoe ram attachment. However, only 1 bedding plane void (9 to 3 feet wide by 2 feet to less than 0.5 feet high) was found on the excavation wall at about 2.5 feet below the surface that extended laterally toward the northwest for approximately 8.5 feet before pinching off. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.4 acres.

F-4 A' (0.0,5)	N 1 1"=10"
TTTT	a <u>5</u> _19
+ <u>[05]</u>	
	<u>A'</u>
	Stude 5
) - 10.5' below - 10 Stade

Geologic feature F-5 is a possible sinkhole or old water well that is filled with trash, rocks, and bricks, with spoil piles around the feature. The feature measures about 7 feet in diameter by 4 feet deep. After limited hand excavation, small rocks and loose soil were encountered to about 5 feet deep. Slight airflow was noted at the opening after hand excavation. Water infiltration of this feature is low to intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-6 is an upland sinkhole that measures approximately 3 feet in diameter by 1 foot deep, with a solution-enlarged fracture (N3°E) in the center about 1.5 feet long by 0.5 feet wide by 2 feet deep. After limited hand excavation, small rocks and loose soil were encountered about 3 feet deep. Slight airflow was noted at the opening after hand excavation.



Water infiltration of this feature is intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-7 is an upland sinkhole that measures approximately 5 feet in diameter by 0.5 feet deep, with a solution-enlarged fracture (N57°E) in the center about 4 feet wide by 1 foot wide by 0.5 feet deep. After limited hand excavation, small rocks and loose soil were encountered about 2 feet deep. Slight airflow was noted at the opening after hand excavation. Water infiltration of this feature is intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-8 is a solution cavity that measures approximately 1 foot in diameter by 1.5 feet deep. After limited hand excavation, small rocks and loose soil were encountered to a depth of about 2 feet. Slight airflow was noted at the opening after hand excavation. Water infiltration of this feature is low to intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-9 is an upland sinkhole that measures approximately 3.5 feet by 2.5 feet wide by 0.5 feet deep, with a solution cavity drainage portal in the center about 1.5 feet wide by 1 foot wide by 1 foot deep. After limited hand excavation, small rocks and loose soil were encountered about 1.5 feet deep. Slight airflow was noted at the opening after hand excavation. Water infiltration of this feature is intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-10 is a partially burrowed solution cavity measuring approximately 1.5 feet long by 1 foot wide by 1.5 feet deep. After limited hand excavation, small rocks and loose soil were encountered about 2 feet deep. Slight airflow was noted at the openings after hand excavation. Water infiltration of this feature is intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-11 is a partially burrowed solution cavity measuring approximately 1 foot long by 0.5 feet wide by 1 foot deep. After limited hand excavation, small rocks and loose soil were encountered about 2 feet deep. Slight airflow was noted at the openings after hand excavation. Water infiltration of this feature is intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-12 is an upland sinkhole that measures approximately 5 feet by 2 feet wide by 0.5 feet deep, with a partially burrowed solution cavity in the center about 2 feet long by 1.5 feet wide by 2 feet deep. A photograph of this feature is not available. After limited hand excavation, small rocks and loose soil were encountered about 3 feet deep. Very slight airflow was noted at the opening after hand excavation. Water infiltration of this feature is low to intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Approximately 12 geologic features (F-1 to F-12) have been evaluated as sensitive for groundwater recharge capability and would therefore require a TCEQ protective setback buffer.


In general, a protective buffer encompassing a sensitive feature is recommended to meet the TCEQ guidance for a setback of at least 50 feet in all directions from the feature's areal extent (perimeter), plus its watershed catchment up to 200 feet from the perimeter of the feature.

All the man-made features (M-1 to M-3) have been evaluated as non-sensitive for groundwater recharge capability and would therefore not require TCEQ protective setback buffers.

Portions of the site generally appear well-suited to development prospectuses. It should be noted that soil and drainage erosion would increase with ground disturbance. Native grasses and the cobbly content of the soil aid to prevent erosion. Soil and sedimentation fencing should be placed in all appropriate areas prior to any site disturbing activities.

Because the subject site is located over the Edwards Aquifer Recharge Zone, it is possible that subsurface voids underlie the site. If any subsurface voids are encountered during site development, work should halt immediately so that a geologist may assess the potential for the void(s) to provide meaningful contribution to the Edwards Aquifer.



4.0 **REFERENCES**

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- . 1994b. 7.5-minute series topographic maps, New Braufels, Texas, quadrangle. 1994.
- _____. 2-foot contours. Available via the Texas Natural Resources Information System (TNRIS) at https://data.tnris.org/collection/?c=6ddcc1e6-2059-4fa2-a2cf-4ab163e2c97e. Acquired 20 February 2019.

ATTACHMENT F

ADDITIONAL SITE MAPS



24085-Gruen_140_Acre_Tract\Graphics\24085-001GA_01A_Vicinity



24085--Gruen_140_Acre_Tract\Graphics\24085-001GA_02A_TopoHydro



24085-Gruen_140_Acre_Tract\Graphics\24085-001GA_03A_Topo





ATTACHMENT G

SITE PHOTOGRAPHS





PHOTO 1 View of geologic feature F-1 (solution-enlarged fractures), facing down



PHOTO 3 View of geologic feature F-2 (small solution cavity), facing south



PHOTO 2 View of F-1 after mechanical excavation, facing down



PHOTO 4 View of geologic feature F-3 (solution-enlarged fracture), facing down





PHOTO 5 View of geologic feature F-4 (solution cavity), facing down



PHOTO 7 View of F-5 (possible water well and/or trash-filled sinkhole), facing down



PHOTO 6 View of F-4 after excavation, facing down toward northwest



PHOTO 8 View of geologic feature F-6 (sinkhole/solution-enlarged fracture), facing down





PHOTO 9 View of geologic feature F-7 (sinkhole/solution-enlarged fracture), facing down



PHOTO 10 Closer view of F-8 (solution cavity), facing down



PHOTO 11 View of geologic feature F-9 (sinkhole/solution cavity), facing down



PHOTO 12 View of F-10 (solution cavity), facing down





PHOTO 13 View of geologic feature F-11 (solution cavity), facing down



PHOTO 15 View of man-made feature M-2 (old steel water storage tank)



PHOTO 14 View of man-made feature M-1 (water well), facing down



PHOTO 16 View of man-made feature M-3 (water well), facing down



22 August 2024

Clint Jones Regal, LLC 6 Gruen Wald New Braunfels, Texas, 78130 512.466.6695 | clint@regallanddevelopment.com

RE: Phase II Karst Survey of the 125-acre tract Located at Farm-to-Market Road 306 and Bretzke Lane Gruene, Comal County, Texas HJN 24085.002KS

Dear Mr. Jones:

Per request by Regal, LLC, Horizon Environmental Services (Horizon) has surveyed 2 geologic karst features out of 15 features (F-1 to F-15) previously identified at the above-referenced site. The objective of this Phase II Karst Survey (KS) was to evaluate the features' structural development, subgrade extent, and aquifer point recharge capability. Approximately 2 karst features (F-1 and F-4) were selected for Phase II karst survey investigation at the site based on their potential for aquifer point recharge sensitivity. Of note, the US Fish and Wildlife Service (USFWS) currently has no terrestrial karst invertebrates (TKIs) listed as endangered within Comal County. Figures are provided in Appendix A.

PHASE II KARST SURVEY METHODOLOGY

The field assessment was conducted between 29 May and 3 June 2024 and led by James Killian, Professional Geoscientist (PG), of Horizon, who is currently permitted by the USFWS (ESPER0004032-1) to sample and collect federally listed karst invertebrate species within Bexar, Travis, and Williamson counties, Texas, for scientific and species recovery purposes. Additional assistance was provided by Tyler Bradley (Geologist), Cherman Hall (Field Technician), Erick Bryant (Field Technician), and Chermaz Hall (Field Technician). Mr. Hall, Mr. Bryant, and Mr. Hall performed hand excavation of the features, explored/surveyed the features, and provided landscape cleanup. Mr. Hall performed mechanical excavation where necessary. Mr. Bradley prepared the sketch maps included in this report and prepared portions of this report. Mr. Killian served as the Project Manager, prepared portions of this report, and provided technical review. Personnel experience summaries are provided in Appendix B.

Sensitive features are defined in the Edwards Aquifer Rules as permeable geologic or man-made features located in the Recharge Zone or Transition Zone where a potential for hydraulic interconnectedness between the surface and the Edwards Aquifer exists and rapid infiltration to the subsurface may occur (TCEQ, 2005). Protection of a sensitive feature is provided by a natural ^{24085-002KS_Report}



surface buffer area, and the size is based on the drainage area for the feature, which typically includes a well-defined, bowl-shaped depression with evident drainage portals. The natural buffer around a feature should extend a minimum of 50 feet in all directions. However, when the boundary of the drainage area to the feature lies more than 50 feet from the feature, the buffer should extend to the boundary of the drainage area or 200 feet, whichever is less.

Tasks included excavation of the subject features, surveying and mapping of any subgrade void space, and assessing whether point recharge capability to the Edwards Aquifer (i.e., whether the feature is sensitive or non-sensitive) exists. Excavation of the features was performed using hand tools and a backhoe/front end loader with hoe ram attachment due to the presence of bedrock and/or large boulders/rocks at select features. The locations of features were mapped using a Garmin Foretrex 301 GPS, and data were post-processed with the aid of topographic maps and aerial photographs.

PHASE II KARST SURVEY RESULTS

A summary of the features' TKI habitat characteristics is included in Table 1 and detailed descriptions, photographs and sketches of the features are provided below each feature description.

	Potential Habitat Characteristics ⁱ					Additional Potential Habitat Characteristics ⁱⁱ			Unlikely Habitat Characteristics ⁱⁱⁱ				ination				
Feature Name	Presence of leaf litter, loose soils, or surface nutrients	Presence of air flow	Channelized recharge of water	Loose soil or rock fill of at least 30 cm	Collapse-formed/related to collapse	Clean washed rock at base	Cave crickets	Developed along or near fracture	Extends at least 1 m	Similar to nearby known caves	Contains enterable void	Calcite speleothems	Absence of troglobites or troglophiles	Lacks evidence of water-formed features	Absence of air flow	Not collapse-formed/related to collapse	Potential Habitat Detern
F-1	x		х	x				х	x				x	х	х	х	No
F-4	х		х	х									х	х	х	Х	No

TABLE 1 POTENTIAL HABITAT CHARACTERISTICS



ⁱⁱ A feature may be considered potential TKI habitat if it meets at least two of the criteria in this column

ⁱⁱⁱ If a feature meets all 5 of the habitat criteria in this column, it is unlikely to be TKI habitat and no further surveys would be needed

<u>Geologic Feature F-1</u> consists of 2 solution-enlarged cross joint fractures (N67°E and N352°W), with the larger (primary) fracture measuring 2 feet long by 2 feet wide by 2 feet deep. After limited hand excavation, small rocks and loose soil were encountered. Slight airflow was noted at the opening after hand excavation. Horizon staff excavated the feature (~11 feet long by 7 feet wide by 8.5 feet deep) on 1 and 3 June 2024 using a backhoe with hoe ram attachment. However, only 1 small bedding plane void (3 feet wide by 0.5 feet high) was found on the excavation wall at about 6 feet below the surface that extended laterally approximately 5 feet to the northwest.

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Sketch of F-1

ⁱⁱ A feature may be considered potential TKI habitat if it meets at least one of the criteria in this column



Horizon spent approximately 8 personnel-hours observing and searching this feature for any troglobitic karst invertebrates and cave fauna. However, no troglobitic karst invertebrates or cave fauna were observed during excavation. Based on a lack of pursuable void leads, the excavation was terminated and left open for review/concurrence by the Texas Commission on Environmental Quality (TCEQ). Based on the lack of airflow and its defined surveyed void extent, feature F-1 does not appear to have suitable habitat for karst invertebrates or cave fauna. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.4 acres.

Feature F-1 does not meet the minimum requirements to be classified as a cave, but rather is a mesocavern (e.g., humanly impassable void that does not appear to be connected to larger cave passages). According to the USFWS, there are currently no known and/or listed threatened or endangered (T/E) TKIs for mesocaverns and/or caves located within Comal County, Texas. This feature has been deemed sensitive for groundwater recharge and therefore has a TCEQ buffer of 200 feet upslope and 50 feet downslope surrounding the excavation/footprint of the void.



PHOTO 1 View of geologic feature F-1 (solution-enlarged fractures), facing down





PHOTO 2 View of F-1 after mechanical excavation, facing down

<u>Geologic Feature F-4</u> is a solution cavity (previously hand-excavated with spoil piles surrounding the feature) measuring approximately 5 feet long by 4 feet wide by 3 feet deep that drops into a small room about 9 feet in diameter by 3 feet high. Slight airflow was noted at the opening. Horizon staff excavated the feature (9 feet long by 6 feet wide by 10.5 feet deep) on 29 and 30 May 2024 using a backhoe with hoe ram attachment. However, only 1 bedding plane void (9 to 3 feet wide by 2 feet to less than 0.5 feet high) was found on the excavation wall at about 2.5 feet below the surface that extended laterally toward the northwest for approximately 8.5 feet before pinching off.

Horizon spent approximately 8 personnel-hours observing and searching this feature for troglobitic karst invertebrates and cave fauna. Based on the lack of airflow and its defined surveyed void extent, feature F-4 does not appear to have suitable habitat for karst invertebrates or cave fauna. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.4 acres.

Feature F-4 does not meet the minimum requirements to be classified as a cave, but rather is a mesocavern (e.g., humanly impassable void that may or may not be connected to larger cave passages) that has the potential to contain suitable habitat for any T/E TKIs. According to the USFWS, there are currently no known and/or listed T/E TKIs for mesocaverns and/or caves located within Comal County, Texas. This feature has been deemed sensitive for groundwater recharge and therefore has a TCEQ buffer of 200 feet upslope and 50 feet downslope surrounding the excavation/footprint of the void.



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Sketch of F-4





PHOTO 3 View of geologic feature F-4 (solution cavity), facing down



PHOTO 4 View of F-4 after excavation, facing down toward northwest



TABLE 2FEATURE SUMMARY

Name	Latitude (Decimal Degree)	Longitude (Decimal Degree)	Description	T/E Habitat Potential
F-1	29.748906	-98.1128417	Solution-enlarged fracture	No
F-4	29.748323	-98.110422	Solution cavity	No

KARST FEATURE ASSESSMENT

In Central Texas, cave development and potential karst invertebrate species habitat usually occur within the more porous and/or solutioned stratigraphic members of the Edwards Formation. Caves that have developed within the Edwards via a natural entrance path (i.e., sinkhole, solution cavity, or solution-enlarged fracture) frequently provide more suitable conditions for karst invertebrates. However, if a cave develops within the Edwards and does not have a natural connection to the surface (i.e., interstitial), the cave or void is usually a sterile environment (void of organisms). Unsuitable habitat occurs because there is no surface connection that allows organic materials into the cave to sustain any invertebrate life forms. Caves that do have a surface connection also require sufficient depth and/or extent to provide stable temperature and humidity. All these factors are examined and reviewed in determining the potential for karst invertebrate species habitat in the subgrade.

According to the USFWS, 16 karst invertebrate species are listed as endangered in central Texas. Nine of these species occur within Bexar County and 7 occur within Travis and/or Williamson counties. However, no threatened and/or endangered karst invertebrate species are currently listed by the USFWS within Comal County.

The results of the Phase II Karst Survey have identified no geologic features within the subject site which have sufficient subsurface development to be classified as a **cave**. The standards established by the Texas Speleological Survey (TSS) require a karst feature to have, at a minimum, 15 feet of human-traversable subterranean passage to be properly classified as a cave. This distance may be vertical, horizontal, or a combination of both. Neither of the karst features (F-1 or F-4) met the criteria for TSS cave classification.

RECOMMENDATIONS

Based upon the results of the karst feature investigation and the absence of any USFWS known and/or listed karst invertebrate species, no biological collections are recommended for features F-1 and F-4. Figure 3 presents the proposed TCEQ setback buffers for select features.

As previously discussed, all the excavated karst features deemed sensitive for groundwater point recharge into the Edwards Aquifer would require natural surface setback buffers pending TCEQ concurrence after submittal of a Geologic Assessment for Water Pollution Abatement Plan



(WPAP). Sensitive features identified in the Geologic Assessment should not be sealed but should instead be protected from the potential impacts of stormwater runoff from any new development in the subject area.

Based on the identified geologic information, a moderate potential exists that subsurface voids may be encountered during any proposed construction or grading activities. If such voids are encountered, excavation should stop immediately, and a qualified karst geologist should be contacted to perform an inspection of the voids.

Horizon appreciates the opportunity to be of service to you and provide this letter report. Please contact us if you have any questions or require additional information.

For Horizon Environmental Services A Branch of LJA Environmental Services, LLC Registered TBPG Firm No. 50679

Amere P. Iullion

Jámes Killian, P.G.¹ Senior Geologist – Horizon

REFERENCES



- Clark, A.K., Golab, J.A., Morris, R.R., and Pedraza, D.E., Geologic framework and hydrostratigraphy of the Edwards and Trinity Aquifers within northern Bexar and Comal Counties, Texas, US Geological Survey, Scientific Investigations Map 3510, 1:24,000. Published 2016.
- (Nearmap) Nearmap US PhotoMaps. Created by Nearmap_Engineering 20 April 2017. Imagery date 6 December 2023.
- (OSM) OpenStreetMap contributors. Open Street Map, <http://www.openstreetmap.org>. Available under the Open Database License (www.opendatacommons.org/ licenses/odbl). Accessed 17 May 2024.
- (TCEQ) Texas Commission on Environmental Quality. RG-348, Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices. Revised July 2005.
- (TWSC) United States Geological Survey, Texas Water Science Center. Geologic Database of Texas, <https://txpub.usgs.gov/txgeology/>. Updated 1 February 2014; Accessed 17 May 2024.
- (UT-BEG) The University of Texas at Austin Bureau of Economic Geology; C.V. Proctor, Jr., T.E. Brown, J.H. McGowen, N.B. Waechter, and V.E. Barnes. *Geologic Atlas of Texas*, Austin Sheet. Francis Luther Whitney Memorial Edition. Revised 1995.

¹ Registered Professional Geologist, State of Texas



APPENDIX A

FIGURES





Legend A Man-Made Fea Sensitive Geole Fault Subject Site	ature ogic Feature					
Horizon Environmental Services	Date: Drawn: HJN NO: Source:	05/20/2024 KRW 24085.001 KS Clark, 2016; Nearmap, 2023	Figure 2 Geologic Feature Map Gruene 125-Acre Tract FM 306 & Bretzke Lane Gruene, Comal County, Texas	CAMES P. KILLIAN B. COLOGY M. COLOGY M. COLOGY M. COLOGY	0 200 4 Feet	400 ⊐
Fault Subject Site Horizon Environmental Services W24085-Gruen_140_Acre_Tract\Graphics\2408	Date: Drawn: HJN NO: Source:	05/20/2024 KRW 24085.001 KS Clark, 2016; Nearmap, 2023	Figure 2 Geologic Feature Map Gruene 125-Acre Tract FM 306 & Bretzke Lane Gruene, Comal County, Texas	AMES P KILLAN Recogy No. 1001 No. 1001 No. 1001 No. 1001 No. 1001 No. 1001 No. 1001	0 200 4 Feet	400



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APPENDIX B

PERSONNEL EXPERIENCE SUMMARIES



James P. Killian, PG, Senior Geoscientist

Texas Professional Geoscientist No. 10281 | USFWS Permit No. ESPER0004032-1 (Karst invertebrates)

Mr. James Killian, PG, is a graduate of Stephen F. Austin State University in Nacogdoches, Texas, where he studied Geological Sciences. Mr. Killian has been with Horizon for 8.5 years and has over 30 years of experience in the fields of geology, hydrogeology, and speleology. He has performed various waste (hazardous and non-hazardous) characterizations, geologic/hydrogeologic studies, environmental assessments (EA), environmental impact statements (EIS), and remedial design projects. He has conducted numerous karst surveys, karst excavations, and endangered karst invertebrate species collections per US Fish and Wildlife Service (USFWS) guidelines and is permitted for scientific research and recovery of species in Travis, Williamson, and Bexar counties under USFWS Permit No. ESPER0004032-1. In addition, he has valuable experience in the exploration, surveying, mapping, and gating of various caves throughout Central Texas. He has also conducted dye tracer studies and aquifer testing for karstrelated groundwater investigations. As an authorized permittee, Mr. Killian is present during all surface and biological surveys and is responsible for project management, report writing and preparation. Additionally, Mr. Killian's duties include backhoe/hoe ram operation, hand excavation, cave exploration/surveying/mapping, and landscaping/site cleanup.

Tyler Bradley, Geologist

Mr. Bradley is a graduate of Texas Tech University in Lubbock, Texas, where he studied Geosciences. Mr. Bradley has been with Horizon for over 1 year. He provides field support in recognition of karst characteristics, karst excavations, and endangered karst invertebrate species collections per USFWS guidelines, as well as geologic assessments according to Texas Commission on Environmental Quality (TCEQ) Water Pollution Abatement Plan (WPAP) guidelines. Mr. Bradley is proficient in ArcMap and contributes to Horizon's GIS mapping services, preparing exhibits for technical reports and permitting packages.

Prior to his work at Horizon, Mr. Bradley learned and developed skills in structure contour mapping in addition to gaining experience using ArcGIS software. He completed structure mapping projects using strike and dip data to fully create and analyze cross sections of environmental structures. Outside of field work, he has developed proficiency in thin section microscopic analysis of rock compositions to determine their formation processes and depositional environments, which has strengthened both his practical knowledge of geologic situations as well as his strategic thinking when dealing with challenges.

Mr. Bradley is actively studying for the Association of State Boards of Geology (ASBOG) exam and plans to earn his Geologist-In-Training (GIT) certification before eventually becoming a licensed Professional Geoscientist. Under the supervision of James Killian, PG, Mr. Bradley provides field support in surface and biological surveys with duties including hand excavation, cave exploration, and landscaping/site cleanup. Additionally, Mr. Bradley assists in report writing, providing geospatially referenced data, preparing sketch maps, and creating figures for reports.



Cherman Hall, Field Technician

Mr. Cherman Hall is a graduate of Verbum Dei Catholic High School in Los Angeles, California. Mr. Hall is an ecological technician specializing in wetlands restoration/preservation and karst studies. During his 8 years of wetlands work with Horizon, Mr. Hall worked under the supervision of Lee Sherrod (Senior Project Director and Wetland Scientist) and Greg Sherrod (Ecological Project Manager). His responsibilities included the preservation of native vegetation and the removal of invasive vegetation, as well as the introduction of native plants and fish to man-made lakes and ponds. Mr. Hall also plants native plants and grasses for the purpose of erosion control. Mr. Hall has 5 years of experience working with karst studies under the supervision of James Killian, PG (Senior Geoscientist). His responsibilities include locating possible positive aquifer recharge features, excavating the features, karst surveying/mapping, and collecting endangered invertebrates. Mr. Hall has studied over 100 karst features. Under supervision of James Killian, PG, Mr. Hall provides field support in surface and biological surveys with duties including site supervision, backhoe/hoe ram operation, hand excavation, cave exploration/surveying, and landscaping/site cleanup.

Erick Bryant, Field Technician

Mr. Erick Bryant is a graduate of LBJ High School in Austin, Texas. Before taking on karst-related geological work for Horizon approximately 1 year ago, he was employed as a laborer for an event design company. Under the supervision of Mr. James Killian, PG, Mr. Bryant has located, excavated, explored, and assisted in surveying several karst features. Mr. Bryant recently started assisting with wetlands preservation under the supervision of Greg Sherrod (Ecological Project Manager). Under the supervision of James Killian, PG, Mr. Bryant provides field support in surface and biological surveys with duties including hand excavation, cave exploration, and landscaping/site cleanup.

Chermaz Hall, Field Technician

Mr. Chermaz Hall is a graduate of Del Valle High School in Del Valle, Texas. Mr. Hall began taking on the exciting challenge of karst-related duties approximately 1.5 years ago. Prior to geological work for Horizon, he was employed as a security officer and as a laborer for an event design company. Under the supervision of James Killian, PG, Mr. Hall provides field support in surface and biological surveys with duties including hand excavation, cave exploration, and landscaping/site cleanup.

Water Pollution Abatement Plan Application

Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b), 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 **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: Seamus MacFarland, PE

Date: 10/04/2024

Signature of Customer/Agent:

Seamus MacFarland

Regulated Entity Name: River's Edge at Gruene Condos

Regulated Entity Information

- 1. The type of project is:
 - Residential: Number of Lots: _____

 X
 Residential: Number of Living Unit Equivalents: 27

 Commercial
 - _____ Industrial
 - Other:
- 2. Total site acreage (size of property): 124.79 AC
- 3. Estimated projected population:
- 4. The amount and type of impervious cover expected after construction are shown below:

 Table 1 - Impervious Cover Table

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops		÷ 43,560 =	
Parking		÷ 43,560 =	
Other paved surfaces		÷ 43,560 =	
Total Impervious Cover		÷ 43,560 =	

Total Impervious Cover $5.73 \div$ Total Acreage $124.79 \times 100 = 4.59 \%$ Impervious Cover

- 5. X Attachment A Factors Affecting Surface Water Quality. A detailed description of all factors that could affect surface water and groundwater quality that addresses ultimate land use is attached.
- 6. X 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:

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Concrete
Asphaltic concrete pavement
Other:
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9. Length of Right of Way (R.O.W.): _____ feet.

Width of R.O.W.: _____ feet. L x W = _____ $Ft^2 \div 43,560 Ft^2/Acre = _____ acres.$

10. Length of pavement area: _____ feet.

Width of pavement area: _____ feet. L x W = ____ $Ft^2 \div 43,560 Ft^2/Acre = ____ acres.$ Pavement area _____ acres \div R.O.W. area _____ acres x 100 = ____% impervious cover.

11. A rest stop will be included in this project.

A rest stop will not be included in this project.

12. 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 detailed description of the volume (quantity) and character (quality) of the stormwater runoff which is expected to occur from the proposed project is attached. The estimates of stormwater runoff quality and quantity are based on the 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:

<u>100_</u> % Domestic	Gallons/day
% Industrial	Gallons/day
% Commingled	Gallons/day
TOTAL gallons/day	

15. Wastewater will be disposed of by:

On-Site Sewage Facility (OSSF/Septic Tank):

Attachment C - Suitability Letter from Authorized Agent. An on-site sewage facility
will be used to treat and dispose of the wastewater from this site. The appropriate
licensing authority's (authorized agent) written approval is attached. It states that
the land is suitable for the use of private sewage facilities and will meet or exceed
the requirements for on-site sewage facilities as specified under 30 TAC Chapter 285
relating to On-site Sewage Facilities.

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.

Sewage Collection System (Sewer Lines):

- Private service laterals from the wastewater generating facilities will be connected to an existing SCS.
- Private service laterals from the wastewater generating facilities will be connected to a proposed SCS.

The SCS was previously submitted on_____.

-] The SCS was submitted with this application.
-] 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. \times All private service laterals will be inspected as required in 30 TAC §213.5.

Site Plan Requirements

Items 17 – 28 must be included on the Site Plan.

17. X The Site Plan must have a minimum scale of 1'' = 400'.

Site Plan Scale: 1'' = 400'.

18. 100-year floodplain boundaries:

Х	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): <u>48091</u>C0455G (05/08/2024), 48091C0290G (05/08/2024)

19. X The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Lots, recreation centers, buildings, roads, open space, etc. are shown on the plan.

The layout of the development is shown with existing contours at appropriate, but not greater than ten-foot intervals. Finished topographic contours will not differ from the existing topographic configuration and are not shown. Lots, recreation centers, buildings, roads, open space, etc. are shown on the site plan.

20. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):

There are _____ (#) 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.

X 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:
 - X 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. A request and justification for an exception to a portion of the Geologic Assessment is attached.

- 22. X 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. Surface waters (including wetlands).

X N/A

27. Locations where stormwater discharges to surface water or sensitive features are to occur.

 \mathbf{X} There will be no discharges to surface water or sensitive features.

28. X Legal boundaries of the site are shown.

Administrative Information

- 29. 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.
- 30. X Any modification of this WPAP will require Executive Director approval, prior to construction, and may require submission of a revised application, with appropriate fees.

Attachment A – Factors Affecting Surface Water Quality

Potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the site during construction include:

- Soil erosion due to the clearing of the site
- Oil grease, fuel and hydraulic fluid contamination from construction equipment and vehicle drippings
- Hydrocarbons from asphalt paving operations
- Miscellaneous trash and litter from construction workers and material wrappings
- Concrete truck washout
- Spills/Overflow from portable toilets

Potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the site after development include:

- Oil, grease, fuel and hydraulic fluid contamination from vehicle drippings
- Dirt and dust which may fall off vehicles
- Miscellaneous trash and litter

Attachment B – Volume and Character of Stormwater

The site is currently undeveloped, with slopes from 2%-10%. The overall runoff coefficient prior to development of the 24.34 acre lot varies based on storm (see drainage area map). The site will flow thru stormwater system into the extended detention water quality ponds, and eventually into Guadalupe River.

The proposed use for this property is for a temporary street consisting of 3.25 acres of impervious and 2.48 acres of impervious based on max building pad sizing for each lot. A proposed composite c-value varies based on the storm event for the run-off coefficients.

Attachment C – Suitability Letter from Authorized Agent

Each lot is larger than 1 acre, an OSSF will be designed by a registered sanitarian and installed by a licensed installer in compliance with 30 TAC Chapter 285.

Attachment D – Exception to the Required Geologic Assessment

Geological assessment by others to be provided. No exception is being requested.





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K: \A292 Regal Land Development\426 Site Development Plans\DWG-Sheets\sh_l User: smacfarland Last Modified: Jan. 29, 25 - 16:22

DRAINAGE & GRADING NOTES:

- THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING EXACT LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES WHETER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL UNCOVER EXISTING UTILITIES HORIZONTALLY AND VERTICALLY PRIOR TO CONSTRUCTION TO VERIFY SIZE, GRADE, AND LOCATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY DEVIATION FROM PLANS PRIOR TO BEGINNING CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES, WHETER SHOWN ON THE PLANS OR NOT, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR, AT HIS EXPENSE
- 2. ALL CONCRETE FOR TXDOT DRAINAGE STRUCTURES SHALL MEET TXDOT SPECIFICATIONS. ALL OTHER CONCRETE SHALL BE CLASS "A" CONCRETE AND MEET
- MINIMUM COMPRESIVE STRENGTH OF 3,000 PSI IN 28 DAYS. 3. REFERENCE DRAINAGE DETAILS FOR PIPE TRENCH DETAILS, BOX CULVERT, HEADWALL, AND WINGWALL CONSTRUCTION DETAILS, AND BOX CULVERT BEDDING
- AND EXCAVATION LIMITS. 4. CONTRACTOR SHALL GROUT ALL CURB INLETS AND JUNCTION BOXES TO PROVIDE
- FOR POSITIVE DRAINAGE. 5. EARTHEN CHANNELS WILL BE VEGETATED BY SEEDING OR SODDING 85% OF THE
- CHANNEL SURFACE MUST HAVE ESTABLISHED VEGETATIUON BEFORE THE CITY OF NEW BRAUNFELS WILL ACCEPT. 6. CONTRACTOR SHALL MATCH TOP OF CHANNEL TO NATURAL GROUND AND MAINTAIN A
- MINIMUM CHANNEL DEPTH "D" AS SHOWN IN THE PROFILE. 7. ALL RCP SHALL BE AASHTO M170 CLASS III RCP. 8. ALL WORK SHALL BE PERFORMED WITHIN SITE LIMITS OF CONSTRUCTION. 9. CONTRACTOR TO PROOF ROLL BOTTOM AND SIDES OF POND TO ENSURE FIRM
- BOTTOM. IF BOTTOM APPEARS FRACTURED CONTRACTOR TO NOTIFY ENGINEER PRIOR TO PLACEMENT OF SAND BED ON TOPSOIL. 10. THE CONTRACTOR WILL BE REQUIRED TO PERFORM TESTING REQUIREMENTS TO
- SATISFY CITY OF NEW BRAUFNELS INSPECTIONS. THIS SHALL INCLUDE BUT NOT LIMITED TO PROVIDING NECESSARY WATER AS REQUESTED BY INSPECTOR 11. THE CONTRACTOR WILL BE RESPONSIBLE FOR POSITIVE DRAINAGE IN BASIN AREA.
- 12. ALL DISTURBED AREAS TO BE STABILIZED WITH HYDROMULCH IMMEDIATELY AFTER ESTABLISHING FINAL GRADES UNLESS OTHERWISE NOTED. 13. UPON COMPLETION OF THE PROPOSED STORMWATER DETENTION, AND PRIOR TO THE
- RELEASE OF THE CERTIFICATE OF ACCEPTANCE OR OCCUPANCY BY THE PERMIT CENTER, THE DESIGN ENGINEER SHALL CERTIFY IN WRITING THAT THE PROPOSED STRUCTURAL CONTROL(S) WAS INSPECTED (INCLUDING DATE AND TIME OF THE INSPECTION) AND CONSTRUCTED IN CONFORMANCE WITH THE APPROVED PLANS. 14. ALL CONCRETE LINING SHALL BE A MINIMUM OF SIX (6) INCHES THICK AND
- REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER EACH WAY OR WELDED WIRE FABRIC OF 6" x 6"-W/D6 x W/D6. THE DEPTH OF ALL TOEDOWNS SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES FOR SIDE SI OPES
- 15. CONTRACTOR TO FILL AND COMPACT TO 95% DENSITY IN FILL SECTIONS OVER STORM SEWER LINES. 2.0'(MIN) COVER OVER WATER PRIOR TO CONSTRUCTION.
- 16. ALL PIPE SHALL BE INSTALLED IN ACCORDANCE WITH CITY OF NEW BRAUNFELS SPECIFICATIONS. 17. ALL BENDS AND FITTINGS SHALL BE PREFABRICATED BY MANUFACTURER. NO FIELD

FABRICATION OF FITTINGS IS ALLOWED.

Edwards Aquifer Protection Program Construction Notes – Legal Disclaimer The following/listed "construction notes" are intended to be advisory in nature only and do not constitute an approval or conditional approval The following/listed "construction notes" are intended to be advisory in nature only and do not constitute an approval or conditional approval by the Executive Diractor (ED), nor do they constitute a comprehensive listing of rules or conditions to be followed during construction. Further actions may be required to achieve compliance with TCEO regulations found in Title 30, Texas Administrative Code (TAC), Chapters 213 and 217, as well as local ordinances and regulations providing for the protection of water quality. Additionally, nothing contained in the following/listed "construction notes" restricts the powers of the ED, the commission or any other governmental entity to prevent, correct, or curatal activities that result or may result in pollution of the Edwards Aquifer or hydrologically connected surface waters. The holder of any Edwards Aquifer Protection Plan containing "construction notes" is still responsible for compliance with Title 30, TAC, Chapters 213 or any other applicable TCEO regulation, as well as all conditions of an Edwards Aquifer Protection Plan through all phases of plan implementation. Failure to comply with any condition of the ED's approval, whether or not in contradiction of any "construction notes," is a violation of TCEQ regulations and any violation is subject to administrative rules, oriers, and panellise as provided nucle Title 30, TAC, Chapters 'in a violation is subject to administrative rules, oriers, and panellise as provided nucle Title 30, TAC § 213.10 (relating to Enforcement). Such violations may also be subject to civil penalties and injunction. The following/listed "construction notes" in no way represent an approved exception by the ED to any part of Title 30 TAC, Chapters 213 and 217, or any other TCEQ applicable regulation and the top to the ED's approval.

Texas Commission on Environmental Quality Water Pollution Abatement Plan General Construction Notes

- 1. A written notice of construction must be submitted to the TCEQ regional office at least 48 the norm prior to the start of any regulated activities. This notice must include:
 the name of the approved project;
 the activity start date; and
 the contact information of the prime contractor.
- All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan (WPAP) and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approved letter.
- 3. If any sensitive feature(s) (caves, solution cavity, sink hole, etc.) is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. Construction activities may not be resumed until the TCEQ has reviewed and approved the appropriate protective measures in order to protect any sensitive feature and the Edwards Aquifer from potentially adverse impacts to water quality. impacts to water quality.
- No temporary or permanent hazardous substance storage tank shall be installed within 150 feet of a water supply source, distribution system, well, or sensitive feature. 5. Prior to beginning any construction activity, all temporary erosion and sedimentation (E&S) control measures must be properly installed and maintained in accordance with the approved plans and manufacturers specifications. If inspections indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations. These controls must remain in place until the disturbed areas have been nermanently stabilized.
- permanently stabilize Any sediment that escapes the construction site must be collected and properly disposed of before the next rain event to ensure it is not washed into surface streams, sensitive features,
- 7. Sediment must be removed from the sediment traps or sedimentation basins not later than

Page 1 of 2

TCEQ-0592 (Rev. July 15, 2015)

TCEQ-0592 (Rev. July 15, 2015)

---------------_____ -----/--/ -----48.97 L.F. 36" SDR-26 @ 4.72%-5'x5' JUNCTION BOX STA=1+55.29 RIM=649.08-INV IN=644.21 INV OUT=644.21 53.61 L.F. 3'x2' R.C.B. @ 0.50%-20' CURB INLET STA=2+08.90 _____ RIM=648.01 INV OUT=644.48





THESE GENERAL CONSTRUCTION NOTES MUST BE INCLUDED ON THE CONSTRUCTION PLANS PROVIDED TO THE CONTRACTOR AND ALL SUBCONTRACTORS.

Page 2 of 2

	RE	QUIRED TS	SS REMOVAL	FOR ENTI	RE SITE			
TOTAL ACREAGE	TOTAL PRE-DEVELOPMENT ACREAGE IMPERVIOUS COVER		POST-DEVELOPME IMPERVIOUS COVER	NT POST-DE IMPERV TREA APPROV	VELOPMENT IOUS COVER TED BY EX /ED PONDS*	Lm-REQUIRED TSS REMOVAL		
24.34 ACRES	0.0	00 ACRES	5.73 ACRES	0.00) ACRES	5,359 LBS		
		BREAKD	OWN OF TSS	BEING TH	REATED BY	PERMANEN	T BMP'S	
PROPOS BMP	SED	DRAINAGE AREA TO BMP	IMPERVIOUS COVER TO BPM	BMP EFFICIENCY	F	REQUIRED TSS TO BE TREATED (LBS)	TSS BEING REMOVED BY BMP (LBS)	ACTUAL TSS BEING REMOVED BY BMP (LBS)
BATCH DET 'A1'	ENTION	14.80 ACRES	3.21 ACRES	91%	0.88	2,881 LBS	3,523 LBS	3,100 LBS
VEGETATIVE STRIP '/	E FILTER A2'	0.5 ACRES	0.22 ACRES	85%	1.0	197 LBS	218 LBS	218 LBS
VEGETATIVE FILTER STRIP 'A3'		0.6 ACRES	0.25 ACRES	85%	1.0	224 LBS	248 LBS	248 LBS
VEGETATIVE FILTER STRIP 'B1'		2.6 ACRES	1.13 ACRES	85%	1.0	1014 LBS	1119 LBS	1119 LBS
VEGETATIVE FILTER STRIP 'C1'		0.8 ACRES	0.34 ACRES	85%	1.0	305 LBS	337 LBS	337 LBS
VEGETATIVE FILTER STRIP 'C2'		0.8 ACRES	0.34 ACRES	85%	1.0	305 LBS	337 LBS	337 LBS
UNTREATED		10.9 ACRES	0.5 ACRES			449 LBS	0 LBS	0 LBS

20 10	0 20 40
	SCALE IN FEET SCALE: 1"=20'
LEGEND	
———————————	EXISTING CONTOUR
	PROPOSED CONTOUR
X.XX	FLOW ARROWS
CEREER O	ROCK BERM
	TEMP. SPOILS & STORAGE AREA
\boxtimes	CONCRETE TRUCK WASHOUT PIT
	CONSTRUCTION ENTRANCE
LOC*SF	LIMITS OF CONSTRUCTION/ SILT FENCE
I.P. 53	INLET PROTECTION
	VEGETATIVE FILTER STRIPS

EMERGENCY OVERFLOW WEIR CALCULATION Q_{CAP}=C*L*H^{3/2} L=50' H=1.0' C=2.6 Q_{CAP}=2.6*50*1.0^{3/2} Q_{CAP}=130.0 CFS Q₁₀₀=56.0 CFS 130.0 CFS > 56.0 CFS = OK

> CAUTION: CONTRACTOR TO NOTIFY TEXAS ONE CALL AT 1-800-245-4545 48 HOURS PRIOR TO CONSTRUCTION FOR UTILITY LINE LOCATE. CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY SIGNIFICANT DISCREPANCIES OR REQUIRED DESIGN CHANGES. EXISTING UTILITIES SHOWN HEREON ARE FOR INFORMATIONAL PURPOSES ONLY. ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THIS INFORMATION.

UNDERGROUND AND OVERHEAD UTILITIES ARE APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING WORK AND SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR.

LOCATION OF EXISTING







K:\A292 Regal Land Development\426 Site Development Plans\DWG-Sheets\sh_Prop I User: smacfarland Last Modified: Nov. 18, 24 - 08:42 Plot Date/Time: Jan. 29, 25 - 16:31:38

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81 00	0.83 Runo 0.50	off Coefficie	0.39 ents Refere 10.40	0.86 enced from (0.00	0.88 City of New B 0.50	raunfels 0.41	0.42 DCM Table 10.40	4.1 0.00	0.92	0.44	0.46	0.95	0.97	0.48	E SUE		INAGE	
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	Texas Commission on Environmental Quality	Texas C
	ISS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024	TSS Rem
	Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348. Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadebest	Addition Text show Characte
	1. The Required Load Reduction for the total project Calculations from RG-348 Pages 3-27 to 3-30	Characte 4. The Post
	Page 3-29 Equation 3.3: L _M = 27.2(A _N x P) where: L _{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load	<u>1. The Red</u>
	A _N = Net increase in impervious area for the project P = Average annual precipitation, inches Site Data: Determine Required Load Removal Based on the Entire Project	wh
	County = Comal Total project area included in plan * = 24.34 acres Predevelopment impervious area within the limits of the plan* = 0.00 acres Total post-development impervious area within the limits of the plan* = 5.70 lacres	Site D
	Total post-development impervious cover fraction [*] = $\frac{0.57}{0.25}$ acres P = $\frac{33}{33}$ inches	Tot
	L _{M TOTAL PROJECT} = 5359 lbs. * The values entered in these fields should be for the total project area.	
	Number of drainage basins / outfalls areas leaving the plan area = 7	* The value
	2. Drainage Basin Parameters (This information should be provided for each basin Drainage Basin/Outfall Area No. = A1	
	Total drainage basin/outfall area 14.80 acres Predevelopment impervious area within drainage basin/outfall are = 0.00 acres Post-development impervious area within drainage basin/outfall are = 3.21 acres Past-development impervious area within drainage basin/outfall are = 0.22	<u>2. Drainage</u>
	L _{M THIS BASIN} = 2881 lbs. 3. Indicate the proposed BMP Code for this basin	Pa
	Proposed BMP = <mark>Extended Detention</mark> Removal efficiency = 91 percent Aqualogic Cartridge Filter	Post-c
	Bioretention Contech StormFilter Constructed Wetland Extended Detention	<u>3. Indicate</u>
	Grassy Swale Retention / Irrigation Sand Filter	
<pre>bit de la de</pre>	Vegetated Filter Strips Vortechs Wet Basin	
<pre>M</pre>	4. Calculate Maximum TSS Load Removed (L _a) for this Drainage Basin by the selected BMP Type. Wet Vault RG-348 Page 3-33 Equation 3.7: L _R = (BMP efficiency) x P x (A x 34.6 + A _P x 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	
<pre>https://www.setup.org/fice/fice/fice/fice/fice/fice/fice/fice</pre>	A_p = Pervious area remaining in the BMP catchment area L_R = TSS Load removed from this catchment area by the proposed BMP	4. Calculate
	$A_{1} = 3.21$ acres $A_{p} = 11.59$ acres $L_{p} = 2523$ line	wh
<pre>share share s</pre>		
<pre>result of the second seco</pre>	5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall are Desired L _{M THIS BASIN} = 3100 lbs.	
<pre>light dig dig dig dig dig dig dig dig dig dig</pre>	F = 0.88 6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall are: Calculations from RG-348 Pages 3-34 to 3-36	
<pre>Second second seco</pre>	Rainfall Depth = 1.50 inches Post Development Runoff Coefficient = 0.21	<u>5. Calculate</u>
<pre>Prove provide state of the second state o</pre>	On-site Water Quality Volume = 17056 cubic feet Calculations from RG-348 Pages 3-36 to 3-37	
<pre>Prove state s</pre>	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	
<pre>Market de la de la</pre>	Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 cubic feet	
Take Control and a control of the second data and a control of the	Storage for Seament = 3411 Total Capture Volume (required water quality volume(s) x 1.20) = 20468 cubic feet	
<pre>bit can be called a base of the base</pre>		
<pre>that was a watch a watch</pre>	Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge	Texas C TSS Ren
Index definition for index definitionContract 100 and	Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.	Texas C TSS Ren Addition
	Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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 black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.	Texas C TSS Ren Addition Text show Character Character
<pre>Product of the second of</pre>	Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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 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 for RG-348 Pages 3-27 to 3-30	Texas C TSS Ren Addition Text show Characte Characte 1. The Ren
<pre>bit description of the strength of the st</pre>	Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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 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 33: Lu = 27 2(Aqi x P)	Texas C TSS Ren Addition Text sho Characte 1. The Rec
<pre>bit bit bit bit bit bit bit bit bit bit</pre>	Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Propared: 10/9/2024 Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell. Text shown in bule 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 Lead Reduction for the total project Calculations from RG-348 Page 3-29 Equation 33: Lu = 27.2(Au x P) where: Luronze, reaser: The Required TSS removal resulting from the proposed development = 80% of increased load Au = Net increase in impervious area for the project P = Average annual precipitation, increase	Texas C TSS Ren Addition Text sho Characte Characte 1. The Ren wit
<pre>location provide a serie of the series of the series</pre>	Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Propared: 10/9/2024 Additional Information Is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell. Texas to shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348. 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: lue 27.2/(Au X P) Vener: Larone are for the project where: Larone resulting from the proposed development = 80% of increased load Au = Net increase in impervious area for the project Paverage annual project Paverage annual project Comal Site Date: Determine Required Load Renoval Based on the Entire Project Comal County = County =	Texas C TSS Ren Addition Text sho Characte Characte 1. The Ren wf Site I
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NOTES:

- 1. CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION IN BASINS PER BASIN DETAIL SHEET PRIOR TO SITE CLOSEOUT.
- 2. UPON COMPLETION OF CONSTRUCTION, AND IN ACCORDANCE WITH TCEQ REGULATIONS, ALL PERMANENT BMP'S (FILTERSTRIPS AND BASINS) MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
- 3. ALL AREAS DISTURBED AS PART OF CONSTRUCTION OF BASINS SHALL BE REVEGATATED PRIOR TO COMPLETION.

SEQUENCE OF OPERATION

- 1. UPON ACTIVATION OF FLOAT SWITCH, DDC CONTROLLER TO START DETENTION TIMER #1.
- 2. DETENTION TIMER #1 TO BE MANUALLY SET TO 12 HOURS AND TO BE USER ADJUSTABLE VALUE.
- 3. WHEN DETENTION TIMER #1 HAS ELAPSED, A 8" BUTTERFLY VALVE IS TO OPEN AND RELEASE DETAINED WATER BASIN.
- 4. UPON DEACTIVATION OF FLOAT SWITCH, DDC CONTROL TO START DETENTION TIMER #2.
- 5. DETENTION TIMER #2 TO BE MANUALLY SET TO 19-48 HOURS AND TO BE USER ADJUSTABLE.
- 6. WHEN DETENTION TIMER #2 HAS ELAPSED, THE 8" BUTTERFLY VALVE IS TO CLOSE.
- 7. VALVE TO BE ACTUATED PERIODICALLY TO SHOW ACTIVE REGARDLESS OF FLOAT SWITCH OPERATION.

NOTES TO CONTRACTOR (EACH PHASE OF BASIN CONSTRUCTION)

- 1. CONTRACTOR IS ADVISED THAT TCEQ DOES NOT ALLOW CHANGES TO PERMANENT POLLUTION ABATEMENT MEASURES WITHOUT THEIR PRIOR APPROVAL.
- 2. CONTRACTOR SHALL NOTIFY CERTIFYING ENGINEER WHEN:
- REINFORCING STEEL FOR BASIN WALL OR RIPRAP LINER HAS BEEN SET, CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE AND RISER PIPE IS IN PLACE.
- 3. WORK SHALL NOT CONTINUE ON THE BASIN UNTIL THE ENGINEER HAS HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.
- 4. UPON SUBSTANTIAL COMPLETION, OR AS REQUESTED BY ENGINEER, CONTRACTOR TO PROVIDE CERTIFYING ENGINEER WITH FIELD SHOTS VERIFYING ELEVATIONS OF THE FOLLOWING:
- TOP OF BANK/WALL AT EACH CORNER OF BASIN - TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE) - SPLASH PAD/INLET PIPES - OVERFLOW WEIRS
- 5. BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS, AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.

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Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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: $L_M = 27.2(A_N \times P)$ where L_{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load A_N = 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 = Total project area included in plan * = Comal 24.34 acres Predevelopment impervious area within the limits of the plar Total post-development impervious area within the limits of the plar acres 0.00 acres Total post-development impervious cover fraction* 0.25 P = 33 nches L_{M TOTAL PROJECT} = 5359 lbs * The values entered in these fields should be for the total project area Number of drainage basins / outfalls areas leaving the plan area = 7 2. Drainage Basin Parameters (This information should be provided for each basin Drainage Basin/Outfall Area No. = A1 14.80 Total drainage basin/outfall area= acres Predevelopment impervious area within drainage basin/outfall are = Post-development impervious area within drainage basin/outfall are = 0.00 acres acres Post-development impervious fraction within drainage basin/outfall are = 0.22 lbs. L_{M THIS BASIN} = 2881 3. Indicate the proposed BMP Code for this basin Proposed BMP = Extended Detention Removal efficiency = 91 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 (LR) for this Drainage Basin by the selected BMP Type RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A x 34.6 + A_P x 0.54) A_c = Total On-Site drainage area in the BMP catchment area where: 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 = 14 80 acres A, = 3.21 acres A_p = 11.59 acres L_R = 3523 lbs 5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall are

Desired L_{M THIS BASIN} =

3100

lbs.

10/10/2024 F = 0.88 OF 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 Denth = 1.50 inches ☆ Post Development Runoff Coefficient = On-site Water Quality Volume = 0.21 ★ cubic feet 17056 PRISCILLA G. FLORES Calculations from RG-348 Pages 3-36 to 3-37 YEER: 109874 σ Off-site area draining to BMP = 0.00 acres 'CENSED Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = 0.00 acres Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 cubic feet Storage for Sediment = 3411 Total Capture Volume (required water quality volume(s) x 1.20) = 20468 cubic feet

Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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_M = 27.2(A_N x P) where: L_{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load A_N = 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 = Total project area included in plan 24.34 acres Predevelopment impervious area within the limits of the plan * = Total post-development impervious area within the limits of the plan* = 0.00 acres acres 0.25 Total post-development impervious cover fraction * . P = nches 33 L_{M TOTAL PROJECT} = 5359 lbs. * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 7 2. Drainage Basin Parameters (This information should be provided for each basin): Drainage Basin/Outfall Area No. = A2 Total drainage basin/outfall area = 0.50 acres Predevelopment impervious area within drainage basin/outfall area = 0.00 acres Post-development impervious area within drainage basin/outfall area = 0.22 acres Post-development impervious fraction within drainage basin/outfall area = 0.44 L_{M THIS BASIN} = 197 lbs. 3. Indicate the proposed BMP Code for this basin. Proposed BMP = Vegetated Filter Strips percent Removal efficiency = 85 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_p) for this Drainage Basin by the selected BMP Type. RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 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
- $A_{\rm C} = 0.50$ acres $A_{\rm I} = 0.22$ acres
- A_P = **0.28** acres L_R = **218** lbs

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

Desired L_{M THIS BASIN} = 218 lbs.



Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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_M = 27.2(A_N x P) L_{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load where: A_N = 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 = Total project area included in plan 24.34 acres Predevelopment impervious area within the limits of the plan * = Total post-development impervious area within the limits of the plan* = 0.00 acres acres 0.25 Total post-development impervious cover fraction * . P = nches 33 L_{M TOTAL PROJECT} = 5359 lbs. * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 7 2. Drainage Basin Parameters (This information should be provided for each basin): Drainage Basin/Outfall Area No. = A3 Total drainage basin/outfall area = 0.60 acres Predevelopment impervious area within drainage basin/outfall area = 0.00 acres Post-development impervious area within drainage basin/outfall area = 0.25 acres Post-development impervious fraction within drainage basin/outfall area = 0.42 L_{M THIS BASIN} = 224 lbs. 3. Indicate the proposed BMP Code for this basin. Proposed BMP = Vegetated Filter Strips percent Removal efficiency = 85 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_p) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A₁ x 34.6 + A_P x 0.54)

where:

- $A_{\rm C}$ = Total On-Site drainage area in the BMP catchment area $A_{\rm I}$ = 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
- $A_{\rm C} = 0.60$ acres $A_{\rm I} = 0.25$ acres
- A_P = 0.35 acres L_R = 248 lbs

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

Desired $L_{M THIS BASIN} =$ 248 lbs.



Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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_M = 27.2(A_N x P) L_{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load where: A_N = 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 = Total project area included in plan 24.34 acres Predevelopment impervious area within the limits of the plan * = Total post-development impervious area within the limits of the plan* = 0.00 acres acres 0.25 Total post-development impervious cover fraction * . P = nches 33 L_{M TOTAL PROJECT} = 5359 lbs. * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 7 2. Drainage Basin Parameters (This information should be provided for each basin): Drainage Basin/Outfall Area No. = **B1** Total drainage basin/outfall area = 2.60 acres Predevelopment impervious area within drainage basin/outfall area = 0.00 acres Post-development impervious area within drainage basin/outfall area = 1.13 acres Post-development impervious fraction within drainage basin/outfall area = 0.43 L_{M THIS BASIN} = 1014 lbs. 3. Indicate the proposed BMP Code for this basin. Proposed BMP = Vegetated Filter Strips percent Removal efficiency = 85 Aqualogic Cartridge Filter Bioretention Contech StormFilter Constructed Wetland Extended Detention Grassy Swale Retention / Irrigation Sand Filter Stormceptor Vegetated Filter Strips Vortechs Wet Basin

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

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 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
- $A_{\rm P}$ = Pervious area remaining in the BMP catchment area
- L_R = TSS Load removed from this catchment area by the proposed BMP

Wet Vault

- $A_{\rm C} = 2.60$ acres $A_{\rm I} = 1.13$ acres
- A_P = **1.47** acres L_R = **1119** lbs

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

Desired L_{M THIS BASIN} = 1119 lbs.



Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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_M = 27.2(A_N x P) where: L_{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load A_N = 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 = Total project area included in plan 24.34 acres Predevelopment impervious area within the limits of the plan * = Total post-development impervious area within the limits of the plan* = 0.00 acres acres 0.25 Total post-development impervious cover fraction * P nches 33 L_{M TOTAL PROJECT} = 5359 lbs. * The values entered in these fields should be for the total project area Number of drainage basins / outfalls areas leaving the plan area = 7 2. Drainage Basin Parameters (This information should be provided for each basin): Drainage Basin/Outfall Area No. = C1 Total drainage basin/outfall area = 0.80 acres Predevelopment impervious area within drainage basin/outfall area = 0.00 acres Post-development impervious area within drainage basin/outfall area = 0.34 acres Post-development impervious fraction within drainage basin/outfall area = 0.43 L_{M THIS BASIN} = 305 lbs. 3. Indicate the proposed BMP Code for this basin. Proposed BMP = Vegetated Filter Strips percent Removal efficiency = 85 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_p) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 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 =	0.80	acres
A _I =	0.34	acres
A _P =	0.46	acres

L_R = **337** lbs

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

Desired L_{M THIS BASIN} = 337 lbs.



Texas Commission on Environmental Quality TSS Removal Calculations 04-20-2009 Project Name: Rivers Edge Date Prepared: 10/9/2024 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_M = 27.2(A_N x P) L_{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load where: A_N = 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 = Total project area included in plan 24.34 acres Predevelopment impervious area within the limits of the plan * = Total post-development impervious area within the limits of the plan* = 0.00 acres acres 0.25 Total post-development impervious cover fraction * . P = nches 33 L_{M TOTAL PROJECT} = 5359 lbs. * The values entered in these fields should be for the total project area Number of drainage basins / outfalls areas leaving the plan area = 7 2. Drainage Basin Parameters (This information should be provided for each basin): Drainage Basin/Outfall Area No. = C2 Total drainage basin/outfall area = 0.80 acres Predevelopment impervious area within drainage basin/outfall area = 0.00 acres Post-development impervious area within drainage basin/outfall area = 0.34 acres Post-development impervious fraction within drainage basin/outfall area = 0.43 L_{M THIS BASIN} = 305 lbs. 3. Indicate the proposed BMP Code for this basin. Proposed BMP = Vegetated Filter Strips percent Removal efficiency = 85 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_p) for this Drainage Basin by the selected BMP Type. RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54) where: A_C = Total On-Site drainage area in the BMP catchment area

 $A_{\rm I}$ = 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 =	0.80	acres
A _I =	0.34	acres

A. = 0.46 acres L. = 337 lbs

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

Desired LM THIS BASIN = 337 lbs.



Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Rivers Edge Date Prepared: 10/9/2024

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 f	rom RG-348	Pages 3-27 to 3-30
Page 3-29 Equation 3.3: L _M	= 27.2(A _N x P)		
where: $$L_{\rm M}$ \mbox{total PROJECT}$A_{\rm N}$ $A_{\rm N}$ P :$	= Required TSS = Net increase i = Average annu	S removal resultir in impervious are ial precipitation, i	g from the proposed development = 80% of increased load a for the project iches
Site Data: Determine Required Load Removal Based on the Entire Proje County Total project area included in plan * Predevelopment impervious area within the limits of the plan * Total post-development impervious area within the limits of the plan * Total post-development impervious cover fraction *	$= \frac{\text{Comal}}{24.34} = 0.00 = \frac{5.97}{33}$	acres acres acres inches	
L _{M TOTAL PROJECT} * The values entered in these fields should be for the total project area.	= 5359	lbs.	
Number of drainage basins / outfalls areas leaving the plan area	= 7		

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

Drainage Basin/Outfall Area No. = Untreated

10.90 acres	10.90	Total drainage basin/outfall area =
0.00 acres	0.00	Predevelopment impervious area within drainage basin/outfall area =
0.50 acres	0.50	Post-development impervious area within drainage basin/outfall area =
0.05	0.05	Post-development impervious fraction within drainage basin/outfall area =
449 lbs.	449	L _{M THIS BASIN} =



Temporary 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)(A), (B), (D)(I) and (G); 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 **Temporary Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Print Name of Customer/Agent: Seamus MacFarland, PE

Date: 10/03/2024

Signature of Customer/Agent:

Seamus MacFarland

Regulated Entity Name: River's Edge at Gruene Condos

Project Information

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:

The following fuels and/or hazardous substances will be stored on the site: _____

These fuels and/or hazardous substances will be stored in:

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.
- X Fuels and hazardous substances will not be stored on the site.
- 2. X Attachment A Spill Response Actions. A site specific description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is attached.
- 3. X 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. X Attachment B Potential Sources of Contamination. A description of any activities or processes which may be a potential source of contamination affecting surface water quality is attached.

Sequence of Construction

5. X 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 attached.

X For each activity described, an estimate (in acres) of the total area of the site to be disturbed by each activity is given.

For each activity described, include a description of appropriate temporary control measures and the general timing (or sequence) during the construction process that the measures will be implemented.

6. X 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: <u>Blieders Creek</u>

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. X Attachment D – Temporary Best Management Practices and Measures. 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 is attached:

X 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.	

Х	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.

 \overline{X} A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.

X 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. X 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 attached. The request includes justification as to why no reasonable
and practicable alternative exists for each feature.

 \boxed{X} There will be no temporary sealing of naturally-occurring sensitive features on the site.

9. X Attachment F - Structural Practices. A description of 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 is attached. Placement of structural practices in floodplains has been avoided.

10. 🔀 Attachment G - Drainage /	rea Map. A drainage area map supporting the following
requirements is attached:	

X 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.

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.

There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. Erosion and sediment controls other than sediment basins or sediment traps within each disturbed drainage area will be used.

- 11. 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 have 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 attached.
 - X N/A
- 12. X Attachment I Inspection and Maintenance for BMPs. A plan for the inspection of each temporary BMP(s) and measure(s) and for their timely maintenance, repairs, and, if necessary, retrofit is attached. A description of the documentation procedures, recordkeeping practices, and inspection frequency are included in the plan and are specific to the site and/or BMP.
- 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.

- 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.

Temporary Stormwater Section

Attachment A – Spill Response Actions

Spill Prevention and Control

The objective of this section is to describe measures to prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

The following steps will help reduce the storm water impacts of leaks and spills:

Education

- (1) Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when spill must be reported to the TCEQ. Information available in 30 TAC 327.4 and 40 CFR 302.4.
- (2) Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- (3) Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- (4) Establish a continuing education program to indoctrinate new employees.
- (5) Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- (1) To the extent that the work can be accomplished safely, spills of oil, petroleum products, and substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- (2) Store hazardous materials and wastes in covered containers and protect from vandalism.
- (3) Place a stockpile of spill cleanup materials where it will be readily accessible.
- (4) Train employees in spill prevention and cleanup.
- (5) Designate responsible individuals to oversee and enforce control measures.

- (6) Spills should be covered and protected from stormwater runoff during rainfall to the extent that it doesn't compromise cleanup activities.
- (7) Do not bury or wash spills with water.
- (8) Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- (9) Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.
- (10) Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- (11) Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- (12) Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- (1) Clean up leaks and spills immediately.
- (2) Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.
- (3) Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- (1) Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- (2) Use absorbent materials on small spills rather than hosing down or burying the spill.
- (3) Absorbent materials should be promptly removed and disposed of properly.

- (4) Follow the practice below for a minor spill:
 - a) Contain the spread of the spill.
 - b) Recover spilled materials.
 - c) Clean the contaminated area and properly dispose of contaminated materials.

Semi-significant Spills

Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

Spills should be cleaned up immediately:

- (1) Contain spread of the spill.
- (2) Notify the project foreman immediately.
- (3) If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
- (4) If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
- (5) If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

- (1) Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
- (2) For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
- (3) Notification should first be made by telephone and followed up with a written report.
- (4) The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

(5) Other agencies which may need to be consulted include, but are not limited to, the City Police Department, County Sheriff Office, Fire Departments, etc.

More information on spill rules and appropriate responses is available on the TCEQ website at: http://www.tnrcc.state.tx.us/enforcement/emergency_response.html.

Vehicle and Equipment Maintenance

- (1) If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- (2) Regularly inspect onsite vehicles and equipment for leaks and repair immediately.
- (3) Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- (4) Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- (5) Place drip pans or absorbent materials under paving equipment when not in use.
- (6) Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- (7) Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- (8) Oil filters disposed of in trashcans or dumpsters can leak 03 and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- (9) Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you & think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- (1) If fueling must occur on site, use designated areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- (2) Discourage "topping off" of fuel tanks.

(3) Always use secondary containment, such as a drain pan, when fueling to catch spills/leaks.

Spill Response Actions

In the event that a spill of hydrocarbons or hazardous substances does occur, the contractor shall be required to maintain a sufficient stockpile of sand material in the staging area. This sand material shall be used to immediately isolate and provide containment of the spill by constructing dikes. Furthermore, this sand material shall act as an absorbent material that can be disposed of offsite and out of the Recharge Zone during clean-up operations. The contractor, in the event of a spill, shall also notify the owner who shall contact TCEQ. All contaminated soils resulting from an accidental release will be required to be removed and disposed of in accordance with all local, state and federal regulations.

Attachment B – Potential Sources Contamination

Potential Source	Oil, grease, fuel and hydraulic fluid contamination from construction equipment and vehicle dripping.
Preventive Measure	Vehicle maintenance, when possible, will be performed within a construction staging area specified by the General Contractor.
Potential Source	Miscellaneous trash and litter from construction workers and material wrappings.
Preventive Measure	Trash containers will be placed throughout the site to encourage proper trash disposal.
Potential Source	Construction debris.
Preventive Measure	Construction debris will be monitored daily by contractor. Debris will be collected weekly and placed in disposal bins. Situations requiring immediate attention will be addressed on a case by case basis.
Potential Source	Stormwater contamination from excess application of fertilizers, herbicides and pesticides.
Preventive Measure	Fertilizers, herbicides and pesticides will be applied only when necessary and in accordance with manufacturer's directions.

Potential Source the site.	Soil and mud from construction vehicle tires as they leave
Preventive Measure	A temporary construction entrance/exit shall be utilized as vehicles leave the site. Any soil, mud, etc. carried from the project onto public roads shall be cleaned up within 24 hours.
Potential Source	Sediment from soil, sand, gravel and excavated materials stockpiled on site.
Preventive Measure	Silt fence shall be installed on the down gradient side of all stockpiled materials. Reinforced rock berms shall be installed at all downstream discharge locations.
Potential Source	Portable toilet spill.
Preventive Measure	Toilets on the site will be emptied on a regular basis by the contracted toilet company.

Attachment C – Sequence of Major Activities

The sequence of major activities which disturb soil during construction on this site will be divided into stages. The first stage is site preparation that will include clearing and grubbing of vegetation, where applicable. This will disturb approximately 24.34 AC. The second is construction that will include installation of utilities, construction of the water quality basin and the proposed roads, landscaping and site cleanup. This will disturb approximately 24.34 AC.

Sequence Item	Description
1.	Install TBMP's as required. (Silt fence, ect.)
2.	Clearing of Disturbed Areas
3.	Grading of Disturbed Areas
4.	Construction of Permanent BMP's /Storm Drains
5.	Construction of Utilities
6.	Construction of Roads
7.	Soil Stabilization and/or re-vegetation
8.	Clean site
9.	Remove TBMP's

Attachment D – Temporary Best Management Practices and Measures

- Temporary Construction Entrance/Exit A stabilized pad of crushed stone located at any point where traffic will be entering or leaving the construction site from a public R.O.W., street, alley, sidewalk or parking area. It shall be a minimum of 50 feet long, 12 feet wide and 8 inches thick. The rock shall be 4" to 8" in size.
- 2. Silt Fence A barrier consisting of geotextile fabric supported by metal posts to prevent soil and sediment loss from a site. Silt fences shall be installed on the down gradient side of the proposed areas to be disturbed that have a drainage area of ¼ acres per 100 feet of fence.
- 3. Rock Berms A sediment trap consisting of 3" to 5" diameter rock wrapped in a woven wire sheathing. The berm shall have a minimum height of 36" and a minimum top width of 2 feet. A rock berm shall be placed at locations of the concentrated flows where the drainage area is between 2 and 5 acres.
- 4. Inlet Protection Placed around inlets to catch and stop sediment from entering the storm drain system before filtration system are in place.
- 5. Concrete Washout Pit Designed to trap and store waste from concrete and similar activities. This allows for safe storage and removal from the site by not allowing contaminants to enter the storm water. Contaminants can be kept in a location that will not allow storm water to mix and flow off the site.

Sequence of installation during construction process

- 1. The Temporary Construction Entrance/Exit (Item 1) shall be installed prior to disturbing any soil except at the location of the Temporary Construction Entrance/Exit. It shall stay in place and be maintained until the end of the infrastructure construction.
- 2. Silt fence (Item 2) shall be installed along the western boundary of the site prior to any disturbance of the site
- 3. Rock berms (Item 4) shall be installed around the perimeter of the project at natural low points following rough grading of the site and shall be removed once grading to the on-site stormwater drainage system with bagged gravel inlet filters in sump is complete. Rock berms will also be utilized at the outlet of the pond while it is being constructed.

The TBMPs and measures utilized for the proposed project to prevent pollution of storm water, groundwater, and surface water during the construction phase are the following:

- Temporary Construction Entrance/Exit
 Silt Fence
- 3. Concrete Washout Pit
- 4. Rock Berm
- 5. Inlet Protection

Attachment D – Temporary Best Management Practices and Measures

Stormwater originating from upgradient.

• Stormwater originating from upgradient from the east site of the property will be routed around the site by proposed grading.

Stormwater originating from onsite.

• Stormwater originating from onsite will be maintained by the proposed TMBPs (Silt fence, rock berms, etc.) to stay within the project limits and treated by the proposed PBMP.

Prevent stormwater from entering surface water, sensitive features and aquifer.

• No stormwater is expected to enter any surface water, sensitive feature or directly to the aquifer.

Will maintain flow to naturally occurring sensitive features.

• No naturally occurring sensitive features are documented on the geological assessment table.

1.4.2 <u>Temporary Construction Entrance/Exit</u>

The purpose of a temporary gravel construction entrance is to provide a stable entrance/exit condition from the construction site and keep mud and sediment off public roads. A stabilized construction entrance is a stabilized pad of crushed stone located at any point traffic will be entering or leaving the construction site from a public right-of-way, street, alley, sidewalk or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking or flowing of sediment onto public rights-of-way. This practice should be used at all points of construction ingress and egress. Schematic diagrams of a construction entrance/exit are shown in Figure 1-24 and Figure 1-25.

Excessive amounts of mud can also present a safety hazard to roadway users. To minimize the amount of sediment loss to nearby roads, access to the construction site should be limited to as few points as possible and vegetation around the perimeter should be protected were access is not necessary. A rock stabilized construction entrance should be used at all designated access points.



Figure 1-24 Schematic of Temporary Construction Entrance/Exit (after NC, 1993)



Figure 1-25 Cross-section of a Construction Entrance/Exit (NC, 1993)

Materials:

- (1) The aggregate should consist of 4 to 8 inch washed stone over a stable foundation as specified in the plan.
- (2) The aggregate should be placed with a minimum thickness of 8 inches.
- (3) The geotextile fabric should be designed specifically for use as a soil filtration media with an approximate weight of 6 oz/yd^2 , a mullen burst rating of 140 lb/in², and an equivalent opening size greater than a number 50 sieve.
- (4) If a washing facility is required, a level area with a minimum of 4 inch diameter washed stone or commercial rack should be included in the plans. Divert wastewater to a sediment trap or basin.

Installation: (North Carolina, 1993)

- (1) Avoid curves on public roads and steep slopes. Remove vegetation and other objectionable material from the foundation area. Grade crown foundation for positive drainage.
- (2) The minimum width of the entrance/exit should be 12 feet or the full width of exit roadway, whichever is greater.
- (3) The construction entrance should be at least 50 feet long.
- (4) If the slope toward the road exceeds 2%, construct a ridge, 6 to 8 inches high with 3:1 (H:V) side slopes, across the foundation approximately 15 feet from the entrance to divert runoff away from the public road.
- (5) Place geotextile fabric and grade foundation to improve stability, especially where wet conditions are anticipated.
- (6) Place stone to dimensions and grade shown on plans. Leave surface smooth and slope for drainage.
- (7) Divert all surface runoff and drainage from the stone pad to a sediment trap or basin.
- (8) Install pipe under pad as needed to maintain proper public road drainage.

Common trouble points

- (1) Inadequate runoff control sediment washes onto public road.
- (2) Stone too small or geotextile fabric absent, results in muddy condition as stone is pressed into soil.
- (3) Pad too short for heavy construction traffic extend pad beyond the minimum 50 foot length as necessary.
- (4) Pad not flared sufficiently at road surface, results in mud being tracked on to road and possible damage to road edge.
- (5) Unstable foundation use geotextile fabric under pad and/or improve foundation drainage.

Inspection and Maintenance Guidelines:

- (1) The entrance should be maintained in a condition, which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment.
- (2) All sediment spilled, dropped, washed or tracked onto public rights-of-way should be removed immediately by contractor.
- (3) When necessary, wheels should be cleaned to remove sediment prior to entrance onto public right-of-way.
- (4) When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin.
- (5) All sediment should be prevented from entering any storm drain, ditch or water course by using approved methods.

1.4.3 Silt Fence

A silt fence is a barrier consisting of geotextile fabric supported by metal posts to prevent soil and sediment loss from a site. When properly used, silt fences can be highly effective at controlling sediment from disturbed areas. They cause runoff to pond, allowing heavier solids to settle out. If not properly installed, silt fences are not likely to be effective. A schematic illustration of a silt fence is shown in Figure 1-26.



Figure 1-26 Schematic of a Silt Fence Installation (NCTCOG, 1993b)

The purpose of a silt fence is to intercept and detain water-borne sediment from unprotected areas of a limited extent. Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This fence should remain in place until the disturbed area is permanently stabilized. Silt fence should not be used where there is a concentration of water in a channel or drainage way. If concentrated flow occurs after installation, corrective action must be taken such as placing a rock berm in the areas of concentrated flow. Silt fencing within the site may be temporarily moved during the day to allow construction activity provided it is replaced and properly anchored to the ground at the end of the day. Silt fences on the perimeter of the site or around drainage ways should not be moved at any time.

Materials:

- (1) Silt fence material should be polypropylene, polyethylene or polyamide woven or nonwoven fabric. The fabric width should be 36 inches, with a minimum unit weight of 4.5 oz/yd, mullen burst strength exceeding 190 lb/in², ultraviolet stability exceeding 70%, and minimum apparent opening size of U.S. Sieve No. 30.
- (2) Fence posts should be made of hot rolled steel, at least 4 feet long with Tee or Ybar cross section, surface painted or galvanized, minimum nominal weight 1.25 lb/ft², and Brindell hardness exceeding 140.
- (3) Woven wire backing to support the fabric should be galvanized 2" x 4" welded wire, 12 gauge minimum.

Installation:

- (1) Steel posts, which support the silt fence, should be installed on a slight angle toward the anticipated runoff source. Post must be embedded a minimum of 1-foot deep and spaced not more than 8 feet on center. Where water concentrates, the maximum spacing should be 6 feet.
- (2) Lay out fencing down-slope of disturbed area, following the contour as closely as possible. The fence should be sited so that the maximum drainage area is ¹/₄ acre/100 feet of fence.
- (3) The toe of the silt fence should be trenched in with a spade or mechanical trencher, so that the down-slope face of the trench is flat and perpendicular to the line of flow. Where fence cannot be trenched in (e.g., pavement or rock outcrop), weight fabric flap with 3 inches of pea gravel on uphill side to prevent flow from seeping under fence.
- (4) The trench must be a minimum of 6 inches deep and 6 inches wide to allow for the silt fence fabric to be laid in the ground and backfilled with compacted material.
- (5) Silt fence should be securely fastened to each steel support post or to woven wire, which is in turn attached to the steel fence post. There should be a 3-foot overlap, securely fastened where ends of fabric meet.

(6) Silt fence should be removed when the site is completely stabilized so as not to block or impede storm flow or drainage.

Common Trouble Points:

- (1) Fence not installed along the contour causing water to concentrate and flow over the fence.
- (2) Fabric not seated securely to ground (runoff passing under fence)
- (3) Fence not installed perpendicular to flow line (runoff escaping around sides)
- (4) Fence treating too large an area, or excessive channel flow (runoff overtops or collapses fence)

Inspection and Maintenance Guidelines:

- (1) Inspect all fencing weekly, and after any rainfall.
- (2) Remove sediment when buildup reaches 6 inches.
- (3) Replace any torn fabric or install a second line of fencing parallel to the torn section.
- (4) Replace or repair any sections crushed or collapsed in the course of construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a silt fence at common vehicle access points.
- (5) When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

1.4.5 Rock Berms

The purpose of a rock berm is to serve as a check dam in areas of concentrated flow, to intercept sediment-laden runoff, detain the sediment and release the water in sheet flow. The rock berm should be used when the contributing drainage area is less than 5 acres. Rock berms are used in areas where the volume of runoff is too great for a silt fence to contain. They are less effective for sediment removal than silt fences, particularly for fine particles, but are able to withstand higher flows than a silt fence. As such, rock berms are often used in areas of channel flows (ditches, gullies, etc.). Rock berms are most effective at reducing bed load in channels and should not be substituted for other erosion and sediment control measures farther up the watershed.

Materials:

- (1) The berm structure should be secured with a woven wire sheathing having maximum opening of 1 inch and a minimum wire diameter of 20 gauge galvanized and should be secured with shoat rings.
- (2) Clean, open graded 3- to 5-inch diameter rock should be used, except in areas where high velocities or large volumes of flow are expected, where 5- to 8-inch diameter rocks may be used.

Installation:

- (1) Lay out the woven wire sheathing perpendicular to the flow line. The sheathing should be 20 gauge woven wire mesh with 1 inch openings.
- (2) Berm should have a top width of 2 feet minimum with side slopes being 2:1 (H:V) or flatter.
- (3) Place the rock along the sheathing as shown in the diagram (Figure 1-28), to a height not less than 18".
- (4) Wrap the wire sheathing around the rock and secure with tie wire so that the ends of the sheathing overlap at least 2 inches, and the berm retains its shape when walked upon.
- (5) Berm should be built along the contour at zero percent grade or as near as possible.
- (6) The ends of the berm should be tied into existing upslope grade and the berm should be buried in a trench approximately 3 to 4 inches deep to prevent failure of the control.







Common Trouble Points:

- (1) Insufficient berm height or length (runoff quickly escapes over the top or around the sides of berm)
- (2) Berm not installed perpendicular to flow line (runoff escaping around one side)

Inspection and Maintenance Guidelines:

- (1) Inspection should be made weekly and after each rainfall by the responsible party. For installations in streambeds, additional daily inspections should be made.
- (2) Remove sediment and other debris when buildup reaches 6 inches and dispose of the accumulated silt in an approved manner that will not cause any additional siltation.
- (3) Repair any loose wire sheathing.
- (4) The berm should be reshaped as needed during inspection.
- (5) The berm should be replaced when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.
- (6) The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.
1.4.18 Concrete Washout Areas

The purpose of concrete washout areas is to prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, performing onsite washout in a designated area, and training employees and subcontractors.

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Avoid mixing excess amounts of fresh concrete.
- Perform washout of concrete trucks in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped onsite, except in designated areas.

For onsite washout:

- Locate washout area at least 50 feet from sensitive features, storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
- Wash out wastes into the temporary pit where the concrete can set, be broken up, and then disposed properly.

Below grade concrete washout facilities are typical. These consist of a lined excavation sufficiently large to hold expected volume of washout material. Above grade facilities are used if excavation is not practical. Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this section, with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and disposed of. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and disposed of. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.



Figure 1-43 Schematics of Concrete Washout Areas

1.4.11 Inlet Protection

Storm sewers that are made operational prior to stabilization of the associated drainage areas can convey large amounts of sediment to natural drainage ways. In case of extreme sediment loading, the storm sewer itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets. The following guidelines for inlet protection are based primarily on recommendations by the Virginia Dept. of Conservation and Recreation (1992) and the North Central Texas Council of Governments (NCTCOG, 1993b).

In developments for which drainage is to be conveyed by underground storm sewers (i.e., streets with curbs and gutters), all inlets that may receive storm runoff from disturbed areas should be protected. Temporary inlet protection is a series of different measures that provide protection against silt transport or accumulation in storm sewer systems. This clogging can greatly reduce or completely stop the flow in the pipes. The different measures are used for different site conditions and inlet types.

Care should be taken when choosing a specific type of inlet protection. Field experience has shown that inlet protection that causes excessive ponding in an area of high construction activity may become so inconvenient that it is removed or bypassed, thus transmitting sediment-laden flows unchecked. In such situations, a structure with an adequate overflow mechanism should be utilized.

It should also be noted that inlet protection devices are designed to be installed on construction sites and not on streets and roads open to the public. When used on public streets these devices will cause ponding of runoff, which can cause minor flooding and can present a traffic hazard. An example of appropriate siting would be a new subdivision where the storm drain system is installed before the area is stabilized and the streets open to the general public. When construction occurs adjacent to active streets, the sediment should be controlled on site and not on public thoroughfares. Occasionally, roadwork or utility installation will occur on public roads. In these cases, inlet protection is an appropriate temporary BMP.

The following inlet protection devices are for drainage areas of one acre or less. Runoff from larger disturbed areas should be routed to a temporary sediment trap or basin.

Filter barrier protection using silt fence is appropriate when the drainage area is less than one acre and the basin slope is less than five percent. This type of protection is not applicable in paved areas.

Block and gravel protection is used when flows exceed 0.5 cubic feet per second and it is necessary to allow for overtopping to prevent flooding. This form of protection is also useful for curb type inlets as it works well in paved areas.

Wire mesh and gravel protection is used when flows exceed 0.5 cubic feet per second and construction traffic may occur over the inlet. This form of protection may be used with both curb and drop inlets.

Excavated impoundment protection around a drop inlet may be used for protection against sediment entering a storm drain inlet. With this method, it is necessary to install weep holes to allow the impoundment to drain completely. If this measure is implemented, the impoundment should be sized such that the volume of excavation is 3,600 cubic feet per acre (equivalent to 1 inch of runoff) of disturbed area entering the inlet.

Materials:

- Filter fabric should be a nylon reinforced polypropylene fabric which meets the following minimum criteria: Tensile Strength, 90 lbs.; Puncture Rating, 60 lbs.; Mullen Burst Rating, 280 psi; Apparent Opening Size, U.S. Sieve No. 70.
- (2) Posts for fabric should be 2" x 4" pressure treated wood stakes or galvanized steel, tubular in cross-section or they may be standard fence "T" posts.
- (3) Concrete blocks should be standard 8" x 8" x 16" concrete masonry units.
- (4) Wire mesh should be standard hardware cloth or comparable wire mesh with an opening size not to exceed 1/2 inch.

Guidelines for installation:

Silt Fence Drop Inlet Protection

- (1) Silt fence should conform to the specifications listed above and should be cut from a continuous roll to avoid joints.
- (2) For stakes, use 2 x 4-inch wood or equivalent metal with a minimum length of 3 feet.
- (3) Space stakes evenly around the perimeter of the inlet a maximum of 3 feet apart, and securely drive them into the ground, approximately 18 inches deep (Figure 1-33).
- (4) To provide needed stability to the installation, a frame with 2 x 4-inch wood strips around the crest of the overflow area at a maximum of $1\frac{1}{2}$ feet above the drop inlet crest should be provided.



Figure 1-33 Filter Fabric Inlet Protection (NCTCOG, 1993)

- (5) Place the bottom 12 inches of the fabric in a trench and backfill the trench with 12 inches of compacted soil.
- (6) Fasten fabric securely by staples or wire to the stakes and frame. Joints must be overlapped to the next stake.
- (7) It may be necessary to build a temporary dike on the down slope side of the structure to prevent bypass flow.

If the drop inlet is above the finished grade, the grate may be completely covered with filter fabric. The fabric should be securely attached to the entire perimeter of the inlet using 1"x 2" wood strips and appropriate fasteners.

Gravel and Wire Mesh Drop Inlet Sediment Filter

(1) Wire mesh should be laid over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure. Wire mesh with 1/2-inch openings should be used. If more than one strip of mesh is necessary, the strips should be overlapped (see Figure 1-34).



Figure 1-34 Wire Mesh and Gravel Inlet Protection (NCTCOG, 1993)

- (2) Coarse aggregate should be placed over the wire mesh as indicated in Figure 1-34. The depth of stone should be at least 12 inches over the entire inlet opening. The stone should extend beyond the inlet opening at least 18 inches on all sides.
- (3) If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stones must be pulled away from the inlet, cleaned and/or replaced.

<u>Note</u>: This filtering device has no overflow mechanism; therefore, ponding is likely especially if sediment is not removed regularly. This type of device should never be used where overflow may endanger an exposed fill slope. Consideration should also be given to the possible effects of ponding on traffic movement, nearby structures, working areas, adjacent property, etc.

Block and Gravel Drop Inlet Sediment Filter

- (1) Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, with the ends of adjacent blocks abutting. The height of the barrier can be varied, depending on design needs, by stacking combinations of 4-inch, 8-inch and 12-inch wide blocks. The barrier of blocks should be between 12 and 24 inches high.
- (2) Wire mesh should be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Wire mesh with 1/2-inch openings should be used.
- (3) Stone should be piled against the wire to the top of the block barrier, as shown in Figure 1-35.
- (4) If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and replaced.

Block and Gravel Curb Inlet Sediment Filter

- (1) Two concrete blocks should be placed on their sides abutting the curb at either side of the inlet opening.
- (2) A 2-inch x 4-inch stud should be cut and placed through the outer holes of each spacer block to help keep the front blocks in place.
- (3) Concrete blocks should be placed on their sides across the front of the inlet and abutting the spacer blocks as depicted in Figure 1-35.
- (4) Wire mesh should be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Wire mesh with 1/2-inch openings should be used.
- (5) Coarse aggregate should be piled against the wire to the top of the barrier as shown in Figure 1-35.
- (6) If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and/or replaced.



Figure 1-35 Block and Gravel Inlet Protection (NCTCOG, 1993)

Excavated Drop Inlet Sediment Trap

(1) The excavated trap should be sized to provide a minimum storage capacity calculated at 3,600 cubic feet per acre of drainage area. A trap should be no less than 1-foot nor more than 2 feet deep measured from the top of the inlet structure. Side slopes should not be steeper than 2:1 (see Figure 1-36).



Figure 1-36 Excavated Inlet Protection (NCTCOG, 1993)

(2) The slope of the basin may vary to fit the drainage area and terrain. Observations must be made to check trap efficiency and modifications should be made as necessary to ensure satisfactory trapping of sediment. Where an inlet is located so as to receive concentrated flows, such as in a highway median, it is recommended that the basin have a rectangular shape in a 2:1 (length/width) ratio, with the length oriented in the direction of the flow.

(3) Sediment should be removed and the trap restored to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Removed sediment should be deposited in a suitable area and in a manner such that it will not erode.

Curb Inlet Protection with 2-inch x 4-inch Wooden Weir

- (1) Attach a continuous piece of wire mesh (30-inch minimum width x inlet throat length plus 4 feet) to the 2-inch x 4-inch wooden weir (with a total length of throat length plus 2 feet) as shown in Figure 1-37. Wood should be "construction grade" lumber.
- (2) Place a piece of approved filter cloth of the same dimensions as the wire mesh over the wire mesh and securely attach to the 2-inch x 4-inch weir.
- (3) Securely nail the 2-inch x 4-inch weir to the 9-inch long vertical spacers which are to be located between the weir and inlet face at a maximum 6-foot spacing.
- (4) Place the assembly against the inlet throat and nail 2-foot (minimum) lengths of 2-inch x 4-inch board to the top of the weir at spacer locations. These 2-inch x 4inch anchors should extend across the inlet tops and be held in place by sandbags or alternate weight.
- (5) The assembly should be placed so that the end spacers are a minimum 1 foot beyond both ends of the throat opening.
- (6) Form the wire mesh and filter cloth to the concrete gutter and against the face of curb on both sides of the inlet. Place coarse aggregate over the wire mesh and filter fabric in such a manner as to prevent water from entering the inlet under or around the filter cloth.
- (7) This type of protection should be inspected frequently and the filter cloth and stone replaced when clogged with sediment.
- (8) Assure that storm flow does not bypass inlet by installing temporary earth or asphalt dikes directing flow into inlet.



Figure 1-37 Wooden Weir Curb Inlet Protection (VA Dept of Conservation, 1992)

Common Trouble Points:

- (1) Gaps between the inlet protection and the curb (flows bypass around side of filter).
- (2) Filter fabric skirt not anchored to pavement (flows pass under filter).

Bagged Gravel Inlet Filter

Sandbags filled with pea gravel can also be used to construct a sediment barrier around curb and drain inlets. The sandbags should be filled with washed pea gravel and stacked to form a continuous barrier about 1 foot high around the inlets. The bags should be tightly abutted against each other to prevent runoff from flowing between the bags. This measure should be installed as shown in Figure 1-38.



Figure 1-38 Diagram of Bagged Gravel Grate Inlet Protection (Pape - Dawson)



Figure 1-39 Diagram of Bagged Gravel Curb Inlet Protection (Pape - Dawson).

Inspection and Maintenance Guidelines:

- (1) Inspection should be made weekly and after each rainfall. Repair or replacement should be made promptly as needed by the contractor.
- (2) Remove sediment when buildup reaches a depth of 3 inches. Removed sediment should be deposited in a suitable area and in such a manner that it will not erode.
- (3) Check placement of device to prevent gaps between device and curb.
- (4) Inspect filter fabric and patch or replace if torn or missing.

(5) Structures should be removed and the area stabilized only after the remaining drainage area has been properly stabilized.

Attachment E – Request to Temporarily Seal a Feature

No sensitive features will be sealed in this project site.

Attachment F – Structural Practices

The following structural measures will be installed prior to the initiation of site preparation activities:

- Erection of silt fences along the downgradient boundary of construction activities and rock berms with silt fence for secondary protection, as located on WPAP SITE PLAN
- Installation of stabilized construction entrance/exit(s) and construction staging area(s), as located on WPAP SITE PLAN

The following structural measures will be installed at the initiation of construction activities or as appropriate based on the construction sequencing:

 Installation of concrete truck washout pit(s), as required and located on WPAP SITE PLAN

Attachment G – Drainage Area Map

See Sheet WPAP Drainage Area Map attached at the end of these attachments.

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

No Temporary Sediment Pond will be utilized with this project.

Attachment I – Inspection and Maintenance for TBMPs

Inspections

Designated and qualified person(s) shall inspect Pollution Control Measures weekly and within 24 hours after a storm event greater than 0.5 inches of rainfall. An inspection report that summarizes the scope of the inspection, names and qualifications of personnel conducting the inspection, date of the inspection, major observations, and actions taken as a result of the inspection shall be recorded and maintained as part of Storm Water TPDES data for a period of three years after the date o the inspection. A copy of the Inspection Report Form is provided in this Storm Water Pollution Prevention Plan.

As a minimum, the inspector shall observe: (1) significant disturbed areas for evidence of erosion, (2) storage areas for evidence of leakage from the exposed stored materials, (3) structural controls (rock berm outlets, silt fences, drainage swales, etc.) for evidence of failure or excess siltation (over 6 inches deep), (4) vehicle exit point for evidence of off-site sediment tracking, (5) vehicle storage areas for signs of leaking equipment or spills, and (6) concrete truck rinse-out pit for signs of potential failure. Deficiencies noted during the inspection will be corrected and documented within seven (7) calendar days following the inspection or before the next anticipated storm event if practicable.

Pollution	cte	Corrective Action	
Prevention Measure	Inspe d	Description	Date Completed
General			
Revegetation			
Erosion/Sediment Controls			
Vehicle Exits			
Material Areas			
Equipment Areas			
Concrete Rinse			
Construction Debris			
Trash Receptacles			
Infrastructure			
Roadway Clearing			
Utility Clearing			
Roadway Grading			
Utility Construction			
Drainage Construction			
Roadway Base			
Roadway Surfaces			
Site Cleanups			
Building			
Clearing for Building			
Foundation Grading			
Utility Construction			
Foundation Construction			
Building Construction			
Site Grading			
Site Cleanup			

*Indicate N/A where measure does not apply.

By my signature below, I certify that all items are acceptable and the project site is in compliance with SWPPP.

Inspector's Name

Inspector's Signature

Name of Owner/Operator (Firm)

Date

Note: Inspector is to attach a brief statement of his qualifications to this report.

PROJECT MILESTONE DATES

Date when major site grading activities begin:

Construction Activity	Date
Dates when construction activities temporarily or perma of the project:	nently cease on all or a portion
Construction Activity	Date
Date when stabilization measures are initiated:	
Stabilization Activity	Date

Attachment I (con't) – Inspection and Maintenance for TBMPs

Temporary Sediment Control Fences

- 1. Inspect all fencing weekly, and after any rainfall.
- 2. Remove sediment when buildup reaches 6 inches.
- 3. Replace any torn fabric or install a second line of fencing parallel to the torn section.
- 4. Replace or repair any sections crushed or collapsed in the course of construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a silt fence at common vehicle access points.
- 5. When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

Rock Berm/High Service Rock Berm

- 1. Inspections should be made weekly and after each rainfall by the responsible party.
- 2. Remove sediment and other debris when buildup reaches 6 inches and dispose of the accumulated silt of in an approved manner.
- 3. Repair any loose wire sheathing.
- 4. The berm should be reshaped as needed during inspection.
- 5. The berm should be replaced when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.
- 6. The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.

Temporary Construction Entrance and Exits

- The entrance should be maintained in a condition, which will prevent tracking or following of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment.
- 2. All sediment spilled, dropped, washed or tracked on to public rights-of-ways should be removed immediately by contractor.
- 3. When necessary, wheels should be cleaned to remove sediment prior to entrance onto public right-of-way.
- 4. When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin.
- 5. All sediment should be prevented from entering ant storm drain, ditch, or water course by using approved methods.

Bagged Gravel Inlet Filters

- 1. Inspections should be made weekly and after each rainfall. Repair or replacement should be made promptly as needed by the contractor.
- 2. Remove sediment when buildup reached a depth of 3 inches. Removed sediment should be deposited in a suitable area and in such a manner that it will not eride.
- 3. Check placement of device to prevent gaps between device and curb.
- 4. Inspect filter fabric and patch or replace if torn or missing.
- 5. Structures should be removed and the area stabilized only after the remaining drainage area has been properly stabilized.

Temporary Sedimentation Basin

- Inspection should be made weekly and after each rainfall. Check the embankment, spillways, and outlet for erosion damage, and inspect the embankment for piping and settlement. Repair should be made promptly as needed by contractor.
- 2. Trash and other debris should be removed after each rainfall to prevent clogging out fo the outlet structure.
- 3. Accumulated silt should be removed and the basin should be re-graded to its original dimensions at such point that the capacity of the impoundment has been reduced to 75% of its original storage capacity.
- 4. The removed sediment should be stockpiled or redistributed in areas that are protected from erosion.

Documentation Procedures

- 1. A copy of the inspection report is located on the following page.
- 2. The inspection report must be maintained on site at all times.
- 3. The inspection report is incorporated as part of the WPAP. The contractor is responsible for completing and updating the form in compliance with TCEQ rules.

Attachment J – Schedule of Interim and Permanent Soil Stabilization

Interim on-site stabilization measures, which are continuous, will include minimizing soil disturbances by exposing only the smallest practical area of land required for the shortest period of time and maximizing use of natural vegetation. As soon as practical, all disturbed soil will be stabilized as per project specifications in accordance with pages 1-35 to 1-60 of TCEQ's Technical Guidance Manual (TGM) RG-348 (2005). Mulching, netting, erosion blankets and seeding are acceptable.

Stabilization measures will be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and except as provided below, will be initiated no more than fourteen (14) days after the construction activity in that portion of the site has temporarily or permanently ceased. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within twenty-one (21) days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures must be initiated as soon as practicable.

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: Seamus MacFarland

Date: 10/04/2024

Signature of Customer/Agent

Seamus MacFarland

Regulated Entity Name: River's Edge at Gruene Condos

Permanent Best Management Practices (BMPs)

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

1. X Permanent BMPs and measures must be implemented to control the discharge of pollution from regulated activities after the completion of construction.



- 2. X 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.
 - X 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. X 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.
 - X 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 multifamily 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.
 - \overline{X} The site will not be used for multi-family residential developments, schools, or small business sites.
- 6. X 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.	Х	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.	X	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.	X	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.	X	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:
		 X Design calculations (TSS removal calculations) X TCEQ construction notes X All geologic features X All proposed structural BMP(s) plans and specifications

N/A

11. 🔀 At in m	tachment G - Inspection, Maintenance, Repair and Retrofit Plan . A plan for the spection, maintenance, repairs, and, if necessary, retrofit of the permanent BMPs and easures is attached. The plan includes all of the following:
X	Prepared and certified by the engineer designing the permanent BMPs and measures
Х	Signed by the owner or responsible party
X	Procedures for documenting inspections, maintenance, repairs, and, if necessary retrofit
] A discussion of record keeping procedures
N/	Ά
12. 🗌 At re pi	tachment H - Pilot-Scale Field Testing Plan . Pilot studies for BMPs that are not cognized by the Executive Director require prior approval from the TCEQ. A plan for lot-scale field testing is attached.
X N/	Ά
13. X At of ar ar	tachment I -Measures for Minimizing Surface Stream Contamination. A description the measures that will be used to avoid or minimize surface stream contamination of 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
cr	eation of stronger nows and in-stream velocities, and other in-stream effects caused

N/A

degradation.

Responsibility for Maintenance of Permanent BMP(s)

by the regulated activity, which increase erosion that results in water quality

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

14. |X| 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. |X| 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

No impervious cover waiver is being requested with this project.

Attachment B – BMP for Upgradient Stormwater

No treatment of this upgradient area is necessary.

Attachment C – BMP for On-Site Stormwater

In keeping with the TCEQ rules, this development will employ a Batch detention basin.

1) (1) Batch detention pond is proposed to be built on the development as on-site permanent BMP, this water quality pond would be treating a total of 24.34 acres of impervious cover.

All site BMPs were designed to remove at least 80% of the increased (TSS) in accordance with TCEQ's.

Attachment D – BMP for Surface Streams

This project will protect the natural drainage course by constructing the Batch detention ponds discussed above and shown on the plans to filter pollutants from the captured first flush. The sedimentation/filtration basin proposed has been designed in accordance with TCEQ's TGM RG-348 (2005) which indicates a minimum of 80% of the increased TSS load from the site as a whole must be removed.

Attachment E – Request to Seal Features

There are no naturally occurring sensitive features located within the boundaries of the site which are to be sealed.

Attachment F – Construction Plans

See attached plans.

ATTACHMENT "G" – Inspection, Maintenance, Repair and Retrofit Plan

PROJECT NAME: River's Edge at Gruene Condos

ADDRESS: 3500 LF North of the Hunter Rd & FM 306 Intersection

CITY, STATE ZIP: New Braunfels, Texas 78132

BATCH DETENTION BASINS

Batch detention basins may have somewhat higher maintenance requirements than an extended detention basin since they are active stormwater controls. The maintenance activities are identical to those of extended detention basins with the addition of maintenance and inspections of the automatic controller and the valve at the outlet.

There are many factors that may affect the basin's operation and that should be periodically checked. These factors can include mowing, control of pond vegetation, removal of accumulated bottom sediments, removal of debris from all inflow and outflow structures, unclogging of orifice perforations, and the upkeep of all physical structures that are within the detention pond area. One should conduct periodic inspections and after each significant storm. Remove floatables and correct erosion problems in the pond slopes and bottom. Pay particular attention to the outlet control perforations for signs of clogging. If the orifices are clogged, remove sediment and other debris. The generic aspects that must be considered in the maintenance plan for a detention facility are as follows:

<u>Inspections.</u> Inspections should take place a minimum of twice a year. One inspection should take place during wet weather to determine if the basin is meeting the target detention time of 12 hours and a drawdown time of no more than 48 hours. The remaining inspections should occur between storm events so that manual operation of the valve and controller can be verified. The level sensor in the basin should be inspected and any debris or sediment in the area should be removed. The outlet structure and the trash screen should be inspected for signs of clogging. Debris and sediment should be removed from the orifice and outlet(s) as described in previous sections. Debris obstructing the valve should be removed. During each inspection, erosion areas inside and downstream of this BMP should be identified and repaired/revegetated immediately.

<u>Mowing</u>. The basin, basin side-slopes, and embankment of the basin must be mowed to prevent woody growth and control weeds. A mulching mower should be used, or the grass clippings should be caught and removed. Mowing should take place at least twice a year, or more frequently if vegetation exceeds 18 inches in height. More frequent mowing to maintain aesthetic appeal may be necessary in landscaped areas. <u>Debris and Litter Removal</u>. Litter and debris removal should take place at least twice a year, as part of the periodic mowing operations and inspections. Debris and litter should be removed from the surface of the basin. Particular attention should be paid to floatable debris around the outlet structure. The outlet should be checked for possible clogging or obstructions and any debris removed.

<u>Erosion Control</u>. The basin side slopes and embankment all may periodically suffer from slumping and erosion. To correct these problems, corrective action, such as regrading and revegetation, may be necessary. Correction of erosion control should take place whenever required based on the periodic inspections.

<u>Structural Repairs and Replacement.</u> With each inspection, any damage to structural elements of the basin (pipes, concrete drainage structures, retaining walls, etc.) should be identified and repaired immediately. An example of this type of repair can include patching of cracked concrete, sealing of voids, removal of vegetation from cracks and joints. The various inlet/outlet structures in a basin will eventually deteriorate and must be replaced..

<u>Nuisance Control.</u> Standing water or soggy conditions may occur in the basin. Some standing water may occur after a storm event since the valve may close with 2 to 3 inches of water in the basin. Some flow into the basin may also occur between storms due to spring flow and residential water use that enters the storm sewer system. Twice a year, the facility should be evaluated in terms of nuisance control (insects, weeds, odors, algae, etc.).

<u>Sediment Removal.</u> A properly designed batch detention basin will accumulate quantities of sediment over time. The accumulated sediment can detract from the appearance of the facility and reduce the pollutant removal performance of the facility. The sediment also tends to accumulate near the outlet structure and can interfere with the level sensor operation. Sediment shall be removed from the basin at least every 5 years, when sediment depth exceeds 6 inches, when the sediment interferes with the level sensor or when the basin does not drain within 48 hours. Care should be taken not to compromise the basin lining during maintenance.

Login Controller. The Logic Controller should be inspected as part of the twiceyearly investigations. Verify that the external indicators (active, cycle in progress) are operating properly by turning the controller off and on, and by initiating a cycle by triggering the level sensor in the basin. The valve should be manually opened and closed using the open/close switch to verify valve operation and to assist in inspecting the valve for debris. The solar panel should be inspected and any dust or debris on the panel should be carefully removed. The controller and all other circuitry and wiring should be inspected for signs of corrosion, damage from insects, water leaks, or other damage. At the end of the inspection, the controller should be reset.

VEGETATED FILTER STRIPS

Vegetation height for native grasses shall be limited to no more than 18-inches. When vegetation exceeds that height, the filter strip shall be cut to a height of approximately 4-inches. Turf grass shall be limited to a height of 4-inches with a regular maintenance that utilizes a mulching mower. Trash and debris shall be removed from filter strip prior to cutting. Check filter strips for signs of concentrated flow and erosion. Areas of filter strip showing signs of erosion shall be repaired by scarifying the eroded area, reshaping, regrading, and placement of solid block sod over the affected area. A written record should be kept of inspection findings and corrective actions performed should be made.

Permanent Stormwater Section Attachment "G" continued Sample Maintenance Table

ITEM #	DATE	DESCRIPTION OF ACTION(S) TAKEN	INITIALS

Responsible Party for Maintenance

Address

City, State Zip

Telephone Number

Signature of Responsible Party

<u>(512) 466-6695</u>

6 Gruene Wald

Print name of Responsible Party

Clint E. Jones

River's Edge at Gruene, LP

New Braunfels, Texas 78130

Attachment H – Pilot-Scale Field Testing Plan

The TCEQ's TGM was used to design the BMP's for this project.

Attachment I– Measures for Minimizing Surface Stream Contamination

Any points where discharge from this site is concentrated and erosive velocities exist will include appropriately sized energy dissipaters to reduce velocities to non-erosive levels.

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

I	Clint Jones	,
	Print Name	
	President	,
	Title - Owner/President/Other	,
of	River's Edge at Gruene, LP	,
	Corporation/Partnership/Entity Name	
have authorized	Seamus MacFarland	
	Finit Name of Agent/Engineer	
of	LJA Engineering	
	Print Name of Firm	

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

I also understand that:

- 1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to \$10,000 per day per violation.
- 2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.
- 3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.
- 4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.
- 5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

Applicant's Signature

<u>10 |4|24</u> Date

THE STATE OF TEXAS § County of LOMAL §

NOTARY PUBLIC

STATE OF TEXAS

MY COMM. EXP. 09/13/25

NOTARY ID 1104690-4

BEFORE ME, the undersigned authority, on this day personally appeared $\underline{Clint fones}_{known}$ 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 _____ day of _____ KRISTINA D TRIPP

AND

Ripp NUA

Typed or Printed Name of Notary

MY COMMISSION EXPIRES: $\frac{9/1}{3}/25$

TCEQ-0599 (Rev.04/01/2010)

Application Fee Form

Texas Commission on Environmental Quality				
Name of Proposed Regulated Entity: <u>River's</u> Edge at Gruene Condos				
Regulated Entity Location: 3500 LF North of the Hunter Rd & FM 306 intersection				
Name of Customer: Regal Land De	velopment			
Contact Person: Clint Jones	Phor	ne:		
Customer Reference Number (if issu	ied):CN			
Regulated Entity Reference Number	(if issued):RN			
Austin Regional Office (3373)				
Havs	Travis	Πw	/illiamson	
San Antonio Regional Office (3362)				
Bexar	Medina		valde	
X Comal	 Kinney			
Application fees must be paid by che	eck, certified check, c	or money order, payał	ole to the Texas	
Commission on Environmental Qua	lity. Your canceled o	check will serve as you	r receipt. This	
form must be submitted with your	fee payment. This p	ayment is being subm	itted to:	
Austin Regional Office	XS	an Antonio Regional C	Office	
Mailed to: TCEQ - Cashier Overnight Delivery to: TCEQ - Cashie		TCEQ - Cashier		
Revenues Section 12100 Park 35 Circle				
Mail Code 214 Building A. 3rd Floor				
P.O. Box 13088	А	ustin, TX 78753		
Austin, TX 78711-3088	088 (512)239-0357			
Site Location (Check All That Apply):				
X Recharge Zone	Contributing Zone	Trans	ition Zone	
Type of Plan		Size	Fee Due	
Water Pollution Abatement Plan, Co	ontributing Zone			
Plan: One Single Family Residential	Dwelling	Acres	\$	
Water Pollution Abatement Plan, Contributing Zone		40470		
Plan: Multiple Single Family Residential and Parks		124.79 Acres	\$ 8,000	
Water Pollution Abatement Plan, Contributing Zone				
Plan: Non-residential		Acres	\$	
Sewage Collection System		L.F.	\$	
Lift Stations without sewer lines		Acres	\$	
Underground or Aboveground Stora	ge Tank Facility	Tanks	\$	
Piping System(s)(only)		Each	\$	
Exception		Each	\$	
Extension of Time		Each	\$	

Signature:

Date: 12/5/24

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

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

Organized Sewage Collection Systems and Modifications

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

Underground and Aboveground Storage Tank System Facility Plans and Modifications

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

Exception Requests

Project	Fee
Exception Request	\$500

Extension of Time Requests

Project	Fee
Extension of Time Request	\$150


TCEQ Core Data Form

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

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided.)								
New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)								
Renewal (Core Data Form should be submitted with the renewal form) Other								
2. Customer Reference Number (if issued)	3. Regulated Entity Reference Number (if issued)							
CN 0 Central Registry** RN								

SECTION II: Customer Information

4. General Cu	4. General Customer Information 5. Effective Date for Customer Information Updates (mm/dd/yyyy)							8/28/2024					
Image:													
The Custome (SOS) or Texa	The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA)												
6. Customer	6. Customer Legal Name (If an individual, print last name first: eg: Doe, John) If new Customer, enter previous Customer below:												
Regal Land Dev	elopment												
7. TX SOS/CPA Filing Number 8. TX Sta 30001483				8. TX State	ate Tax ID (11 digits) 3871			9. Federal Tax ID (9 digits)		10. DUNS Number (if applicable)			
11. Type of C	ustomer:		Corporat	ion				🗌 Individ	lual Partnership:		rship: 🗌 Gen	eral 🔀 Limited	
Government: [City 🗌 C	County [Federal	Local 🗌 State	e 🗌 Other			Sole Pr	roprietorship 🗌 Other:				
12. Number o	of Employ	ees							13. Independently Owned and Operated?				
⊠ 0-20 □ 2	21-100] 101-25	50 🗌 251-	500 🗌 501	and higher			🖂 Yes 🗌 No					
14. Customer	Role (Prop	posed or	Actual) – as it	relates to the	Regulated Er	ntity list	ed on	this form. I	Please d	check one of	the follo	wing	
Owner	al Licensee	Ope	erator esponsible Par	ty Dv	vner & Opera VCP/BSA App	tor licant				🛛 Other:	Vice Pre	esident	
15. Mailing	6 Gruene	Wald											
Addross													
City New Braunfels			State	ТХ	тх Z		78130			ZIP + 4			
16. Country N	Mailing Inf	formatio	on (if outside	USA)	•		17. E-Mail Address (if applicable)						
18. Telephone Number			:	19. Extension or Code				20. Fax Number (if applicable)					

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (If 'New Regulated Entity" is selected, a new permit application is also required.)									
New Regulated Entity Update to Regulated Entity Name Update to Regulated Entity Information									
The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC).									
22. Regulated Entity Nam	1e (Enter name	of the site where the	regulated action	is taking plac	ce.)				
Regal Land Development									
23. Street Address of	23. Street Address of								
the Regulated Entity:									
<u>(No PO Boxes)</u>	City		State		ZIP		ZIP + 4		
24. County									

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

25. Description to	3500 LF North of Hunter Rd & FM 306 intersection								
Physical Location:									
26. Nearest City					S	itate	Nea	rest ZIP Code	
New Braunfels TX 78132									
Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).									
27. Latitude (N) In Decim	al:	29.752896		28. Loi	ngitude (W)	In Decimal:	-98.10368	39	
Degrees	Minutes		Seconds	Degree	S	Minutes		Seconds	
29		45	10.4		98	6		13.28	
29. Primary SIC Code	29. Primary SIC Code 30. Secondary SIC Code 31. Primary NAICS Code 32. Secondary NAICS Code							CS Code	
(4 digits)	(4 c	ligits)		(5 or 6 digits)			(5 or 6 digits)		
1522			508034						
33. What is the Primary E	Business of	this entity? (Do	not repeat the SIC or	r NAICS descrip	otion.)				
Residential, street,									
34. Mailing									
Address:	City		Chaba		710		710 . 4		
	City		State		ZIP		ZIP + 4		
35. E-Mail Address:									
36. Telephone Number			37. Extension or	Code	38. Fax	Number (if applicable	le)		
() -					()	-			

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

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

SECTION IV: Preparer Information

40. Name:	40. Name: Seamus MacFarland, PE				Project Manager
42. Telephone	Number	43. Ext./Code	44. Fax Number	45. E-Mail /	Address
(210) 503-2700 () -		smacfarland	@lja.com		

SECTION V: Authorized Signature

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

Company:	LJA Engineering, Inc.	anager			
Name (In Print):	Seamus MacFarland, PE	Phone:	(210) 503- 2700		
Signature:	Seamus MacFarland			Date:	12/5/2024

New Braunfels Title Co.



NOTICE OF CONFIDENTIALITY RIGHTS: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OR ALL OF THE FOLLOWING INFORMATION FROM ANY INSTRUMENT THAT TRANSFERS AN INTEREST IN REAL PROPERTY BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORDS: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVER'S LICENSE NUMBER.

GENERAL WARRANTY DEED RESERVING VENDOR'S LIEN IN FAVOR OF THIRD PARTY

THE STATE OF TEXAS § KNOW ALL MEN BY THESE PRESENTS: COUNTY OF COMAL §

THAT ANNA GARTH CLARK f/k/a ANNA GARTH ELROD, a single woman, ARCHIE A. WOHLFAHRT, a married man and JANIS KAY WOMMACK, a married woman, not joined herein by their respective spouses because the herein conveyed property forms no part of any property claimed as homestead, hereinafter called Grantor, for and in consideration of the sum of TEN AND NO/I00 DOLLARS (\$10.00) cash and other good and valuable consideration in hand paid by RIVER'S EDGE AT GRUENE, L.P., whose address is 6 Gruene Wald, New Braunfels, Texas, 78130, hereinafter called Grantee, the receipt and sufficiency of which is hereby acknowledged and confessed, and the further consideration of the execution and delivery by the said Grantee of one certain Promissory Note of even date herewith in the amount specified therein, payable to the order of TEXAS COMMUNITY BANK, hereinafter called Mortgagee, said Note being payable as therein provided, bearing interest at the rate therein specified, providing for attorney's fees and acceleration of maturity at the rate and in the events therein set forth, and payment of said Note being secured by a vendor's lien and superior title retained herein in favor of said Mortgagee, and by Deed of Trust of even date herewith from Grantee to ADAM GARZA, Trustee, to which reference is hereby made for all purposes; and,

WHEREAS, Mortgagee has, at the special instance and request of said Grantee herein, paid to Grantor herein a portion of the purchase for the property hereinafter described as represented by the above described Note, said Note, together with the vendor's lien and Deed of Trust Lien against said property securing the payment of said Note is, without recourse upon the Grantor herein, hereby assigned, transferred and delivered to Mortgagee, the Grantor hereby conveying to the said Mortgagee the said superior title to said property, and subrogating the said Mortgagee unto all the rights and remedies of Grantor in the premises by virtue of said Note and liens; the indebtedness evidenced by said Note being due and payable as therein provided, both principal and interest being due and payable at the office of **TEXAS COMMUNITY BANK**;

HAS GRANTED, SOLD and CONVEYED, and by these presents does GRANT, SELL and CONVEY unto the said Grantee, the following described property, to-wit:

Description of a **124.79** acre tract of land, situated in the Orilla Russell Survey No. 2, Abstract No. 485 and Alanson P. Fuquay Survey No. 35, Abstract No. 155, Comal County, Texas. being all of a called 39.312 acre tract described as Tract 2 in Deed conveyed to Anna Garth Clark (1/3 proportion), Archie A. Wohlfahrt (1/3 proportion), and Janis Kay Wommack (1/3 proportion), as recorded in Document No. 201406020560, Official Public Records of Comal County, Texas (O.P.R.C.C.TX.), and being a portion of a called 90.871 acre tract as conveyed in Deed to Anna Garth Clark (1/3 proportion), Archie A. Wohlfahrt (1/3 proportion), and Janis Kay Wommack (1/3 proportion), Archie A. Wohlfahrt (1/3 proportion), and Janis Kay Wommack (1/3 proportion), Archie A. Wohlfahrt (1/3 proportion), and Janis Kay Wommack (1/3 proportion), as recorded in Document No. 201406020562, O.P.R.C.C.TX.; SAID 124.79 acre tract being more particularly described by metes and bounds in **Exhibit "A"** attached hereto ...

This conveyance is made subject to:

- 1. Rights of lessees, under the terms of any unrecorded leases.
- Easement in Volume 241, Page 866, of the Deed Records of Comal County, Texas.
- 3. Electric Water Sewer Line Right-of-Way Agreement to City of New Braunfels (Utilities) recorded in Volume 267, Page 1 and corrected in

Volume 267, Page 818, of the Deed Records of Comal County, Texas.

- 4. NBU Water and Wastewater Easement recorded in Document No. 201606027233, of the Official Public Records of Comal County, Texas.
- 5. New Braunfels Utilities Water and Wastewater Easements recorded in Document Numbers 202006052944, 202006052946 and 202006052947, of the Official Public Records of Comal County, Texas.
- 6. Survey dated May 10, 2024, prepared by Matt Overall, RPLS# 6864, reflects overhead electric line, power poles and underground water lines.
- Consequences of past or future changes in the location and/or direction of the Guadalupe River, which forms the boundary of the land insured herein caused by the forces of erosion, accretion or avulsion.
- 8. Any rights of adjoining property owners in and to that part of the hereinabove property which may constitute accretion or avulsion by virtue of the possible shifting of the bed or shores of the river, stream or body of water which bounds the subject property.
- 9. All, leases, grants, exceptions or reservations of coal, lignite, oil, gas and other minerals, together with all rights, privileges, and immunities relating thereto, appearing in the Public Records.

Taxes for the current year have been prorated and are assumed by Grantee.

It is expressly agreed and stipulated that a vendor's lien is retained in favor of the payee in said Note against the above described property, premises and improvements, until said Note, and all interest thereon, is fully paid according to the face and tenor, effect and reading thereof, when this deed shall become absolute.

TO HAVE AND TO HOLD the above described premises, together with, all and singular, the rights and appurtenances thereto in anywise belonging unto the said Grantee, Grantee's heirs and assigns forever.

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Grantor does hereby bind Grantor, Grantor's heirs, executors, administrators and successors to warrant and forever defend, all and singular, the said premises unto the said Grantee, Grantee's heirs, executors, administrators, successors and assigns, against every person whomsoever claiming or to claim the same or any part thereof.

EFFECTIVE as of the $4 + 4^{-1}$ day of September, 2024.

inno barth (In K CLARK f/k/a ANNA GAR ANNA GARTH ELROD, by and through her agent and

ARCHIE A. WOHLFAHRT

attorney-in-fact, ROBIN M. JEFFERS

Ka M YANI'S KAY WOMMACK

STATE OF TEXAS COUNTY OF COMAL § §

This instrument was acknowledged before me on this the $\underline{4}$ day of September, 2024, by ROBIN M. JEFFERS agent and attorney-in-fact for ANNA GARTH CLARK f/k/a ANNA GARTH ELROD.

LONDIE BYRD NOTARY PUBLIC STATE OF TEXAS MY COMM. EXP. 09/18/25 NOTARY ID 230650-6

LONDIE BYRD NOTARY PUBLIC

STATE OF TEXAS

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Notary Public in and for the State of Texas

STATE OF TEXAS COUNTY OF COMAL

This instrument was acknowledged before me on this the $\underline{+}$ day of September, 2024, by ARCHIE A. WOHLFAHRT.

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Notary Public in and for the State of Texas MY COMM. EXP. 09/18/25 NOTARY ID 230650-6

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STATE OF TEXAS COUNTY OF COMAL

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This instrument was acknowledged before me on this the $\underline{4}$ day of September, 2024, by JANIS KAY WOMMACK.



LONDIE BYRD NOTARY PUBLIC STATE OF TEXAS MY COMM. EXP. 09/18/25 NOTARY ID 230650-6

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Notary Public in and for the State of Texas

7505B.deeds New Braunfels Title Co. (CG) GF #2053-2021 NBT

LEGAL DESCRIPTION

DESCRIPTION OF A 124.79 ACRE TRACT OF LAND, SITUATED IN THE ORILLA RUSSELL SURVEY NO. 2, ABSTRACT NO. 485 AND THE ALANSON P. FUQUAY SURVEY NO. 35, ABSTRACT NO. 155, COMAL COUNTY, TEXAS, BEING A PORTION OF A CALLED 39.312 ACRE TRACT DESCRIBED AS TRACT 2 IN DEED CONVEYED TO ANNA GARTH CLARK (1/3 PROPORTION), ARCHIE A. WOHLFAHRT (1/3 PROPORTION), AND JANIS KAY WOMMACK (1/3 PROPORTION), AS RECORDED IN DOCUMENT NO. 201406020560, OFFICIAL PUBLIC RECORDS, COMAL COUNTY, TEXAS (O.P.R.C.C.TX.), AND BEING A PORTION OF A CALLED 90.871 ACRE TRACT AS CONVEYED IN DEED TO ANNA GARTH CLARK (1/3 PROPORTION), ARCHIE A. WOHLFAHRT (1/3 PROPORTION), AND JANIS KAY WOMMACK (1/3 PROPORTION), ARCHIE A. WOHLFAHRT (1/3 PROPORTION), AND JANIS KAY WOMMACK (1/3 PROPORTION), ARCHIE A. WOHLFAHRT (1/3 PROPORTION), AND JANIS KAY WOMMACK (1/3 PROPORTION), AS RECORDED IN DOCUMENT NO. 201406020562, O.P.R.C.C.TX.; SAID 124.79 ACRE TRACT BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS FOLLOWS:

BEGINNING AT A 1/2-INCH ROD FOUND WITH CAP STAMPED "URBAN CIVIL" (GRID NORTHING: 13,823,314.87 U.S. SURVEY FEET, GRID EASTING: 2,252,620.11 U.S. SURVEY FEET) ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF F.M. 306, FOR A COMMON EASTERLY CORNER OF SAID 90.871 ACRE TRACT AND LOT 4 OF THE ROVER'S RETREAT SUBDIVISION, A SUBDIVISION OF RECORD IN VOLUME 9, PAGE 235, AND VOLUME 7, PAGE 23, PLAT RECORDS, COMAL COUNTY, TEXAS (P.R.C.C.TX.), SAME BEING THE **POINT OF BEGINNING** AND A NORTHEASTERLY CORNER OF THE HEREIN DESCRIBED TRACT;

THENCE SOUTH 13 DEGREES 09 MINUTES 19 SECONDS EAST, WITH THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF SAID F.M. 306, A DISTANCE OF 83.32 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY" SET FOR THE COMMON EAST CORNER OF SAID 90.871 ACRE TRACT AND A CALLED 5.92 ACRE TRACT CONVEYED IN A DEED TO ARCHIE A. WOHLFAHRT, RECORDED IN DOCUMENT NO. 175284, O.P.R.C.C.TX., FROM WHICH A TXDOT BRASS DISK FOUND ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF SAID F.M. 306 AND THE EAST LINE OF SAID 5.92 ACRE TRACT BEARS, SOUTH 13 DEGREES 43 MINUTES 20 SECONDS EAST, A DISTANCE OF 464.61 FEET;

THENCE SOUTH 60 DEGREES 09 MINUTES 04 SECONDS WEST, DEPARTING THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF SAID F.M. 306, WITH THE COMMON LINES OF SAID 90.871 ACRE TRACT AND SAID 5.92 ACRE TRACT, A DISTANCE OF 520.07 FEET TO A 3/8-INCH IRON ROD FOUND FOR THE WEST CORNER OF SAID 5.92 ACRE TRACT;

THENCE OVER AND ACROSS SAID 90.871 ACRE TRACT, WITH THE NEW COMMON LINE OF SAID 90.871 ACRE TRACT AND AN ADDITION TRACT CONTAINING 1.78 ACRES BEING CONVEYED TO ARCHIE A. WOHLFAHRT IN SEPARATE DOCUMENT, THE FOLLOWING THREE COURSES AND DISTANCES:

1) SOUTH 60 DEGREES 10 MINUTES 47 SECONDS WEST, A DISTANCE OF 70.01 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY" SET FOR THE NORTHWEST CORNER OF SAID 1.78 ACRE WOHLFAHRT ADDITION TRACT,

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- 2) SOUTH 29 DEGREES 49 MINUTES 13 SECONDS EAST, A DISTANCE OF 727.93 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY SET FOR THE SOUTHWEST CORNER OF SAID 1.78 ACRE WOHLFAHRT ADDITION TRACT, AND
- 3) NORTH 45 DEGREES 43 MINUTES 52 SECONDS EAST, A DISTANCE OF 452.57 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY" SET FOR THE SOUTHEAST CORNER OF SAID 1.78 ACRE WOHLFAHRT ADDITION TRACT, SAME BEING A NORTHEASTERLY CORNER OF THE HEREIN DESCRIBED TRACT, FROM WHICH A 3/8-INCH IRON ROD FOUND FOR THE WEST CORNER OF SAID 5.92 ACRE TRACT BEARS NORTH 22 DEGREES 05 MINUTES 39 SECONDS WEST, A DISTANCE OF 75.60 FEET;

THENCE SOUTH 22 DEGREES 05 MINUTES 39 SECONDS EAST, WITH THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF SAID F.M. 306 AND AN EAST LINE OF SAID 39.312 ACRE TRACT, A DISTANCE OF 808.10 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY" SET FOR THE NORTHEAST CORNER OF AN ADDITION TRACT CONTAINING 18.805 ACRES BEING CONVEYED TO WOMMACK FAMILY IN SEPARATE DOCUMENT, SAME BEING A SOUTHEASTERLY CORNER OF THE HEREIN DESCRIBED TRACT, FROM WHICH A 1/2-INCH IRON ROD WITH CAP STAMPED "URBAN CIVIL" FOUND FOR COMMON CORNER OF SAID 39.912 ACRE TRACT AND A CALLED 5.029 ACRE TRACT CONVEYED TO JANIS KAY WOMMACK AND HER HUSBAND, MAX R. WOMMACK, JR., RECORDED IN DOCUMENT NO. 168213, O.P.R.C.C.TX. BEARS SOUTH 22 DEGREES 05 MINUTES 35 SECONDS EAST, A DISTANCE OF 53.20 FEET;

THENCE SOUTH 47 DEGREES 56 MINUTES 50 SECONDS WEST, THROUGH THE INTERIOR OF SAID 39.912 ACRE TRACT, WITH THE NORTH LINE OF SAID 18.805 ACRE WOMMACK ADDITION TRACT, A DISTANCE OF 1,631.47 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY" SET ON A NORTHEASTERLY LINE OF LOT 3, HIGH POINT, UNIT TWO, RECORDED IN VOLUME 10, PAGE 363, PLAT RECORDS, COMAL COUNTY, TEXAS, FOR THE NORTHWESTERLY CORNER OF SAID 18.805 ACRE WOMMACK ADDITION TRACT, SAME BEING A SOUTHWESTERLY CORNER OF THE HEREIN DESCRIBED TRACT, FROM WHICH A 1/2-INCH IRON ROD FOUND FOR A COMMON CORNER OF SAID LOT 3, HIGH POINT, AND SAID 39.912 ACRE TRACT BEARS SOUTH 42 DEGREES 06 MINUTES 40 SECONDS EAST, A DISTANCE OF 689.62 FEET;

THENCE NORTH 42 DEGREES 06 MINUTES 40 SECONDS WEST, WITH THE COMMON LINE OF SAID 39.312 ACRE TRACT AND SAID LOT 3, HIGH POINT A DISTANCE OF 437.74 FEET TO A MAG NAIL IN ROCK FOUND FOR A COMMON CORNER OF SAID 39.312 ACRE TRACT, SAID 90.871 ACRE TRACT, AND SAID LOT 3, HIGH POINT, FROM WHICH A 1/2-INCH IRON ROD FOUND ON A COMMON LINE OF SAID 39.312 ACRE TRACT AND SAID 90.871 ACRE TRACT BEARS, NORTH 44 DEGREES 25 MINUTES 04 SECONDS EAST, A DISTANCE OF 289.33 FEET;

THENCE SOUTH 34 DEGREES 55 MINUTES 51 SECONDS WEST, WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT AND SAID LOT 3, HIGH POINT, A DISTANCE OF 824.82 FEET TO A 1/2-INCH IRON ROD FOUND ON A SOUTHERLY LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID LOT 3, HIGH POINT AND A CALLED 9.45 ACRE TRACT CONVEYED IN A DEED TO BJORN A. JOHNSON AND CYNTHIA J. JOHNSON, RECORDED IN DOCUMENT NO. 202206041914, O.P.R.C.C.TX.;

THENCE WITH THE COMMON LINES OF SAID 90.871 ACRE TRACT AND SAID 9.45 ACRE TRACT, THE FOLLOWING THREE (3) COURSES AND DISTANCES:

- 1) SOUTH 55 DEGREES 19 MINUTES 07 SECONDS WEST, A DISTANCE OF 233.94 FEET TO A 5/8-INCH IRON PIPE FOUND FOR A NORTHWESTERLY CORNER OF SAID 9.45 ACRE TRACT,
- 2) SOUTH 35 DEGREES 15 MINUTES 33 SECONDS EAST, A DISTANCE OF 463.65 FEET TO A 1/2-INCH IRON ROD WITH CAP STAMPED "HMT" FOUND FOR AN INTERIOR ELL CORNER OF SAID TRACTS, AND
- 3) SOUTH 35 DEGREES 25 MINUTES 25 SECONDS WEST, A DISTANCE OF 128.22 FEET TO A 1/2-INCH IRON ROD WITH CAP STAMPED "HMT" FOUND ON THE BANK OF THE GUADALUPE RIVER, FOR A COMMON SOUTHERLY CORNER OF SAID 9.45 ACRE TRACT AND SAID 90.871 ACRE TRACT;

THENCE WITH THE NORTH BANK OF THE GUADALUPE RIVER, SAME BEING A SOUTH LINE OF SAID 90.871 ACRE TRACT, THE FOLLOWING SIX (6) COURSES AND DISTANCES:

- 1) NORTH 72 DEGREES 34 MINUTES 16 SECONDS WEST, A DISTANCE OF 153.89 FEET TO A POINT,
- 2) NORTH 77 DEGREES 27 MINUTES 07 SECONDS WEST, A DISTANCE OF 259.55 FEET TO A POINT,
- 3) SOUTH 89 DEGREES 57 MINUTES 17 SECONDS WEST, A DISTANCE OF 250.69 FEET TO A POINT,
- 4) SOUTH 82 DEGREES 50 MINUTES 35 SECONDS WEST, A DISTANCE OF 192.81 FEET TO A POINT,
- 5) SOUTH 73 DEGREES 12 MINUTES 16 SECONDS WEST, A DISTANCE OF 286.35 FEET TO A POINT, AND
- 6) SOUTH 82 DEGREES 21 MINUTES 05 SECONDS WEST, A DISTANCE OF 110.10 FEET TO A POINT FOR A COMMON CORNER OF SAID 90.871 ACRE TRACT AND LOT 26AB, RIADA SUBDIVISION, UNIT ONE, A SUBDIVISION OF RECORD IN VOLUME 12, PAGE 93, P.R.C.C.TX.;

THENCE WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT AND SAID LOT 26AB, THE FOLLOWING TWO (2) COURSES AND DISTANCES:

- 1) NORTH 37 DEGREES 26 MINUTES 18 SECONDS WEST, A DISTANCE OF 288.55 FEET TO A 1/2-INCH IRON ROD FOUND FOR AN ANGLE POINT, AND
- 2) NORTH 20 DEGREES 21 MINUTES 19 SECONDS WEST, A DISTANCE OF 529.41 FEET TO A 1/2-INCH IRON ROD FOUND FOR A COMMON CORNER OF SAID 90.871 ACRE TRACT, SAID LOT 26AB, LOT 27, RIADA SUBDIVISION, UNIT 1, A SUBDIVISION OF RECORD IN VOLUME 7, PAGE 63, P.R.C.C.TX., AND LOT 14, RIADA SUBDIVISION, A SUBDIVISION OF RECORD IN VOLUME 5, PAGE 242, P.R.C.C.TX.;

THENCE NORTH 49 DEGREES 29 MINUTES 59 SECONDS EAST, WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT AND SAID LOT 14, A DISTANCE OF 344.96 FEET TO A 1/2-INCH IRON ROD FOUND ON A NORTHWEST LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID LOT 14 AND LOT 13, SAID RIADA SUBDIVISION, VOLUME 5, PAGE 242; THENCE NORTH 45 DEGREES 53 MINUTES 06 SECONDS EAST, WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT AND SAID LOT 13, A DISTANCE OF 350.95 FEET TO A 1/2-INCH IRON ROD FOUND ON A NORTHWEST LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID LOT 13 AND LOT 12A, RIADA SUBDIVISION, UNIT 1, A SUBDIVISION OF RECORD IN VOLUME 12, PAGE 326, P.R.C.C.TX.;

THENCE NORTH 43 DEGREES 05 MINUTES 23 SECONDS EAST, WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT, SAID LOT 12A, AND LOT 12B OF SAID RIADA SUBDIVISION, UNIT 1, VOLUME 12, PAGE 326, PASSING AT A DISTANCE OF 300.41 FEET A RAILROAD SPIKE (BENT) FOUND FOR A COMMON CORNER OF SAID LOT 12A AND 12B, AND CONTINUING FOR A TOTAL DISTANCE OF 636.06 FEET TO A 1/2-INCH IRON ROD FOUND ON A NORTHWEST LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID LOT 12B AND CACTUS ROAD, SAID RIADA SUBDIVISION, VOLUME 12, PAGE 326;

THENCE NORTH 43 DEGREES 15 MINUTES 27 SECONDS EAST, WITH THE COMMON LINE OF SAID 90.781 ACRE TRACT AND SAID CACTUS LANE, A DISTANCE OF 60.01 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY" SET ON A NORTHWEST LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID CACTUS LANE AND LOT 11A, RIADA SUBDIVISION, UNIT 1, A SUBDIVISION OF RECORD IN VOLUME 11, PAGE 130, P.R.C.C.TX.;

THENCE NORTH 43 DEGREES 27 MINUTES 41 SECONDS EAST, WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT, SAID LOT 11A, AND LOT 11B OF SAID RIADA SUBDIVISION, UNIT 1, VOLUME 11, PAGE 130, PASSING AT A DISTANCE OF 333.11 FEET A 1/2-INCH IRON ROD WITH "ILLEGIBLE" CAP FOUND FOR A COMMON CORNER OF SAID LOT 11A AND LOT 11B, AND CONTINUING FOR A TOTAL DISTANCE OF 541.98 FEET TO A 1/2-INCH IRON ROD FOUND ON A NORTHWEST LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID LOT 11B AND LOT 10 OF RIADA SUBDIVISION, A SUBDIVISION OF RECORD IN VOLUME 5, PAGE 242, P.R.C.C.TX.;

THENCE NORTH 43 DEGREES 15 MINUTES 08 SECONDS EAST, WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT AND SAID LOT 10, A DISTANCE OF 541.98 FEET TO A 1/2-INCH IRON ROD FOUND ON A NORTHWEST LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID LOT 10 AND LOT 9 OF SAID RIADA SUBDIVISION, VOLUME 5, PAGE 242;

THENCE WITH THE COMMON LINES OF SAID 90.871 ACRE TRACT AND SAID LOT 9, THE FOLLOWING TWO (2) COURSES AND DISTANCES:

- 1) NORTH 43 DEGREES 14 MINUTES 44 SECONDS EAST, A DISTANCE OF 518.77 FEET TO A 5/8-INCH IRON ROD FOUND FOR THE EAST CORNER OF SAID LOT 9, AND
- 2) NORTH 45 DEGREES 46 MINUTES 33 SECONDS WEST, A DISTANCE OF 420.34 FEET TO A 5/8-INCH IRON ROD FOUND ON THE SOUTHEASTERLY LINE OF RIADA DRIVE, FOR A COMMON CORNER OF SAID 90.871 ACRE TRACT AND SAID LOT 9;

THENCE NORTH 45 DEGREES 23 MINUTES 38 SECONDS EAST, WITH THE COMMON LINE OF SAID RIADA DRIVE AND SAID 90.871 ACRE TRACT, A DISTANCE OF 1,067.37 FEET TO A 5/8-INCH IRON ROD WITH CAP STAMPED "LJA SURVEY" SET FOR A COMMON CORNER OF SAID 90.871 ACRE TRACT AND LOT 1B, ROVERS RETREAT, VOLUME 9, PAGE 235;

THENCE SOUTH 29 DEGREES 27 MINUTES 16 SECONDS EAST, WITH THE COMMON LINE OF SAID 90.871 ACRE TRACT AND SAID LOT 1B, A DISTANCE OF 95.03 FEET TO A 3/4-INCH IRON ROD FOUND ON AN EASTERLY LINE OF SAID 90.871 ACRE TRACT, FOR A COMMON CORNER OF SAID LOT 1B AND LOT 2A OF SAID ROVER'S RETREAT SUBDIVISION, VOLUME 7, PAGE 23;

THENCE WITH THE COMMON LINES OF SAID 90.871 ACRE TRACT, SAID LOT 2A, LOT 3, AND LOT 4 OF SAID ROVER'S RETREAT SUBDIVISION, VOLUME 7, PAGE 23, THE FOLLOWING THREE (3) COURSES AND DISTANCES:

- SOUTH 29 DEGREES 52 MINUTES 17 SECONDS EAST, A DISTANCE OF 171.30 FEET TO A 1/2-INCH IRON ROD FOUND FOR THE COMMON CORNER OF SAID LOT 2A AND SAID LOT 3,
- 2) SOUTH 29 DEGREES 46 MINUTES 47 SECONDS EAST, A DISTANCE OF 329.83 FEET TO A 1/2-INCH IRON ROD (BENT) FOUND FOR THE SOUTH CORNER OF SAID LOT 4, AND
- 3) NORTH 60 DEGREES 16 MINUTES 49 SECONDS EAST, A DISTANCE OF 253.36 FEET TO THE POINT OF BEGINNING AND CONTAINING 124.79 ACRES OF LAND, MORE OR LESS.

Bearing Basis: All bearings shown are based on the Texas State Plane Coordinate System, Grid North, South Central Zone (4204), NAD83. All distances were adjusted to surface using a combined scale factor of 1.00013

Matt Chinall

Matt Overall, RPLS No. 6864 LJA Surveying, Inc. 7500 Rialto Blvd., Bldg. II, Ste. 150 Austin, Texas 78735 Texas Firm No. 10194382



10 May 2024

After Recording Return to:

New Braunfels Title Company-Main - Main Office 243 South Seguin Avenue New Braunfels, TX 78130

Reference Order Number: NB-4186-24

Filed and Recorded Official Public Records Bobbie Koepp, County Clerk Comal County, Texas 09/05/2024 09:12:35 AM MARY 11 Pages(s) 202406026818



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