

4350 Lockhill Selma Road, Suite 100 San Antonio, Texas 78249 Tel: 210.494.5511 www.quiddity.com

WATER POLLUTION ABATEMENT PLAN

FOR

TBAR M CAMP EXPANSION

Regulated Entity ID: RNXXXXXXXXX

Additional ID No: XXXXXXXX

Prepared for Center for Christian Growth, Inc.



MAY 2024 Job No. 17758-0001-00



EDWARDS AQUIFER APPLICATION COVER PAGE SECTION

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: T Bar M Camp Expansion						2. Regulated Entity No.:				
3. Customer Name: Center for Christian Growth, Inc.					4. Customer No.: CN604880377					
5. Project Type: (Please circle/check one)	New	Modif	icatior	1	Exter	nsion	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-residential				8. Sit	e (acres):	28.957		
9. Application Fee:	\$6,500	10. Permanent BMP				s):	Vegetative Filter Strips, Bioretentio			
11. SCS (Linear Ft.):	3,756	12. AST/UST (No. Tanks): N/A								
13. County:	Comal	14. W	aters	hed:			Comal River-Guadalupe River			

Application Distribution

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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 Creek	Barton Springs/ Edwards Aquifer	NA				
City(ies) Jurisdiction	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.)		_X_						
Region (1 req.)		_X_						
County(ies)		<u>_X</u>						
Groundwater Conservation District(s)	Edwards Aquifer Authority Trinity-Glen Rose	uthority Authority		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.

Darren J McAfee, P.E.

Print Name of Customer/Authorized Agent

Dann Malla

Signature of Customer/Authorized Agent

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):					

5/8/2024 Date



GENERAL INFORMATION SECTION

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: Darren J. McAfee, P.E.

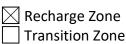
Date: 5/8/2024

Signature of Customer/Agent:

Dann Malla

Project Information

- 1. Regulated Entity Name: <u>T Bar M Camp Expansion</u>
- 2. County: Comal
- 3. Stream Basin: Blieders Creek
- 4. Groundwater Conservation District (If applicable): <u>Comal Trinity GCD, Edwards Aquifer</u> <u>Authority</u>
- 5. Edwards Aquifer Zone:



6. Plan Type:

\boxtimes	WPAP
	SCS

Modification
AST

TCEQ-0587 (Rev. 02-11-15)

🗌 UST

Exception Request

7. Customer (Applicant):

Contact Person: John MacDonald Entity: <u>Center for Christian Growth, Inc.</u> Mailing Address: <u>2549 W State Hwy 46</u> City, State: <u>New Braunfels, TX</u> Telephone: <u>830-620-4263</u> Email Address: <u>johnmac@tbarm.org</u>

Zip: <u>78132</u> FAX: _____

8. Agent/Representative (If any):

Contact Person: <u>Darren J. McAfee, P.E.</u>						
Entity: <u>Quiddity Engineering, LLC</u>						
Mailing Address: <u>4350 Lockhill Selma Rd., Suite 100</u>						
City, State: <u>San Antonio, TX</u>	Zip: <u>78249</u>					
Telephone: <u>210-546-0053</u>	FAX:					
Email Address: <u>dmcafee@quiddity.com</u>						

- 9. Project Location:
 - The project site is located inside the city limits of <u>New Braunfels</u>.
 - The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of _____.
 - The project site is not located within any city's limits or ETJ.
- 10. 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.
 - The site is located within the city limits of New Braunfels, located off the intersection of SH 46 and FM 1863, approximently 1.45 miles northwest of Loop 337. The proposed site entrance off FM 1863 is approximently 0.25 miles southwest of the intersection. The proposed site entrance off SH 46 is approximently 0.30 miles northwest of the intersection.
- 11. 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. 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:
 - Project site boundaries.
 - USGS Quadrangle Name(s).
 - Boundaries of the Recharge Zone (and Transition Zone, if applicable).
 - Drainage path from the project site to the boundary of the Recharge Zone.

- 13. 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: June 1, 2024
- 14. 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
 - \boxtimes Permanent BMP(s)
 - Proposed site use
 - Site history
 - Previous development
 - 🔀 Area(s) to be demolished
- 15. 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. 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. 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

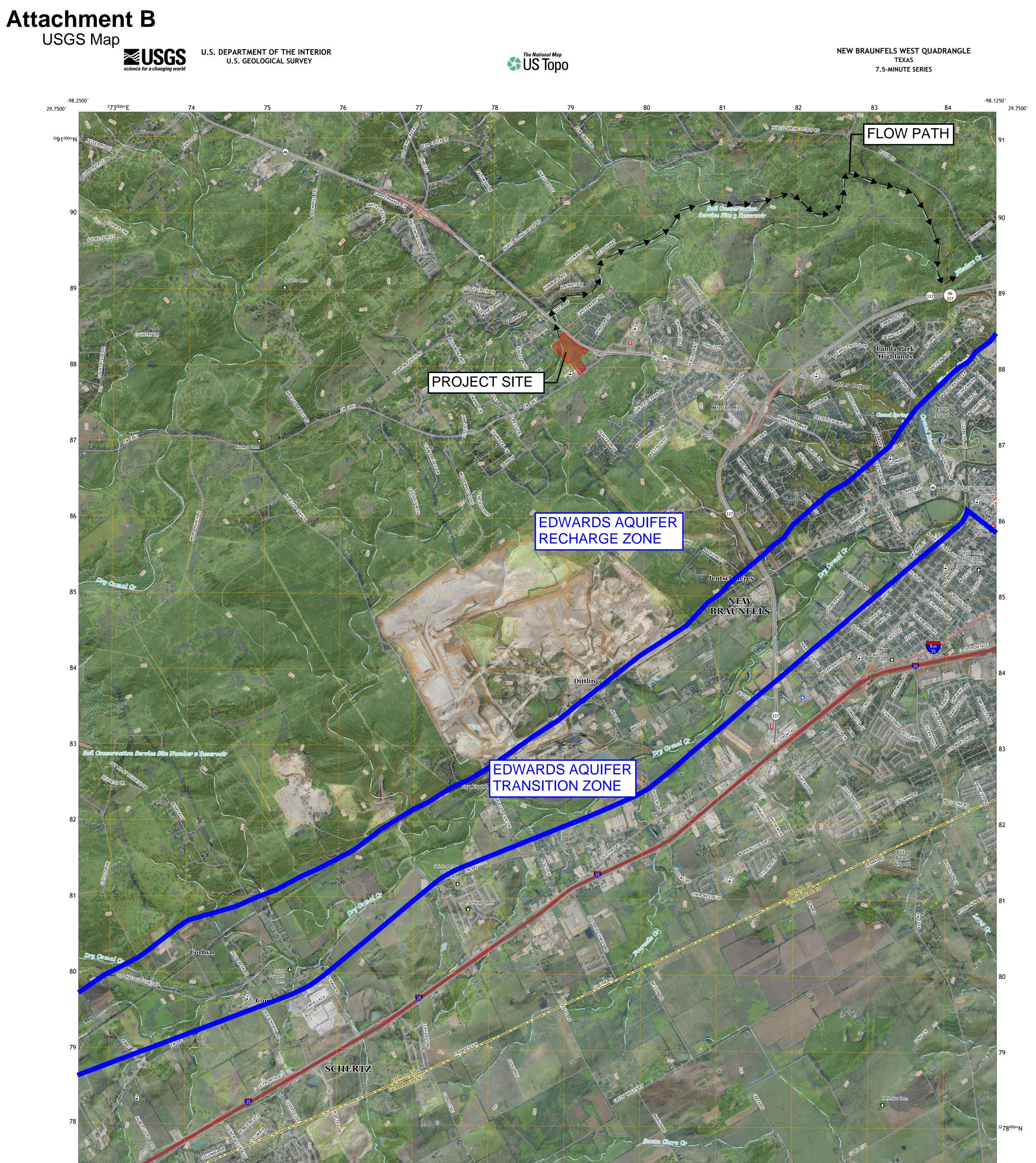
18. The fee for the plan(s) is based on:

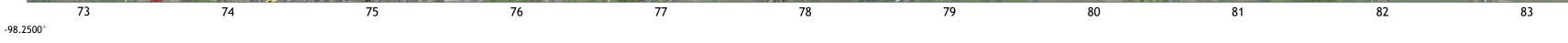
- For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
- For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
- For a UST Facility Plan or Modification or an AST Facility 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. 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) San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and

- Uvalde Counties)
- 20. 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. \square 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.

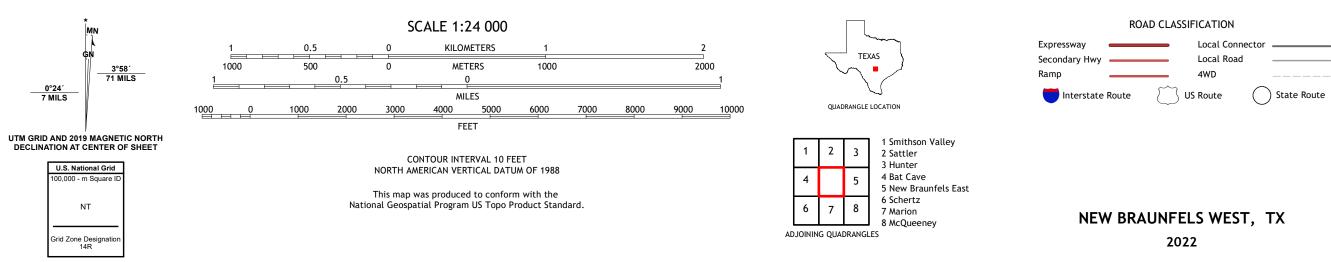






Produced by the United States Geological Survey North American Datum of 1983 (NAD83) World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 14R This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within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

29.6250°



⁵84^{000m}E

-98.1250°^{29.6250°}



Attachment C

PROJECT DESCRIPTION

The T Bar M Camp Expansion is a 28.957-acre commercial lot, located at 2549 West SH Highway 46 in New Braunfels, Texas, within Comal County. The proposed development will be an expansion of the existing T Bar M Camp Retreat facilities directly northwest of the proposed lot. The site mainly consists of uncleared/undeveloped land, with one existing tract that currently has a residential house and unpaved driveway on the property. This residential house is serviced by an on-site water supply well located approximately 90 feet south of the structure and is covered and housed within a wooden well-house structure. The residential house is also serviced by a residential septic tank that is approximately 8 feet by 6 feet in dimension and is located approximately 200 feet west of the structure. There are two existing concrete-lined ponds onsite; one located approximately 200 feet northwest of the residential structure and one located approximately 552 feet south of the north property corner. The project is within the Edwards Aquifer Recharge Zone and the Comal Trinity Groundwater Conservation District. No part of the project site falls within the 100-year floodplain per FEMA firm panel #48091C0435F, dated September 2, 2009.

The proposed use of the site will be an expansion of the adjacent T Bar M Camp Retreat facilities to be used as a family and day camp. The new facilities will include new buildings, paved roads and parking, sports courts, walking paths, and a detention pond. The existing residential structure, septic tank, concrete-lined ponds, unpaved driveway will be demolished. The proposed facilities will be developed over 3 phases of construction. The impervious cover of the site will be 8.39 acres, or 28.97%, at ultimate build-out conditions. There are 143.0 acres of upgradient runoff that flows through a natural dry drainage channel to an unnamed tributary. This unnamed tributary's ultimate outfall is Blieder's Creek. Of this acreage, 0.89 acres will be treated through a bioretention facility, with 0.19 acres of that being impervious. The total impervious area that will be treated for TSS removal is 8.58 acres.

The on-site detention pond will be used for detention only. The proposed permanent BMP's for TSS removal includes natural and engineered vegetative filter strips and bioretention (separate from detention pond). The vegetative filter strips will be used to treat the runoff from the paved streets and paved parking. Bioretention facilities will be used to treat the runoff from the buildings.



GEOLOGIC ASSESSMENT SECTION

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: Richard V. Klar, P.G.

Telephone: 210-699-9090

Date: <u>August 8, 2023</u>

Fax: <u>210-699-6426</u>

Representing: <u>Raba Kistner, Inc., TBPG Firm #50220 / TBPE Firm #3257 for Quiddity</u> <u>Engineering LLC.</u> (Name of Company and TBPG or TBPE registration number)



Regulated Entity Name: <u>T Bar M Camp Expansion – 28.96 Acres</u>

Project Information

- 1. Date(s) of Geologic Assessment was performed: <u>April 29, 2022 and July 11, 2023</u>
- 2. Type of Project:

🖂 WPAP	AST
\boxtimes scs	UST

3. Location of Project:

Recharge Zone

Transition Zone

Contributing Zone within the Transition Zone

- 4. 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.

Table 1 - Soil Units, Infiltration Characteristics and Thickness

Soil Name	Group*	Thickness (feet)
Rumple-Comfort association, undulating (RUD)	С	Veneer to 4 feet

*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 thickness 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>80'</u> Site Geologic Map Scale: 1" = <u>80'</u> Site Soils Map Scale (if more than 1 soil type): <u>See **Site Geologic Map**</u>

- 9. Method of collecting positional data:
 - Global Positioning System (GPS) technology.
 - Other method(s). Please describe method of data collection: _____
- 10. The project site boundaries are clearly shown and labeled on the Site Geologic Map.
- 11. Xurface 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.

X	There are <u>11 (</u> #) test	holes/well present	on the project s	site and the	locations are
	shown and labeled. (Check all of the foll	owing that appl	y.)	

- \boxtimes The test holes are not in use and have been properly abandoned.
- The wells are not in use and will be properly abandoned.
- The well is in use and complies with 16 TAC Chapter 76.
- There are no wells or test holes of any kind known to exist on the project site.

Administrative Information

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.

ATTACHMENTS

R A B A K I S T N E R

ATTACHMENT A

GEOLOGIC ASSESSMENT TABLE (TCEQ-0585-TABLE)

COMMENTS TO GEOLOGIC ASSESSMENT TABLE

SOIL PROFILE

GEOLOGIC ASSESSMENT TABLE						PROJE		E:	T Bar M Ca (RKI Project			- 28.96 A	cres - N	lew Braunf	els, Con	nal Co	unty, 1	Texas		
	LOCATION		FEATURE CHA	RACTER	RISTICS										EVA	LUAT	ION		PHYSIC	CAL SETTING
1A	1B *	1C*	2A	2B	3		4		5	5A	6	7	8A	8B	9	1	0	1	1	12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION		DIMENSIONS (F	FEET)	TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENS	ITIVITY	CATCHME (ACI	ENT AREA RES)	TOPOGRAPHY
						Х	Y	Z		10						<40	>40	<1.6	<u>>1.6</u>	
S-1	N29 43 25.69	W98 11 3.42	SF	20	Кер	8.0	10.0		N-S		1/FT	0.5-1	F	6	26	√		✓		Hilltop
S-2	N29 43 19.43	W98 10 54.50	CD	5	Кер	6.5	6.0	1.5					F	6	11	√		✓		Hilltop
S-3	N29 43 16.75	W98 11 2.38	CD	5	Кер	24.0	66.0	3.0					х	6	11	√			~	Drainage
S-4	N29 43 20.88	W98 11 2.49	CD	5	Кер	12.0	12.0	2.5					Х	6	11	√			✓	Drainage
S-5	N29 43 23.04	W98 11 0.77	F	20	Кер	854.0	10.0		NE-SW	10			C / F	8	38	√			✓	Drainage
S-6	N29 43 14.36	W98 11 0.16	MB (Well)	30	Кер	0.3	0.3	~400-425 ⁽¹⁾					N	35	65		✓	✓		Hilltop
S-7	N29 43 15.34	W98 11 0.94	MB (Septic)	30	Кер	8.0	6.0	~6.0					F/X	8	38	√		√		Hilltop
S-8	N29 43 23.55	W98 11 3.85	MB (SS)	30	Кер	1,404.0	0.25	~3.0-4.0					F	6	36	√			✓	Drainage
S-9	N29 43 19.05	W98 11 7.21	MB (PTH, B-1)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop
S-10	N29 43 19.25	W98 11 5.75	MB (PTH, B-2)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop
S-11	N29 43 16.76	W98 11 3.75	MB (PTH, B-3)	30	Кер	8.0	0.5	20.0					Z	5	35	√		√		Hilltop
S-12	N29 43 16.43	W98 11 0.94	MB (PTH, B-4)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop
S-13	N29 43 13.70	W98 10 59.16	MB (PTH, B-5)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop
S-14	N29 43 15.14	W98 10 57.87	MB (PTH, B-6)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop
S-15	N29 43 15.64	W98 10 56.56	MB (PTH, B-7)	30	Кер	8.0	0.5	20.0					Z	5	35	✓		✓		Hilltop
S-16	N29 43 18.40	W98 11 0.22	MB (PTH, B-8)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop
S-17	N29 43 22.05	W98 11 2.65	MB (PTH, B-9)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop
S-18	N29 43 23.86	W98 11 1.88	MB (PTH, B-10)	30	Кер	8.0	0.5	20.0					Z	5	35	√		✓		Hilltop

* DATUM: *NAD 83*

Features: SS = sanitary sewer utility; Well = water-supply well; Septic = septic system; PTH = plugged geotechnical test hole.

Formation: Kep = Person Formation

1. The onsite well depth is unknown. The depths are estimated based on surrounding water wells.

2A TYPE	TYPE	2B POINTS		8A INFILLING
С	Cave	30	Ν	None, exposed bedrock
SC	Solution cavity	20	С	Coarse - cobbles, breakdown, sand, gravel
SF	Solution-enlarged fracture(s)	20	0	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fault	20	F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
0	Other natural bedrock features	5	V	Vegetation. Give details in narrative description
MB	Manmade feature in bedrock	30	FS	Flowstone, cements, cave deposits
SW	Swallow hole	30	Х	Other materials: Concrete-lined (Features S-3 and S-4) and granular bedding materials fo
SH	Sinkhole	20		and sewer utility trench (Feature S-8).
CD	Non-karst closed depression	5	Z	Soil cuttings for geotechnical test holes (Features S-9 through S-18.
Z	Zone, clustered or aligned features	30		12 TOPOGRAPHY
			Cliff, H	Hilltop, Hillside, Drainage, Floodplain, Streambed

I have read, I understood, and I have followed the Texas Natural Resource Conservation Commission's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field. My signature certifies that I am qualified as a geologist as defined by 30 TAC 213.

OFT RICHARD V. KLAR GEOLOGY ²⁵⁹ Prim G. Fre CENSE

for the septic system (Feature S-7)

COMMENTS TO GEOLOGIC ASSESSMENT TABLE T Bar M Camp Expansion – 28.96 Acres New Braunfels, Comal County, Texas

The locations of the following features are indicated on the *Site Geologic Map* provided as *Attachment D* of this report.

Karst Feature

Feature S-1 consists of solution-enlarged fractures in a limestone outcrop measuring approximately 8 x 10 feet in plan view. This feature is located near the north property corner. The limestone exposure is generally consistent along the 840 foot elevation contour interval. The fractures shown are oriented at approximately 170° (N-S). The fracture density was observed to be one per foot with apertures ranging from approximately 6 inches to 1 foot. Fracture infilling consisted of fine, compact soils. At the time field activities were conducted, there was no direct or indirect evidence of capacity for rapid infiltration.



Non-Karst Closed Depression



Feature S-2 is located within the northeast portion of the subject property near State Highway 46 and is classified as a non-karst closed depression. The feature dimensions are $6.5 \times 6 \times 1$ feet in length, width and depth, respectively. The long axis of this feature is oriented E-W. The feature was apparently formed by animal burrowing and is completely contained within the soil horizon. At the time field activities were conducted, there was no direct or indirect evidence of capacity for rapid infiltration.

Feature S-3 consists of concrete-lined pond measuring approximately 24 x 66 feet in plan view. The pond is located approximately 200 feet northwest of the existing residential structure within an existing drainage channel (i.e., tributary to Blieders Creek). As depicted in the photograph, the pond was observed filled with water and water plants. It is inferred that the cementitious materials comprising the pond liner extend through soils to depths greater than approximately 3 feet, intersecting the underlying limestone bedrock (Person Formation).





Feature S-4 consists of concrete-lined pond similar to **Feature S-3** measuring approximately 12 x 12 feet in plan view. The pond is located approximately 552 feet south of the north property corner within the Blieders Creek tributary. The pond was observed filled with water. It is inferred that the cementitious materials comprising the pond liner extend through soils to depths greater than approximately 2.5 feet, intersecting the underlying limestone bedrock (Person Formation).

<u>Fault</u>

Feature S-5

The fault (*Feature S-5*) was mapped based on review of the published geologic reference entitled *Geologic Framework and Hydrogeologic Characteristics of the Edwards Aquifer Outcrop* (Small and Hanson, 1994). Field evidence of faulting was not observed near the mapped location or surrounding vicinity. In addition to the field reconnaissance efforts, **Raba Kistner, Inc.** inspected historical aerial photography of the area via Google Earth[™] from years 1995 to 2023. No evidence of faulting or pervasive lineations were observed in the aerial photographs. Therefore, the location of this feature is inferred as indicated on the *Site Geologic Map* by the dashed line.

Manmade Features in Bedrock (MB)

Feature S-6 (Sanitary Sewer Line-Trench)

Feature S-6 consists of trench for an existing sanitary sewer utility that extends from the Sanctuary building within the existing T Bar M Camp area into the assessment area along the north property boundary. The sanitary sewer utility extends through the north-central portion of the assessment area

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terminating along the west-central property boundary. The existing utility location data was provided by Quiddity (2023). Sanitary sewer manholes were not observed during field reconnaissance activities. It is inferred that the trench hosting the sanitary sewer utility is approximately 3 feet wide and installed to depths of approximately 3 to 4 feet. The length of the trench within the assessment area is estimated to be 1,404 feet.

Feature S-7 (Water-Supply Well)

Feature S-7 is a water-supply well likely completed in the Edwards Aquifer. The wellhead is located approximately 90 feet to the south of the residential structure. The well has a 4-inch polyvinyl chloride (PVC) surface casing with an associated submersible pump and a pressure tank, and is covered and housed within a wooden well-house structure. Review of the Texas Water Development Board (TWDB) Well Registration Database did not indicate any information regarding this well; however a nearby water-supply well located approximately 1,415 feet to the northwest (i.e., within the Mission Valley Estates subdivision) is reportedly installed to a depth of 421 feet in the Edwards Aquifer.



Feature S-8 (Septic System)

Feature S-8 is a septic system of unknown size located approximately 70 feet to the west of an existing residential structure. It is assumed to be approximately 10 feet long, 5 to 10 feet wide, and 6 feet deep based on typical septic system dimensions. It is inferred that the base of the septic system is installed into the limestone bedrock of the underlying Person Formation. Cleanouts and an apparent leach field were observed within the vicinity of the residential structure.



Features S-9 through S-18 (Plugged Geotechnical Test Holes):

Features S-9 through S-18 consist of plugged geotechnical test holes installed by Rock Engineering and Testing Laboratory, LLC in April 2023 to support the construction of additional cabins for the T Bar M Camp. A total of ten test holes were drilled within the project site to depths of approximately 20 feet below the existing ground surface using air-rotary methods. According to the geotechnical test hole log data, a dark brown to reddish-brown clay stratum ranging from a few inches to approximately 4 feet was encountered underlain by very hard tan limestone comprising the top of the Edwards formation. Shallow

groundwater was not observed during drilling operations. Based on the referenced geotechnical report and observations in conjunction with field reconnaissance activities, the test holes were backfilled with soil cuttings following completion of drilling activities. No evidence of the test holes were observed during the field mapping effort.

SOIL PROFILE T Bar M Camp Expansion – 28.96 Acres New Braunfels, Comal County, Texas

SOIL SERIES	THICKNESS ON SITE	DESCRIPTION
Rumple Comfort	Veneer to 4 feet	Rumple-Comfort-association, undulating (RUD): Rumple soils make up about 60% of this association and are on broad ridge tops and side slopes. The surface layer is dark reddish brown very cherty clay loam about 10 inches thick with rounded chert, limestone cobbles and gravel cover about 20% of the surface. The subsoil is dark reddish brown very cherty clay to approximate depth of 14 inches and dark reddish brown extremely stony clay to a depth of about 28 inches. The surface layer of the Comfort soil is dark brown, neutral, extremely stony clay about 7 inches thick. The subsoil is dark reddish brown, mildly alkaline, extremely stony clay to a depth of 12 inches. The underlying material for both Rumple and Comfort soils is indurated fractured limestone fragments

The preceding table was prepared based on information provided in the *Soil Survey of Comal and Hays Counties, Texas (1984)* in addition to field observations. As presented on the attached *Site Geologic Map*, native soils mapped for the entire project are classified as Rumple-Comfort association, undulating (RUD). RUD soils are weakly-developed and relatively thin, occurring over weathered limestone units of the Person Formation. RUD soils are noted to have medium runoff and moderate hazard for erosion. The RUD soils are characterized as having a very low water capacity and a moderately slow permeability of approximately 0.06 to 0.6 inches per hour, considering both included soil types. RUD soils have a very slow infiltration when the soils are thoroughly wet and rapid infiltration when the soils are dry.

Reported test hole data (Rock, 2023) indicates that surface soils vary in thickness, ranging from approximately 0.25 to 4 feet and consisting of dark brown to reddish-brown clay soils overlying limestone rock units. The geotechnical drilling data is generally consistent with the published soil information presented above.

ATTACHMENT B

STRATIGRAPHIC COLUMN

STRATIGRAPHIC COLUMN T Bar M Camp Expansion – 28.96 Acres New Braunfels, Comal County, Texas

STRATIGRAPHIC FORMATION	THICKNESS	DESCRIPTION
Edwards Limestone (Ked) Person Formation (Kep)	180-224 feet	Unit consists of gray to light tan marly limestone. Identified in the field by the presence of <i>Waconella wacoensis</i> .
Cyclic and Marine Members, undivided	80–100 feet	Unit consists of massive mudstone to packstone; <i>miliolid</i> grainstone; and chert. Identified in the field by cycles of massive beds to relatively thin beds. <i>Isolated exposures observed throughout the SITE.</i>
Leached and Collapsed Members, undivided	80–100 feet	Unit consists of crystalline limestone, mudstone to grainstone and chert. Identified in the field by bioturbated iron- stained beds separated by massive limestone beds. Not exposed at the SITE.
Regional Dense Member	20–24 feet	Unit consists of dense, argillaceous mudstone. Identified in the field by wispy iron-oxide stains. <i>Not exposed at the SITE.</i>

Note: Stratigraphic Column adapted from Small and Hanson (1994) and Collins (2000).

ATTACHMENT C

NARRATIVE OF SITE SPECIFIC GEOLOGY

SITE GEOLOGY NARRATIVE T Bar M Camp Expansion – 28.96 Acres New Braunfels, Comal County, Texas

Introduction

The following discussion is a site-specific assessment of existing geological conditions and potential recharge features within the referenced project site (hereinafter referred to as SITE). This assessment was performed by **Raba Kistner, Inc. (RKI)** for Quiddity Engineering LLC, pursuant to applicable Edwards Aquifer Protection Program Rules as specified in *Title 30 of the Texas Administrative Code, Section 213 (30 TAC §213, effective April 24, 2008)*. This assessment report is in the format required by the Texas Commission on Environmental Quality (TCEQ) for the Geologic Assessment portion of a Water Pollution Abatement Plan (WPAP) and/or Sewage Collection System (SCS) Plan, and was prepared in accordance with the revised *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones (TCEQ-0585),* which are applicable to submittals received by the TCEQ after October 1, 2004.

This geologic assessment report documents conditions observed by **RKI** within the project boundaries on April 28, 2022, May 2, 2022, and July 11, 2023. The SITE was fully reassessed in July 2023 to support the current land development plan as further discussed in the WPAP.

Site Description

Site Location. The overall tract to be developed, which is located northwest of State Highway (SH) 46 and Farm-to-Market (FM) 1863 intersection, comprises approximately 28.96 acres. The SITE is primarily undeveloped, but hosts a former residential structure. Based on review of official maps published by the TCEQ, the SITE is fully located within the Edwards Aquifer Recharge Zone (EARZ). As such, the performance of a geologic assessment is required to facilitate planned construction activities in accordance with applicable provisions set forth in the Edwards Aquifer Protection Program (EAPP) rules.

RKI understands that planned improvements include main structures, cabins, tennis courts, and roadway, in addition to the installation of a SCS system, which comprises approximately 2,900 linear feet of an 8-inch diameter polyvinyl chloride (PVC) sanitary sewer line. In accordance with TCEQ requirements, the full extent of the proposed SCS alignment and surrounding 50-foot buffer zone were fully assessed in conjunction with Geologic Assessment activities.

As presented on the attached *Site Geologic Map*, adjacent properties include: T Bar M Camp to the northwest; SH 46 to the north/northeast with commercial (Standard Casualty Company) and single-family residential development (Northwoods Subdivision) beyond; residential property to the east; FM 1863 and vacant land beyond to the south; school development to the southwest (New Braunfels Christian Academy); and single-family residential development to the west (Mission Valley Estates).

Topography and Drainage. Topographic contours on the U.S. Geological Survey (USGS, 2022) 7.5-minute topographic map (i.e. New Braunfels West Quadrangle) were reviewed to evaluate the general surface conditions and drainage patterns along with more detailed 2-foot topographic contours obtained from the

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Comal County Geographic Information System (GIS) Hub (i.e., open data portal) (CCEO, 2023) are depicted on the *Site Geologic Map*. The SITE consists of a gently sloping hillside characterized by hilltop topography. The property is transected from north to the southwest by an unnamed tributary to Blieders Creek. Maximum elevations occur along the south property boundary near FM 1863 on the order 886 feet relative to mean sea level (msl), which slopes to a minimum elevation of 831 feet msl along the unnamed tributary to Blieders Creek at the north property boundary.

The surface drainage patterns for the majority of the SITE are locally to the north/northwest toward the unnamed tributary. The majority of drainage across the SITE occurs as sheet flow directed toward the unnamed tributary, which reaches a confluence with Blieders Creek approximately 0.2 miles north beyond the SITE boundary. A review of the Flood Insurance Rate Map (FIRM 48091C0435F, FEMA, September 2, 2009) indicates that no portion of the SITE is within the 100-year floodplain. The SITE is fully within Zone X as designated on official maps (i.e., an area determined to be outside of the defined 0.2% annual probability floodplain area).

Historical Property Use. Although research pertaining to past SITE operations and historical land use activities was beyond the scope of this assessment, historical aerial imagery was reviewed to evaluate past land use and the presence of lineations that could indicate the presence of normal faulting. The following aerial photographs Google Earth[™] were reviewed: 1995, 2005, 2008, 2010, 2012 through 2021, and 2023. The 1995 aerial photograph indicates a single residential structure and caliche drive within the south-central portion of the property. The 2005 through 2010 aerial photographs indicate small structures in the northwest corner of the property with additional small shed-like structures installed in 2012. The SITE remain unchanged in the aerial photographs from 2013 to 2023. With the exception of the few structures on the property, the SITE is heavily vegetated.

Classification of Recharge Features: As further described herein, 18 recharge features were identified within SITE boundaries including a solution-enlarged fracture outcrop, non-karst closed depressions, manmade features (i.e., water well, a septic system, sanitary sewer utility line, and test holes), in addition to an inferred normal fault. The significance of these features was assessed using definitions and guidance provided in *Instructions to Geologists (TCEQ-0585-Instructions, revised October 1, 2004)*. All features within the SITE that met the criteria presented in this reference were mapped. The characteristics of all mapped features and the assessments of these features, as defined by the TCEQ, are presented in the attached **Geologic Assessment Table (TCEQ-0585-Table)**.

Stratigraphy

As presented in the attached **Stratigraphic Column**, information pertaining to the lithologies and thickness of geologic units underlying the SITE was primarily taken from Collins (2000) and Small and Hanson (1994). Collective published data referenced indicate that the Person Formation (Kep) underlies the SITE. As depicted on the **Site Geologic Map**, the Kep is commonly divided into three distinct members: (i) Cyclic and Marine Member, undivided – mudstone to packstone, grainstone, and chert; (ii) Leached and Collapsed Member, undivided - unit includes crystalline limestone, mudstone to grainstone, and chert; and (iii) Regional Dense Member - unit consists of dense, carbonate mudstone. The reported total thickness of the Kep in the SITE vicinity is on the order of 180 to 224 feet. The uppermost or Cyclic and Marine member of the Kep represents the portion of the Edwards Limestone directly underlying the west

portion of the SITE to depths on the order of 80 to 100 feet. Based upon the work of Maclay (1995), this unit contains many open fractures and possesses low matrix permeability with total porosity on the order of 5 to 10%. Patch exposures of the Kep were observed along the Blieders Creek tributary.

Structure

This SITE is located along the southern edge of the Balcones Fault Zone and, as such, is expected to exhibit a similar structural trend. The Balcones Fault Zone generally consists of a northeast-southwest trending, *en echelon* normal fault system, which juxtaposes Upper Cretaceous lithologies in the southeast with Lower Cretaceous lithologies in the northwest. As a result of this large-scale regional faulting, minor internal fault sequences and fractures exist within this zone, which generally follow the same structural trend and accommodate localized displacement.

Based on review of historical aerial photographs, published maps, and in conjunction with field mapping efforts, no indications of lineations that could be associated with normal faulting were identified within the boundaries of the SITE. Small and Hanson (1994) mapped a fault that transects near the north portion of the SITE, designated herein as *Feature S-18*. This feature is described as a normal fault that juxtaposes the younger Del Rio Clay formation to the northwest with older Edwards Limestone to the southeast in the SITE vicinity. However, as direct evidence of faulting (e.g., lineations, changes in soil type and vegetation, fractured rock outcrops, etc.) was not observed near the mapped fault or in the surrounding vicinity, the location is inferred as indicated by dashed lines on the *Site Geologic Map*. Any direct or indirect evidence of faulting may be obscured by the presence of soil cover.

This feature is classified as not sensitive, based upon the lack of discrete recharge openings along the inferred fault trace and low relative infiltration rate of overlying clay soils (i.e., no evidence of capacity for rapid infiltration). This classification is based upon the point assignment criteria presented in the *Geologic Assessment Table (TCEQ-0585)* and professional judgment.

Karst Feature

A solution enlarged fracture outcrop **(S-1)** is located near the north property corner of the SITE and formed the Person Formation. *Feature S-1* is approximately 8 feet in length and 10 feet in width and is oriented N-S. Fracture density was observed to be one per foot with apertures ranging from approximately 0.5 to 1 foot. Collective field observations indicate that the fractures are limited to the surface and do not connect to larger subsurface karst features openings.

This feature is classified as not sensitive owing to the inferred surficial erosional origin; extent limited to the surface with no connection to underlying limestone, and estimated low relative infiltration rates (i.e., no evidence of rapid infiltration capacity).

Non-Karst Closed Depressions

Three non-karst closed depression (NKCD) were identified throughout the SITE. These features penetrate the surface soils that were not formed by karst processes. No indications of direct drainage or rapid

infiltration were observed in connection with these features. The following is a brief description of these features:

Feature S-2 was apparently formed by animal burrowing and measures approximately $6.5 \times 6 \times 1$ feet in length, width and depth, respectively. The feature is completely contained within the soil horizon. At the time field activities were conducted, there was no direct or indirect evidence of capacity for rapid infiltration.

Features S-3 and S-4 are manmade concrete-lined ponds with brick coping. The larger pond measures approximately 24 feet in length and 66 feet in width and the smaller pond measures approximately 12 feet in length and width. The depths of these features range from approximately 2.5 to 3 feet. These ponds are located along the unnamed tributary to Blieders Creek and were holding water at the time of field reconnaissance.

These non-karst closed depression features do not have capacity for rapid infiltration of surface runoff and are therefore considered not sensitive based upon the point assignment criteria set forth in the *Geologic Assessment Table (TCEQ-0585)* and professional judgment.

Manmade Features

As presented on the *Site Geologic Map*, thirteen manmade features were identified that may potentially serve to enhance the transmission of surface runoff to the subsurface. The features consist of a sanitary sewer utility trench, an existing domestic water well, residential septic system, in addition to plugged geotechnical test holes. Information regarding the location of the existing utility trench was gleaned from the Site Plan Exhibit prepared by Quiddity, the project civil engineer (provided to **RKI** on June 26, 2023), in addition to field observations of a well-house and cleanouts. The following is a brief description of the features that were identified excluding geotechnical test holes:

Feature S-6 is a domestic water-supply well completed in the Edwards Aquifer. Review of the Texas Water Development Board website does not indicate any information regarding this well. It is estimated the well is approximately 400 to 425 in depth based on review of water wells within the SITE vicinity, which extend into the underlying Edwards Limestone. This feature is classified as sensitive, having a high potential of transmitting fluids into the Edwards Aquifer if the well casing was to become compromised. At the time field mapping activities were conducted, the well was operational and the casing was found to be in good condition.

Feature S-7 is a residential septic system estimated to be approximately 8 feet long by 6 feet wide based on typical septic system dimensions. It is likely installed up to 6 feet deep into the underlying bedrock of the Person Formation. This feature is classified as not sensitive considering typical septic system design criteria, which facilitates controlled infiltration to the subsurface, and the absence of natural karst features observed in proximity.

Feature S-8 is an existing sanitary sewer utility trench (Quiddity, 2023). The utility trench is inferred to be approximately 3 feet wide and installed to depths of approximately 3 to 4 feet into the underlying bedrock of the Person Formation This feature is classified as not sensitive

Although not directly observable, it is inferred that the subgrade trenches (*Features S-7* and S-8) are backfilled in accordance with standard construction practices that include the use of structural fill soils (e.g., base course materials, limestone gravel, compacted clay soils, etc.) overlain by native or fill soils, depending upon location and surface improvements. These trenches were not observed in conjunction with any naturally occurring recharge features. Although the backfilled trenches may exhibit a somewhat greater relative infiltration rate than the surrounding soil/rock strata underlying the project boundaries, these manmade features were collectively classified as not sensitive, having a low potential of preferentially transmitting fluids into the Edwards Aquifer. This classification is based upon the point assignment criteria presented in the *Geologic Assessment Table (TCEQ-0585)* and professional judgment.

Information regarding the locations of the geotechnical test holes were gleaned from the Preliminary Subsurface Exploration, Laboratory Testing Program, and Geotechnical Discussion report prepared by Rock Engineering and Testing Laboratory, LLC, dated May 10, 2023 (provided to **RKI** by Quiddity on June 26, 2023). There were no remaining field indications of these plugged test holes. The following is a discussion of the features that were identified:

Features S-9 through S-18 consist of geotechnical borings installed by Rock Engineering and Testing Laboratory, LLC as part of the referenced geotechnical engineering study (Rock, 2023). These were reportedly installed with air rotary to maximum total depths of approximately 20 feet. Borings generally encountered very stiff dark brown to reddish-brown clay soils to depths of approximately 3 inches to 4 feet. Below these depths, a hard, tan limestone consisting of the uppermost part of the Edwards Limestone was reported. These logging observations are consistent with mapped soil and rock types. No groundwater was observed during drilling operations. These logging observations are consistent with mapped soil and rock types. No shallow groundwater was observed during drilling operations.

These features are collectively classified as not sensitive as they have been plugged and no longer exist. The former locations of these features are included on the *Site Geologic Map*.

Potential for Fluid Migration to the Edwards Aquifer

The majority of the SITE is overlain with clay soils having very slow published infiltration rates. Based on our review of SITE geology, topography and drainage conditions, in addition to the results of our detailed mapping efforts, the overall potential for fluid movement (i.e. surface-derived flow) to the Edwards Aquifer via infiltration is considered to be low to moderate. The following assessment findings support this conclusion.

• The SITE is primarily underlain by surface soils ranging in thickness from approximately 0.25 to 4 feet based on geotechnical drilling data and field observations. The Rumple-Comfort clays are classified as Hydrologic Soil Group C and have low infiltration rate with medium runoff potential when thoroughly wet, and a slow rate of water transmission.

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- No features were identified that can be attributed to karstification of limestone terrain. There were no natural karst features observed within the vicinity of any the observed manmade features, which would increase the potential for rapid infiltration.
- With the exception of the water-supply well (*Feature S-6*), which is observed in use and in good condition, the manmade features present at the SITE, are collectively classified as not sensitive based on consideration of construction/plugging details and application of point assignment criteria and professional judgment.
- The fault (*Feature S-5*) is inferred as no direct field evidence was observed. This feature is classified as not sensitive within the SITE boundaries, based upon the lack of discrete recharge openings along the majority of the fault trace, and inferred low relative infiltration rate of overlying soil cover.

References

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- United States Department of Agriculture (USDA), 1984, Soil Survey of Comal and Hays Counties, Texas; USDA / Soil Conservation Service / Texas Agricultural Experiment Station, Issued June 1984.
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ATTACHMENT D

FEATURE POSITION TABLE (GPS COORDINATES)

SITE GEOLOGIC MAP

FEATURE POSITION TABLE

T Bar M Camp Expansion - 28.96 Acres

New Braunfels, Comal County, Texas

RKI Project No. ASF15-092-01

Feature Designation Feature Type		Date Collected	North Latitude	West Longitude	UTM Northing (meters)	UTM Easting (meters)
S-1 Solution-Enlarged Fracture		7/11/2023	N29 43 25.69	W98 11 3.42	3288460	578892
S-2	Non-Karst Closed Depression	7/11/2023	N29 43 19.43	W98 10 54.50	3288269	579133
S-3	Non-Karst Closed Depression	7/11/2023	N29 43 16.75	W98 11 2.38	3288185	578922
S-4	Non-Karst Closed Depression	7/11/2023	N29 43 20.88	W98 11 2.49	3288312	578918
S-5	Fault	7/11/2023	N29 43 23.04	W98 11 0.77	3288378	578964
S-6	Manmade feature in bedrock (Water Well)	7/11/2023	N29 43 14.36	W98 11 0.16	3288112	578982
S-7	Manmade feature in bedrock (Septic Tank)	7/11/2023	N29 43 15.34	W98 11 0.94	3288142	578961
S-8	Manmade feature in bedrock (Sanitary Sewer Utility Trench)	7/11/2023	N29 43 23.55	W98 11 3.85	3288394	578881
S-9	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-1)	7/11/2023	N29 43 19.05	W98 11 7.21	3288255	578831
S-10	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-2)	7/11/2023	N29 43 19.25	W98 11 5.75	3288261	578831
S-11	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-3)	7/11/2023	N29 43 16.76	W98 11 3.75	3288185	578885
S-12	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-4)	7/11/2023	N29 43 16.43	W98 11 0.94	3288175	579961
S-13	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-5)	7/11/2023	N29 43 13.70	W98 10 59.16	3288092	579009
S-14	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-6)	7/11/2023	N29 43 15.14	W98 10 57.87	3288136	579044
S-15	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-7)	7/11/2023	N29 43 15.64	W98 10 56.56	3288152	579079
S-16	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-8)	7/11/2023	N29 43 18.40	W98 11 0.22	3288236	578980
S-17	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-9)	7/11/2023	N29 43 22.05	W98 11 2.65	3288348	579914
S-18	Manmade feature in bedrock (Plugged Geotechnical Test Hole, B-10)	7/11/2023	N29 43 23.86	W98 11 1.88	3288404	578934

Notes:

1. Geographic coordinates are presented Degrees, Minutes, Decimal Seconds

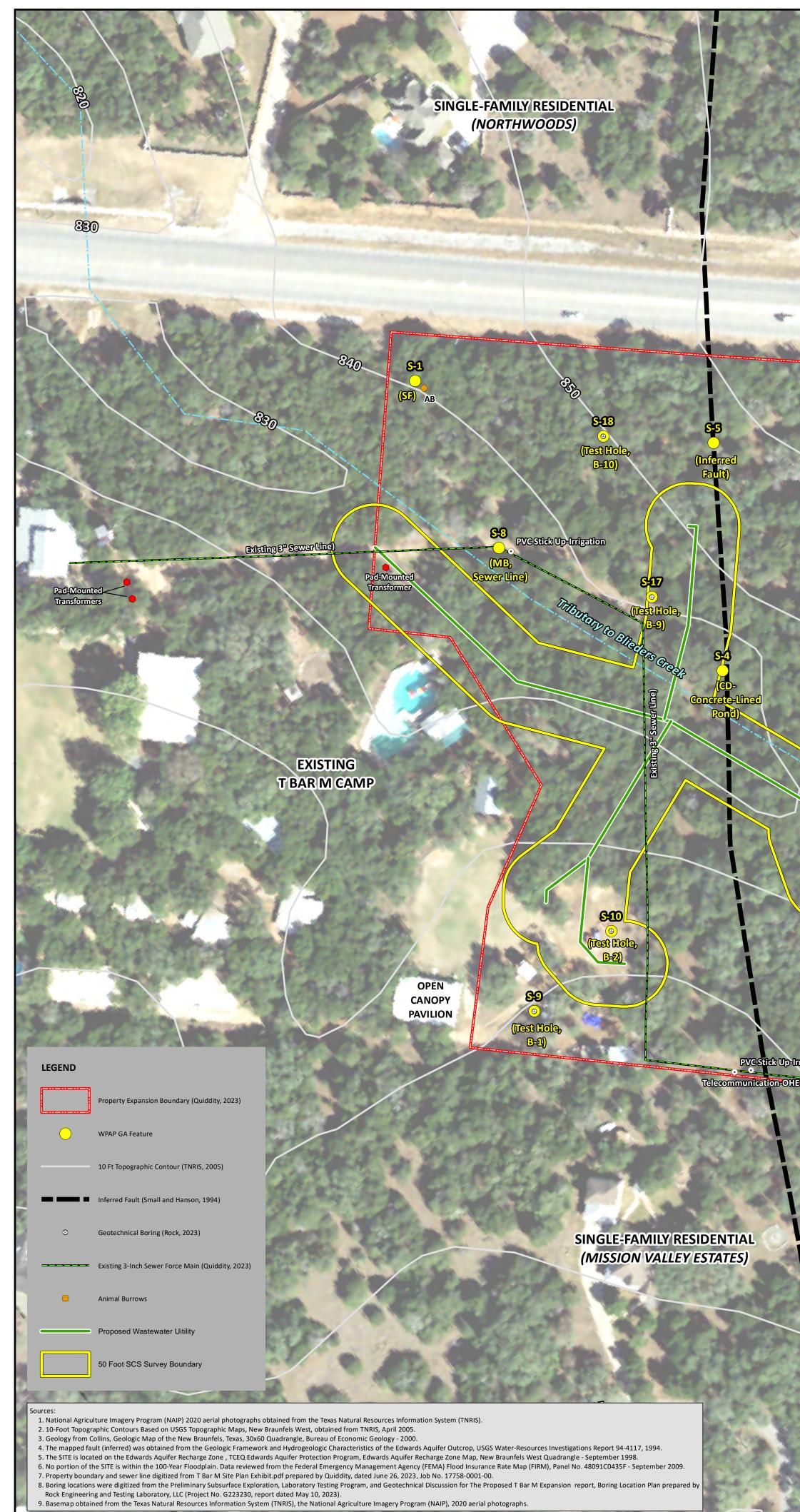
2. Reference Datum is NAD 83.

3. Data were collected utilizing a Garmin GPS 60cx Global Positioning System .

4. Horizontal Accuracy: RMS Value < 3 meter ground resolution.

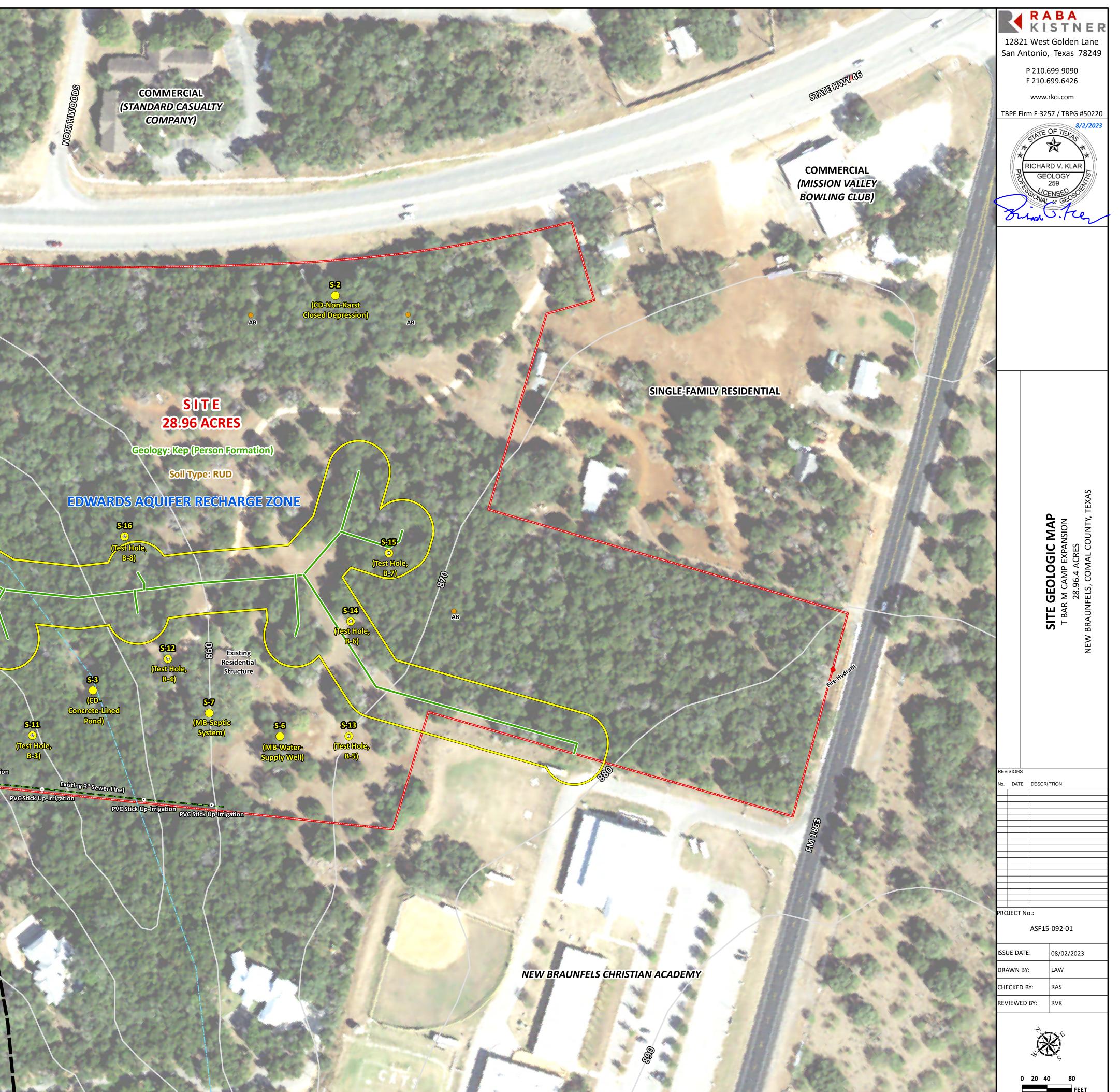
5. GPS data were collected by Rick Sample (RKI Project Professional).

6. GPS coordinates correlate to the points on the map for each feature.



NOTE: This Drawing is Provided for Illustration Only, May Not be to Scale and is Not Suitable for Design or Construction Purposes

COMPANY)



1 INCH = 80 FEET



APPLICATION FORM SECTION

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: Darren J. McAfee, P.E.

Date: 5/8/2024

Signature of Customer/Agent:

Dawn Malla

Regulated Entity Name: T Bar M Camp Expansion

Regulated Entity Information

- 1. The type of project is:
 - Residential: Number of Lots:
 Residential: Number of Living Unit Equivalents:
 Commercial
 Industrial
 Other:
- 2. Total site acreage (size of property): 28.957
- 3. Estimated projected population: N/A
- 4. The amount and type of impervious cover expected after construction are shown below:

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	128,018	÷ 43,560 =	2.94
Parking	148,835	÷ 43,560 =	3.42
Other paved surfaces	88,648	÷ 43,560 =	2.03
Total Impervious Cover	322,377	÷ 43,560 =	8.39

Table 1 - Impervious Cover Table

Total Impervious Cover 8.39 ÷ Total Acreage 28.957 X 100 = 28.97% Impervious Cover

- 5. 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. Only inert materials as defined by 30 TAC §330.2 will be used as fill material.

For Road Projects Only

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

7. Type of project:

TXDOT road project.

County road or roads built to county specifications.

City thoroughfare or roads to be dedicated to a municipality.

Street or road providing access to private driveways.

8. Type of pavement or road surface to be used:

```
Concrete
Asphaltic concrete pavement
Other:
```

9. Length of Right of Way (R.O.W.): _____ 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. 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	<u>36,776</u> Gallons/day
% Industrial	Gallons/day
% Commingled	Gallons/day
TOTAL gallons/day <u>36,776</u>	

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 <u>Gruene WRF</u> (name) Treatment Plant. The treatment facility is:

\times	Existing.
	Proposed

16. \square 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. \square The Site Plan must have a minimum scale of 1" = 400'.

Site Plan Scale: 1" = <u>80</u>'.

18. 100-year floodplain boundaries:

Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.

 \boxtimes 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	e of
material) sources(s): FEMA firm panel #48091C0435F, dated September 2, 2009	

19.	\boxtimes	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 $\underline{1}$ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply)

The wells are not in use and have been properly abandoned.

The wells are not in use and will be properly abandoned.

 \square The wells are in use and comply with 16 TAC §76.

There are no wells or test holes of any kind known to exist on the project site.

- 21. Geologic or manmade features which are on the site:
 - All sensitive geologic or manmade features identified in the Geologic Assessment are shown and labeled.

No sensitive geologic or manmade features were identified in the Geologic Assessment.

Attachment D - Exception to the Required Geologic Assessment. A request and justification for an exception to a portion of the Geologic Assessment is attached.

- 22. The drainage patterns and approximate slopes anticipated after major grading activities.
- 23. 🖂 Areas of soil disturbance and areas which will not be disturbed.
- 24. 🔀 Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.
- 25. \square Locations where soil stabilization practices are expected to occur.
- 26. Surface waters (including wetlands).
 - N/A
- 27. 🔀 Locations where stormwater discharges to surface water or sensitive features are to occur.
 - There will be no discharges to surface water or sensitive features.
- 28. \square Legal boundaries of the site are shown.

Administrative Information

- 29. 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. 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 contamination could be from the following:

Construction Phase

- 1. Fluids may be dropped from the use of construction equipment.
- 2. Fluids may be dropped form vehicles entering the site during construction.
- 3. Fluids may be dropped or spilled by construction workers constructing on site.
- 4. Mud or dirt may be tracked onto streets form construction areas.
- 5. Fine Particles may be washed from non-stabilized surfaces.
- 6. Debris from the site may leave the site by person, vehicle, or construction equipment.
- 7. Miscellaneous litter may be left on site from construction workers on site.

Post Construction

- 1. Fluids from vehicles or maintenance equipment that utilizes the site.
- 2. Landscape chemicals to maintain landscape features.
- 3. Litter that comes from the general public within the site or in the surrounding areas.



Attachment B

VOLUME AND CHARACTER OF STORMWATER

Existing Conditions

The existing tract currently does not have storm sewer infrastructure, temporary BMPs, or permanent BMPs in place. The existing conditions of the 28.957-acre tract mainly consists of uncleared/undeveloped land, with one existing tract that currently has a residential house and unpaved driveway on the property. The site is located within the Edwards Aquifer Recharge Zone and the Comal Trinity Groundwater Conservation District. The average slope of the site is approximately 3%, with a natural channel located in the middle of the site. The site currently has 143.0 acres of upgradient runoff that flows through the natural channel to an unnamed tributary, and ultimately to Blieder's Creek. The existing 100-year storm event flow, including upstream and offsite flow, is 1,046.8 cubic feet per second (cfs) at the downstream analysis point.

Proposed Conditions

The proposed facilities will include new buildings, paved roads, sports courts, walking paths, and a detention pond. The proposed slopes will be similar to existing with grading changes concentrated around proposed buildings, roadways, and walking paths. Ground disturbance will be isolated to the areas of proposed development. Otherwise, the site will not be disturbed and will be left in a natural state. Stormwater will sheet flow across the site to a proposed on-site detention pond. Runoff from buildings will be treated for TSS removal through bioretention. All proposed runoff from buildings, paved parking, and streets will be treated for TSS removal through bioretention or natural and engineered vegetative filter strips. The proposed flow for a 100-year storm event at the downstream analysis point will be 1,035.8 cfs. Refer to the Proposed Drainage Area Map included with Attachment G in the Temporary Stormwater section of this report.



Attachment C

SUITABILITY LETTER FROM AUTHORIZED AGENT

The site does not have an on-site sewage facility.



Attachment D

EXCEPTION TO THE REQUIRED GEOLOGIC ASSESSMENT

The Geologic Assessment is included in this report.



TEMPORARY STORMWATER SECTION

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: Darren J McAfee, P.E.

Date: 5/8/2024

Signature of Customer/Agent:

Dann Malla

Regulated Entity Name: T Bar M Camp Expansion

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: <u>diesel &</u> <u>other fuel for construction equipment</u>

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.

TCEQ-0602 (Rev. 02-11-15)

Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
 Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ

- prior to moving the tanks onto the project. Fuels and hazardous substances will not be stored on the site.
- 2. 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. Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
- 4. Attachment B Potential Sources of Contamination. 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. 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.

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. 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. 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:

		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.
		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.
		A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.
		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.	\square	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. There will be no temporary sealing of naturally-occurring sensitive features on the
	<u> </u>	site.
9.		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 Area Map. A drainage area map supporting the following requirements is attached:
		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.
 - 🗌 N/A
- 12. 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. 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. 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. 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. 🖂 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. 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. 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. Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

Administrative Information

- 20. \square All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.
- 21. 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. 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.



Attachment A

SPILL RESPONSE ACTIONS

From TCEQ Section 30 TAC 327.5.

- 1. The responsible person shall immediately abate and contain the spill or discharge and cooperate fully with the executive director and the local incident command system. The responsible person shall also begin reasonable response actions which may include, but are not limited to, the following actions:
 - arrival of the responsible person or response personnel hired by the responsible person at the site of the discharge or spill;
 - initiating efforts to stop the discharge or spill;
 - minimizing the impact to the public health and the environment;
 - neutralizing the effects of the incident;
 - removing the discharged or spilled substances; and
 - managing the wastes.
- 2. Upon request of the local government responders or the executive director, the responsible person shall provide a verbal or written description, or both, of the planned response actions and all actions taken before the local governmental responders or the executive director arrive. When the agency on-scene coordinator requests this information, it is subject to possible additional response action requirements by the executive director. The information will serve as a basis for the executive director to determine the need for:
 - further response actions by the responsible person;
 - initiating state funded actions for which the responsible person may be held liable to the maximum extent allowed by law; and
 - subsequent reports on the response actions.
- 3. Except for discharges or spills occurring during the normal course of transportation about which carriers are required to file a written report with the U.S. Department of Transportation under 49 CFR §171.16, the responsible person shall submit written information, such as a letter, describing the details of the discharge or spill and supporting the adequacy of the response action, to the appropriate TNRCC regional manager within 30 working days of the discovery of the reportable discharge or spill. The regional manager has the discretion to extend the deadline. The documentation shall contain one of the following items:
 - A statement that the discharge or spill response action has been completed and a description of how the response action was conducted. The statement shall include the initial report information required by §327.3(c) of this title (relating to Notification Requirements). The executive director may request additional information. Appropriate response actions at any time following the discharge or spill include use of the Texas Risk Reduction Program rules in Chapter 350 of this title (relating to Texas Risk Reduction Program).
 - A request for an extension of time to complete the response action, along with the reasons for the request. The request shall also include a projected work schedule outlining the time required to complete the response action. The executive director may grant an extension up to six months from the date the spill or discharge was reported. Unless otherwise notified by the



appropriate regional manager or the Emergency Response Team, the responsible person shall proceed according to the terms of the projected work schedule.

• A statement that the discharge or spill response action has not been completed nor is it expected to be completed within the maximum allowable six month extension. The statement shall explain why completion of the response action is not feasible and include a projected work schedule outlining the remaining tasks to complete the response action. This information will also serve as notification that the response actions to the discharge or spill will be conducted under the Texas Risk Reduction Program rules in Chapter 350 of this title (relating to Texas Risk Reduction Program)

Numbers for Spill Response:

State of Texas 24-Hour Spill-Reporting Hotline and the State Emergency Response Commission

Phone: 1-800-832-8224

Texas Commission on Environmental Quality (San Antonio Regional Office),

Hours: Monday-Friday, 8:00 a.m.-5:00 p.m.

Address: 14250 Judson Rd, San Antonio TX 78233-4480,

Main Line: 210-490-3096

Local Emergency Response Teams

911



Attachment B

POTENTIAL SOURCES OF CONTAMINATION

- 1. Fluids may be dropped from the use of construction equipment.
- 2. Fluids may be dropped from vehicles entering the site during construction.
- 3. Fluids may be dropped or spilled by construction workers constructing on site.
- 4. Mud or dirt may be tracked onto streets from construction areas.
- 5. Fine Particles may be washed from non-stabilized surfaces.
- 6. Debris from the site may leave the site by person, vehicle, or construction equipment.
- 7. Miscellaneous litter may be left on site from construction workers on site.



Attachment C

SEQUENCE OF MAJOR ACTIVITIES

Major Activities	Area Disturbed	Permanent Stabilization
1. Installation of Temporary Best Management Practices	26.90 ac.	Sod/Seeding
Silt Fence		
Silt Fence with Rock Berm		
Construction Entrance		
Tree Protection		
Concrete Washout		
Temporary Sedimentation Basin		
Inlet Protection		
2. Earthwork: site grading, excavation, etc.	26.90 ac.	Sod/Seeding/ Pavement
3. Installation of site utilities	2.87 ac.	Sod/Seeding/ Pavement
4. Building Structures	2.94 ac.	Concrete
5. Cleanup of site and removal of Temporary Best Management Practices	26.90 ac.	Sod/Seeding



Attachment D

TEMPORARY BEST MANAGEMENT PRACTICES AND MEASURES

- 1. There is upgradient stormwater that will flow into disturbed areas and will be cleaned by silt fencing, silt fencing with rock berm, inlet filters, or in the temporary sedimentation basin as appropriate prior to off-site release.
- 2. All onsite stormwater flowing will be cleaned by silt fencing, silt fencing with rock berm, inlet filters, or in the temporary sedimentation basin as appropriate prior to off-site release.
- 3. All "possibly sensitive" or "sensitive" features will either be sealed or protected with a perimeter barrier prior to any construction (but after Erosion and Sedimentation clearing).
- 4. All runoff flows will be maintained to all "possibly sensitive" or "sensitive" features except any features which have been sealed. Runoff flows will be treated prior to entering or flowing across a feature (see 2 above).
- 5. Any sensitive features identified on the property have been noted in in the Geologic Assessment section of this report.



Attachment E

REQUEST TO TEMPORARILY SEAL A FEATURE

There will be no temporary sealing required.



Attachment F

STRUCTURAL PRACTICES

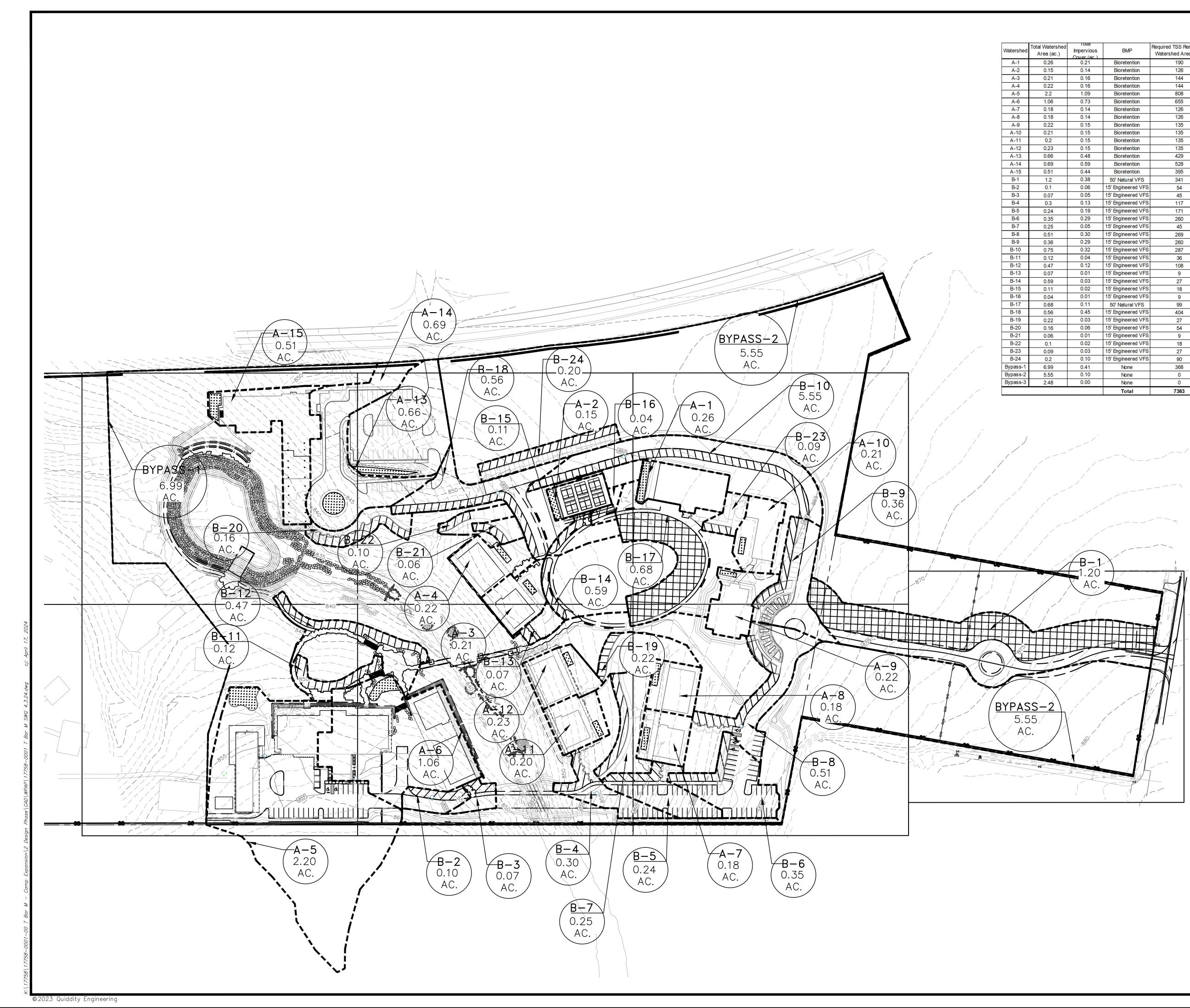
- 1. A stabilized construction entrance with washout pit will be constructed at all locations where vehicular traffic enters and leaves the site. This will reduce sediments which leave the site and are tracked or fall onto adjacent roadways.
- 2. Silt fencing and silt fencing with rock berm will be installed adjacent to any drainage way which receives sheet flow from upgradient-disturbed areas and along the side slope perimeter of disturbed areas.
- 3. Inlet protection will be used to provide protection against silt transport or accumulation in the storm sewer system.



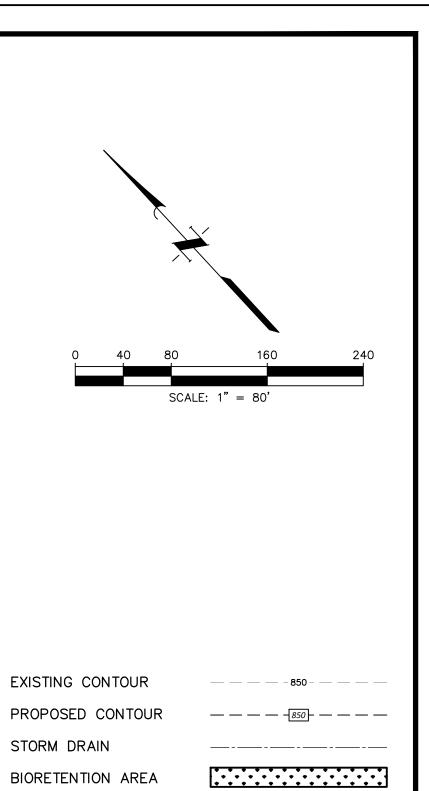
Attachment G

DRAINAGE AREA MAP

The drainage area map included with this section shows that the proposed project exceeds ten (10) acres contributing to the same discharge point disturbed during construction at the same time. A temporary sedimentation basin will be provided. The drainage area map included in this section shows the size of the various drainage sub-areas. The temporary sedimentation basin calculations are included on the Erosion Control Plan following Attachment H of this section.



		Total	7363	7363
	0.00	None	0	0
	0.10	None	0	0
	0.41	None	368	0
	0.10	15' Engineered VFS	90	99
	0.03	15' Engineered VFS	27	30
	0.02	15' Engineered VFS	18	21
	0.01	15' Engineered VFS	9	10
\uparrow	0.06	15' Engineered VFS	54	60
\uparrow	0.03	15' Engineered VFS	27	32
+	0.45	15' Engineered VFS	404	438
+	0.11	50' Natural VFS	99	115
+	0.01	15' Engineered VFS	9	10
+	0.02	15' Engineered VFS	18	21
+	0.03	15' Engineered VFS	27	38
$\neg \uparrow$	0.01	15' Engineered VFS	9	11
+	0.12	15' Engineered VFS	108	122
+	0.04	15' Engineered VFS	36	40
+	0.32	15' Engineered VFS	287	317
+	0.29	15' Engineered VFS	260	283
+	0.30	15' Engineered VFS	269	294
+	0.05	15' Engineered VFS	45	52
+	0.29	15' Engineered VFS	260	282
+	0.19	15' Engineered VFS	171	185
+	0.13	15' Engineered VFS	117	129
+	0.05	15' Engineered VFS	45	49
-+	0.06	15' Engineered VFS	54	59
+	0.38	50' Natural VFS	341	381
+	0.33	Bioretention	395	395
_	0.59	Bioretention	528	528
-+	0.13	Bioretention	429	429
-	0.15	Bioretention	135	135
-	0.15	Bioretention	135	135
-+	0.15	Bioretention Bioretention	135 135	135 139
-+	0.14	Bioretention	126	136
-+	0.14	Bioretention	126	136
	0.73	Bioretention	655	655
-+	1.09	Bioretention	808	808
_	0.16	Bioretention	144	154
	0.16	Bioretention	144	144
	0.14	Bioretention	126	142
	0.21	Bioretention	190	214
	Cover (ac.)	Divit	Watershed Area (Ibs)	Removed (lbs)
ned	Impervious	BMP	Required TSS Removal in	Total TSS



NATURAL VEGETATED FILTER STRIP ENGINEERED VEGETATED FILTER STRIP

_ A B B I	R <u>EVIATIONS</u>
E.G.T.C.	ELECTRIC, GAS, TELEPHONE, CABLE
ESMT	EASEMENT
FH	FIRE HYDRANT
0E	OVERHEAD ELECTRIC
PP	POWER POLE
R.O.W.	RIGHT-OF-WAY
<i>SS</i>	SANITARY SEWER LINE
SW	SIDEWALK
TELE	TELEPHONE
UE	UNDERGROUND ELECTRIC
UT	UNDERGROUND TELEPHONE
WV	WATER VALVE
D.R.C.C.T	DEED RECORDS COMAL COUNTY TEXAS
0.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS

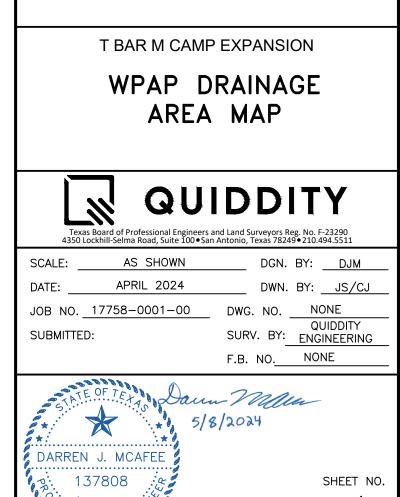
!!CAUTION!! Contractor to Verify Exact Location & Depth of Exist Facilities Prior to any Construction Activities

CAUTION!!! CONTACT: 1-800-DIG-TESS

48 HOURS PRIOR TO CONSTRUCTION

NO.	DATE	REVISIONS	APP.

CENTER FOR CHRISTIAN GROWTH, INC



OF 1

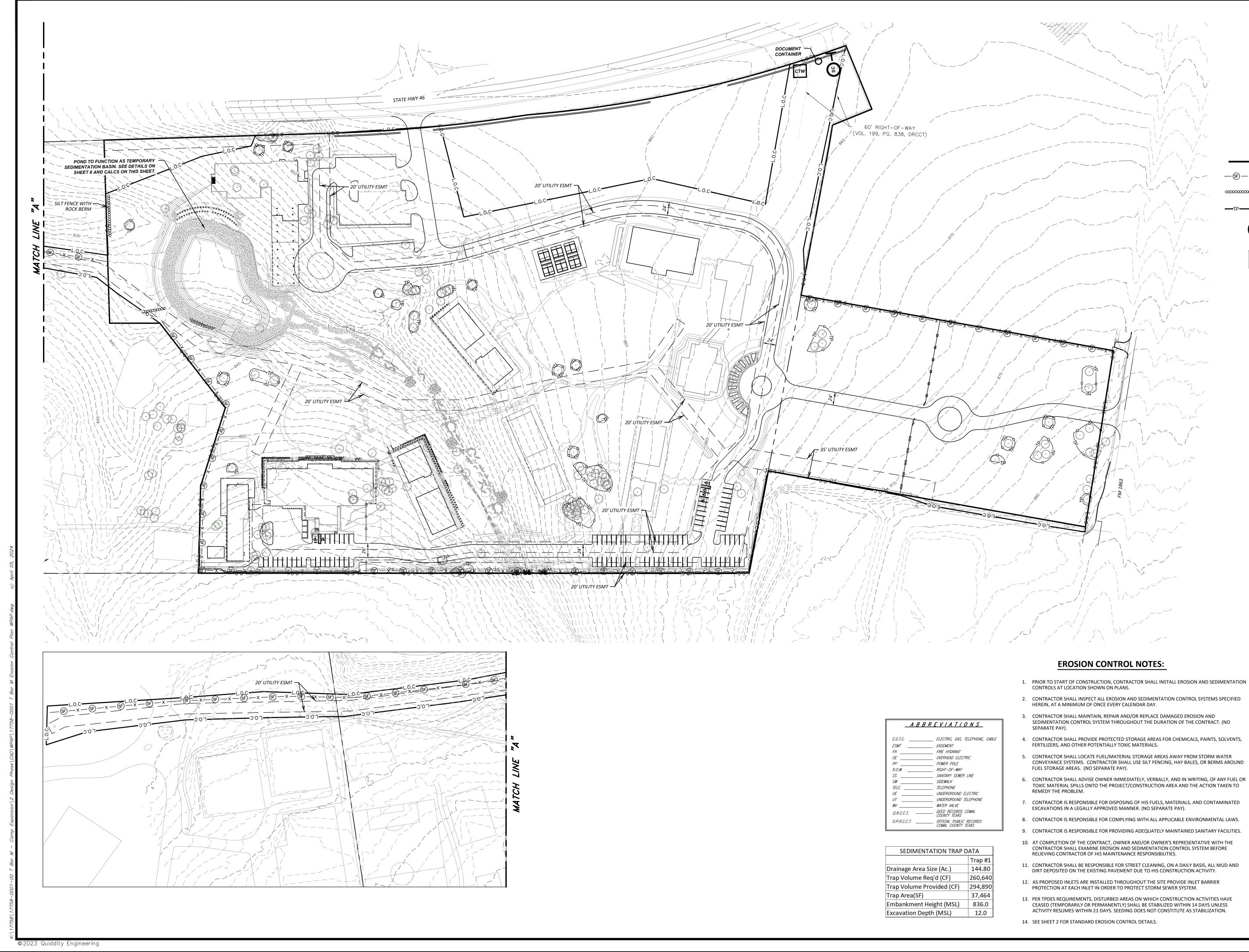
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Attachment H

TEMPORARY SEDIMENT POND PLANS AND CALCULATIONS

The project site will have more than 10 acres within a common drainage area disturbed at one time and a temporary sediment basin will be used. The sediment basin will provide storage for the volume of runoff from a 2-year, 24-hour storm in Comal County, in accordance with TCEQ's Technical Guidance Manual (TGM) RG-348 (rev. 2005). Construction plans and calculations for the proposed temporary BMPs and measures are included in this section.



<u> </u>	<u>EVIATIONS</u>
E.G.T.C.	ELECTRIC, GAS, TELEPHONE, CABLE
ESMT	EASEMENT
 FH	FIRE HYDRANT
OE	OVERHEAD ELECTRIC
PP	POWER POLE
R.O.W.	RIGHT-OF-WAY
<i>ss</i>	SANITARY SEWER LINE
SW	SIDEWALK
TELE.	TELEPHONE
UE	UNDERGROUND ELECTRIC
UT	UNDERGROUND TELEPHONE
WV	WATER VALVE
D.R.C.C.T	DEED RECORDS COMAL COUNTY TEXAS
0.P.R.C.C.T.	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS

SEDIMENTATION TRAP DATA		
	Trap #1	
Drainage Area Size (Ac.)	144.80	
Trap Volume Req'd (CF)	260,640	
Trap Volume Provided (CF)	294,890	
Trap Area(SF)	37,464	
mbankment Height (MSL) 836.		
Excavation Depth (MSL)	12.0	

40 80 240 SCALE: 1'' = 80LEGEND LIMITS OF CONSTRUCTION SILT FENCE (SF) — X — (SF) — X — SILT FENCE WITH ROCK BERM TREE PROTECTION FENCING STABILIZED sc CONSTRUCTION ENTRANCE/EXIT стw CONCRETE TRUCK WASHOUT AREA 0 DOCUMENT CONTAINER IPB INLET PROTECTION BARRIER

> !!CAUTION!! Contractor to Verify Exact Location & Depth of Exist Facilities Prior to any Construction Activities

CAUTION!!! CONTACT: 1-800-DIG-TESS

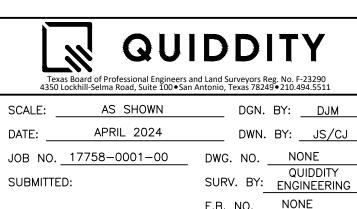
48 HOURS PRIOR TO CONSTRUCTION

REVISIONS NO. DATE APP

CENTER FOR CHRISTIAN GROWTH, INC

T BAR M CAMP EXPANSION

EROSION CONTROL PLAN



F.B. NO. NONE um Malla 5/8/2024

DARREN J. MCAFEE

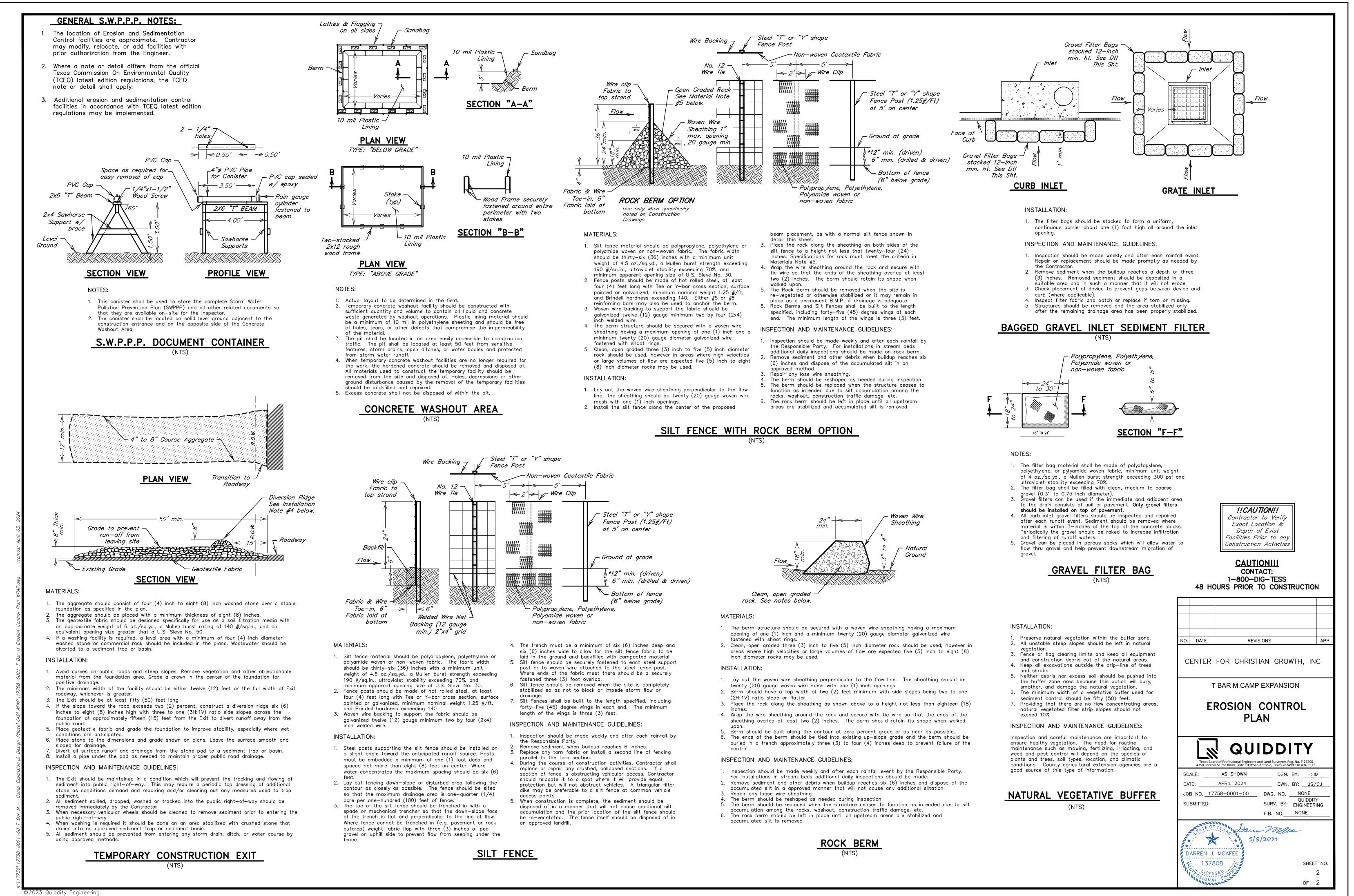
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- 13. PER TPDES REQUIREMENTS, DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITIES HAVE CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITY RESUMES WITHIN 21 DAYS. SEEDING DOES NOT CONSTITUTE AS STABILIZATION.

of 2

SHEET NO.





Attachment I

INSPECTION AND MAINTENANCE FOR BMPS

1. Inspection

- a. A qualified inspector (representing the discharger) shall inspect the following items once per calendar week and within 24 hours after the end of a 1/2-inch or greater rainfall:
 - i. disturbed areas of the construction site that have not been finally stabilized
 - ii. areas used for storage of materials that are exposed to precipitation
 - iii. structural and stabilization control measures
 - iv. construction entrance/exits
- b. The E & S inspector shall have authority to require immediate action on the part of the Contractor to correct any nonconforming items found during inspections or to require revisions to the E & S controls if appropriate. If revisions are needed, they shall be implemented within 7 calendar days after the date of inspection.
- c. The E & S inspector will provide written reports covering all items/areas inspected and outlining corrective measures if any.
- 2. Maintenance
 - a. All erosion and sedimentation (E & S) measures/controls shall be maintained in good working order by the Contractor. Written maintenance reports shall be prepared covering all inspections and maintenance affecting E & S controls. If repair(s) are necessary, they shall be initiated within 24 hours after report.
 - b. The construction entrance shall be maintained in a condition which will prevent/minimize tracking or flowing of sediments onto public roadways. Sediments spilled, dropped, washed or tracked onto public roadway must be removed.
 - c. Temporary and permanent seeding and planting shall be maintained to insure the following:
 - bare spots are filled in
 - wash-outs are filled in
 - healthy growth is promoted
 - d. For silt fences and rock berms, when silt reaches a depth equal to 1/3 the height of the barrier, the silt shall be removed and mixed with other soil materials to be placed within the embankment areas of the project site. After construction is complete, the silt shall be disposed of off-site.



- e. Silt fences shall be maintained to insure the following:
 - torn fabric is replaced
 - loose fabric is properly resecured
 - loose post supports are plumbed and strengthened
 - fabric bottom is buried as anchor
- f. Rock berms shall be maintained/cleaned by lifting, dropping and reshaping stones as required.
- g. Truck washout pit shall be maintained/cleaned when silt reaches a depth of six(6) inches. Silt shall be removed and disposed of at an approved site.
- h. The temporary sediment basin shall be maintained in accordance with the following:
 - Trash and debris are removed to prevent clogging in the outlet structure.
 - 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.
 - The removed sediment should be stockpiled or redistributed in areas that are protected from erosion.
 - i. Inlet protection shall be maintained in accordance with the following:
 - Sediment is to be removed when buildup reaches a depth of 3 inches. Removed sediment should be deposited in a suitable area in such a manner that it will not erode.
 - Placement of device is to be checked to prevent gaps between device and the curb.
 - Patch or replace filter fabric if torn or missing.
 - Structures should be removed, and the area stabilized only after the remaining drainage area has been properly stabilized.
 - j. If damage to protected trees occurs, the following maintenance guidelines should be followed:
 - If the soil has become compacted over the root zone of any tree, the ground should be aerated by punching holes with an iron bar. The bar should be driven 1- foot deep and then moved back and forth until the soil is loosened. This procedure should be repeated every 18 inches until all of the compacted soil beneath the crown of the tree has been loosened.
 - Any damage to the crown, trunk, or root system of any tree retained on the site should be repaired immediately.
 - Whenever major root or bark damage occurs, remove some foliage to reduce the demand for water and nutrients.
 - Damaged roots should immediately be cut off cleanly inside the exposed or damaged area. Cut surfaces should be painted with approved tree paint, and moist peat moss, burlap, or topsoil should be spread over the exposed area.
 - To treat bark damage, carefully cut away all loosened bark back into the undamaged area, taper the cut at the top and bottom, and provide drainage at the base of the wound.
 - All tree limbs damaged during construction or removed for any other reason should be cut off above the collar at the preceding branch junction.



T Bar M Camp Expansion Water Pollution Abatement Plan Temporary Stormwater

- Care for serious injuries should be prescribed by a forester or a tree specialist.
- Broadleaf trees that have been stressed or damaged should receive a heavy application of fertilizer to aid their recovery. Trees should be fertilized in the late fall (after November 1) or the early spring (until April 1). Fall applications are preferred, as the nutrients will be made available over a longer period of time. Fertilizer should be applied to the soil over the feeder roots. In no case should it be applied closer than 3 feet to the trunk. Fertilizer should be applied using approved fertilization methods and equipment.
- Maintain a ground cover of organic mulch around trees that is adequate to prevent erosion, protect roots, and hold water.



Attachment J

SCHEDULE OF INTERIM AND PERMANENT SOIL STABILIZATION PRACTICES

- 1. Interim stabilization will be performed any time a denuded area remains disturbed for over 14 days without restart within 21 days.
- 2. Permanent stabilization will be done after construction is complete.
- 3. Contractor shall sod or seed all disturbed previous areas once finished grade is met.
- 4. Seeding rates should be as shown in Table 1-2 or as recommended by the county agricultural extension agent.
- 5. The seed should be applied uniformly with a cyclone seeder, drill, cultipacker seeder or hydroseeder (slurry includes seed, fertilizer and binder)
- 6. Slopes that are steeper than 3:1 should be covered with appropriate sol stabilization matting as described in the following section to prevent loss of soil and seed.

Table 1-2 Temporary Seeding for Bexar, Comal, Kinney, Medina and Uvalde Counties (Northcutt,

Dates	Climate	Species (Ib/ac)	
Sept 1 to Nov 30	Temporary Cool Season	Tall Fescue	4.0
		Oats	21.0
		Wheat (Red, Winter)	30.0
		Total	55.0
Sept 1 to Nov 30	Cool Season Legume	Hairy Vetch	8.0
May 1 to Aug 31	Temporary Warm Season	Foxtail Millet	30.0



PERMANENT STORMWATER SECTION

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: Darren J. McAfee, P.E.

Date: 5/8/2024

Signature of Customer/Agent

Dann Malla

Regulated Entity Name: T Bar M Camp Expansion

Permanent Best Management Practices (BMPs)

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

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



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

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

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

____ N/A

- 4. Where a site is used for low density single-family residential development and has 20 % or less impervious cover, other permanent BMPs are not required. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.
 - The site will be used for low density single-family residential development and has 20% or less impervious cover.
 - The site will be used for low density single-family residential development but has more than 20% impervious cover.
 - The site will not be used for low density single-family residential development.
- 5. The executive director may waive the requirement for other permanent BMPs for 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.
 - The site will not be used for multi-family residential developments, schools, or small business sites.
- 6. Attachment B BMPs for Upgradient Stormwater.

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

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

creation of stronger flows and in-stream velocities, and other in-stream effects caused

□ 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. The applicant is responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. Such entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred.

🗌 N/A

15. A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days of the transfer if the site is for use as a multiple single-family residential development, a multi-family residential development, or a non-residential development such as commercial, industrial, institutional, schools, and other sites where regulated activities occur.

___N/A



Attachment A

20% OR LESS IMPERVIOUS COVER DECLARATION

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



Attachment B

BMPS FOR UPGRADIENT STORMWATER

The site currently has 143.0 acres of upgradient runoff that flows through a natural dry drainage channel to an unnamed tributary. This unnamed tributary's ultimate outfall is Blieder's Creek. Of this acreage, 0.89 acres will be treated through a bioretention facility, with 0.19 acres of that being impervious. All other off-site gradient will be routed to an on-site detention pond through proposed culverts and grassy swales. Please reference the drainage area map included with Attachment G in the Temporary Stormwater Section and TSS Removal calculations included with the Construction Plans as part of Attachment F in this section.



Attachment C

BMPS FOR ON-SITE STORMWATER

Onsite stormwater will ultimately flow to the on-site detention pond being proposed for detention only. The proposed permanent BMPs for TSS removal include natural and engineered vegetative filter strips and bioretention in accordance with TCEQ's Technical Guidance Manual (TGM) RG-348 (rev. 2005) to remove at least 80% TSS from the proposed improvements. The vegetative filter strips will be used to treat the runoff from the paved streets and parking. Bioretention facilities will be used to treat the runoff from buildings and some paved areas. Table 1 shows a summary of the permanent BMP coverage on the site and TSS removal capacity.

Table 1: BMP Coverage

Watershed	Total Watershed Area (ac.)	rotai Impervious Cover (ac.)	BMP	Required TSS Removal in Watershed Area (lbs)	Total TSS Removed (lbs)
A-1	0.26	0.21	Bioretention	190	214
A-2	0.15	0.14	Bioretention	126	142
A-3	0.21	0.16	Bioretention	144	144
A-4	0.22	0.16	Bioretention	144	154
A-5	2.2	1.09	Bioretention	808	808
A-6	1.06	0.73	Bioretention	655	655
A-7	0.18	0.14	Bioretention	126	136
A-8	0.18	0.14	Bioretention	126	136
A-9	0.22	0.15	Bioretention	135	135
A-10	0.21	0.15	Bioretention	135	139
A-11	0.2	0.15	Bioretention	135	135
A-12	0.23	0.15	Bioretention	135	135
A-13	0.66	0.48	Bioretention	429	429
A-14	0.69	0.59	Bioretention	528	528
A-15	0.51	0.44	Bioretention	395	395
B-1	1.2	0.38	50' Natural VFS	341	381
B-2	0.1	0.06	15' Engineered VFS	54	59
B-3	0.07	0.05	15' Engineered VFS	45	49
B-4	0.3	0.13	15' Engineered VFS	117	129
B-5	0.24	0.19	15' Engineered VFS	171	185
B-6	0.35	0.29	15' Engineered VFS	260	282
B-7	0.25	0.05	15' Engineered VFS	45	52
B-8	0.51	0.30	15' Engineered VFS	269	294
B-9	0.36	0.29	15' Engineered VFS	260	283
B-10	0.75	0.32	15' Engineered VFS	287	317
B-11	0.12	0.04	15' Engineered VFS	36	40
B-12	0.47	0.12	15' Engineered VFS	108	122
B-13	0.07	0.01	15' Engineered VFS	9	11
B-14	0.59	0.03	15' Engineered VFS	27	38
B-15	0.11	0.02	15' Engineered VFS	18	21
B-16	0.04	0.01	15' Engineered VFS	9	10
B-17	0.68	0.11	50' Natural VFS	99	115
B-18	0.56	0.45	15' Engineered VFS	404	438
B-19	0.22	0.03	15' Engineered VFS	27	32
B-20	0.16	0.06	15' Engineered VFS	54	60
B-21	0.06	0.01	15' Engineered VFS	9	10
B-22	0.1	0.02	15' Engineered VFS	18	21
B-23	0.09	0.03	15' Engineered VFS	27	30
B-24	0.2	0.10	15' Engineered VFS	90	99
Bypass-1	6.99	0.41	None	368	0
Bypass-2	5.55	0.10	None	0	0
Bypass-3	2.48	0.00	None	0	0
	-		Total	7363	7363



Attachment D

BMPS FOR SURFACE STREAMS

The site does not directly outflow into a surface stream. All treated runoff from the vegetative filter strips and bioretention facilities will be directed to the on-site detention pond and discharged at a rate less than or equal to existing conditions.



Attachment E

REQUEST TO SEAL FEATURES

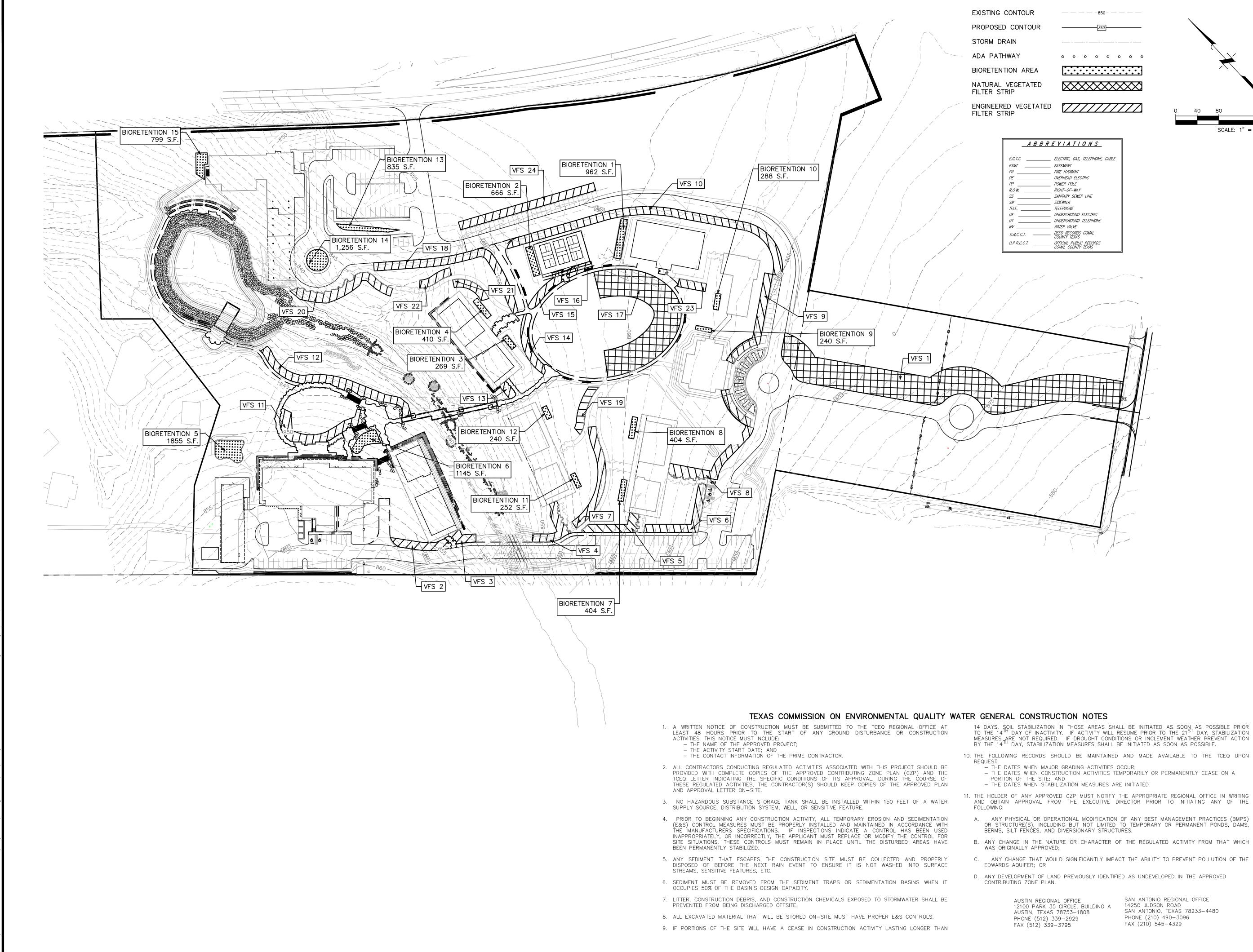
The permanent sealing of or diversion of flow from a naturally occurring sensitive feature has not been proposed.

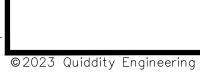


Attachment F

CONSTRUCTION PLANS

Construction plans are included in this section.





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40 80

SCALE: 1'' = 80

<u> </u>	EVIATIONS
. <i>G.T.C</i> .	ELECTRIC, GAS, TELEPHONE, CABLE
-SMT	EASEMENT
Ή	FIRE HYDRANT
DE	OVERHEAD ELECTRIC
<i>Ъ</i> Р	POWER POLE
?.O.W.	RIGHT-OF-WAY
<i>s</i>	SANITARY SEWER LINE
SW	SIDEWALK
ELE.	TELEPHONE
IE	UNDERGROUND ELECTRIC
/7	UNDERGROUND TELEPHONE
W	WATER VALVE
D.R.C.C.T.	DEED RECORDS COMAL COUNTY TEXAS
D.P.R.C.C.T	OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS

14 DAYS, SOIL STABILIZATION IN THOSE AREAS SHALL BE INITIATED AS SOON AS POSSIBLE PRIOR TO THE 14TH DAY OF INACTIVITY. IF ACTIVITY WILL RESUME PRIOR TO THE 21ST DAY, STABILIZATION MEASURES ARE NOT REQUIRED. IF DROUGHT CONDITIONS OR INCLEMENT WEATHER PREVENT ACTION BY THE 14TH DAY, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS POSSIBLE.

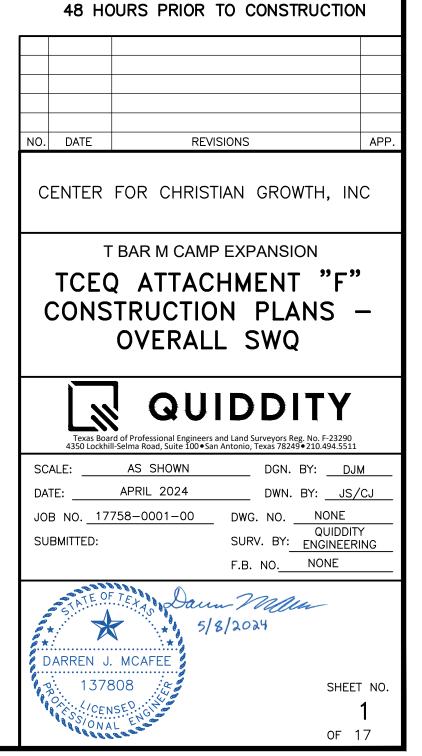
10. THE FOLLOWING RECORDS SHOULD BE MAINTAINED AND MADE AVAILABLE TO THE TCEQ UPON

11. THE HOLDER OF ANY APPROVED CZP MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE

A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY BEST MANAGEMENT PRACTICES (BMPS) OR STRUCTURE(S), INCLUDING BUT NOT LIMITED TO TEMPORARY OR PERMANENT PONDS, DAMS,

B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH

SAN ANTONIO REGIONAL OFFICE 14250 JUDSON ROAD SAN ANTONIO, TEXAS 78233-4480 PHONE (210) 490-3096 FAX (210) 545-4329



!!CAUTION!!

Contractor to Verify Exact Location &

Depth of Exist Facilities Prior to any

Construction Activities

CAUTION!!!

CONTACT: 1-800-DIG-TESS

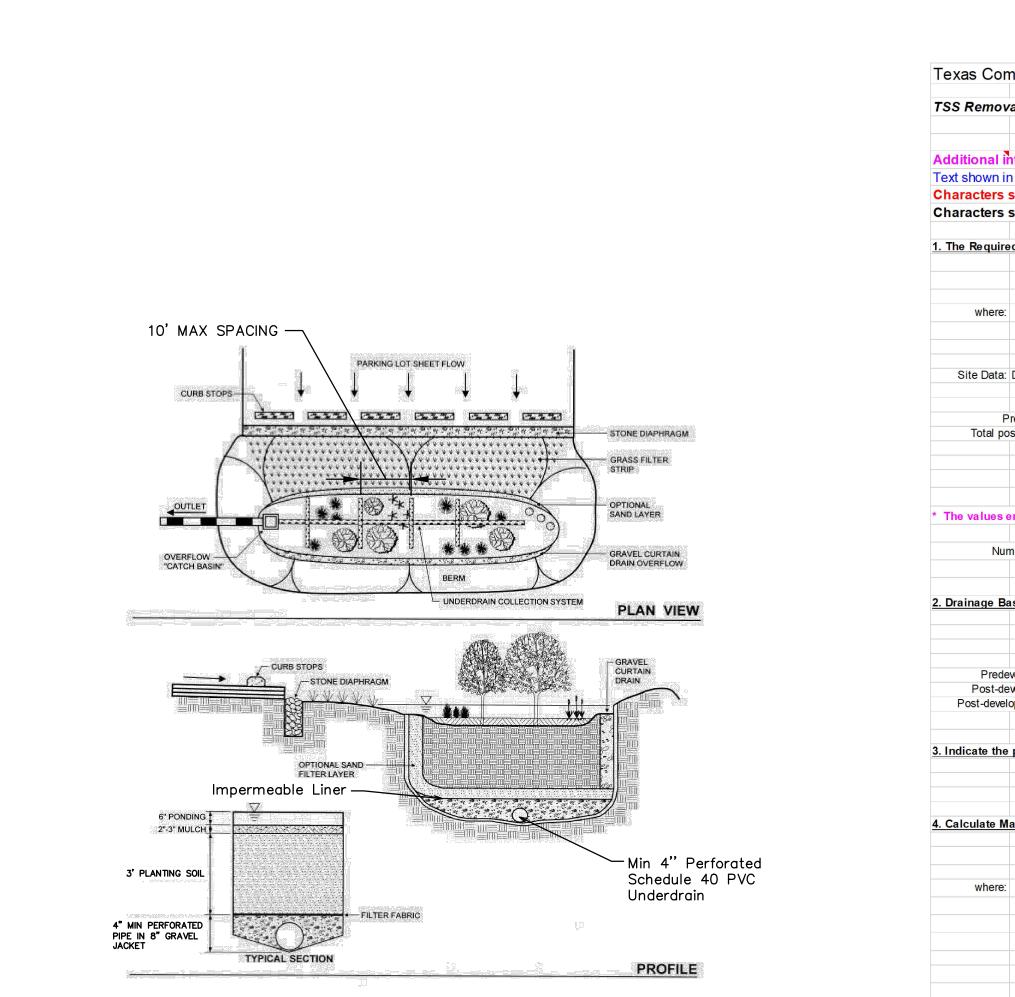


Figure 3-5 Schematic of a Bioretention Facility (MDE, 2000)

Filtration media shall have a minimum thickness of 3 ft. Soil mixture of 50-60% sand; 20-30% compost; and 20-30% topsoil. All piping to be Schedule 40 PVC

BIORETENTION DETAIL

COMPLIYING WITH THE EDWARDS AQUIFER RULES TECHNICAL GUIDANCE ON BEST MANAGEMENT PRACTICES

Bioretetnion Basin	Area (sq.ft.)	Depth (ft)	Water Quality Volume Required (cuft)	Provided Water Quality Volume (cuft)
A-1	962	3	2,875	2,886
A-2	666	3	1,992	1,998
A-3	269	3	788	807
A-4	410	3	1,229	1,230
A-5	1855	3	5,466	5,565
A-6	1145	3	3,425	3,435
A-7	404	3	1,211	1,212
A-8	404	3	1,211	1,212
A-9	240	3	701	720
A-10	288	3	857	864
A-11	252	3	732	756
A-12	240	3	693	720
A-13	835	3	2,212	2,505
A-14	1256	3	3,148	3,768
A-15	799	3	2,348	2,397

TSS REMOVAL CALCULATIONS: A-1

TSS REMOVAL CALCULATIONS: A-2

	mmission on Environmental Quality		Texas Commission on Environmental Quality				
SS Remov	val Calculations 04-20-2009	Project Name: T Bar M Camp Expansion Date Prepared: 4/11/2024	TSS Removal Calculations 04-20-2009		Project Name: Date Prepared:		amp Expansion
dditional	information is provided for cells with a red triangle in the up	per right corner. Place the cursor over the cell	Additional information is provided for a literative	le in the unreaded t			
Fext shown i	in blue indicate location of instructions in the Technical Guidance		Additional information is provided for cells with a red triang Text shown in blue indicate location of instructions in the Technica			cursor ove	
	s shown in red are data entry fields. s shown in black (Bold) are calculated fields. Changes to the	ese fields will remove the equations used in the spreadsheet.	Characters shown in red are data entry fields. Characters shown in black (Bold) are calculated fields. Cha	anges to these fields	will remove the co	uations w	sed in the spreadshoot
. The Require	red Load Reduction for the total project: Calculations f	om RG-348 Pages 3-27 to 3-30	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)		Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)			
where:		removal resulting from the proposed development = 80% of increased load	where: L _{M TOTAL PROJECT} =	Required TSS removal resu	Iting from the propose	d development	t = 80% of increased load
		n impervious area for the project all precipitation, inches	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	Net increase in impervious			
Sito Data:	a: Determine Required Load Removal Based on the Entire Project			Average annual precipitatio	n, incres		
Sile Dala.	County = Comal		Site Data: Determine Required Load Removal Based on the Entire Projection County =				
F	Total project area included in plan * = 28.96 Predevelopment impervious area within the limits of the plan * = 0.33	acres acres	Total project area included in plan * = Predevelopment impervious area within the limits of the plan * =				
Total po	Doost-development impervious area within the limits of the plan* = 8.39 Total post-development impervious cover fraction * = 0.29	acres	Total post-development impervious area within the limits of the plan* =	8.39 acres			
	$P = \frac{33}{3}$	inches	Total post-development impervious cover fraction * =	0.29 33 inches			
	L _{M TOTAL PROJECT} = 7234	lbs.	L _{M TOTAL PROJECT} =	7234 Ibs.			
The values	entered in these fields should be for the total project area.		* The values entered in these fields should be for the total project area				
Nu	umber of drainage basins / outfalls areas leaving the plan area = 1						
INU			Number of drainage basins / outfalls areas leaving the plan area =	1			
Desine es D	2 - sin Dansmattern (This information should be maxided for each basis).						
. ואוש ומוחמ <u>ש</u>	Basin Parameters (This information should be provided for each basin):		2. Drainage Basin Parameters (This information should be provided for	<u>each basin):</u>			
	Drainage Basin/Outfall Area No. = A-1		Drainage Basin/Outfall Area No. =	A-2			
Drode	Total drainage basin/outfall area = 0.26 levelopment impervious area within drainage basin/outfall area = 0.00	acres acres	Total drainage basin/outfall area =				
Post-de	development impervious area within drainage basin/outfall area = 0.21	acres	Predevelopment impervious area within drainage basin/outfall area = Post-development impervious area within drainage basin/outfall area =	0.14 acres			
Post-deve	elopment impervious fraction within drainage basin/outfall area = 0.82 L _{M THIS BASIN} = 190	lbs.	Post-development impervious fraction within drainage basin/outfall area =				
Indicate (
. maicate the	e proposed BMP Code for this basin.		3. Indicate the proposed BMP Code for this basin.				
	Proposed BMP = Bioretention Removal efficiency = 89		Proposed BMP = Removal efficiency =				
. Calculate M	Maximum TSS Load Removed (L _R) for this Drainage Basin by the select				2		
			4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin				
	RG-348 Page 3-33 Equation 3.7: L _R = (BMP efficient	y) x P x (A _I x 34.6 + A _P x 0.54)	RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficiency) x P x (A ₁ x	x 34.6 + A _P x 0.54)		
where:		drainage area in the BMP catchment area	where: A _C =	Total On-Site drainage area	a in the BMP catchme	nt area	
		a proposed in the BMP catchment area remaining in the BMP catchment area		Impervious area proposed in Pervious area remaining in			
		oved from this catchment area by the proposed BMP		TSS Load removed from thi			3MP
	A _C = 0.26	acres	A _C =	0.15 acres			
	A ₁ = 0.21	acres	A ₁ =				
	A _P = 0.05	acres	A _P =				
	L _R = 214	Ibs	L _R =	142 Ibs			
. Calculate F	Fraction of Annual Runoff to Treat the drainage basin / outfall area		5. Calculate Fraction of Annual Runoff to Treat the drainage basin / out	tfall area			
	Desired L _{M THIS BASIN} = 214	lbs.	Desired L _{M THIS BASIN} =	142 Ibs.			
	F = 1.00						
			F =				
. calculate C	Capture Volume required by the BMP Type for this drainage basin / out	all area. Calculations from RG-348 Pages 3-34 to 3-36	6. Calculate Capture Volume required by the BMP Type for this drainag	ge basin / outfall area.	Calculations from RG	-348	Pages 3-34 to 3-36
	Rainfall Depth = 4.00	inches	Rainfall Depth =	4.00 inches			
	Post Development Runoff Coefficient = 0.63 On-site Water Quality Volume = 2396	cubic feet	Post Development Runoff Coefficient = On-site Water Quality Volume =	0.76			
		om RG-348 Pages 3-36 to 3-37		Calculations from RG-348	D 0.00 / 0.07		
	Calculations f			Calculations non RG-346	Pages 3-36 to 3-37		
	Off-site area draining to BMP = 0.00	acres	Off-site area draining to BMP =		Pages 3-36 to 3-37		
	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00		Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	0.00 acres 0.00 acres	Pages 3-36 to 3-37		
	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00	acres acres	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	0.00 acres 0.00 acres 0 0.00	Pages 3-36 to 3-37		
	Off-site area draining to BMP =0.00Off-site Impervious cover draining to BMP =0.00Impervious fraction of off-site area =0Off-site Runoff Coefficient =0.00Off-site Water Quality Volume =0	acres	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0.00 acres 0.00 acres 0 0.00	Pages 3-36 to 3-37		
Tatel A	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Storage for Sediment = 479	acres acres cubic feet	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment =	0.00 acres 0.00 acres 0 0.00 0 0 cubic feet	Pages 3-36 to 3-37		
he following	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Storage for Sediment = 479 Capture Volume (required water quality volume(s) x 1.20) = 2875 g sections are used to calculate the required water quality volume(s) for	acres acres acres acres acres acres cubic feet acres cubic feet acres	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality	0.00 acres 0.00 acres 0 0.00 0 0 cubic feet 332 1992 cubic feet			
he following he values fo	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Storage for Sediment = 479 Capture Volume (required water quality volume(s) x 1.20) = 2875 g sections are used to calculate the required water quality volume(s) for BMP Types not selected in cell C45 will show NA. 100	acres acres acres acres acres acres cubic feet acres cubic feet acres	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA.	0.00 acres 0.00 acres 0 0.00 0 0 cubic feet 332 1992 cubic feet	d BMP.	Pages 3-42 to	→ 3-46
he following he values fo	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Storage for Sediment = 479 Capture Volume (required water quality volume(s) x 1.20) = 2875 g sections are used to calculate the required water quality volume(s) for BMP Types not selected in cell C45 will show NA. Designed as Irrigation System Designed as	acres acres <td< td=""><td>Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System</td><td>0.00 acres 0.00 acres 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>d BMP.</td><td>Pages 3-42 to</td><td>) 3-46</td></td<>	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System	0.00 acres 0.00 acres 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	d BMP.	Pages 3-42 to) 3-46
The following The values for	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Storage for Sediment = 479 Capture Volume (required water quality volume(s) x 1.20) = 2875 g sections are used to calculate the required water quality volume(s) for BMP Types not selected in cell C45 will show NA. Designed as Irrigation System Designed as Required Water Quality Volume for retention basin = NA	acres acres <td< td=""><td>Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System Required Water Quality Volume for retention basin =</td><td>0.00 acres 0.00 acres 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>d BMP.</td><td>Pages 3-42 to</td><td>D 3-46</td></td<>	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System Required Water Quality Volume for retention basin =	0.00 acres 0.00 acres 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	d BMP.	Pages 3-42 to	D 3-46
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he following he values fo	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Storage for Sediment = 479 Capture Volume (required water quality volume(s) x 1.20) = 2875 g sections are used to calculate the required water quality volume(s) for BMP Types not selected in cell C45 will show NA. Designed as I Irrigation System Designed as I Required Water Quality Volume for retention basin = NA Irrigation Area Calculations: 0.1	acres acres <td< td=""><td>Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate =</td><td>0.00 acres 0.00 acres 0 0.00 cubic feet 332 1992 cubic feet volume (s) for the selecte Designed as Required in Re NA cubic feet</td><td>d BMP. G-348</td><td></td><td></td></td<>	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate =	0.00 acres 0.00 acres 0 0.00 cubic feet 332 1992 cubic feet volume (s) for the selecte Designed as Required in Re NA cubic feet	d BMP. G-348		
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he following he values fo Retention/In	Off-site area draining to BMP = 0.00 Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Storage for Sediment = 479 Sapture Volume (required water quality volume(s) x 1.20) = 2875 g sections are used to calculate the required water quality volume(s) for or BMP Types not selected in cell C45 will show NA. Designed as Irrigation System Designed as Required Water Quality Volume for retention basin = NA Irrigation Area Calculations: NA Detention Basin System Designed as	acres acres <td< td=""><td>Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Irrigation area =</td><td>0.00 acres 0 acres 0 cubic feet 332 1992 1992 cubic feet volume (s) for the selecte Designed as Required in R 0.1 in/hr NA square feet NA acres Designed as Required in R</td><td>d BMP. G-348 Enter determined p</td><td>ermeability r</td><td>rate or assumed value of 0.1</td></td<>	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Irrigation area =	0.00 acres 0 acres 0 cubic feet 332 1992 1992 cubic feet volume (s) for the selecte Designed as Required in R 0.1 in/hr NA square feet NA acres Designed as Required in R	d BMP. G-348 Enter determined p	ermeability r	rate or assumed value of 0.1
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G-348 Enter determined p G-348 G-348 G-348 G-348 For minimum water For maximum water For maximum water</td><td>ermeability r Pages 3-46 to Pages 3-58 to Pages 3-58 to r depth of 2 fo r depth of 2 fo</td><td>Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 rate or assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: set of a sector assumed value of 0.1 Image: sector assumed value of 0.1</td></td<>	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Water Quality Volume = Off-site Water Quality Volume = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. 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The following The values for A Retention/In B. Extended D D. Filter area	Off-site area draining to BMP = 0.00 Off-site Impervious fraction of off-site area = 0 Off-site Runoff Coefficient = 0.00 Off-site Water Quality Volume = 0 Off-site Water Quality Volume = 0 Storage for Sediment = 479 Storage for Sediment = 0.1 Irrigation Area Calculations: Designed as I Irrigation Area Calculations: 0.1 Irrigation Area Calculations: NA Required Water Quality Volume for extended detention basin = NA for Sand Filters Designed as I 9A. Full Sedimentation and Filtration System NA <td>acres acres <td< td=""><td>Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Water Quality Volume = Off-site Water Quality Volume = Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA. 7. 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	T BAR M CAMP EXPANSION TCEQ ATTACHMENT "F" CONSTRUCTION PLANS – BIORETENTION (1 OF 6)								
<u> </u>		d of Professional Engineers I-Selma Road, Suite 100♦Sa			4				
		AS SHOWN APRIL 2024		3Y: <u>DJM</u> 3Y: JS/					
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Texas Commission on Environmental Quality								Texas Com	
TSS Removal Calculations 04-20-2009			Project Name:			pansior	1	TSS Remova	al C
			Date Prepared:	4/11/2024					
Additional information is provided for cells with a red triang Text shown in blue indicate location of instructions in the Technica				cursor ove	er the co	ell.		Additional in Text shown in	
Characters shown in red are data entry fields.								Characters s	
Characters shown in black (Bold) are calculated fields. Cha	anges to the	ese fields v	vill remove the e	quations u	sed in t	he sprea	adsheet.	Characters s	ino
1. The Required Load Reduction for the total project:	Calculations fi	rom RG-348		Pages 3-27 t	o 3-30			<u>1. The Required</u>	d Lo
Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)								
where:	Required TSS	removal resul	ting from the propose	d developmen	t = 80% c	ofincrease	d load	where:	
A _N =	Net increase i	n impervious a	area for the project						
	Average annua	al precipitation	n, inches					Site Data: I	Dete
Site Data: Determine Required Load Removal Based on the Entire Proje County =	Comal								Dele
Total project area included in plan * = Predevelopment impervious area within the limits of the plan * =	0.33	acres acres							redev
Total post-development impervious area within the limits of the plan* = Total post-development impervious cover fraction * =		acres						Total pos	st-ae
P =		inches							
L _{M TOTAL PROJECT} =		lbs.						+	
* The values entered in these fields should be for the total project area	a.							* The values e	nter
Number of drainage basins / outfalls areas leaving the plan area =	1	•						Num	ıber
2. Drainage Basin Parameters (This information should be provided for	<u>r each basin):</u>							<u>2. Drainage Ba</u>	<u>sin l</u>
Drainage Basin/Outfall Area No. =	A-3								
Total drainage basin/outfall area = Predevelopment impervious area within drainage basin/outfall area =		acres acres						Predev	velor
Post-development impervious area within drainage basin/outfall area =	0.16	acres						Post-dev Post-develo	velop
Post-development impervious fraction within drainage basin/outfall area = L _{M THIS BASIN} =		lbs.							
3. Indicate the proposed BMP Code for this basin.								3. Indicate the	proj
Proposed BMP =	Bioretention								
Removal efficiency =		percent							
4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basir	by the select	ed BMP Type	<u>ə.</u>					4. Calculate Ma	<u>ax im</u>
RG-348 Page 3-33 Equation 3.7: L _R =	BMP efficient	cy) x P x (A _l x	(34.6 + A _P x 0.54)						
where: A _C =	Total On-Site	drainage area	in the BMP catchme	nt area				where:	
			the BMP catchment he BMP catchment a						
			s catchment area by t		BMP				
A _C =	0.21	acres							
A ₁ =	0.16	acres							
A _P = L _R =		acres Ibs							
5. Calculate Fraction of Annual Runoff to Treat the drainage basin / ou	tfall area	•						5. Calculate Fra	actio
		lbs.							
Desired L _{M THIS BASIN} =	144								
F =	0.88								
6. Calculate Capture Volume required by the BMP Type for this draina	ge basin / outf	fall area.	Calculations from RG	-348	Pages 3	-34 to 3-36		<u>6. Calculate Ca</u>	ptu
Rainfall Depth =	1.50	inches							
Post Development Runoff Coefficient = On-site Water Quality Volume =	0.57	cubic feet							
	Calculations f	rom RG-348	Pages 3-36 to 3-37						
Off-site area draining to BMP =		acres							
Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0	acres							
Off-site Runoff Coefficient = Off-site Water Quality Volume =		cubic feet							
Storage for Sediment =	131								
Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality		cubic feet	BMP.					Total Cap The following s	
The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System	Designed as F			Pages 3-42 t	0.3-46			The values for 7. Retention/Irr	
Required Water Quality Volume for retention basin =		cubic feet	5-0-0	1 uges 0 42 t	0040				
	NA	cubic leel							Irrior
Irrigation Area Calculations:									Irriga
Soil infiltration/permeability rate = Irrigation area =		in/hr square feet	Enter determined p	ermeability	rate or as	ssumed va	alue of 0.1		
	NA	acres							
8. Extended Detention Basin System	Designed as F	Required in RO	G-348	Pages 3-46 t	o 3-51			8. Extended De	ten
Required Water Quality Volume for extended detention basin =		cubic feet							Requi
9. Filter area for Sand Filters	Designed as F	Required in RO	G-348	Pages 3-58 t	0 3-63			<u>9. Filter area fo</u>	or Sa
9A. Full Sedimentation and Filtration System									9A.
Water Quality Volume for sedimentation basin =	NA	cubic feet							
Minimum filter basin area =	NA	square feet							
Maximum sedimentation basin area =			For minimum wate						
Minimum sedimentation basin area =	NA	square feet	For maximum wate	er depth of 8	feet				
9B. Partial Sedimentation and Filtration System								9	9B.
Water Quality Volume for combined basins =	NA	cubic feet							
Minimum filter basin area =		square feet							
				- d 4 - 6 2 4					
Maximum sedimentation basin area =	NA	Square feet	For minimum wate	r denin of 7*	eer				

Designed as Required in RG-348

Required Water Quality Volume for Bioretention Basin = 788 cubic feet

Pages 3-63 to 3-65

-00 T Bar M – Camp Expansion\2 Design Phase\CAD\WPAP\17758-0001 T Bar M SWQ 4.3.24.dwg cj: April 17, 2024

10. Bioretention System

TSS REMO\	AL CA	ALCU	LATIONS	S: A-4			TSS REM
Texas Commission on Environmental Quality							Texas Commission on Environmental Quality
TSS Removal Calculations 04-20-2009					amp Expansion		TSS Removal Calculations 04-20-2009
			Date Prepared:				
Additional information is provided for cells with a red trian Text shown in blue indicate location of instructions in the Techni				cursor ove	er the cell.		Additional information is provided for cells with a red tr Text shown in blue indicate location of instructions in the Tec
Characters shown in red are data entry fields.					and in the enve	dahaat	Characters shown in red are data entry fields. Characters shown in black (Bold) are calculated fields.
Characters shown in black (Bold) are calculated fields. C			will remove the e	-		asheet.	
1. The Required Load Reduction for the total project:	Calculations	from RG-348		Pages 3-27 t	o 3-30		<u>1. The Required Load Reduction for the total project:</u>
Page 3-29 Equation 3.3: L _N	= 27.2(A _N x P)						Page 3-29 Equation 3.3:
			ulting from the propose	ed developmen	t = 80% of increased	lload	where: L _{M TOTAL PROJ}
	= Average annu		area for the project on, inches				
Site Data: Determine Required Load Removal Based on the Entire Pro							Site Data: Determine Required Load Removal Based on the Entire
County Total project area included in plan Predevelopment impervious area within the limits of the plan	= 28.96	acres acres					Total project area included in pla Predevelopment impervious area within the limits of the pla
Total post-development impervious area within the limits of the plan Total post-development impervious area within the limits of the plan	= 8.39	acres					Total post-development impervious area within the limits of the pl Total post-development impervious cover fraction
	= 33	inches					
L _{M TOTAL} PROJECT	= 7234	lbs.					L _{M TOTAL PROJ}
* The values entered in these fields should be for the total project and	ea.						* The values entered in these fields should be for the total project
Number of drainage basins / outfalls areas leaving the plan area	= 1	•					Number of drainage basins / outfalls areas leaving the plan a
2. Drainage Basin Parameters (This information should be provided							2. Drainage Basin Parameters (This information should be provide
Drainage Basin/Outfall Area No							Drainage Basin/Outfall Area
Total drainage basin/outfall area Predevelopment impervious area within drainage basin/outfall area	= 0.00	acres acres					Total drainage basin/outfall a Predevelopment impervious area within drainage basin/outfall a Post-development impervious area within drainage basin/outfall a
Post-development impervious area within drainage basin/outfall area Post-development impervious fraction within drainage basin/outfall area	= 0.73	acres					Post-development impervious fraction within drainage basin/outfall a
	= 144	lbs.					
3. Indicate the proposed BMP Code for this basin.							3. Indicate the proposed BMP Code for this basin.
Proposed BMF Removal efficiency	= Bioretention = 89	percent					Proposed B Removal efficien
4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Bas	in by the selec	ted BMP Typ	<u>e.</u>				4. Calculate Maximum TSS Load Removed (L _R) for this Drainage B
RG-348 Page 3-33 Equation 3.7: L _F	= (BMP efficien	icy) x P x (A _l	x 34.6 + A _P x 0.54)				RG-348 Page 3-33 Equation 3.7:
where: A _c	= Total On-Site	drainage are	a in the BMP catchme	nt area			where:
			n the BMP catchment the BMP catchment a				
		-	is catchment area by		BMP		
Ac	= 0.22	acres					
A	= 0.16 = 0.06	acres acres					
L		lbs					
5. Calculate Fraction of Annual Runoff to Treat the drainage basin / o	utfall area	•					5. Calculate Fraction of Annual Runoff to Treat the drainage basin
Desired L _{M THIS BASIN}	= 154	lbs.					Desired L _{M THIS B}
F	= 0.94	•					
6. Calculate Capture Volume required by the BMP Type for this drain	age basin / out	fall area.	Calculations from RC	3-348	Pages 3-34 to 3-36		6. Calculate Capture Volume required by the BMP Type for this dr
	0.10	in the second					Rainfall De
Rainfall Depth Post Development Runoff Coefficient	= 0.53	inches					Post Development Runoff Coefficie On-site Water Quality Volu
On-site Water Quality Volume	= 1024	cubic feet					
	Calculations	from RG-348	Pages 3-36 to 3-37				
Off-site area draining to BMF Off-site Impervious cover draining to BMF		acres acres					Off-site area draining to B Off-site Impervious cover draining to B
Impervious fraction of off-site area Off-site Runoff Coefficien	= 0						Impervious fraction of off-site a Off-site Runoff Coeffici
Off-site Water Quality Volume		cubic feet					Off-site Water Quality Volu
Storage for Sediment		aubia fast					Storage for Sedim Total Capture Volume (required water quality volume(s) x 1.
Total Capture Volume (required water quality volume(s) x 1.20 The following sections are used to calculate the required water qual The volume for DND Types not calculate the required water Quality		cubic feet	d BMP.				The following sections are used to calculate the required water quarty volume(s) x 1. The values for BMP Types not selected in cell C45 will show NA.
The values for BMP Types not selected in cell C45 will show NA. 7. Retention/Irrigation System	Designed as	Required in F	G-348	Pages 3-42 t	o 3-46		7. Retention/Irrigation System
Required Water Quality Volume for retention basir	= NA	cubic feet					Required Water Quality Volume for retention ba
Irrigation Area Calculations:							Irrigation Area Calculations:
Soil infiltration/permeability rate		in/hr square feet	Enter determined p	oerm eability	rate or assumed va	lue of 0.1	Soil infiltration/permeability r
	NA	acres					
8. Extended Detention Basin System	Designed as	Required in F	G-348	Pages 3-46 t	o 3-51		8. Extended Detention Basin System
Required Water Quality Volume for extended detention basir		cubic feet					Required Water Quality Volume for extended detention ba
9. Filter area for Sand Filters	Designed as	Required in F	G-348	Pages 3-58 t	o 3-63		9. Filter area for Sand Filters
9A. Full Sedimentation and Filtration System							9A. Full Sedimentation and Filtration System
Water Quality Volume for sedimentation basir	= NA	cubic feet					Water Quality Volume for sedimentation ba
Minimum filter basin area	= NA	square feet					Minimum filter basin a
Maximum sedimentation basin area Minimum sedimentation basin area			For minimum wate For maximum wate				Maximum sedimentation basin a Minimum sedimentation basin a
9B. Partial Sedimentation and Filtration System							9B. Partial Sedimentation and Filtration System
Water Quality Volume for combined basins		cubic feet					Water Quality Volume for combined bas
Minimum filter basin area		square feet					Minimum filter basin a
Maximum sedimentation basin area Minimum sedimentation basin area			For minimum wate For maximum wate				Maximum sedimentation basin a Minimum sedimentation basin a
10 Bioretention System	Designed as	Required in F	PG_3/8	Pages 3-63 t	0 3-65		10. Bioretention System
10. Bioretention System Required Water Quality Volume for Bioretention Basir		cubic feet	-0 1 0	। ayes 3-03 โ			Required Water Quality Volume for Bioretention Ba

MOVAL CALCULATIONS: A-5

				10.71			
			Designed	TRANKS	ame E-	Danalas	
			Project Name: Date Prepared:		аттр ЕХ	pansion	
ang	le in the upr	per right c	orner. Place the		r the ce	ell.	
	I Guidance N						
Cha	nges to the	se fields v	vill remove the eq	quations us	sed in tl	ne sprea	dsheet.
	Calculations fro	om RG-348		Pages 3-27 to	o 3-30		
	27.2(A _N x P)						
		removal recu	Iting from the propose	d developmont	= 80% ~	fincressed	load
A _N =	Net increase in	impervious a	area for the project	a aevelopment	1 = 80% 0	rincreased	
	Average annua	l precipitation	n, inches				
Projec nty =	Comal						
n * = n * =	28.96 0.33	acres acres					
an* = n * =	8.39 0.29	acres					
P =	33	inches					
ест =	7234	lbs.					
area							
rea =	1						
d for	agob basin'						
	each basin):						
lo. =	A-5	20100					
rea = rea =	2.20 0.19	acres acres					
rea = rea = -	1.09 0.50	acres					
SIN =	808	lbs.					
MP = ncy =	Bioretention 89	percent					
Basin	by the selecte	d BMP Type	<u>e.</u>				
L _R =	(BMP efficienc	y) x P x (A _i >	(34.6 + A _P x 0.54)				
			in the BMP catchme	nt area			
A _I =	Impervious are	a proposed in	n the BMP catchment	area			
			the BMP catchment a s catchment area by t		BMP		
A _C =	1.29	acres					
A _I =	0.90	acres					
A _P = L _R =	0.39 921	acres Ibs					
/ out	fall area						
sin =	808	lbs.					
F =	0.88						
	e basin / outfa	all area.	Calculations from RG	-348	Pages 3-	34 to 3-36	
oth = nt =	1.50 0.50	inches					
me =	3536	cubic feet					
	Calculations fro	om RG-348	Pages 3-36 to 3-37				
NP =	0.90	acres					
/IP = rea =	0.19 0.21	acres					
ent = me =	0.21	cubic feet					
ent =	911						
20) =	5466 volume(s) for	cubic feet	d BMP				
	Designed as R			Pages 3-42 to	0 3-46		
sin =	NA	cubic feet		0.2.0 12 (
nte =	0.1	in/hr	Enter determined p	ermeabilitv r	ate or as	sum ed va	lue of 0.1
ea =	NA	square feet acres					
	Designed as R	equired in R	G-348	Pages 3-46 to	5 3-51		
sin =	NA	cubic feet					
	Designed as R	equired in R	G-348	Pages 3-58 to	0 3-63		
sin =	NA	cubic feet					
rea =	NA	square feet					
rea =	NA		For minimum water	r depth of 2 f	eet		
rea =	NA		For maximum wate				
ins =	NA	cubic feet					
rea =	NA	square feet					
rea =	NA		For minimum water	r depth of 2 fe	eet		
rea =	NA		For maximum wate				
	Designed as R	equired in R	G-348	Pages 3-63 to	0 3-65		
sin =	5466	cubic feet					
							1

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DATE		APRIL 2024		BY: JS/CJ	-
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	val Calculations 04 20 2000			Decision	TResMA	amp Everation		Texas C
Additional	val Calculations 04-20-2009			Project Name: Date Prepared:		amp Expansion		TSS Rem
Addillonal i	nformation is provided for cells with a red triang	le in the up	per right c	orner. Place the	cursor ove	r the cell.		Additiona
Text shown i	n blue indicate location of instructions in the Technica							Text show
	shown in red are data entry fields. shown in black (Bold) are calculated fields. Cha	anges to the	ese fields v	will remove the e	quations u	sed in the spread	dsheet.	Characte Characte
1 The Pequir	ed Load Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 to	3-30		
i. The Requi					1 4903 0-27 1			<u>1. The Req</u>
	Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)						
where				Iting from the propose	d development	= 80% of increased l	load	whe
		Average annua		area for the project n, inches				
Site Data	: Determine Required Load Removal Based on the Entire Project	:t						Site D
	County = Total project area included in plan * =	Comal	acres					-
	Predevelopment impervious area within the limits of the plan * = ost-development impervious area within the limits of the plan* =	0.33	acres acres					Tota
rotur p	Total post-development impervious cover fraction * = P =	0.29						1018
	P -	33	inches					
	L _{M TOTAL PROJECT} =		lbs.					
The values	entered in these fields should be for the total project area							* The valu
Nu	mber of drainage basins / outfalls areas leaving the plan area =	1						
								_
. Drainage B	asin Parameters (This information should be provided for	<u>each basin):</u>						<u>2. Drainage</u>
	Drainage Basin/Outfall Area No. =	A-6						_
	Total drainage basin/outfall area =		acres					
Post-d	evelopment impervious area within drainage basin/outfall area = evelopment impervious area within drainage basin/outfall area =	0.00 0.73	acres acres					Pi
Post-deve	lopment impervious fraction within drainage basin/outfall area = L _{M THIS BASIN} =	0.69 655	lbs.					Post-de
Indiant- 4								
. marcate the	e proposed BMP Code for this basin.		 					3. Indicate
	Proposed BMP = Removal efficiency =		percent					
. Calculate N	Aaximum TSS Load Removed (L _R) for this Drainage Basin	by the selecte	ed BMP Typ	e.				4. Calculate
	RG-348 Page 3-33 Equation 3.7: L _R =							
where			-	a in the BMP catchme n the BMP catchment				whe
	A _P =	Pervious area	remaining in	the BMP catchment a	irea			_
	L _R =	TSS Load rem	oved from thi	s catchment area by t	he proposed E	BMP		_
	A _C =		acres					_
	A _I =		acres					_
	L _R =		lbs					_
								_
5. Calculate F	raction of Annual Runoff to Treat the drainage basin / out	fall area	•					5. Calculate
	Desired L _{M THIS BASIN} =	655	lbs.					
	F							
	F =							
6. Calculate C	F = Capture Volume required by the BMP Type for this drainag		all area.	Calculations from RG	3-348	Pages 3-34 to 3-36		6. Calculat
6. Calculate C	Capture Volume required by the BMP Type for this drainage	<u>e basin / outf</u>		Calculations from RG	j-348	Pages 3-34 to 3-36		<u>6. Calculat</u>
3. Calculate C	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient =	<u>le basin / outf</u> 1.50 0.49	inches	Calculations from RG	3-348	Pages 3-34 to 3-36		<u>6. Calculat</u>
<u>). Calculate C</u>	Capture Volume required by the BMP Type for this drainage Rainfall Depth =	<u>je basin / outf</u> 1.50		Calculations from RG	3-348	Pages 3-34 to 3-36		<u>6. Calculat</u>
6. Calculate C	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient =	<u>le basin / outf</u> 1.50 0.49 2854	inches cubic feet	Calculations from RG	G-348	Pages 3-34 to 3-36		<u>6. Calculat</u>
6. Calculate C	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP =	<u>le basin / outf</u> 1.50 0.49 2854	inches cubic feet		5-348	Pages 3-34 to 3-36		
<u>8. Calculate C</u>	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume =	1.50 0.49 2854 Calculations fr 0.00 0.00	inches cubic feet om RG-348		G-348	Pages 3-34 to 3-36		6. Calculat
<u>). Calculate C</u>	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area = Off-site Runoff Coefficient =	1.50 0.49 2854 Calculations fr 0.00 0.00 0	inches cubic feet om RG-348 acres acres		3-348	Pages 3-34 to 3-36		
<u>). Calculate C</u>	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume =	<u>e basin / outf</u> 1.50 0.49 2854 Calculations fr 0.00 0.00 0 0 0	inches cubic feet om RG-348 acres		j-348	Pages 3-34 to 3-36		6. Calculate
	Capture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume =	<u>e basin / outf</u> 1.50 0.49 2854 Calculations fr 0.00 0.00 0 0 0 571	inches cubic feet om RG-348 acres acres		3-348	Pages 3-34 to 3-36		
Total Ca Fhe following	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) =	<u>e basin / outf</u> 1.50 0.49 2854 Calculations fr 0.00 0.00 0 0.00 0 571 3425	inches cubic feet om RG-348 acres acres cubic feet	Pages 3-36 to 3-37		Pages 3-34 to 3-36		Total The follow
Total Ca The following The values fo	Capture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) =	<u>e basin / outf</u> 1.50 0.49 2854 Calculations fr 0.00 0.00 0 0.00 0 571 3425	inches cubic feet om RG-348 acres acres cubic feet the selecte	Pages 3-36 to 3-37	3-348			Total The followi The values
Total Ca The following The values fo	Capture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality r BMP Types not selected in cell C45 will show NA.	<u>e basin / outf</u> 1.50 0.49 2854 Calculations fr 0.00 0.00 0 0.00 0 571 3425 volum e (s) for Designed as F	inches cubic feet om RG-348 acres acres cubic feet the selecte	Pages 3-36 to 3-37				Total The followi The values
Total Ca The following The values fo	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality r BMP Types not selected in cell C45 will show NA. rrigation System	<u>e basin / outf</u> 1.50 0.49 2854 Calculations fr 0.00 0.00 0 0.00 0 571 3425 volum e (s) for Designed as F	inches cubic feet om RG-348 acres acres cubic feet the selecte Required in R	Pages 3-36 to 3-37				Total The followi The values
Total Ca The following The values fo	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality rigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations:	<u>e basin / outf</u> 1.50 0.49 2854 Calculations fr 0.00 0.00 0 0.00 0 571 3425 volum e (s) for Designed as F	inches cubic feet om RG-348 acres acres cubic feet the selecte Required in R	Pages 3-36 to 3-37 d BMP. G-348	Pages 3-42 to			Total The followi The values
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Total Ca The following The values fo 7. Retention/I	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality r BMP Types not selected in cell C45 will show NA. rrigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate =	le basin / outfi 1.50 0.49 2854 Calculations fr 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.1 NA	inches cubic feet om RG-348 acres acres cubic feet the selecte cubic feet the selecte cubic feet in/hr square feet acres	Pages 3-36 to 3-37 d BMP. G-348 Enter determined p	Pages 3-42 to	2 3-46	ue of 0.1	Total The followi The values 7. Retention
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Total Ca The following The values fo 7. Retention/I 8. Extended E	Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = Onf-site Water Quality Volume = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Vater Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality rigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate = Irrigation area Calculations: Soil infiltration/permeability rate = Irrigation area Calculations: Soil infiltration System Required Water Quality Volume for extended detention basin = for Sand Filters 9A. Full Sedimentation and Filtration System Water Quality Volume for sedimentation basin area = Maximum sedimentation basin area = Maximum sedimentation basin area =	1.50 0.49 2854 Calculations fr 0.00 0 0.00 0 0.00 0 0.00 0 0.1 NA 0.1 NA Designed as F NA Designed as F NA	inches cubic feet om RG-348 acres acres cubic feet the selecte Required in R cubic feet in/hr square feet acres Required in R cubic feet cubic feet square feet square feet	Pages 3-36 to 3-37 d BMP. G-348 G-348 G-348 G-348	Pages 3-42 to Pages 3-42 to Pages 3-46 to Pages 3-58 to	ate or assumed value 3.46 3.46 3.46 3.46 3.46 3.46 4.4 4.4 4.4 4.4 4.4 4.4 4.4		6. Calculate
Total Ca The following The values fo 7. Retention/I 8. Extended E	Capture Volume required by the EMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = apture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality rigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate = Irrigation area = Petention Basin System Required Water Quality Volume for extended detention basin = for Sand Filters 9A. Full Sedimentation and Filtration System Water Quality Volume for sedimentation basin area = Maximum sedimentation basin area = Maximum sedimentation basin area =	I - 50 0.49 2854 Calculations fr 0.00 0 0.00 0 0.00 0 0.00 0 0.1 NA 0.1 NA Designed as F NA Designed as F NA NA <t< td=""><td>inches cubic feet om RG-348 acres acres cubic feet the selecte cubic feet the selecte cubic feet in/hr square feet acres cubic feet acres cubic feet square feet square feet square feet square feet</td><td>Pages 3-36 to 3-37 Pages 3-36 to 3-37 d BMP. G-348 G-3</td><td>Pages 3-42 to Pages 3-42 to Pages 3-46 to Pages 3-58 to Pa</td><td>2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3</td><td></td><td>Total The followi The values 7. Retention</td></t<>	inches cubic feet om RG-348 acres acres cubic feet the selecte cubic feet the selecte cubic feet in/hr square feet acres cubic feet acres cubic feet square feet square feet square feet square feet	Pages 3-36 to 3-37 Pages 3-36 to 3-37 d BMP. G-348 G-3	Pages 3-42 to Pages 3-42 to Pages 3-46 to Pages 3-58 to Pa	2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		Total The followi The values 7. Retention
Total Ca The following The values fo 7. Retention/I 8. Extended E	Capture Volume required by the EMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area = Off-site Runoff Coefficient = Storage for Sediment = sections are used to calculate the required water quality rigation Area Calculations: Irrigation Area Calculations: Soil infiltration/permeability rate = Irrigation Basin System Required Water Quality Volume for extended detention basin =	I - 50 0.49 2854 Calculations fr 0.00 0 0.00 0 0.00 0 0.00 0 0.1 NA 0.1 NA Designed as F NA Designed as F NA NA <t< td=""><td>inches cubic feet om RG-348 acres acres cubic feet the selecte cubic feet the selecte cubic feet in/hr square feet acres cubic feet acres cubic feet square feet square feet square feet square feet</td><td>Pages 3-36 to 3-37 d BMP. G-348 G-348 G-348 G-348</td><td>Pages 3-42 to Pages 3-42 to Pages 3-46 to Pages 3-58 to Pa</td><td>2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3</td><td></td><td>Total The followi The values 7. Retention</td></t<>	inches cubic feet om RG-348 acres acres cubic feet the selecte cubic feet the selecte cubic feet in/hr square feet acres cubic feet acres cubic feet square feet square feet square feet square feet	Pages 3-36 to 3-37 d BMP. G-348 G-348 G-348 G-348	Pages 3-42 to Pages 3-42 to Pages 3-46 to Pages 3-58 to Pa	2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		Total The followi The values 7. Retention

TSS REMOVAL CALCULATIONS: A-8

								Texas Comn
Commission on Environmental Quality			Due is at Name at	TPerMC	omn Ev	noncion		TSS Removal
noval Calculations 04-20-2009			Project Name: Date Prepared:			pansion		
al information is provided for cells with a red triang				cursor ove	er the ce	ell.		Additional info
In in blue indicate location of instructions in the Technica ers shown in red are data entry fields.	Il Guidance N	Manual - RO	G-348.					Text shown in b Characters sh
ers shown in black (Bold) are calculated fields. Cha	anges to the	ese fields v	will remove the e	quations u	sed in t	he sprea	dsheet.	Characters sh
uired Load Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 t	o 3-30			<u>1. The Required</u>
Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)							
			Iting from the propose area for the project	d developmen	t = 80% o	f increased	lload	where:
	Average annua							
ata: Determine Required Load Removal Based on the Entire Project County =	Comal	•						Site Data: De
Total project area included in plan * = Predevelopment impervious area within the limits of the plan * =	0.33	acres acres						Prec Total post-
al post-development impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P =	8.39 0.29 33	acres inches						
= ۲۵ HM TOTAL PROJECT Hes entered in these fields should be for the total project area	7234	lbs.						* The values ent
Number of drainage basins / outfalls areas leaving the plan area =	1	•						Numbe
e Basin Parameters (This information should be provided for	each basin):							<u>2. Drainage Basi</u>
Drainage Basin/Outfall Area No. =								
Total drainage basin/outfall area = redevelopment impervious area within drainage basin/outfall area = st-development impervious area within drainage basin/outfall area =	0.18 0.00 0.14	acres acres acres						Predevel Post-devel
evelopment impervious fraction within drainage basin/outfall area =	0.78	lbs.						Post-developr
the proposed BMP Code for this basin.	120	103.						3. Indicate the pr
Proposed BMP =	Bioretention	•						
Removal efficiency =	89	percent						
e Maximum TSS Load Removed (L _R) for this Drainage Basin	_							<u>4. Calculate Max</u>
RG-348 Page 3-33 Equation 3.7: L _R =								
-			a in the BMP catchme n the BMP catchment					where:
171		=	the BMP catchment a s catchment area by t		BMP			
A _C =	0.18	acres						
A _I = A _P =	0.14 0.04	acres acres						
L _R =	143	lbs						
e Fraction of Annual Runoff to Treat the drainage basin / out	fall area							<u>5. Calculate Frac</u>
Desired L _{M THIS BASIN} =	136	lbs.						_
F =	0.95							
e Capture Volume required by the BMP Type for this drainag	je basin / outh	all area.	Calculations from RG	6-348	Pages 3-	34 to 3-36		<u>6. Calculate Capt</u>
Rainfall Depth = Post Development Runoff Coefficient =	2.60 0.59	inches						
On-site Water Quality Volume =	1009	cubic feet						
	Calculations fr	om RG-348	Pages 3-36 to 3-37					
Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	0.00	acres acres						_
Impervious fraction of off-site area = Off-site Runoff Coefficient =	0							
Off-site Water Quality Volume =	0	cubic feet						
Storage for Sediment = I Capture Volume (required water quality volume(s) x 1.20) =	202 1211	cubic feet						Total Captu
ing sections are used to calculate the required water quality s for BMP Types not selected in cell C45 will show NA.								The following set The values for B
n/Irrigation System Required Water Quality Volume for retention basin =	Designed as F	cubic feet	G-348	Pages 3-42 t	0 3-46			7. Retention/Irrig
Irrigation Area Calculations:								Irri
Soil infiltration/permeability rate =	0.1	in/hr	Enter determined p	ermeability	rate or as	sum ed va	lue of 0.1	
Irrigation area =	NA NA	square feet acres						_
d Detention Basin System	Designed as F	Required in R	G_348	Pages 3-46 t	0 3-51			8. Extended Dete
Required Water Quality Volume for extended detention basin =	NA	cubic feet		Tages 0-40 t	0.0-01			Req
ea for Sand Filters	Designed as F	Required in R	G-348	Pages 3-58 t	o 3-63			<u>9. Filter area for</u>
9A. Full Sedimentation and Filtration System		aubia faat						<u>Ae</u>
Water Quality Volume for sedimentation basin = Minimum filter basin area =	NA	cubic feet						
Maximum sedimentation basin area =	NA		For minimum wate	r depth of 2 f	eet			
Minimum sedimentation basin area =	NA		For maximum wate					
9B. Partial Sedimentation and Filtration System								95
Water Quality Volume for combined basins =	NA	cubic feet						
Minimum filter basin area =	NA	square feet						
Maximum sedimentation basin area = Minimum sedimentation basin area =	NA NA		For minimum wate For maximum wate					
Required Water Quality Volume for Bioretention Basin =	Designed as F	Required in Received in Re	G-348	Pages 3-63 t	0 3-65			<u>10. Bioretention S</u>
Toquirou vvator quality volume for Bioretention Basin =	1211		1	1			1	

Date Preparate	100 Reliiu	al Calculations 04-20-2009			Project Name:	T Bar M C	amp Ex	pansior	
Trad shown is the induce sector in the formation in the formation (2004). Character allow in a low and provide sector in the formation of the formation of the spectros and in the spectroshow. The found is a low and provide sector in the formation of the formation of the formation of the spectroshow is a low and provide sector in the spectroshow is low and provide sector in the spec									
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Obackets shown in black (Bobb) Devise there with Seven the second or seven the second or seven the second or seven the second or seven the seven t	Text shown i	n blue indicate location of instructions in the Technica							
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Note::::::::::::::::::::::::::::::::::::		Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)						
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	6. Calculate C 5. Calculate C	Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site inpervious cover draining to BMP = Off-site memory fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = Inigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil Infiltration/permeability rate = Irrigation area = Irrigation area = Mater Quality Volume for extended detention basin = Gor Sand Filters 9A. Full Sedimentation and Filtration System Water Quality Volume for combined basin area = Maximum sedimentation basin area =	136 0.95 e basin / outfa 2.60 0.59 1009 Calculations fr 0.00 0.00 0 0.00 0 0 0 0 0 0 0 0 0 0 0 0	all area. inches cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet in/hr square feet acres cubic feet in/hr square feet acres cubic feet in/hr square feet acres cubic feet cubic feet in/hr	Pages 3-36 to 3-37 Pages 3-36 to 3-37 d BMP. G-348 Enter determined p G-348 G-348 G-348 G-348 G-348	Pages 3-42 t ermeability Pages 3-46 t Pages 3-58 t Pages 3-58 t r depth of 2 f er depth of 2 f	2 3-46 ate or as 2 3-51 2 3-51 2 3-63 eet feet		

	-	ABBREVI	ATIONS		
	0E PP R.O.W. SS SW TELE UE UT WV D.R.C.C.	EASEMI. FIRE H OVERHI. POWER RIGHT- SANITA. SIDEWA SIDEWA TELEPH UNDER UNDER T. COUNT C.T. OFFICIA COMAL	YDRANT EAD ELECTRIC OF-WAY RY SEWER LINE LK IONE GROUND ELECTRIC GROUND TELEPHONE VALVE RECORDS COMAL Y TEXAS		
		Exact L Depth Facilities Constructi	or to Verify ocation & of Exist Prior to any on Activities [ION!!! TACT: DIG-TESS		
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Texas Commission on Environmental Quality		TIONS: A-9	Texas Cor	TSS REMOVA			TSS REMC Texas Commission on Environmental Quality
TSS Removal Calculations 04-20-2009		Project Name: T Bar M Camp Expansion Date Prepared: 4/11/2024	TSS Remov	al Calculations 04-20-2009	-	Name: TBarMCampExpansion	TSS Removal Calculations 04-20-2009
Additional information is provided for cells with a red triang	le in the upper righ		Additional	nformation is provided for cells with a red triang			Additional information is provided for cells with a re
Text shown in blue indicate location of instructions in the Technica			Text shown i	n blue indicate location of instructions in the Technic			Text shown in blue indicate location of instructions in the
Characters shown in red are data entry fields. Characters shown in black (Bold) are calculated fields. Cha	anges to these field	Is will remove the equations used in the spreadsheet.		shown in red are data entry fields. shown in black (Bold) are calculated fields. Ch	anges to these fields will remove t	the equations used in the spreadsheet.	Characters shown in red are data entry fields. Characters shown in black (Bold) are calculated fiel
1. The Required Load Reduction for the total project:	Calculations from RG-3	48 Pages 3-27 to 3-30		ed Load Reduction for the total project:	Calculations from RG-348	Pages 3-27 to 3-30	1. The Required Load Reduction for the total project:
Page 3-29 Equation 3.3: L _M =				Page 3-29 Equation 3.3: L _M =	= 27.2(A _N x P)		Page 3-29 Equation
	Required TSS removal Net increase in impervi	resulting from the proposed development = 80% of increased load	where:		 Required TSS removal resulting from the presence of the project in impervious area for the project in the project	roposed development = 80% of increased load	where: L _{M TOTAL}
	Average annual precipit				= Average annual precipitation, inches		
Site Data: Determine Required Load Removal Based on the Entire Project			Site Data:	Determine Required Load Removal Based on the Entire Proje			Site Data: Determine Required Load Removal Based on the En
County = Total project area included in plan * =	28.96 acres			County = Total project area included in plan * =	= 28.96 acres		Total project area included in
Predevelopment impervious area within the limits of the plan * = Total post-development impervious area within the limits of the plan* =	8.39 acres			Predevelopment impervious area within the limits of the plan * = ost-development impervious area within the limits of the plan* =	= 8.39 acres		Predevelopment impervious area within the limits of th Total post-development impervious area within the limits of the
Total post-development impervious cover fraction * =	0.29 33 inches			Total post-development impervious cover fraction * = P =			Total post-development impervious cover fr
L _{M TOTAL PROJECT} =	7234 Ibs.			LM TOTAL PROJECT =	= 7234 Ibs.		
* The values entered in these fields should be for the total project area			* The values	entered in these fields should be for the total project are			L _{M TOTAL} * The values entered in these fields should be for the total pro
Number of drainage basins / outfalls areas leaving the plan area =	1		Nu	mber of drainage basins / outfalls areas leaving the plan area =	= 1		Number of drainage basins / outfalls areas leaving the p
2. Drainage Basin Parameters (This information should be provided for	each basin):		2. Drainage B	asin Parameters (This information should be provided fo	r each basin):		2. Drainage Basin Parameters (This information should be pro
Drainage Basin/Outfall Area No. =				Drainage Basin/Outfall Area No. =			Drainage Basin/Outfall Ar
Total drainage basin/outfall area =	0.22 acres			Total drainage basin/outfall area =			Total drainage basin/outf
Predevelopment impervious area within drainage basin/outfall area = Post-development impervious area within drainage basin/outfall area =	0.00 acres			evelopment impervious area within drainage basin/outfall area = evelopment impervious area within drainage basin/outfall area =	= 0.00 acres		Predevelopment impervious area within drainage basin/outf Post-development impervious area within drainage basin/outf
Post-development impervious fraction within drainage basin/outfall area =	0.68			opment impervious fraction within drainage basin/outfall area =	= 0.71		Post-development impervious fraction within drainage basin/outf
3. Indicate the proposed BMP Code for this basin.				L _M THIS BASIN =			
			<u>3. Indicate the</u>	proposed BMP Code for this basin.			3. Indicate the proposed BMP Code for this basin.
Proposed BMP = Removal efficiency =				Proposed BMP = Removal efficiency =			Propose Removal ef
4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin	by the selected BMP	Туре.	4. Calculate M	laximum TSS Load Removed (L _R) for this Drainage Basir	n by the selected BMP Type.		4. Calculate Maximum TSS Load Removed (L _R) for this Draina
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)		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)	RG-348 Page 3-33 Equation
where: A _C =	Total On-Site drainage	area in the BMP catchment area	where		= Total On-Site drainage area in the BMP ca		where:
A _I =	Impervious area propos	ed in the BMP catchment area		A ₁ =	= Impervious area proposed in the BMP catc	hment area	
		g in the BMP catchment area https://www.area https://www.a			 Pervious area remaining in the BMP catching TSS Load removed from this catchment area 		
A _C =	0.22 acres						
				A _C =			
A _P =				A _P =			
5. Calculate Fraction of Annual Runoff to Treat the drainage basin / out			<u>5. Calculate F</u>	raction of Annual Runoff to Treat the drainage basin / ou			5. Calculate Fraction of Annual Runoff to Treat the drainage ba
Desired L _{M THIS BASIN} =	135 Ibs.			Desired L _{M THIS BASIN} =	= 139 Ibs.		Desired L _{MTH}
F =	0.88			F =	= 0.91		
6. Calculate Capture Volume required by the BMP Type for this drainag	ge basin / outfall area.	Calculations from RG-348 Pages 3-34 to 3-36	<u>6. Calculate C</u>	apture Volume required by the BMP Type for this draina	ge basin / outfall area. Calculations from	om RG-348 Pages 3-34 to 3-36	6. Calculate Capture Volume required by the BMP Type for this
Rainfall Depth =	1.50 inches			Rainfall Depth =	= 1.80 inches		Rainfal
Post Development Runoff Coefficient = On-site Water Quality Volume =	0.49	at at a second sec		Post Development Runoff Coefficient = On-site Water Quality Volume =	0.52		Post Development Runoff Coe
					= 714 cubic feet		On-site Water Quality
	Calculations from RG-3	48 Pages 3-36 to 3-37			Calculations from RG-348 Pages 3-36 to	3-37	
Off-site area draining to BMP =				Off-site area draining to BMP =			Off-site area draining t
Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0.00 acres 0			Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	= 0		Off-site Impervious cover draining t Impervious fraction of off-si
Off-site Runoff Coefficient = Off-site Water Quality Volume =		et		Off-site Runoff Coefficient = Off-site Water Quality Volume =			Off-site Runoff Coe Off-site Water Quality
Storage for Sediment =	117			Storage for Sediment =	= 143		Storage for Se
Total Capture Volume (required water quality volume(s) x 1.20) = The following sections are used to calculate the required water quality	701 cubic fe			pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality	= 857 cubic feet		Total Capture Volume (required water quality volume(s) The following sections are used to calculate the required wate
The values for BMP Types not selected in cell C45 will show NA.	Designed as Required		The values fo	r BMP Types not selected in cell C45 will show NA.	Designed as Required in RG-348	Pages 3-42 to 3-46	The values for BMP Types not selected in cell C45 will show N
Required Water Quality Volume for retention basin =			<u>r. ketention/li</u>				7. Retention/Irrigation System
				Required Water Quality Volume for retention basin =	= NA cubic feet		Required Water Quality Volume for retention
Irrigation Area Calculations:				Irrigation Area Calculations:			Irrigation Area Calculations:
Soil infiltration/permeability rate = Irrigation area =	NA square	Enter determined permeability rate or assumed value of 0.1		Soil infiltration/permeability rate = Irrigation area =	NA square feet	ined permeability rate or assumed value of 0.1	Soil infiltration/permeabil Irrigatio
	NA acres				NA acres		
8. Extended Detention Basin System	Designed as Required	n RG-348 Pages 3-46 to 3-51	8. Extended D	etention Basin System	Designed as Required in RG-348	Pages 3-46 to 3-51	8. Extended Detention Basin System
Required Water Quality Volume for extended detention basin =	NA cubic fe	et		Required Water Quality Volume for extended detention basin =	-		Required Water Quality Volume for extended detention
9. Filter area for Sand Filters	Designed as Required	n RG-348 Pages 3-58 to 3-63	9. Filter area	for Sand Filters	Designed as Required in RG-348	Pages 3-58 to 3-63	9. Filter area for Sand Filters
9A. Full Sedimentation and Filtration System				9A. Full Sedimentation and Filtration System			9A. Full Sedimentation and Filtration System
Water Quality Volume for sedimentation basin =	NA cubic fe	et		Water Quality Volume for sedimentation basin =	= NA cubic feet		Water Quality Volume for sedimentation
Minimum filter basin area =	NA square	eet		Minimum filter basin area =	= NA square feet		Minimum filter bas
Maximum sedimentation basin area =		eet For minimum water depth of 2 feet		Maximum sedimentation basin area =			Maximum sedimentation bas
Minimum sedimentation basin area =	NA square	eet For maximum water depth of 8 feet		Minimum sedimentation basin area =	= NA square feet For maximum	n water depth of 8 feet	Minimum sedimentation bas
9B. Partial Sedimentation and Filtration System				9B. Partial Sedimentation and Filtration System			9B. Partial Sedimentation and Filtration System
Water Quality Volume for combined basins =	NA cubic fe	et		Water Quality Volume for combined basins =	= NA cubic feet		Water Quality Volume for combined
Minimum filter basin area =				Minimum filter basin area =			Minimum filter bas
		eet For minimum water depth of 2 feet		Maximum sedimentation basin area =	= NA square feet For minimum	water depth of 2 feet	Maximum sedimentation bas
Maximum sedimentation basin area =		eet For maximum water depth of 8 feet		Minimum sedimentation basin area =	= NA square feet For maximum	n water depth of 8 feet	Minimum sedimentation bas
Maximum sedimentation basin area = Minimum sedimentation basin area =	NA square						
Minimum sedimentation basin area =	NA square Designed as Required		10. Bioretenti		Designed as Required in RG-348	Pages 3-63 to 3-65	10. Bioretention System

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MOVAL CALCULATIONS: A-11

lity								
			Project Name: Date Prepared:		amp Ex	pansion		
a red triand	le in the up	per right c	orner. Place the	cursor ove	r the ce			
the Technica								
d fields. Cha	inges to the	ese fields v	vill remove the e	quations us	sed in t	he sprea	dsheet.	
	Calculations fr	rom RG-348		Pages 3-27 to	o 3-30			
uation 3.3: L _M =	27 2(A, x P)							
			ting from the upon one		- 00%	finerecod	laad	
A _N =	Net increase in	n impervious	Iting from the propose area for the project	a aevelopment	. = 80% C	of Increased	IOad	
P =	Average annua	al precipitatio	n, inches					
the Entire Projec County =	ct Comal	•						
uded in plan * = s of the plan * =	28.96 0.33	acres acres						
ts of the plan* = over fraction * =		acres						
P =	33	inches						
TOTAL PROJECT =	7234	lbs.						
al project area								
the plan area =	1	•						
e provided for	each basin):							
fall Area No. =	A-11	•						
in/outfall area = in/outfall area =	0.20	acres						
in/outfall area =	0.00	acres						
in/outfall area = L _{M THIS BASIN} =	0.75 135	lbs.						
roposed BMP =	Bioretention							
oval efficiency =	89	percent						
rainage Basin	by the selecte	ed BMP Typ	<u>e.</u>					
ation 3.7: L _R =	(BMP efficience	cy) x P x (A _l :	x 34.6 + A _P x 0.54)					
			in the BMP catchme					
			n the BMP catchment the BMP catchment a					
			s catchment area by		BMP			
A _C =	0.20	acres						
A _I = A _P =	0.15 0.05	acres acres						
L _R =	153	lbs						
age basin / out	fall area	•						
d L _{M THIS BASIN} =	135	lbs.						
F =	0.88	•						
for this drainag		allaraa	Calculations from RG	348	Pages 3	-34 to 3-36		
or this trainay					r uges e			
Rainfall Depth =	1.50 0.56	inches						
	0.00							
	610	cubic feet						
uality Volume =			Pages 2.26 to 2.27					
uality Volume =	Calculations fr	rom RG-348	Pages 3-36 to 3-37					
uality Volume = aining to BMP = aining to BMP =	Calculations fr 0.00 0.00		Pages 3-36 to 3-37					
ality Volume = aining to BMP = aining to BMP = of off-site area = off Coefficient =	Calculations fr 0.00 0.00 0 0	rom RG-348 acres acres	Pages 3-36 to 3-37					
ining to BMP = ining to BMP = of off-site area = off Coefficient =	Calculations fr 0.00 0.00 0	rom RG-348 acres	Pages 3-36 to 3-37					
ining to BMP = ining to BMP = ining to BMP = of off-site area = off Coefficient = uality Volume = for Sediment =	Calculations fr 0.00 0.00 0 0	rom RG-348 acres acres	Pages 3-36 to 3-37					
ining to BMP = ining to BMP = of off-site area = off Coefficient = uality Volume = for Sediment = ne(s) x 1.20) =	Calculations fr 0.00 0.00 0 0 122 732	rom RG-348 acres acres cubic feet						
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ining to BMP = ining to BMP = ining to BMP = f off-site area = off Coefficient = iality Volume = for Sediment = ne(s) x 1.20) = water quality ow NA. tention basin = eability rate =	Calculations fr 0.00 0.00 0 122 732 volume (s) for Designed as F NA	rom RG-348 acres acres cubic feet cubic feet the selecte Required in Re cubic feet	d BMP. 3-348			ssumed va	Lue of 0.1	
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ining to BMP = ining to BMP = ining to BMP = f off-site area = off Coefficient = iality Volume = for Sediment = ne(s) x 1.20) = water quality ow NA. tention basin = eability rate = igation area =	Calculations fr 0.00 0.00 0 122 732 volume(s) for Designed as F NA 0.1 NA NA Designed as F	acres acres acres cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet	d BMP. 3-348 Enter determined p		ate or as	ssumed va	lue of 0.1	
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	D.R.C.C.	UNDERGROUND ELECTRIC UNDERGROUND TELEPHONE WATER VALVE T. DEED RECORDS COMAL COUNTY TEXAS C.T. OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS	
		!!CAUTION!! Contractor to Verify Exact Location & Depth of Exist Facilities Prior to any Construction Activities	
	48 HC	CAUTION!!! CONTACT: 1-800-DIG-TESS OURS PRIOR TO CONSTRUCTIO	N
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DA JO	ALE:	rd of Professional Engineers and Land Surveyors Reg. No. F-2329 I-Selma Road, Suite 100•San Antonio, Texas 78249•210.494.55 AS SHOWN DGN. BY: APRIL 2024 DWN. BY:S 758–0001–00 DWG. NO SURV. BY: F.B. NO NONE	S/CJ
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exas Commission on Environmental Quality						Texas Commission on Environmental Quality			
SS Removal Calculations 04-20-2009			Project Name: T Bar M Ca Date Prepared: 4/11/2024		ansion	TSS Removal Calculations 04-20-2009		Project Name: Date Prepared:	T Bar M Camp Expansion 4/11/2024
Iditional information is provided for cells with a red triangle				er the cell	· · · · · · · · · · · · · · · · · · ·	Additional information is provided for cells with a red triang	le in the u	pper right corner. Place the	cursor over the cell.
xt shown in blue indicate location of instructions in the Technical naracters shown in red are data entry fields.	Guidance M	/lanual - RO	G-348.			Text shown in blue indicate location of instructions in the Technica Characters shown in red are data entry fields.	l Guidance	e Manual - RG-348.	
naracters shown in black (Bold) are calculated fields. Chan	iges to the	se fields v	vill remove the equations us	sed in the	e spreadsheet.	Characters shown in black (Bold) are calculated fields. Cha	inges to t	hese fields will remove the e	quations used in the spreadsheet
The Required Load Reduction for the total project:	Calculations fro	om RG-348	Pages 3-27 to	:0 3-30		1. The Required Load Reduction for the total project:	Calculations	s from RG-348	Pages 3-27 to 3-30
Page 3-29 Equation 3.3: L _M = 2	7.2(A _N x P)					Page 3-29 Equation 3.3: L _M =	27.2(A × P		
		romoval rocu	ting from the proposed development	t - 20% of it	acrossed load				
A _N = N	let increase in	n impervious a	area for the project					S removal resulting from the propose e in impervious area for the project	d development = 80% of increased load
	verage annua	l precipitatior	, inches			P =	Average ann	nual precipitation, inches	
Site Data: Determine Required Load Removal Based on the Entire Project County =	Comal					Site Data: Determine Required Load Removal Based on the Entire Project County =			
Total project area included in plan * = Predevelopment impervious area within the limits of the plan * =		acres acres				Total project area included in plan * = Predevelopment impervious area within the limits of the plan * =	28.96	acres	
Total post-development impervious area within the limits of the plan* = Total post-development impervious cover fraction * =	8.39 0.29	acres				Total post-development impervious area within the limits of the plan* = Total post-development impervious cover fraction * =	8.39	acres	
P =		inches						inches	
L _{M TOTAL PROJECT} =	7234	lbs.				LM TOTAL PROJECT =	7234	lbs.	
he values entered in these fields should be for the total project area.						* The values entered in these fields should be for the total project area			
Number of drainage basins / outfalls areas leaving the plan area =	1					Number of drainage basins / outfalls areas leaving the plan area =	1		
rainage Basin Parameters (This information should be provided for ea	ach basin):					2. Drainage Basin Parameters (This information should be provided for	each basin	<u>):</u>	
Drainage Basin/Outfall Area No. =	A-12					Drainage Basin/Outfall Area No. =	A-13		
Total drainage basin/outfall area = Predevelopment impervious area within drainage basin/outfall area =		acres				Total drainage basin/outfall area =		acres	
Post-development impervious area within drainage basin/outfall area =	0.15	acres acres				Predevelopment impervious area within drainage basin/outfall area = Post-development impervious area within drainage basin/outfall area =	0.48	acres acres	
Post-development impervious fraction within drainage basin/outfall area = L _{M THIS BASIN} =	0.65 135	lbs.				Post-development impervious fraction within drainage basin/outfall area =		lbs.	
ndicate the proposed BMP Code for this basin.						3. Indicate the proposed BMP Code for this basin.			
Proposed BMP = B	Bioretention					Proposed BMP Code for this basin. Proposed BMP =	Rioretant	n l	
Removal efficiency =		percent				Removal efficiency =		percent	
Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin b	y the selecte	d BMP Type	<u>.</u>			4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin	by the sele	cted BMP Type.	
RG-348 Page 3-33 Equation 3.7: L _R = (E	BMP efficiency	y) x P x (A _l x	34.6 + A _P x 0.54)			RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficie	ency) x P x (A ₁ x 34.6 + A _P x 0.54)	
where: A _C = T	otal On-Site d	drainage area	in the BMP catchment area			where: A _c =	Total On-Si	e drainage area in the BMP catchme	nt area
A ₁ = In	npervious area	a proposed in	the BMP catchment area			A _I =	Impervious a	area proposed in the BMP catchment	area
		-	he BMP catchment area s catchment area by the proposed E	BMP				ea remaining in the BMP catchment a emoved from this catchment area by t	
A _C =		acres							
		acres				A _C =		acres acres	
A _P =		acres Ibs				A _P =		acres	
	154	103				L _R =	491	lbs	
Calculate Fraction of Annual Runoff to Treat the drainage basin / outfa						5. Calculate Fraction of Annual Runoff to Treat the drainage basin / out	<u>fall area</u>		
Desired L _{M THIS BASIN} =	135	lbs.				Desired L _{M THIS BASIN} =	429	lbs.	
F =	0.88					F =	0.87		
Calculate Capture Volume required by the BMP Type for this drainage	basin / outfa	all area.	Calculations from RG-348	Pages 3-34	to 3-36	6. Calculate Capture Volume required by the BMP Type for this drainage	<u>e basin / o</u>	utfall area. Calculations from RG	-348 Pages 3-34 to 3-36
		• for the largest							
Rainfall Depth = Post Development Runoff Coefficient =	0.46	inches				Rainfall Depth = Post Development Runoff Coefficient =	0.53	inches	
On-site Water Quality Volume =	578	cubic feet				On-site Water Quality Volume =	1843	cubic feet	
	Calculations fro	om RG-348	Pages 3-36 to 3-37				Calculations	s from RG-348 Pages 3-36 to 3-37	
Off-site area draining to BMP =	0.00	acres				Off-site area draining to BMP =	0.00	acres	
Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0.00	acres				Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0.00	acres	
Off-site Runoff Coefficient =	0.00	cubic feet				Off-site Runoff Coefficient = Off-site Water Quality Volume =	0.00	cubic feet	
Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) =		cubic feet				Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) =	2212	cubic feet	
following sections are used to calculate the required water quality version values for BMP Types not selected in cell C45 will show NA.	olume(s)for					The following sections are used to calculate the required water quality The values for BMP Types not selected in cell C45 will show NA.			
Retention/Irrigation System D	esigned as R	equired in RC	6-348 Pages 3-42 to	:0 3-46			Designed as	s Required in RG-348	Pages 3-42 to 3-46
Required Water Quality Volume for retention basin =	NA	cubic feet				Required Water Quality Volume for retention basin =	NA	cubic feet	
Irrigation Area Calculations:						Irrigation Area Calculations:			
Soil infiltration/permeability rate = Irrigation area =		in/hr square feet	Enter determined permeability r	rate or assu	med value of 0.1	Soil infiltration/permeability rate =	0.1		ermeability rate or assumed value of 0.
irrigation area =		square feet acres				Irrigation area =	NA NA	square feet acres	
	esigned as R		9-348 Pages 3-46 to	:0 3-51					Pages 3-46 to 3-51
Required Water Quality Volume for extended detention basin =	NA	cubic feet				Required Water Quality Volume for extended detention basin =	NA	cubic feet	
ilter area for Sand Filters	esigned as R	equired in RC	G-348 Pages 3-58 to	0 3-63		9. Filter area for Sand Filters	Designed a	s Required in RG-348	Pages 3-58 to 3-63
9A. Full Sedimentation and Filtration System						9A. Full Sedimentation and Filtration System			
Water Quality Volume for sedimentation basin =	NA	cubic feet				Water Quality Volume for sedimentation basin =	NA	cubic feet	
Minimum filter basin area =		square feet				Minimum filter basin area =			
								square feet	
Maximum sedimentation basin area = Minimum sedimentation basin area =			For minimum water depth of 2 for maximum water depth of 8			Maximum sedimentation basin area = Minimum sedimentation basin area =	NA NA	square feet For minimum wate	
9B. Partial Sedimentation and Filtration System						9B. Partial Sedimentation and Filtration System			
Water Quality Volume for combined basins =	NA	cubic feet				Water Quality Volume for combined basins =	NA	cubic feet	
Minimum filter basin area =	NA	square feet				Minimum filter basin area =	NA	square feet	
Maximum sedimentation basin area = Minimum sedimentation basin area =			For minimum water depth of 2 for maximum water depth of 8 for maximum wate			Maximum sedimentation basin area = Minimum sedimentation basin area =	NA NA	square feet For minimum wate square feet For maximum wate	
	NA	Syuare 188[i of maximum water depth of 81	וסטו		ivinimum sedimentation basin area =	NA	Square reer For maximum wate	
		equired in RC	6-348 Pages 3-63 to	:0 3-65		10. Bioretention System	Designed a	s Required in RG-348	Pages 3-63 to 3-65
Bioretention System D	esigned as R			1					

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Text shown in blue inc Characters shown i Characters shown i Characters shown i I. The Required Load R where: Site Data: Determine Predevelopm Total post-develop The values entered in Number of dra Predevelopment Post-development Post-development Post-development Post-development S. Indicate the proposec Mere: S. Calculate Maximum S. Calculate Fraction of S. Calculate Fraction of S. Calculate Fraction of S. Calculate South Fraction of S. Calculate Capture Vol Total Capture Vol Total Capture Vol Total Capture Vol Retention/Irrigation S	Iticate location of instructions in the Technica n red are data entry fields. n black (Bold) are calculated fields. Cha Page 3-29 Equation 3.3: L _M = L _{M TOTAL PROJECT} = A _N = P = a Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = ment impervious area within the limits of the plan * = Total project area included in plan * = Total project area included in plan * = Total project area included in plan * = M TOTAL PROJECT = https://project.area/ Indexse fields should be for the total project area inage basins / outfalls areas leaving the plan area = meters (This information should be provided for Drainage Basin/Outfall Area No. = Total drainage basin/outfall area = impervious area within drainage basin/outfall area = impervious fraction within drainage basin/outfall area = pervious fraction within drainage basin/outfall area = impervious fraction within drainage basin/outfall area = M THIS BASIN = A BMP Code for this basin. Proposed BMP = Removal efficiency = TSS Load Removed (L _R) for this Drainage Basin/ RG-348 Page 3-33 Equation 3.7: L _R = A _L = A	al Guidance anges to the Calculations f Calculations f 27.2(A _N x P) Required TSS Net increase Average annue tot Comal 28.96 0.33 8.39 0.29 33 7234 a. 7234 a. 7234 a. 1 1 1 1 1 1 1 1 1 1 1 1 1	Manual - Ro ese fields from RG-348 from RG-348 in impervious al precipitation acres acres acres acres inches lbs. lbs. bs. bs. bs. lbs. percent ted BMP Typ cy) x P x (A ₁ drainage area acres	Vill remove the e will remove the propose area for the project on, inches pe. X 34.6 + A _P x 0.54) a in the BMP catchment a the BMP catchment	quations u Pages 3-27	ISEC IN 1 IS C 3-30 IT = 80% C IS C 3-30 IT = 80% C IS C 3-30 IS C 3-30	he sprea	
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where: 5. Calculate Fraction of 6. Calculate Capture Volume 6. Calculate Capture Volume 7. Total Capture Volume Total Capture Volume The following sections at The values for BMP Typ 7. Retention/Irrigation S	Removal efficiency = TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_C = A_L = A_C = A_P = L_R = A_C = A_L = A_P = L_R = A_L = A_L = A_R =	 89 by the select (BMP efficient Total On-Site Impervious area Pervious area TSS Load ren 0.69 0.59 0.10 601 tfall area 528 	ercent ted BMP Typ cy) x P x (A ₁ drainage area ea proposed i remaining in noved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchment in the BMP catchment the BMP catchment a	t area area	BMP		
where: 5. Calculate Fraction of 6. Calculate Capture Volume 6. Calculate Capture Volume 7. Total Capture Volume Total Capture Volume The following sections at The values for BMP Typ 7. Retention/Irrigation S	RG-348 Page 3-33 Equation 3.7: $L_R =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ $A_C =$ $A_C =$ $A_C =$ $A_R =$	 (BMP efficient) Total On-Site Impervious area Pervious area TSS Load ren 0.69 0.59 0.10 601 tfall area 528 	cy) x P x (A ₁ drainage area ea proposed i remaining in noved from the acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchment in the BMP catchment the BMP catchment a	t area area	BMP		Image: Constraint of the sector of the se
where: 5. Calculate Fraction of 6. Calculate Capture Volume 6. Calculate Capture Volume 7. Total Capture Volume Total Capture Volume The following sections at The values for BMP Typ 7. Retention/Irrigation S	RG-348 Page 3-33 Equation 3.7: $L_R =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ $A_C =$ $A_C =$ $A_C =$ $A_R =$	 (BMP efficient) Total On-Site Impervious area Pervious area TSS Load ren 0.69 0.59 0.10 601 tfall area 528 	cy) x P x (A ₁ drainage area ea proposed i remaining in noved from the acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchment in the BMP catchment the BMP catchment a	t area area	BMP		
5. Calculate Fraction of 6. Calculate Capture Vol 6. Calculate Capture Vol 7. Total Capture Vol 7. Retention/Irrigation S	$A_{C} = A_{I} = A_{P} = L_{R} = L_{R} = A_{P} = A_{P$	Total On-Site Impervious area Pervious area TSS Load ren 0.69 0.59 0.10 601 tfall area	drainage area ea proposed i remaining in noved from thi acres acres acres lbs	a in the BMP catchme in the BMP catchment the BMP catchment a	t area area	BMP		
5. Calculate Fraction of 6. Calculate Capture Vol 6. Calculate Capture Vol 7. Total Capture Vol 7. Retention/Irrigation S	$A_{I} = A_{P} = L_{R} = L_{R} = A_{C} = A_{I} = A_{P} = L_{R} = L_{R$	Impervious area Pervious area TSS Load ren 0.69 0.59 0.10 601 tfall area	ea proposed i remaining in noved from thi acres acres acres lbs	in the BMP catchment the BMP catchment a	t area area	BMP		
5. Calculate Capture Vo 5. Calculate Capture Vo Total Capture Vol The following sections a The values for BMP Typ 7. Retention/Irrigation S	A _P = L _R = A _C = A _I = A _P = L _R = Annual Runoff to Treat the drainage basin / out	Pervious area TSS Load ren 0.69 0.59 0.10 601 tfall area 528	acres acres acres lbs	the BMP catchment a	area	BMP		
5. Calculate Capture Vo 5. Calculate Capture Vo Total Capture Vol The following sections a The values for BMP Typ 7. Retention/Irrigation S	$L_R =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ Annual Runoff to Treat the drainage basin / out	TSS Load ren	acres acres acres lbs			BMP		
5. Calculate Capture Vo 5. Calculate Capture Vo Total Capture Vol The following sections a The values for BMP Typ 7. Retention/Irrigation S	A _l = A _P = L _R = Annual Runoff to Treat the drainage basin / out	= 0.59 = 0.10 = 601 tfall area = 528	acres acres Ibs					
5. Calculate Capture Vo 5. Calculate Capture Vo Total Capture Vol The following sections a The values for BMP Typ 7. Retention/Irrigation S	A _l = A _P = L _R = Annual Runoff to Treat the drainage basin / out	= 0.59 = 0.10 = 601 tfall area = 528	acres acres Ibs					
5. Calculate Capture Vo 5. Calculate Capture Vo Total Capture Vol The following sections a The values for BMP Typ 7. Retention/Irrigation S	A _P = L _R = Annual Runoff to Treat the drainage basin / out	0.10 601 tfall area 528	lbs					
5. Calculate Capture Vo 5. Calculate Capture Vo Total Capture Vol The following sections a The values for BMP Typ 7. Retention/Irrigation S	Annual Runoff to Treat the drainage basin / out	tfall area 528						
5. Calculate Capture Vo 5. Calculate Capture Vo Total Capture Vol The following sections a The values for BMP Typ 7. Retention/Irrigation S		528						
Total Capture Volu The following sections a The values for BMP Typ 7. Retention/Irrigation S	F =	0.88	lbs.					
The following sections a The values for BMP Typ 7. Retention/Irrigation S	lume required by the BMP Type for this drainag	ge basin / out	fall area.	Calculations from RC	G-348	Pages 3	-34 to 3-36	
The following sections a The values for BMP Typ 7. Retention/Irrigation S								
The following sections a The values for BMP Typ 7. Retention/Irrigation S	Rainfall Depth = Post Development Runoff Coefficient =		inches					
The following sections a The values for BMP Typ 7. Retention/Irrigation S	On-site Water Quality Volume =		cubic feet	_				
The following sections a The values for BMP Typ 7. Retention/Irrigation S								
The following sections a The values for BMP Typ 7. Retention/Irrigation S		Calculations f	from RG-348	Pages 3-36 to 3-37				
The following sections a The values for BMP Typ 7. Retention/Irrigation S	Off-site area draining to BMP =		acres					
The following sections a The values for BMP Typ 7. Retention/Irrigation S	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =		acres					
The following sections a The values for BMP Typ 7. Retention/Irrigation S	Off-site Runoff Coefficient = Off-site Water Quality Volume =	0.00	cubic feet					
The following sections a The values for BMP Typ 7. Retention/Irrigation S								
The following sections a The values for BMP Typ 7. Retention/Irrigation S	= Storage for Sediment = ume (required water quality volume(s) x 1.20)		cubic feet					
7. Retention/Irrigation S	are used to calculate the required water quality	volume(s) fo		ed BMP.				
	es not selected in cell C45 will show NA. system	Designed as	Required in R	RG-348	Pages 3-42	to 3-46		
1	Required Water Quality Volume for retention basin =		cubic feet					
		INA			-			
Irrigation A	Area Calculations:							
	Soil infiltration/permeability rate = Irrigation area =		in/hr square feet	Enter determined p	permeability	rate or as	ssumed va	lue of 0.1
	inigation area =	NA NA	acres	-				
8. Extended Detention E	Basin System	Designed as	Required in R	RG-348	Pages 3-46	to 3-51		
Required V	/ater Quality Volume for extended detention basin =	NA	cubic feet					
9. Filter area for Sand F	ilters	Designed as	Required in R	RG-348	Pages 3-58	to 3-63		
9A. Full s	Sedimentation and Filtration System							
	Water Quality Volume for sedimentation basin =	NA	cubic feet					
	, Minimum filter basin area =		square feet	t				
	Maximum sedimentation basin area = Minimum sedimentation basin area =			t For minimum wate For maximum wate				
9B. Parti	al Sedimentation and Filtration System							
	Water Quality Volume for combined basins =	· NA	cubic feet					
			square feet	ł				
		NA			-			
	Minimum filter basin area =			t For minimum wate For maximum wate				
10. Bioretention System	Minimum filter basin area = Maximum sedimentation basin area =						1	

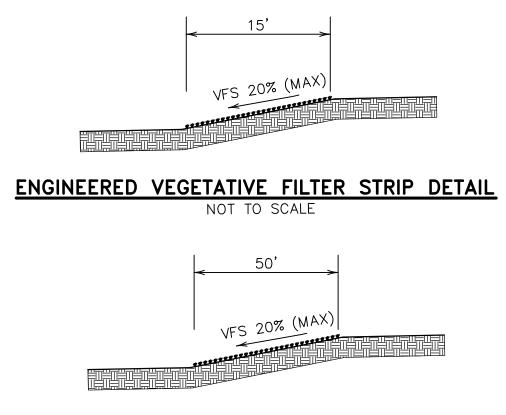
	E.G.T.C. ESMT FH OE PP R.O.W. SS SW TELE UE UT	EASEMEN FIRE HY OVERHE POWER RIGHT-U SANITAR SIDEWAL TELEPHU UNDERG	C, GAS, TELEPHONE, NT DRANT AD ELECTRIC POLE PF-WAY Y SEWER LINE K	CABLE	
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		Exact Lo Depth Facilities F Constructio	r to Verify ocation & of Exist Prior to any on Activities		
	48 HC	CON	TACT: DIG-TESS TO CONST		
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	nmission on Environmental Quality						
TSS Remov	al Calculations 04-20-2009			Project Name: Date Prepared:		amp Expansior	
Additional ir	formation is provided for cells with a red triang	le in the up	per right c	orner. Place the	cursor ove	er the cell.	
Fext shown ir	blue indicate location of instructions in the Technica shown in red are data entry fields.						
	shown in black (Bold) are calculated fields. Cha	anges to the	ese fields v	will remove the eq	quations u	sed in the sprea	dsheet.
. The Require	d Load Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 t	o 3-30	
	Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)					
where:		Required TSS	removal resu	Iting from the propose	d developmen	t = 80% of increased	load
	A _N =	Net increase i	n impervious	area for the project			
01		Average annua	al precipitation	n, Inches			
Site Data:	Determine Required Load Removal Based on the Entire Project County =	Comal	•				
	Total project area included in plan * = redevelopment impervious area within the limits of the plan * =	0.33	acres acres				
lotal po	st-development impervious area within the limits of the plan* = Total post-development impervious cover fraction * =	0.29	acres				
	P =	33	inches				
The values e	= L _{M TOTAL PROJECT} = ntered in these fields should be for the total project area		lbs.				
Nun	nber of drainage basins / outfalls areas leaving the plan area =	1					
. Drainage Ba	sin Parameters (This information should be provided for	each basin):					
	Drainage Basin/Outfall Area No. =	A-15					
	Total drainage basin/outfall area =	0.51	acres				
	velopment impervious area within drainage basin/outfall area = velopment impervious area within drainage basin/outfall area =	0.00	acres				
	opment impervious fraction within drainage basin/outfall area =	0.86	lbs.				
Indicate the	L _{M THIS BASIN} =	333					
5. Indicate the	proposed BMP Code for this basin.	Dioreter					
	Proposed BMP = Removal efficiency =		percent				
I. Calculate M	aximum TSS Load Removed (L _R) for this Drainage Basin	by the select	ed BMP Typ	<u>e.</u>			
	RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficience	y) x P x (A _l)	x 34.6 + A _P x 0.54)			
where:	A _C =	Total On-Site	drainage area	in the BMP catchme	nt area		
	A ₁ =	Impervious are	a proposed in	n the BMP catchment	area		
				the BMP catchment a s catchment area by t		3MP	
	A _C =	0.51	acres				
	A ₁ =	0.44	acres				
	A _P =	0.07					
	L _R =		acres Ibs				
5. Calculate Fr	L _R = action of Annual Runoff to Treat the drainage basin / out	448					
5. Calculate Fr		448					
5. Calculate Fr	action of Annual Runoff to Treat the drainage basin / out	448 fall area 395	lbs			Image: Constraint of the sector of	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} =	448 fall area 395 0.88	lbs	Calculations from RG	-348	Pages 3-34 to 3-36	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainag	448 fall area 395 0.88 je basin / outf	lbs lbs. all area.	Calculations from RG	-348	Pages 3-34 to 3-36	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient =	448 fall area 395 0.88 je basin / outf 1.50 0.70	lbs lbs. all area.	Calculations from RG	-348	Pages 3-34 to 3-36	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainag Rainfall Depth =	448 fall area 395 0.88 re basin / outf 1.50	lbs lbs. all area.	Calculations from RG	-348	Pages 3-34 to 3-36	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient =	448 fall area 395 0.88 1e basin / outf 1.50 0.70 1956	Ibs Ibs. all area. inches cubic feet	Calculations from RG	-348	Pages 3-34 to 3-36	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume =	448 <u>fall area</u> 395 0.88 <u>e basin / outf</u> 1.50 0.70 1956 Calculations fr 0.00	Ibs Ibs. all area. inches cubic feet om RG-348 acres		-348	Pages 3-34 to 3-36	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	448 <u>fall area</u> 395 0.88 <u>e basin / outf</u> 1.50 0.70 1956 <u>Calculations fr</u> 0.00 0.00 0	Ibs Ibs. all area. inches cubic feet om RG-348		-348	Pages 3-34 to 3-36	
	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	448 <u>fall area</u> 395 0.88 <u>e basin / outf</u> 1.50 0.70 1956 <u>Calculations fr</u> 0.00 0.00	Ibs Ibs. all area. inches cubic feet om RG-348 acres		-348	Pages 3-34 to 3-36	
5. Calculate Ca	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume =	448 fall area 395 0.88 te basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0.00 0 391	Ibs Ibs. Ibs. inches cubic feet cubic feet cubic feet		-348	Pages 3-34 to 3-36	
5. Calculate Ca	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality	448 fall area 395 0.88 te basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0.00 0 391 2348	Ibs Ibs. Ibs. all area. inches cubic feet cubic feet cubic feet	Pages 3-36 to 3-37	-348	Pages 3-34 to 3-36	
5. Calculate Ca 5. Calculate Ca Calculate Ca 5. Calculate Ca	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) =	448 fall area 395 0.88 te basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0.00 0 391 2348	Ibs Ibs. Ibs. Ibs. all area. inches cubic feet cubic feet cubic feet the selecter	Pages 3-36 to 3-37	-348 -348 Pages 3-42 t	Image: Constraint of the sector of	
5. Calculate Ca 5. Calculate Ca Calculate Ca 5. Calculate Ca	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality BMP Types not selected in cell C45 will show NA.	448 fall area 395 0.88 te basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0.00 0 391 2348 volume (s) for	Ibs Ibs. Ibs. Ibs. all area. inches cubic feet cubic feet cubic feet the selecter	Pages 3-36 to 3-37		Image: Constraint of the sector of	
5. Calculate Ca 5. Calculate Ca Total Ca The following The values for 7. Retention/Irr	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = upture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality BMP Types not selected in cell C45 will show NA. tigation System	448 fall area 395 0.88 e basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0.00 0 391 2348 volume(s) for Designed as F	Ibs Ibs. Ibs. inches cubic feet cubic feet cubic feet cubic feet the selecter Required in Ro	Pages 3-36 to 3-37		Image: Constraint of the sector of	
5. Calculate Ca 5. Calculate Ca 7. Total Ca 7. Retention/Irr	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality BMP Types not selected in cell C45 will show NA. igation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate =	448 fall area 395 0.88 e basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0.00 0 0 391 2348 volume(s) for Designed as F NA 0.1	Ibs Ibs. Ibs. Ibs. inches cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet	Pages 3-36 to 3-37	Pages 3-42 t	o 3-46	
5. Calculate Ca 5. Calculate Ca Total Ca The following The values for 7. Retention/Irr	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality BMP Types not selected in cell C45 will show NA. igation System Required Water Quality Volume for retention basin = Irrigation Area Calculations:	448 fall area 395 0.88 e basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0.00 0 391 2348 volume (s) for Designed as F NA	Ibs Ibs. Ibs. Ibs. inches cubic feet cubic feet cubic feet cubic feet the selecter Required in Ro cubic feet	Pages 3-36 to 3-37 d BMP. G-348	Pages 3-42 t	o 3-46	
5. Calculate Ca Total Ca The following The values for 7. Retention/Irr	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = upture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality BMP Types not selected in cell C45 will show NA. tigation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate = Irrigation area =	448 fall area 395 0.88 e basin / outf 1.50 0.70 1956 Calculations fr 0.00 0.00 0 0 0 391 2348 volume (s) for Designed as F NA 0.1 NA NA	Ibs Ibs. Ibs. Ibs. Ibs. inches cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet cubic feet	Pages 3-36 to 3-37 d BMP. G-348 Enter determined p	Pages 3-42 t ermeability	o 3-46	
5. Calculate Ca Total Ca The following The values for 7. Retention/Irr	action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = upture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Off-site Impervious fraction of off-site area a Off-site Runoff Coefficient = Off-site Runoff Coefficient = Off-site Water Quality Volume = Storage for Sediment = pture Volume (required water quality volume(s) x 1.20) = sections are used to calculate the required water quality BMP Types not selected in cell C45 will show NA. igation System Required Water Quality Volume for retention basin = Irrigation Area Calculations: Soil infiltration/permeability rate = Irrigation area a etention Basin System	448 fall area 395 0.88 e basin / outf 1.50 0.70 1956 Calculations fr 0.00 0 0 0 0 0 0 0 0 0 0 0 0	Ibs Ibs. Ibs. Ibs. Ibs. inches cubic feet cubic feet	Pages 3-36 to 3-37 d BMP. G-348 Enter determined p	Pages 3-42 t	o 3-46	
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58–0001–00 T Bar M – Camp Expansion\2 Design Phase\CAD\WPAP\17758–0001 T Bar M SWQ 4.3.24.dwg cj: April 17, 2024

	<u> </u>	ABBREVIATIONS		
	FH OE PP R.O.W. SS SW TELE UE UT WV D.R.C.C.	EASEMENT FIRE HYDRANT OVERHEAD POWER POWER POWER POWER POWER POWER POWER SANITARY SIDEWALK UNDERGROUND UNDERGROUND LICTRIC UNDERGROUND VATER VATER VATER VATER VATER OFFEN PORED PORED	E	
	48 HC	!!CAUTION!! Contractor to Verify Exact Location & Depth of Exist Facilities Prior to any Construction Activities Construction Activities CONTACT: 1-800-DIG-TESS DURS PRIOR TO CONSTRUCT	JCTION	
NO.	DATE	REVISIONS	AP	P.
	TCE CONS	FOR CHRISTIAN GROWT BAR M CAMP EXPANSION C ATTACHMENT STRUCTION PLAN	"F" NS —	
	BIOR	ETENTION (6 0	•	
	Texas Boar 4350 Lockhil	rd of Professional Engineers and Land Surveyors Reg. N II-Selma Road, Suite 100♦San Antonio, Texas 78249♦21		
DA JO	ALE: TE: B NO. <u>17</u> JBMITTED:	758-0001-00 DWG. NO	f: JS/CJ NONE QUIDDITY NGINEERING	
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133 Kelliov	val Calculations 04-20-2009
A	
	nformation is provided for cells w n blue indicate location of instructions
	shown in red are data entry fields
	shown in black (Bold) are calcula
1. The Require	ed Load Reduction for the total project:
	Page 3-29 I
where:	
Site Data [.]	Determine Required Load Removal Based
	Total project area ir
	redevelopment impervious area within the li
Total po	ost-development impervious area within the l Total post-development imperviou
The values of	entered in these fields should be for the
Nur	mber of drainage basins / outfalls areas leav
2. Drainage Ba	asin Parameters (This information shoul
	Drainage Basin/G
	Total drainage
	evelopment impervious area within drainage
	evelopment impervious area within drainage opment impervious fraction within drainage
3. Indicate the	proposed BMP Code for this basin.
3. Indicate the	
	R
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NATURAL VEGETATIVE FILTER STRIP DETAIL

Slope should not exceed 10%

The minimum dimension (in the direction of flow) should be 50 feet

Vegetative Filter Strip	Туре	TSS Removal Required (lbs)	Total TSS Removed (lbs)
B-1	50' Natural VFS	341	381
B-2	15' Engineered VFS	54	59
B-3	15' Engineered VFS	45	49
B-4	15' Engineered VFS	117	129
B-5	15' Engineered VFS	171	185
B-6	15' Engineered VFS	260	282
B-7	15' Engineered VFS	45	52
B-8	15' Engineered VFS	269	294
B-9	15' Engineered VFS	260	283
B-10	15' Engineered VFS	287	317
B-11	15' Engineered VFS	36	40
B-12	15' Engineered VFS	108	122
B-13	15' Engineered VFS	9	11
B-14	15' Engineered VFS	27	38
B-15	15' Engineered VFS	18	21
B-16	15' Engineered VFS	9	10
B-17	50' Natural VFS	99	115
B-18	15' Engineered VFS	404	438
B-19	15' Engineered VFS	27	32
B-20	15' Engineered VFS	54	60
B-21	15' Engineered VFS	9	10
B-22	15' Engineered VFS	18	21
B-23	15' Engineered VFS	27	30
B-24	15' Engineered VFS	90	99

TSS REMOVAL CALCULATIONS: B-1

					Texas Commission on Environmental Quality			
				T Bar M Camp Expansion	TSS Removal Calculations 04-20-2009	Proiect Name:	T Bar M Camp Expansion	
			Date Prepared:	4/11/2024		Date Prepared:		
he Technica	al Guidance	Manual - RG-3	48.	cursor over the cell.	Additional information is provided for cells with a red triang Text shown in blue indicate location of instructions in the Technica Characters shown in red are data entry fields.		cursor over the cell.	
fields. Cha	anges to th	iese fields will	remove the ed	quations used in the spreadsheet.	Characters shown in black (Bold) are calculated fields. Cha	anges to these fields will remove the e	quations used in the spreadsheet.	
	Calculations	from RG-348		Pages 3-27 to 3-30	1. The Required Load Reduction for the total project:	Calculations from RG-348	Pages 3-27 to 3-30	
ion 3.3: L _M =	27.2(A _N x P)				Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)		
	Required TS	S removal resulting	n from the propose	d development = 80% of increased load				
A _N =	Net increase	in impervious area	a for the project			Required TSS removal resulting from the propose Net increase in impervious area for the project	d development = 80% of increased load	
P =	Average ann	ual precipitation, in	nches			Average annual precipitation, inches		
Entire Projec County =		•			Site Data: Determine Required Load Removal Based on the Entire Project			
l in plan 🔭 =	28.96	acres			County = Total project area included in plan *=			
the plan * = the plan* =	8.39	acres acres			Predevelopment impervious area within the limits of the plan * = Total post-development impervious area within the limits of the plan* =	0.33 acres 8.39 acres		
fraction * = P =	0.29	inches			Total post-development impervious cover fraction * =	0.29		
					P =	33 inches		
_ PROJECT = oject area		lbs.			L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area	1		
plan area =	1				Number of drainage basins / outfalls areas leaving the plan area =	1	Image: second	
	each basin)	<u> </u>			2. Drainage Basin Parameters (This information should be provided for	each basin):		ABBREVIATIONS
Area No. =					Drainage Basin/Outfall Area No. =	B-2		E.G.T.C ELECTRIC, GAS, TELEPHONE, CABLE
outfall area = outfall area =		acres acres			Total drainage basin/outfall area =			ESMT EASEMENT FH FIRE HYDRANT
outfall area =	0.38	acres			Predevelopment impervious area within drainage basin/outfall area = Post-development impervious area within drainage basin/outfall area =	0.06 acres		OE OVERHEAD ELECTRIC PP POWER POLE
outfall area = м тніз вазім =		Ibs.			Post-development impervious fraction within drainage basin/outfall area =			R.O.W RIGHT-OF-WAY SS SANITARY SEWER LINE
								SW SIDEWALK TELE. TELEPHONE
sed BMP =	Vegetated F	-ilter Strips			3. Indicate the proposed BMP Code for this basin. Proposed BMP =	Vegetated Filter Strips		UE UNDERGROUND ELECTRIC UT UNDERGROUND TELEPHONE WY WATER VALVE
	85	percent			Removal efficiency =			D.R.C.C.T DEED RECORDS COMAL COUNTY TEXAS
age Basin	by the selec	ted BMP Type.			4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin	by the selected BMP Type.		0.P.R.C.C.T OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS
1 3.7: L _R =	(BMP efficier	ncy) x P x (A _I x 34	4.6 + A _P x 0.54)		RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficiency) x P x (A ₁ x 34.6 + A _P x 0.54)		!!CAUTION!! Contractor to Verify
-		•	the BMP catchme e BMP catchment			Total On-Site drainage area in the BMP catchme		Exact Location & Depth of Exist
			BMP catchment a			Impervious area proposed in the BMP catchment Pervious area remaining in the BMP catchment a		Facilities Prior to any Construction Activities
L _R =	TSS Load re	moved from this ca	atchment area by t	he proposed BMP		TSS Load removed from this catchment area by t		
A _C =	1.20	acres			A _C =	0.10 acres		CAUTION!!!
A ₁ =	0.38	acres			A ₁ =	0.06 acres		CONTACT: 1-800-DIG-TESS
A _P = L _R =		acres Ibs			A _P =			48 HOURS PRIOR TO CONSTRUCTION
basin / out	tfall area				5. Calculate Fraction of Annual Runoff to Treat the drainage basin / out	fall area	Image: constraint of the state of	
		lbs.						
THIS BASIN =	381	ius.			Desired L _{M THIS BASIN} =	59 Ibs.		NO. DATE REVISIONS
F =	1.00				F =	1.00		
his drainag	ge basin / ou	tfall area. Ca	lculations from RG	-348 Pages 3-34 to 3-36	6. Calculate Capture Volume required by the BMP Type for this drainage	ge basin / outfall area. Calculations from RG	G-348 Pages 3-34 to 3-36	CENTER FOR CHRISTIAN GROWTH, IN
nfall Depth = Coefficient =	4.00 0.27	inches			Rainfall Depth = Post Development Runoff Coefficient =			T BAR M CAMP EXPANSION TCEQ ATTACHMENT "F"
		cubic feet			On-site Water Quality Volume =			CONSTRUCTION PLANS -
								VEGETATIVE FILTER STRIP
y Volume =		from RG-348 Pa	ges 3-36 to 3-37			Calculations from RG-348 Pages 3-36 to 3-37		(1 OF 9)
y Volume =	Calculations				Off-site area draining to BMP =			
y Volume = g to BMP =	0.00	acres			Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0		
y Volume = g to BMP = g to BMP = f-site area =	0.00 0.00 0	acres acres			Off-site Runoff Coefficient = Off-site Water Quality Volume =			Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290 4350 Lockhill-Selma Road, Suite 100 ◆ San Antonio, Texas 78249 ◆ 210.494.5511
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ty Volume = ng to BMP = ng to BMP = f-site area = Coefficient = ty Volume =	0.00 0.00 0 0.00 0	acres			Storage for Sediment =	122		
ty Volume = ng to BMP = ng to BMP = ff-site area = Coefficient = ty Volume = Sediment =	0.00 0.00 0 0.00 0 929	acres			Storage for Sediment = Total Capture Volume (required water quality volume(s) x 1.20) =			DATE:APRIL 2024DWN. BY:JS/C
ity Volume = ng to BMP = ng to BMP = ff-site area = Coefficient = ity Volume = r Sediment =	0.00 0.00 0 0.00 0 929	acres		Image: A state of the				DATE:APRIL 2024 DWN. BY: JOB NO7758-0001-00 DWG. NO NONE
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ity Volume = ng to BMP = ng to BMP = off-site area = Coefficient = ity Volume = r Sediment =	0.00 0.00 0 0.00 0 929	acres		Image: second				DATE: APRIL 2024 DWN. BY: JS/0 JOB NO. 17758-0001-00 DWG. NO. NONE SUBMITTED: SURV. BY: ENGINEERING F.B. NO. NONE
ity Volume = ing to BMP = ing to BMP = off-site area = Coefficient = lity Volume = or Sediment =	0.00 0.00 0 0.00 0 929	acres		Image: second				DATE: <u>APRIL 2024</u> DWN. BY: <u>JS/0</u> JOB NO. <u>17758-0001-00</u> DWG. NO. <u>NONE</u> SUBMITTED: SURV. BY: <u>ENGINEERII</u> F.B. NO. <u>NONE</u>
ity Volume = ing to BMP = ing to BMP = off-site area = Coefficient = lity Volume = or Sediment =	0.00 0.00 0 0.00 0 929	acres						DATE: <u>APRIL 2024</u> JOB NO. <u>17758-0001-00</u> SUBMITTED: <u>QUIDDITY</u> SUBMITTED: <u>SURV. BY: ENGINEERIN</u> F.B. NO. <u>NONE</u>
ing to BMP = ing to BMP = off-site area = f Coefficient = lity Volume = or Sediment =	0.00 0.00 0 0.00 0 929	acres						DATE: <u>APRIL 2024</u> JOB NO. <u>17758-0001-00</u> SUBMITTED: <u>QUIDDITY</u> SUBMITTED: <u>SURV. BY: ENGINEERII</u> F.B. NO. <u>NONE</u> T.B. NO. <u>NONE</u> SUBMITTED: <u>SURV. BY: ENGINEERII</u> F.B. NO. <u>NONE</u>
ality Volume =	0.00 0.00 0 0.00 0 929	acres						DATE: <u>APRIL 2024</u> DWN. BY: <u>JS/</u> JOB NO. <u>17758-0001-00</u> DWG. NO. <u>NONE</u> SUBMITTED: SURV. BY: <u>QUIDDITY</u> F.B. NO. <u>NONE</u> F.B. NO. <u>NONE</u>

TSS REMOVAL CALCULATIONS: B-2

Texas Comm	nission on Environmental Quality						Texas C
TSS Removal (Calculations 04-20-2009			Project Name:	T Bar M Camp Expansi	ion	TSS Rem
				Date Prepared:	4/11/2024		
Additional info	rmation is provided for cells with a red triang	le in the uni) oer right c	orner Place the	cursor over the cell		Additiona
	ue indicate location of instructions in the Technica						Text show
Characters sho	own in red are data entry fields.						Character
Characters sho	own in black (Bold) are calculated fields. Cha			will remove the e	quations used in the sp	readsheet.	Characte
1. The Required L	oad Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 to 3-30		<u>1. The Requ</u>
	Page 3-29 Equation 3.3: L_M =	27.2(A _N x P)					
where:		Required TSS	removal resu	Iting from the propose	d development = 80% of increa	ised load	whe
	A _N =		n impervious	area for the project			
Site Data: Det	ermine Required Load Removal Based on the Entire Project	ct					Site Da
	County = Total project area included in plan * =		acres				
Prede	evelopment impervious area within the limits of the plan * =		acres				
Total post-d	levelopment impervious area within the limits of the plan * =		acres				Total
	Total post-development impervious cover fraction * = P =	0.29 33	inches				
	L _{M TOTAL PROJECT} =	7234	lbs.				
* The values ente	•red in these fields should be for the total project area		103.				* The value
Numbe	r of drainage basins / outfalls areas leaving the plan area =	1					
2 Drainage Basin	Parameters (This information should be provided for	each hasin):					2. Drainage
z. Drumage Dusin							<u>2. Dramage</u>
	Drainage Basin/Outfall Area No. =	B-3	2				
	Total drainage basin/outfall area =		acres				
	opment impervious area within drainage basin/outfall area =		acres				Pr
	ppment impervious area within drainage basin/outfall area = nent impervious fraction within drainage basin/outfall area =		acres				Post-de
	L _{M THIS} Basin =		lbs.				FOST-de
3. Indicate the pro	pposed BMP Code for this basin.						3. Indicate 1
	Proposed BMP =	Vegetated Fi	ter Strips				
	Removal efficiency =	85	percent				
<u>4. Calculate Maxi</u>	mum TSS Load Removed (L _R) for this Drainage Basin	by the selecte	ed BMP Typ	<u>e.</u>			4. Calculate
	RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficience	y)xPx(A _l :	x 34.6 + A _P x 0.54)			
where:	Δ_=	Total On-Site	drainage area	a in the BMP catchme	nt area		whe
intere.			-	n the BMP catchment			wite
			101 01	the BMP catchment a			-
				s catchment area by t			
	A	0.07					
	A _C = A _I =		acres				_
	A) - A _P =		acres				_
	L _R =		lbs				_
5. Calculate Fract	ion of Annual Runoff to Treat the drainage basin / out	fall area					5. Calculate
	Desired L _{M THIS BASIN} =	49	lbs.				
	F =	1.00	•				_
6. Calculate Captu	ure Volume required by the BMP Type for this drainad	e basin / outf	all area.	Calculations from RG	-348 Pages 3-34 to 3	-36	6. Calculate
	Rainfall Depth = Post Development Runoff Coefficient =	4.00 0.52	inches				
	On-site Water Quality Volume =		cubic feet				
		Calculations fr	om RG-348	Pages 3-36 to 3-37			
	Off-site area draining to BMP =	0.00	acres				—
	Off-site Impervious cover draining to BMP =	0.00	acres				
	Impervious fraction of off-site area =						
	Off-site Runoff Coefficient = Off-site Water Quality Volume =		cubic feet				—
Total Cantur	= Storage for Sediment re Volume (required water quality volume(s) x 1.20)		cubic feet				
Total Captul	re volume (required water quanty volume(s) x 1.20) =	030	CUDIC IEEL				Total

TSS REMOVAL CALCULATIONS: B-4

133 REIVIOVAL GALGULA	1003.	D-4			133 REIVIOVAL GALG	ULATIONS. D-3			
ommission on Environmental Quality			Texas Commission on Environmental Quality						
Oval Calculations 04-20-2009 Project Name: T Bar M Camp Expansion Date Prepared: 4/11/2024			TSS Removal Calcula	tions 04-20-2009	Project Name: TBar M Camp Expansion Date Prepared: 4/11/2024				
Il information is provided for cells with a red triangle in the upper right o		cursor over the ce	ell.		i is provided for cells with a red triangle in the upper right				
n in blue indicate location of instructions in the Technical Guidance Manual - R	6-348.				ate location of instructions in the Technical Guidance Manual -	RG-348.			
rs shown in red are data entry fields.		wetiene weed in fi			red are data entry fields.				
rs shown in black (Bold) are calculated fields. Changes to these fields	vill remove the e	quations used in tr	he spreadsheet.	Characters shown in	black (Bold) are calculated fields. Changes to these fields	s will remove the equations used in the spreadsheet.			
uired Load Reduction for the total project: Calculations from RG-348		Pages 3-27 to 3-30		1. The Required Load Red	uction for the total project: Calculations from RG-34	8 Pages 3-27 to 3-30			
					<u></u>				
Page 3-29 Equation 3.3: L _M = 27.2(A _N x P)					Page 3-29 Equation 3.3: L _M = 27.2(A _N x P)				
			C						
Pre: L _{M TOTAL PROJECT} = Required TSS removal rest A _N = Net increase in impervious		a development = 80% o	fincreased load	where:	A _N = Net increase in imperviou	esulting from the proposed development = 80% of increased load			
P = Average annual precipitatio					P = Average annual precipita				
ta: Determine Required Load Removal Based on the Entire Project County = Comal				Site Data: Determine R	equired Load Removal Based on the Entire Project				
Total project area included in plan * = 28.96 acres					County = Comal Total project area included in plan * = 28.96 acres				
Predevelopment impervious area within the limits of the plan * = 0.33 acres					nt impervious area within the limits of the plan * = 0.33 acres				
post-development impervious area within the limits of the plan* = 8.39 acres Total post-development impervious cover fraction * = 0.29					ant impervious area within the limits of the plan* = 8.39 acres al post-development impervious cover fraction * = 0.29				
P = 33 inches					P = 33 inches				
L _{M TOTAL PROJECT} = 7234 Ibs.					L _{M TOTAL PROJECT} = 7234 Ibs.				
es entered in these fields should be for the total project area.				* The values entered in th	ese fields should be for the total project area.				
Number of drainage basins / outfalls areas leaving the plan area = 1				Number of draina	age basins / outfalls areas leaving the plan area = 1				
Basin Parameters (This information should be provided for each basin):				2 Drainage Rasin Paramo	ters (This information should be provided for each basin):				
Bushr and the provided for each bushr.				Z. Dramage Dasin Parame					
Drainage Basin/Outfall Area No. = B-4					Drainage Basin/Outfall Area No. = B-5				
Total drainage basin/outfall area = 0.30 acres					Total drainage basin/outfall area = 0.24 acres				
edevelopment impervious area within drainage basin/outfall area = 0.00 acres				Predevelopment im	pervious area within drainage basin/outfall area = 0.00 acres				
development impervious area within drainage basin/outfall area = 0.13 acres					pervious area within drainage basin/outfall area = 0.19 acres				
Pelopment impervious fraction within drainage basin/outfall area = 0.43 L _{M THIS BASIN} = 117 lbs.				Post-development impe	rvious fraction within drainage basin/outfall area = 0.79 L _{M THIS BASIN} = 171 Ibs.				
					L _{M THIS BASIN} = 171 Ibs.				
he proposed BMP Code for this basin.				3. Indicate the proposed B	MP Code for this basin.				
Proposed BMP = Vegetated Filter Strips									
Removal efficiency = 85 percent					Proposed BMP = <mark>Vegetated Filter Strips</mark> Removal efficiency = 85 percent				
Maximum TSS Load Removed (L _R) for this Drainage Basin by the selected BMP Typ	<u>).</u>			4. Calculate Maximum TS	S Load Removed (L _R) for this Drainage Basin by the selected BMP T	уре.			
RG-348 Page 3-33 Equation 3.7: L _R = (BMP efficiency) x P x (A ₁	34.6 + A _P x 0.54)				RG-348 Page 3-33 Equation 3.7: L _R = (BMP efficiency) x P x (A	$A_{\rm x} \times 34.6 + A_{\rm p} \times 0.54$			
	and the second sec								
A _C = Total On-Site drainage are	in the BMP catchme	ent area		where:	A _C = Total On-Site drainage a	rea in the BMP catchment area			
A _I = Impervious area proposed					A _I = Impervious area propose	d in the BMP catchment area			
A_P = Pervious area remaining in					A _P = Pervious area remaining				
L _R = TSS Load removed from th	s catchment area by	the proposed BMP			L _R = TSS Load removed from	this catchment area by the proposed BMP			
A _C = 0.30 acres					A _C = 0.24 acres				
A _l = 0.13 acres					$A_{\rm C} = 0.24 \text{acres}$ $A_{\rm I} = 0.19 \text{acres}$				
$A_{\rm P} = 0.17 \text{acres}$					$A_{\rm P} = 0.05 \text{acres}$				
L _R = 129 Ibs					$L_{R} = 185$ Ibs				
Fraction of Annual Runoff to Treat the drainage basin / outfall area				5. Calculate Fraction of Ar	nual Runoff to Treat the drainage basin / outfall area				
Desired L _{M THIS BASIN} = 129 Ibs.					Desired L _{M THIS BASIN} = 185 Ibs.				
F = 1.00					F - - - - - - - - - -				
					F = 1.00				
Capture Volume required by the BMP Type for this drainage basin / outfall area.	Calculations from RC	G-348 Pages 3-	34 to 3-36	6. Calculate Capture Volur	ne required by the BMP Type for this drainage basin / outfall area.	Calculations from RG-348 Pages 3-34 to 3-36			
Rainfall Depth = 4.00 inches					Rainfall Depth = 4.00 inches				
Post Development Runoff Coefficient = 0.32					Post Development Runoff Coefficient = 0.61				
On-site Water Quality Volume = 1407 cubic feet					On-site Water Quality Volume = 2134 cubic fee				
Calculations from RG-348	Pages 3-36 to 3-37				Calculations from RG-34	8 Pages 3-36 to 3-37			
Off-site area draining to BMP = 0.00 acres					Officito prop designer to DMD -				
Off-site Impervious cover draining to BMP = 0.00 acres					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					Impervious fraction of off-site area = 0				
Off-site Runoff Coefficient = 0.00					Off-site Runoff Coefficient = 0.00				
Off-site Water Quality Volume = 0 oubic foot					Off-site Water Quality Volume = 0 cubic fee				
Off-site Water Quality Volume = 0 cubic feet									
Off-site Water Quality Volume = 0 cubic feet Storage for Sediment = 281					Storage for Sediment = 427				

TSS REMOVAL CALCULATIONS: B-5

ABBREVIATIONS	
E.G.T.C. ELECTRIC, GAS, TELEPHONE, CABLE ESMT EASEMENT FH FIRE HYDRANT OE OVERHEAD ELECTRIC PP POWER POLE R.O.W. RIGHT-OF-WAY SS SANITARY SEWER LINE SW SIDEWALK TELE. TELEPHONE UE UNDERGROUND ELECTRIC UT UNDERGROUND TELEPHONE WV WATER VALVE D.R.C.C.T. DEED RECORDS COMAL O.P.R.C.C.T. OFFICIAL PUBLIC RECORDS	
!!CAUTION!!Contractor to VerifyExact Location & Depth of ExistFacilities Prior to any Construction ActivitiesCONTACT: 1-800-DIG-TESS48 HOURS PRIOR TO CONSTRUCTION	
NO. DATE REVISIONS A	APP.
CENTER FOR CHRISTIAN GROWTH, INC	
T BAR M CAMP EXPANSION TCEQ ATTACHMENT "F" CONSTRUCTION PLANS – VEGETATIVE FILTER STRIPS (2 OF 9)	5
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290 4350 Lockhill-Selma Road, Suite 100•San Antonio, Texas 78249•210.494.5511	
SCALE:AS_SHOWNDGN. BY:JM	
DATE:APRIL 2024DWN. BY:JS/CJ	
JOB NO. <u>17758-0001-00</u> DWG. NO. <u>NONE</u> QUIDDITY	
SUBMITTED: SURV. BY: ENGINEERING	<u>}</u>
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	al Calculations 04-20-2009			Date Prepared:		amp Expansion	Characters s Characters s
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	h blue indicate location of instructions in the Technica	I Guidance N	/lanual - Ro	G-348.			
	<mark>shown in red are data entry fields.</mark> shown in black (Bold) are calculated fields. Cha	ngos to the	co fielde i	will remove the e	nuctions u	ad in the enreadeheet	
maracters	shown in black (Bold) are calculated helds. Cha	inges to the	se lieius	will lemove the e	quations u:	seu in me spreausneet.	
. The Require	ed Load Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 to	0 3-30	where:
	Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)					
where:		Required TSS	removal resu	Iting from the propose	d development	= 80% of increased load	Site Data: D
where.				area for the project	a actorophicin		
		Average annua					Pre
							Total pos
Site Data:	Determine Required Load Removal Based on the Entire Project County =						
	Total project area included in plan * =	28.96	acres				
	redevelopment impervious area within the limits of the plan * =		acres				
Total po	st-development impervious area within the limits of the plan* = Total post-development impervious cover fraction * =	8.39 0.29	acres				
	P =	33	inches				* The values er
	L _{M TOTAL PROJECT} =	7234	lbs.				Num
The values e	entered in these fields should be for the total project area						
							2. Drainage Bas
Nur	nber of drainage basins / outfalls areas leaving the plan area =	1					
Drainage D	poin Daramotore (This information should be previded for	ageh hasin)					
<u>. Drainage Ba</u>	asin Parameters (This information should be provided for	each pasin):					Predeve
	Drainage Basin/Outfall Area No. =	B-6					Predeve Post-deve
	Total drainage beein/outfall area -	0.35	0.0100				Post-develop
Prede	= Total drainage basin/outfall area = velopment impervious area within drainage basin/outfall area		acres				
Post-de	velopment impervious area within drainage basin/outfall area =	0.29	acres				
Post-devel	opment impervious fraction within drainage basin/outfall area =		11				3. Indicate the p
	L _M This basin =	260	lbs.				
. Indicate the	proposed BMP Code for this basin.						
8. Indicate the	proposed BMP Code for this basin.						
. Indicate the	Proposed BMP =						4. Calculate Ma
. Indicate the			ter Strips percent			Image: Constraint of the sector of	<u>4. Calculate Ma</u>
	Proposed BMP =	85	percent	<u>e.</u>		Image: Constraint of the sector of	4. Calculate Ma
	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin	85 by the selecte	percent				4. Calculate Ma
	Proposed BMP = Removal efficiency =	85 by the selecte	percent			Image: Constraint of the sector of	
. Calculate M	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R =	85 by the selecte (BMP efficienc	percent ed BMP Typ y) x P x (A _l	x 34.6 + A _P x 0.54)	nt area	Image: Constraint of the sector of	
	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C =	85 by the selecte (BMP efficienc Total On-Site of	percent ad BMP Typ y) x P x (A ₁ drainage area	x 34.6 + A _P x 0.54) a in the BMP catchme		Image: Constraint of the sector of	
. Calculate M	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _I =	85 by the selecter (BMP efficience Total On-Site of Impervious are	percent ad BMP Typ y) x P x (A _I drainage area a proposed i	x 34.6 + A _P x 0.54)	area	Image: Constraint of the sector of	
. Calculate M	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _L = A _P =	85 by the selecter (BMP efficience Total On-Site of Impervious area	percent ad BMP Typ y) x P x (A ₁ drainage area a proposed i remaining in	x 34.6 + A _P x 0.54) a in the BMP catchme n the BMP catchment	area irea	Image: Sector	
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. Calculate M	$\label{eq:response} \begin{array}{l} \mbox{Proposed BMP} = \\ \mbox{Removal efficiency} = \end{array} \\ \hline \mbox{aximum TSS Load Removed (L_R) for this Drainage Basin} \\ \mbox{RG-348 Page 3-33 Equation 3.7: } L_R = \\ \mbox{A_C} = \\ \mbox{A_C} = \\ \mbox{A_P} = \\ \mbox{L_R} = \\ \mbox{A_C} = \end{array} \\ \end{array}$	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.35	percent ad BMP Typ y) x P x (A _I drainage area a proposed i remaining in oved from th acres	x 34.6 + A _P x 0.54) a in the BMP catchme n the BMP catchment the BMP catchment a	area irea	Image: Section of the section of t	
. Calculate M	$\begin{array}{l} \mbox{Proposed BMP} = \\ \mbox{Removal efficiency} = \\ \mbox{aximum TSS Load Removed (L_R) for this Drainage Basin} \\ \mbox{RG-348 Page 3-33 Equation 3.7: } L_R = \\ \mbox{A_C} = \\ \mbox{A_L} = \\ $	85 by the selecter (BMP efficience Total On-Site of Impervious area Pervious area TSS Load rem 0.35 0.29	percent ad BMP Typ y) x P x (A ₁ drainage area a proposed i remaining in oved from th acres acres	x 34.6 + A _P x 0.54) a in the BMP catchme n the BMP catchment the BMP catchment a	area irea	Image:	
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. Calculate M	$\begin{array}{l} \mbox{Proposed BMP} = \\ \mbox{Removal efficiency} = \\ \mbox{aximum TSS Load Removed (L_R) for this Drainage Basin} \\ \mbox{RG-348 Page 3-33 Equation 3.7: } L_R = \\ \mbox{A_C} = \\ \mbox{A_L} = \\ $	85 by the selecter (BMP efficience Total On-Site of Impervious area Pervious area TSS Load rem 0.35 0.29 0.06	percent ad BMP Typ y) x P x (A ₁ drainage area a proposed i remaining in oved from th acres acres	x 34.6 + A _P x 0.54) a in the BMP catchme n the BMP catchment the BMP catchment a	area irea	Image: Section of the sectio	
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• Calculate M where:	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = A_C = A_C = A_R =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.35 0.29 0.06 282	percent ad BMP Typ y) x P x (A ₁ drainage area a proposed i remaining in oved from th acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchme n the BMP catchment the BMP catchment a	area irea	Image: Section of the sectio	
. Calculate M where:	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = L_R =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.35 0.29 0.06 282	percent ad BMP Typ y) x P x (A ₁ drainage area a proposed i remaining in oved from th acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchme n the BMP catchment the BMP catchment a	area irea	Image: Constraint of the sector of	
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4. Calculate M where:	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_I = A_P = L_R = A_C = A_I = A_R = A_R = A_R = L_R = L_R = Taction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Impervious cover draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.35 0.29 0.06 282 fall area 282 1.00 ge basin / outfa 4.00 0.67 3380 Calculations fr 0.00 0.00 0.00	percent ad BMP Typ y) x P x (A ₁ drainage area a proposed i remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet om RG-348 acres	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a is catchment area by t Calculations from RG	area Irea he proposed E	Image: select	Image: state in the state
b. Calculate M where: b. Calculate Fr b. Calculate Calcu	Proposed BMP = Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_I =$ $A_C =$ $A_I =$ $A_R =$ $L_R =$ $A_C =$ $A_I =$ $A_R =$ $L_R =$ $A_R =$ $L_R =$ Taction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.35 0.29 0.06 282 fall area 282 1.00 je basin / outfing 4.00 0.67 3380 Calculations fr 0.00 0 0 0 0	percent a BMP Typ y) x P x (A ₁ drainage area a proposed i remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet om RG-348 acres	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a is catchment area by t Calculations from RG	area Irea he proposed E	Image: select	Image: state in the state

TSS REMOVAL CALCULATIONS: B-7

Texas Commission on Environmental Quality hown in red are data entry fields. hown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet. TSS Removal Calculations 04-20-2009 Calculations from RG-348 Pages 3-27 to 3-30 d Load Reduction for the total project: Additional information is provided for cells with a red Page 3-29 Equation 3.3: L_M = 27.2(A_N x P) Text shown in blue indicate location of instructions in the T Characters shown in red are data entry fields. L_{M TOTAL PROJECT} = Required TSS removal resulting from the proposed development = 80% of increased load Characters shown in black (Bold) are calculated field A_N = Net increase in impervious area for the project 1. The Required Load Reduction for the total project: P = Average annual precipitation, inches Determine Required Load Removal Based on the Entire Project Page 3-29 Equation 3 County = Comal Total project area included in plan * = 28.96 acres where: LM TOTAL edevelopment impervious area within the limits of the plan * = 0.33 acres t-development impervious area within the limits of the plan* = 8.39 acres Total post-development impervious cover fraction * = 0.29 P = 33 inches Site Data: Determine Required Load Removal Based on the Ent Total project area included in L_{M TOTAL PROJECT} = **7234** lbs. Predevelopment impervious area within the limits of the ntered in these fields should be for the total project area. Total post-development impervious area within the limits of the Total post-development impervious cover fra ber of drainage basins / outfalls areas leaving the plan area = 1 LM TOTAL * The values entered in these fields should be for the total pro sin Parameters (This information should be provided for each basin): Number of drainage basins / outfalls areas leaving the pla Drainage Basin/Outfall Area No. = B-7 Total drainage basin/outfall area = 0.25 acres 2. Drainage Basin Parameters (This information should be prov elopment impervious area within drainage basin/outfall area = 0.00 acres elopment impervious area within drainage basin/outfall area = 0.05 acres Drainage Basin/Outfall Ar pment impervious fraction within drainage basin/outfall area = 0.20 L_{M THIS BASIN} = 45 Ibs. Total drainage basin/outf Predevelopment impervious area within drainage basin/outf proposed BMP Code for this basin. Post-development impervious area within drainage basin/outf Post-development impervious fraction within drainage basin/outf Proposed BMP = Vegetated Filter Strips L_{M TH} Removal efficiency = 85 percent 3. Indicate the proposed BMP Code for this basin. ximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type. Propose Removal effi RG-348 Page 3-33 Equation 3.7: $L_{R} = (BMP \text{ efficiency}) \times P \times (A_{I} \times 34.6 + A_{P} \times 0.54)$ 4. Calculate Maximum TSS Load Removed (L_R) for this Draina A_C = Total On-Site drainage area in the BMP catchment area RG-348 Page 3-33 Equation 3 A₁ = Impervious area proposed in the BMP catchment area A_P = Pervious area remaining in the BMP catchment area where: L_{R} = TSS Load removed from this catchment area by the proposed BMP A_c = 0.25 acres A₁ = 0.05 acres A_P = 0.20 acres L_R = **52** Ibs action of Annual Runoff to Treat the drainage basin / outfall area 5. Calculate Fraction of Annual Runoff to Treat the drainage ba Desired $L_{M THIS BASIN} = 52$ lbs. Desired L_{M THIS} F = 1.01 pture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36 6. Calculate Capture Volume required by the BMP Type for this Rainfall Depth = 4.00 inches Post Development Runoff Coefficient = 0.20 Rainfal On-site Water Quality Volume = 729 cubic feet Post Development Runoff Coeff On-site Water Quality Calculations from RG-348 Pages 3-36 to 3-37 Off-site area draining to BMP = 0.00 acres Off-site area draining t Off-site Impervious cover draining to BMP = 0.00 acres Off-site Impervious cover draining t Impervious fraction of off-site area = 0 Impervious fraction of off-sit Off-site Runoff Coefficient = 0.00 Off-site Runoff Coe Off-site Water Quality Volume = 0 cubic feet Off-site Water Quality Storage for Se Storage for Sediment = 146 ture Volume (required water quality volume(s) x 1.20) = 875 cubic feet Total Capture Volume (required water quality volume(s)

TSS REMOVAL CALCULATIONS: B-8

					amp Expansior	1
			Date Prepared:	4/11/2024		
d trianc	le in the up	oor right o	orner. Place the	cursor ove	ar the cell	
	al Guidance N			CUISULOVE		
lds. Cha	anges to the	se fields	will remove the ea	quations us	sed in the sprea	adsheet.
	0.1				2.02	
	Calculations fro	om RG-348		Pages 3-27 to	o 3-30	
33.1=	27.2(A _N x P)					
5.5. L _M -	21.2(AN X 1)					
PROJECT =	Required TSS	removal resu	Iting from the propose	d development	t = 80% of increase	d load
A _N =	Net increase in	impervious	area for the project			
P =	Average annua	l precipitatio	n, inches			
ntire Projec	nt .					
County =						
n plan *=		acres				
ne plan * = he plan* =		acres				
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vided for	each basin):					
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rea No. =	B-8					
K -11	0.54					
tfall area = tfall area =		acres acres				
tfall area =	0.30	acres				
tfall area =						
HIS BASIN =	269	lbs.				
	Vegetated Fi					
fficiency =	85	percent				
age Basin	by the selecte	d BMP Typ	e.			
3.7: L _P =	(BMP efficienc	y) x P x (A _l	x 34.6 + A _P x 0.54)			
1						
		rainage area	in the RMP catchmore	nt area		
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A _C = A _I = A _P =	Total On-Site o Impervious are Pervious area	a proposed i remaining in		area rea	3MP	
A _C = A _I = A _P =	Total On-Site o Impervious are Pervious area	a proposed i remaining in	n the BMP catchment the BMP catchment a	area rea	3MP	
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$A_{C} =$ $A_{I} =$ $A_{P} =$ $L_{R} =$ $A_{C} =$ $A_{I} =$	Total On-Site of Impervious area Pervious area TSS Load rem 0.51 0.30	a proposed i remaining in oved from th acres acres	n the BMP catchment the BMP catchment a	area rea	3MP	
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$A_{C} =$ $A_{I} =$ $A_{P} =$ $L_{R} =$ $A_{C} =$ $A_{I} =$ $A_{P} =$ $L_{R} =$	Total On-Site of Impervious area Pervious area TSS Load rem 0.51 0.30 0.21 294	a proposed i remaining in oved from th acres acres acres	n the BMP catchment the BMP catchment a	area rea	BMP	
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		ABBREVIA	TIONS		
	ESMT FH OE PP R.O.W. SS SW TELE UE UT D.R.C.C.	SIDEWALK TELEPHON UNDERGR UNDERGR WATER VA T DEED REG COUNTY C. T. OFFICIAL	T RANT O ELECTRIC OLE SEWER LINE SEWER LINE NE OUND ELECTRIC OUND TELEPHONE NLVE CORDS COMAL TEXAS	ABLE .	
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Texas Commission on Environmental Quality			Texas Commission on Environmental Quality					Texas Commission on Environmental Quality
TSS Removal Calculations 04-20-2009	Project Name Date Prepared	T Bar M Camp Expansion	TSS Removal Calculations 04-20-2009			Project Name: T Bar M Date Prepared: 4/11/202		TSS Removal Calculations 04-20-2009
Additional information is provided for cells with a red triangle in the up		cursor over the cell.	Additional information is provided for cells with a red triang				/er the cell.	Additional information is provided for cells with a
Text shown in blue indicate location of instructions in the Technical Guidance	Manual - RG-348.		Text shown in blue indicate location of instructions in the Technic	al Guidance	e Manual - R	G-348.		Text shown in blue indicate location of instructions in the
Characters shown in red are data entry fields.	C		Characters shown in red are data entry fields.		fielde			Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to the	ese fields will remove the e	equations used in the spreadsheet.	Characters shown in black (Bold) are calculated fields. Ch	anges to th	iese fields	will remove the equations	used in the spreadsheet.	Characters shown in black (Bold) are calculated f
1. The Required Load Reduction for the total project: Calculations f	from RG-348	Pages 3-27 to 3-30	1. The Required Load Reduction for the total project:	Calculations	from RG-348	Pages 3-27	to 3-30	1. The Required Load Reduction for the total project:
Page 3-29 Equation 3.3: L _M = 27.2(A _N x P)			Page 3-29 Equation 3.3: L _M	= 27.2(A _N x P))			Page 3-29 Equati
		ed development = 80% of increased load		-		ulting from the proposed developme	ent = 80% of increased load	where: L _{M TO}
	in impervious area for the project al precipitation, inches			= Net increase = Average ann	•	area for the project on, inches		
Site Data: Determine Required Load Removal Based on the Entire Project			Site Data: Determine Required Load Removal Based on the Entire Proje					Site Data: Determine Required Load Removal Based on the
County = Comal Total project area included in plan * = 28.96	acres		County = Total project area included in plan * =		acres			
Predevelopment impervious area within the limits of the plan * = 0.33	acres		Predevelopment impervious area within the limits of the plan *		acres			Total project area included Predevelopment impervious area within the limits of
Total post-development impervious area within the limits of the plan [*] = 8.39	acres		Total post-development impervious area within the limits of the plan*		acres			Total post-development impervious area within the limits of
Total post-development impervious cover fraction * = 0.29			Total post-development impervious cover fraction *	= 0.29				Total post-development impervious cover
P = 33	inches		P :	= 33	inches			
L _{M TOTAL PROJECT} = 7234	lbs.		L _{M TOTAL PROJECT}	= 7234	lbs.			L _{M TO}
* The values entered in these fields should be for the total project area.			* The values entered in these fields should be for the total project are	a.				* The values entered in these fields should be for the total
Number of drainage basins / outfalls areas leaving the plan area = 1			Number of drainage basins / outfalls areas leaving the plan area =	= 1				Number of drainage basins / outfalls areas leaving the
2. Drainage Basin Parameters (This information should be provided for each basin):			2. Drainage Basin Parameters (This information should be provided fo	r each basin)) <u>:</u>			2. Drainage Basin Parameters (This information should be r
Drainage Basin/Outfall Area No. = B-9	•		Drainage Basin/Outfall Area No. :	= B-10	•			Drainage Basin/Outfall
								Brankge Bashroudan
Total drainage basin/outfall area = 0.36	acres		Total drainage basin/outfall area	= 0.75	acres			Total drainage basin/o
Predevelopment impervious area within drainage basin/outfall area = 0.00	acres		Predevelopment impervious area within drainage basin/outfall area =		acres			Predevelopment impervious area within drainage basin/o
Post-development impervious area within drainage basin/outfall area = 0.29	acres		Post-development impervious area within drainage basin/outfall area		acres			Post-development impervious area within drainage basin/o
Post-development impervious fraction within drainage basin/outfall area = 0.81			Post-development impervious fraction within drainage basin/outfall area					Post-development impervious fraction within drainage basin/o
L _{M THIS BASIN} = 260	lbs.		L _M This basin ⁻	= 287	lbs.			L
3. Indicate the proposed BMP Code for this basin.			3. Indicate the proposed BMP Code for this basin.					3. Indicate the proposed BMP Code for this basin.
Proposed BMP = Vegetated F	ilter String		Proposed BMP :	- Vegetated F	Eilter String			
Removal efficiency = 85			Removal efficiency :		percent			Prop Remova
						-		
4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin by the select			4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basi					4. Calculate Maximum TSS Load Removed (L _R) for this Drai
RG-348 Page 3-33 Equation 3.7: L _R = (BMP efficien	cy) x P x (A ₁ x 34.6 + A _P x 0.54)		RG-348 Page 3-33 Equation 3.7: L _R =	= (BMP efficier	ncy) x P x (A _l	x 34.6 + A _P x 0.54)		RG-348 Page 3-33 Equation
where: A _C = Total On-Site	drainage area in the BMP catchme	ent area	where: A _C :	= Total On-Site	e drainage area	a in the BMP catchment area		where:
A _I = Impervious are	ea proposed in the BMP catchmen	t area	A _l :	= Impervious a	area proposed i	in the BMP catchment area		
A _P = Pervious area	remaining in the BMP catchment	area	A _P :	= Pervious area	a remaining in	the BMP catchment area		
· · · · · ·	noved from this catchment area by		· · ·			is catchment area by the proposed	I BMP	
A _C = 0.36	acres		Α _C :	= 0.75	acres			
A ₁ = 0.29	acres		Ar:		acres			
$A_{\rm I} = 0.29$ $A_{\rm P} = 0.07$					acres			
· · · · ·	acres		~1					
L _R = 283	lbs		L _R :	= 317	lbs			
E. Coloulate Excellence of Annual Durineff to Tract the shadow in the first H				utfoll - re-				
5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area			5. Calculate Fraction of Annual Runoff to Treat the drainage basin / ou					5. Calculate Fraction of Annual Runoff to Treat the drainage
Desired L _{M THIS BASIN} = 283	lbs.		Desired L _{M THIS BASIN}	= 317	lbs.			Desired L
F = 1.00			F:	= 1.00	•			
6. Calculate Capture Volume required by the BMP Type for this drainage basin / out	fall area. Calculations from R	G-348 Pages 3-34 to 3-36	6. Calculate Capture Volume required by the BMP Type for this draina	iqe basin / ou	ıtfall area.	Calculations from RG-348	Pages 3-34 to 3-36	6. Calculate Capture Volume required by the BMP Type for
	inches		Rainfall Depth :		inches			Rai
Post Development Runoff Coefficient = 0.63			Post Development Runoff Coefficient =					Post Development Runoff C
On-site Water Quality Volume = 3301	cubic feet		On-site Water Quality Volume =	= 3482	cubic feet			On-site Water Quali
Calculations f	from RG-348 Pages 3-36 to 3-37			Calculations	from RG-348	Pages 3-36 to 3-37		
	acres		Off-site area draining to BMP = Off-site Impervious cover draining to BMP =		acres			Off-site area drainir
Off-site Impervious cover draining to BMP = 0.00 Impervious fraction of off-site area = 0	acres		Impervious fraction of off-site area		acres			Off-site Impervious cover drainin Impervious fraction of of
Off-site Runoff Coefficient = 0.00	•		Off-site Runoff Coefficient =		•			Off-site Runoff
	cubic feet		Off-site Water Quality Volume =		cubic feet			Off-site Water Quali
Storage for Sediment = 660			Storage for Sediment =	= 696				Storage for
	cubic feet		Total Capture Volume (required water quality volume(s) x 1.20)		cubic feet			Total Capture Volume (required water quality volume

TSS REMOVAL CALCULATIONS: B-10

TSS REMOVAL CALCULATIONS: B-11

TSS Remov	al Calculations 04-20-2009
Text shown in Characters	nformation is provided for cells with a module indicate location of instructions in the shown in red are data entry fields. shown in black (Bold) are calculated fie
1. The Require	ed Load Reduction for the total project:
	Page 3-29 Equation
where:	L _{M TOTA}
Site Data:	Determine Required Load Removal Based on the E
	Total project area included redevelopment impervious area within the limits of t ist-development impervious area within the limits of Total post-development impervious cover
	L _{M TOTA}
* The values e	entered in these fields should be for the total p
Nur	nber of drainage basins / outfalls areas leaving the
2. Drainage Ba	asin Parameters (This information should be pr
	Drainage Basin/Outfall /
Post-de	Total drainage basin/ou evelopment impervious area within drainage basin/ou evelopment impervious area within drainage basin/ou opment impervious fraction within drainage basin/ou L _M
3. Indicate the	proposed BMP Code for this basin.
	Propos
	Removal
4. Calculate M	aximum TSS Load Removed (L _R) for this Drain RG-348 Page 3-33 Equatior
where:	
<u>5. Calculate Fi</u>	action of Annual Runoff to Treat the drainage
	Desired L _M
6. Calculate C	apture Volume required by the BMP Type for the
	Raint
	Post Development Runoff Co On-site Water Quality
	Off-site area draining Off-site Impervious cover draining Impervious fraction of off- Off-site Runoff C Off-site Water Quality
Tatel C	Storage for Storag
lotal Ca	pture Volume (required water quality volume(গ

			Project Name:			pansion	1					
			Date Prepared:	4/11/2024								
			orner. Place the	cursor ove	r the ce	ell.						
Technica	al Guidance N	/lanual - R(3-348.									
ds. Cha	anges to the	se fields v	will remove the e	quations u	sed in tl	he sprea	adsheet.					
	Colculations fr	DC 248		Deres 2.27 tr	2.20							
	Calculations fr	om RG-348		Pages 3-27 to	5 3-30							
3.3: L _M =	27.2(A _N x P)											
SPOJECT =	Required TSS	removal resu	Iting from the propose	d development	t = 80% o	fincrease	dload					
A _N =	Net increase in	n impervious	area for the project	u uovoiopine	- 00 /0 2	T Incroace -						
P =	Average annua	l precipitatio	n, inches									
ntire Projec												
County = in plan * =	28.96	acres										
he plan * = the plan* =	0.33	acres acres										
fraction * =	0.29					1						
P =	33	inches					_					
L PROJECT =	7234	lbs.										
roject area	1								l			
plan area =	1								–	ABBREVIATIO	<u>NS</u>	
Janaroa	•								<i>E.G.T.C</i> .	ELECTRIC, GAS, TEL	LEPHONE, CABLE	
l-l-d for	each basin):								ESMT _	EASEMENT FIRE HYDRANT		
									0E	OVERHEAD ELECTRI	Ċ	
Area No. =	B-11								R.O.W.	POWER POLE RIGHT-OF-WAY		
utfall area =		acres	-							SANITARY SEWER L SIDEWALK	INE	
utfall area = utfall area =	0.04	acres acres							TELE.		COTO/0	
utfall area =		lbs.							UT	UNDERGROUND TEL		
THIS BASIN =		103.								WATER VALVE DEED RECORDS CO COUNTY TEXAS	OMAL	
										T COUNTY TEXAS .T OFFICIAL PUBLIC R COMAL COUNTY TE.		
sed BMP = efficiency =	Vegetated Fil 85	ter Strips percent								CUMAL CUUIVII IL.	XAS'	
										!!CAUTION	,,,	
age Basin	by the selecte	ed BMP Typ	<u>e.</u>							Contractor to V	lerify	
n 3.7: L _R =	(BMP efficienc	y) x P x (A _l :	x 34.6 + A _P x 0.54)							Exact Location	n &	
A _c =	Total On-Site	trainade area	a in the BMP catchme	nt area						Depth of Exi Facilities Prior to		
A _I =	Impervious are	a proposed i	n the BMP catchment	area						Construction Act		
			the BMP catchment a									
L _R –	ISS LOau tem		is catchment area by t	he proposed L	3MF					CAUTION!		
$A_{\rm C} =$		acres								CONTACT: 1-800-DIG-T		
A _I = A _P =		acres acres	-						48 HO	URS PRIOR TO C		ION
L _R =		lbs										· -
basin / out	Hallarea											
Daonn ca.												
THIS BASIN =	40	lbs.	1									
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his dr <u>ainac</u>	ge basin / outfa	all are <u>a.</u>	Calculations from RG	3-348	Pages 3-	-34 to 3-36						
								C	ENTER I	FOR CHRISTIAN	GROWTH,	INC
fall Depth =		inches										
oefficient = y Volume =	0.27 479	cubic feet							т	BAR M CAMP EXP	ANSION	
										Q ATTACHM		- 99
	Calculations fr	om RG-348	Pages 3-36 to 3-37							TRUCTION		
g to BMP =	0.00	acres										
g to BMP =	0.00	acres							VEGEI	ATIVE FILTI		122
-site area = Coefficient =	0.00									(4 OF 9))	
y Volume =	0	cubic feet)			-
Sediment =			-							QUID	DITY	1
s) x 1.20) =	575	cubic feet							Texas Board	l of Professional Engineers and Land S Selma Road, Suite 100∙San Antonio,		
								DA ⁻ JOI			DGN. BY: DWN. BY: DWN. BY: DWN. BY: W. BY: ENGINE	JS/CJ E
									STATE OF	F.B.	NO. <u>NONE</u>	
								D	ARREN J.	MCAFEE	SH	ieet no. 11

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Texas Con	nmission on Environmental Quality							Texas Cor
TSS Remov	al Calculations 04-20-2009					amp Expansion		TSS Remov
				Date Prepared:	4/11/2024			
Additional in	nformation is provided for cells with a red triang	le in the un	ner right o	orner Place the		ar the cell		Additional
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1. The Require	d Load Reduction for the total project:	Calculations f	rom RG-348		Pages 3-27	:0 3-30		1. The Requir
	Page 3-29 Equation 3.3: L_{M} =	27.2(A _N x P)						
								-
where:				Iting from the propose	ed developmer	nt = 80% of increased	load	where
		Net increase i Average annua		area for the project				
	F -	Average annua						
Site Data:	Determine Required Load Removal Based on the Entire Proje							Site Data
	County = Total project area included in plan * =		acres					
P	redevelopment impervious area within the limits of the plan * =		acres					
	st-development impervious area within the limits of the plan* =	8.39	acres					Total p
	Total post-development impervious cover fraction * = P =		inches					
	P =	33	Inches					
	L _{M TOTAL PROJECT} =	7234	lbs.					
The values e	entered in these fields should be for the total project area							* The values
Nun	nber of drainage basins / outfalls areas leaving the plan area =	1						Nu
2. Drainage Ba	nsin Parameters (This information should be provided for	<u>each basin):</u>						2. Drainage B
	Drainage Basin/Outfall Area No. =	B-12						
Drado	= Total drainage basin/outfall area = velopment impervious area within drainage basin/outfall area		acres					Pred
	velopment impervious area within drainage basin/outial area = velopment impervious area within drainage basin/outfall area =		acres acres					Post-d
	opment impervious fraction within drainage basin/outfall area =							Post-deve
	L _{M THIS} BASIN =	108	lbs.					
Indicate the	proposed BMP Code for this basin.							3. Indicate the
b. mulcate the	proposed bing Code for this basin.							<u>e. maioato an</u>
	Proposed BMP =							
	Removal efficiency =	85	percent					
4. Calculate Ma	aximum TSS Load Removed (L _R) for this Drainage Basin	by the select	ed BMP Typ	e.				4. Calculate
		-						
	RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficience	cy) x P x (A _l	x 34.6 + A _P x 0.54)				
where:	Δ	Total On-Site	drainado ares	a in the BMP catchme	nt area			where
where.			-	n the BMP catchment				
			· · ·	the BMP catchment a				
				is catchment area by t		BMP		
	X			-				
	A _C =		acres					
	A ₁ =		acres					
	A _P =		acres					
	L _R =	122	lbs					
								5 Calanda (s. 1
5. Calculate Fr	<u>action of Annual Runoff to Treat the drainage basin / ou</u>	<u>tfall area</u>						5. Calculate F
	Desired L _{M THIS BASIN} =	122	lbs.					
	F =	1.00						
	where Waltime required by the DMD Time for this during			Colculations from PC	240	Dance 2 24 to 2 26		6. Calculate 0
0.0.1	apture Volume required by the BMP Type for this drainage	ge basin / outi	all area.	Calculations from RG	5-346	Pages 3-34 to 3-36		
6. Calculate Ca								
6. Calculate Ca								
6. Calculate Ca	Rainfall Depth =		inches					
6. Calculate Ca	Post Development Runoff Coefficient =	0.23	inches cubic feet					
6. Calculate Ca		0.23						
6. Calculate Ca	Post Development Runoff Coefficient =	0.23 1599	cubic feet	Dence 2 20 to 2 27				
6. Calculate Ca	Post Development Runoff Coefficient =	0.23 1599	cubic feet	Pages 3-36 to 3-37				
6. Calculate Ca	Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP =	0.23 1599 Calculations fr 0.00	cubic feet	Pages 3-36 to 3-37				
6. Calculate Ca	Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	0.23 1599 Calculations fr 0.00 0.00	cubic feet rom RG-348	Pages 3-36 to 3-37				
3. Calculate Ca	Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0.23 1599 Calculations fr 0.00 0.00 0	cubic feet rom RG-348 acres	Pages 3-36 to 3-37				
6. Calculate Ca	Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	0.23 1599 Calculations fi 0.00 0.00 0 0.00	cubic feet rom RG-348 acres	Pages 3-36 to 3-37				
6. Calculate Ca	Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Water Quality Volume =	0.23 1599 Calculations fi 0.00 0.00 0 0.00 0	cubic feet rom RG-348 acres acres	Pages 3-36 to 3-37				
3. Calculate Ca	Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	0.23 1599 Calculations fi 0.00 0.00 0 0.00 0	cubic feet rom RG-348 acres acres	Pages 3-36 to 3-37				Total Ca

TSS REMOVAL CALCULATIONS: B-13

Comr	mission on Environmental Quality							Texas Cor	nmission on Environmental Quality
	I Calculations 04-20-2009			Drois et Namer	TPorMC	amp Expansion			-
movai				Date Prepared:				TSS Remov	al Calculations 04-20-2009
	ormation is provided for cells with a red triang plue indicate location of instructions in the Technica				cursor ove	er the cell.			nformation is provided for cells with a red trian
	nown in red are data entry fields.		nanuar - r k	5-040.					n blue indicate location of instructions in the Technic shown in red are data entry fields.
	nown in black (Bold) are calculated fields. Cha	inges to the	se fields v	will remove the e	quations us	sed in the sprea	dsheet.		shown in black (Bold) are calculated fields. Ch
equired	Load Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 to	0 3-30		1. The Require	ed Load Reduction for the total project:
	Page 3-29 Equation 3.3: L_{M} =	27.2(A _N x P)							Page 3-29 Equation 3.3: L _M :
		Service 54 Million Control Service			5. 144 144 1				· • • • • • • • • • • • • • • • • •
where:				Iting from the propose	d development	t = 80% of increased	load	where:	LM TOTAL PROJECT
		Average annua		area for the project n. inches					A _N :
Data: D	etermine Required Load Removal Based on the Entire Project County =							Site Data:	Determine Required Load Removal Based on the Entire Proje
	Total project area included in plan *=	28.96	acres						Total project area included in plan
	development impervious area within the limits of the plan * = -development impervious area within the limits of the plan* =	0.33 8.39	acres acres						redevelopment impervious area within the limits of the plan * st-development impervious area within the limits of the plan*
	Total post-development impervious cover fraction * =	0.29							Total post-development impervious cover fraction *
	P =	33	inches						P
	L _M TOTAL PROJECT =	7234	lbs.						
luesen	tered in these fields should be for the total project area		100.					* The values of	L _{M TOTAL} PROJECT Entered in these fields should be for the total project are
Numb	er of drainage basins / outfalls areas leaving the plan area =	1						Nur	nber of drainage basins / outfalls areas leaving the plan area
ge Basi	in Parameters (This information should be provided for	each basin):						2 Drainago Br	asin Parameters (This information should be provided fo
								2. Dramage Ba	asin Parameters (This monitation should be provided to
	Drainage Basin/Outfall Area No. =	B-13							Drainage Basin/Outfall Area No.
	Total drainage basin/outfall area =	0.07	acres						Total drainage basin/outfall area
	lopment impervious area within drainage basin/outfall area = lopment impervious area within drainage basin/outfall area =	0.00 0.01	acres acres						velopment impervious area within drainage basin/outfall area velopment impervious area within drainage basin/outfall area
	ment impervious fraction within drainage basin/outfall area =	0.14	deres						opment impervious fraction within drainage basin/outian area
	L _{M THIS BASIN} =	9	lbs.						L _{M THIS BASIN}
te the p	roposed BMP Code for this basin.							3 Indicate the	proposed BMP Code for this basin.
								<u>v. maleute the</u>	
	Proposed BMP = Removal efficiency =		ter Strips percent						Proposed BMP Removal efficiency
	·								
ate Max	<u>kimum TSS Load Removed (L_R) for this Drainage Basin</u>	by the selecte	ed BMP Typ	<u>e.</u>				4. Calculate M	aximum TSS Load Removed (L _R) for this Drainage Basi
	RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficience	y) x P x (A _l x	x 34.6 + A _P x 0.54)					RG-348 Page 3-33 Equation 3.7: L _R :
		T () O O''							
vhere:	-			in the BMP catchme the BMP catchment				where:	
				the BMP catchment a					A _l : A _P :
	L _R =	TSS Load rem	oved from thi	s catchment area by t	he proposed E	BMP			L _R :
	A _C = A _I =	0.07	acres						
	Ap =	0.06	acres						A _l : A _P :
	L _R =	11	lbs						L _R :
ate Frac	ction of Annual Runoff to Treat the drainage basin / out	fall area						5. Calculate F	raction of Annual Runoff to Treat the drainage basin / oເ
	Desired L _{M THIS BASIN} =	11	lbs.						Desired L _{M THIS BASIN}
	F =	1.04							F
ate Cap	ture Volume required by the BMP Type for this drainag	e basin / outfa	all area.	Calculations from RG	-348	Pages 3-34 to 3-36		6. Calculate C	apture Volume required by the BMP Type for this draina
	Rainfall Depth =	4.00	inches						Rainfall Depth
	Post Development Runoff Coefficient =	0.16							Post Development Runoff Coefficient =
	On-site Water Quality Volume =	163	cubic feet						On-site Water Quality Volume
		Calculations fr	om RG-348	Pages 3-36 to 3-37					
	Off-site area draining to BMP =	0.00	acres						Off-site area draining to BMP
	Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0.00	acres						Off-site Impervious cover draining to BMP
	Off-site Runoff Coefficient =	0.00							Impervious fraction of off-site area Off-site Runoff Coefficient
					1				
	Off-site Water Quality Volume =	0	cubic feet						Off-site Water Quality Volume
	Off-site Water Quality Volume = Storage for Sediment =	0	cubic feet						Storage for Sediment

TSS REMOVAL CALCULATIONS: B-14

nission on Environmental Quality							
Calculations 04-20-2009			Project Name:		amp Ex	xpansion	
			Date Prepared:	4/11/2024			
motion is provided for calls with a set for	lo in the second	nor right	orner Direction		r éle er		
rmation is provided for cells with a red triang				cursor ove	r the c	ell.	
ue indicate location of instructions in the Technica own in red are data entry fields.	al Guidance i	vianuai - Ru	<i>э</i> -348.				
own in black (Bold) are calculated fields. Cha	anges to the	so fielde v	vill remove the ev	u ations u	end in t	the sprea	dsheet
own in black (Bold) are calculated fields. Ch	anges to the	se neius i		quations u	seu III	uie spiea	usneet.
oad Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 to	0 3-30		
Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)						
			Iting from the propose	d development	= 80%	ofincreased	load
			area for the project				
P =	Average annua	al precipitatio	n, inches				
ermine Required Load Removal Based on the Entire Proje	ct						
County =	1						
Total project area included in plan 🍾 =		acres					
evelopment impervious area within the limits of the plan $*$ =		acres					
evelopment impervious area within the limits of the plan* =		acres					
Total post-development impervious cover fraction * = P =		inches					
Г -							
L _{M TOTAL PROJECT} =	7234	lbs.					
ered in these fields should be for the total project area							
r of drainage basins / outfalls areas leaving the plan area =	1						
Parameters (This information should be provided for	each basin):						
· · ·							
Drainage Basin/Outfall Area No. =	B-14						
Total designade basis/sutfall serve	0.50	acros					
= Total drainage basin/outfall area = pment impervious area within drainage basin/outfall area		acres					
pment impervious area within drainage basin/outfall area =		acres					
ent impervious fraction within drainage basin/outfall area =							
L _{M THIS} BASIN =	27	lbs.					
pposed BMP Code for this basin.							
Proposed BMP =	Vegetated Fi	ter Strips					
Removal efficiency =		percent					
mum TSS Load Removed (L _R) for this Drainage Basin	by the selecte	ea Bivir Typ	<u>e.</u>				
RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficience	y) x P x (A ₁ ;	x 34.6 + A _P x 0.54)				
A _C =	Total On-Site	drainage area	a in the BMP catchme	nt area			
A _I =	Impervious are	a proposed i	n the BMP catchment	area			
A _P =	Pervious area	remaining in	the BMP catchment a	rea			
L _R =	TSS Load rem	oved from thi	s catchment area by t	he proposed E	BMP		
A _C =		acres					
A _I =		acres					
A _P =	0.56	acres					
L _R =	38	lbs					
ion of Annual Runoff to Treat the drainage basin / ou	tfall area	•					
Desired L _{M THIS BASIN} =	38	lbs.					
F =	1.01						
ure Volume required by the BMP Type for this draina	ne basin / outf	all area	Calculations from RG	-348	Pages 3	3-34 to 3-36	
and to the second se		an arva.					
Rainfall Depth =		inches					
Post Development Runoff Coefficient = On-site Water Quality Volume =	0.08	cubic feet					
Grisic Water Quality Volulie -	000	SUPIC ICCI					
	Calculations fr	om RG-348	Pages 3-36 to 3-37				
		0010-					
Off-site area draining to BMP = Off-site Impervious cover draining to BMP =		acres					
Impervious fraction of off-site area =		40100					
Off-site Runoff Coefficient =	0.00						
Off-site Water Quality Volume =		cubic feet					
Storage for Sediment = re Volume (required water quality volume(s) x 1.20) =		cubic feet					

	ESMT FH PP R.O.W. SS SW TELE UE UT MV D.R.C.C.	SIDEWALI TELEPHO UNDERGI	NT DRANT AD ELECTRIC POLE PF-WAY Y SEWER LINE K WE ROUND ELECTRIC ROUND TELEPHONE ALVE ECORDS COMAL TEXAS	Ά <i>ΒLΕ</i>
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	DARREN J	MCAFEE	n <i>Malle</i> 8/2024	

OF 17

ABBREVIATIONS

Page 3-29 Equation 3.3: L _M = 2 where: L _{M TOTAL PROJECT} = R A _N = N P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 area within the limits of the plan * = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Total drainage basin/Outfall Area No. = Total drainage basin/outfall area =	Guidance M nges to thes Calculations fro 27.2(A _N x P) Required TSS r Net increase in Average annual Com al 28.96 0.33 8.39 0.29 33 7234	emoval resultin	348. Il remove the equations Pages 3-2 ng from the proposed developm ea for the project	s used in the	e spreadsheet.	Text shown in blue ind Characters shown Characters shown I. The Required Load F where: Site Data: Determine Predevelop Total post-develop	ion is provided for cells with a red triangle dicate location of instructions in the Technical in red are data entry fields. in black (Bold) are calculated fields. Char Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 L _{M TOTAL PROJECT} = F A _N = 1	Guidance nges to th Calculations 1 7.2(A _N x P) Required TSS Net increase	per right corne Manual - RG-348 ese fields will re rom RG-348	3. emove the equations Pages 3-27 rom the proposed development or the project	ver the cell. used in the spreadsheet.	TSS Remo Additional Text shown Characters Characters 1. The Requi where Site Data Total p
Text shown in blue indicate location of instructions in the Technical Characters shown in red are data entry fields. Characters shown in black (Bold) are calculated fields. Chan 1. The Required Load Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 where: L _{M TOTAL PROJECT} = R A _N = N P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 * = P = L _{M TOTAL PROJECT} = * Total post-development impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =	Guidance M nges to thes Calculations fro 27.2(A _N x P) Required TSS r Net increase in Average annual Com al 28.96 0.33 8.39 0.29 33 7234 1 1 Pach basin):	emoval resultin impervious are precipitation, i acres acres acres inches	rner. Place the cursor of 348. Il remove the equations Pages 3-2	over the cell. s used in the 27 to 3-30	e spreadsheet.	Text shown in blue ind Characters shown Characters shown I. The Required Load F where: Site Data: Determine Predevelop Total post-develop	dicate location of instructions in the Technical in red are data entry fields. in black (Bold) are calculated fields. Char Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 L _{M TOTAL PROJECT} = F A _N = N P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P = A	Guidance ages to th Calculations 1 Calculations 1 Calculations 1 Calculations 1 Calculations 1 Calculations 1 Comal Comal 28.96 0.33 8.39 0.29 33	per right corne Manual - RG-348 ese fields will re rom RG-348 removal resulting fi in impervious area fi al precipitation, incl acres acres acres acres	er. Place the cursor of 3. emove the equations Pages 3-27 rom the proposed development or the project	ver the cell. used in the spreadsheet. 7 to 3-30	Text shown Characters Characters 1. The Require when Site Data
Text shown in blue indicate location of instructions in the Technical I Characters shown in red are data entry fields. Characters shown in black (Bold) are calculated fields. Chan 1. The Required Load Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 where: L _{M TOTAL PROJECT} = R A _N = N P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 area within the limits of the plan* = P = L _{M TOTAL PROJECT} = * * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =	Guidance M nges to thes Calculations fro 27.2(A _N x P) Required TSS r Net increase in Average annual Com al 28.96 0.33 8.39 0.29 33 7234 1 1 Pach basin):	emoval resultin impervious are precipitation, i acres acres acres inches	348. Il remove the equations Pages 3-2 ng from the proposed developm ea for the project	s used in the	e spreadsheet.	Text shown in blue ind Characters shown Characters shown I. The Required Load F where: Site Data: Determine Predevelop Total post-develop	dicate location of instructions in the Technical in red are data entry fields. in black (Bold) are calculated fields. Char Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 L _{M TOTAL PROJECT} = F A _N = N P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P = A	Guidance ages to th Calculations 1 Calculations 1 Calculations 1 Calculations 1 Calculations 1 Calculations 1 Comal Comal 28.96 0.33 8.39 0.29 33	Manual - RG-348 ese fields will re- rom RG-348 removal resulting fi in impervious area fi al precipitation, inch acres acres acres inches	3. emove the equations Pages 3-27 rom the proposed development or the project	used in the spreadsheet.	Text shown Character Character 1. The Requ when Site Dat
Characters shown in red are data entry fields. Characters shown in black (Bold) are calculated fields. Chan 1. The Required Load Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 where: L _{M TOTAL PROJECT} = R where: L _{M TOTAL PROJECT} = R Site Data: Determine Required Load Removal Based on the Entire Project 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 * = P = Total post-development impervious area within the limits of the plan * = P = Total post-development impervious area within the limits of the plan * = P = VM TOTAL PROJECT = * * The values entered in these fields should be for the total project area. P = Number of drainage basins / outfalls areas leaving the plan area = Image Basin/Outfall Area No. = Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =	Arges to these Calculations fro 27.2(A _N x P) Required TSS r Net increase in Average annual Com al 28.96 0.33 8.39 0.29 33 7234 1	se fields wil m RG-348 emoval resultin impervious are precipitation, i acres acres acres inches	Il remove the equations Pages 3-2 ng from the proposed developm ea for the project	27 to 3-30		Characters shown Characters shown 1. The Required Load F where: Site Data: Determine Predevelop Total post-develop	in red are data entry fields. in black (Bold) are calculated fields. Char Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 L _{M TOTAL PROJECT} = F A _N = N P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = Z	Arrow Comal 28.96 0.33 8.39 0.29 33	ese fields will re rom RG-348 Fremoval resulting fr in impervious area fr al precipitation, incl acres acres acres inches	emove the equations Pages 3-27 rom the proposed developme or the project	7 to 3-30	Character Character
Characters shown in black (Bold) are calculated fields. Chan 1. The Required Load Reduction for the total project: C Page 3-29 Equation 3.3: L _M = 2 where: L _{M TOTAL PROJECT} = R Mutrice A _N = N P = A Site Data: Determine Required Load Removal Based on the Entire Project County = Total project area included in plan * = Predevelopment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = Mutrotal project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Total drainage basin/outfall area =	Calculations fro Calculations fro 27.2(A _N x P) Required TSS r Net increase in Average annual Com al 28.96 0.33 8.39 0.29 33 7234 1	m RG-348 emoval resultin impervious are precipitation, i acres acres acres inches	Pages 3-2 ng from the proposed developm ea for the project	27 to 3-30		Characters shown	in black (Bold) are calculated fields. Char Reduction for the total project: Page 3-29 Equation 3.3: L _M = 2 L _{M TOTAL PROJECT} = F A _N = N P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = C	Comal 28.96 0.33 8.39 0.29 33	rom RG-348 removal resulting finin impervious area final precipitation, include acres acres acres acres inches	Pages 3-27 rom the proposed developme or the project	7 to 3-30	Character
1. The Required Load Reduction for the total project: C Page 3-29 Equation 3.3: L _M = 2 where: L _{M TOTAL PROJECT} = R Max = N P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 area within the limits of the plan * = P = Max = N P = Max = N P = Total post-development impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = Max = N Quart = N Where: Number of drainage basins / outfalls areas leaving the plan area = Quart = N Prainage Basin Parameters (This information should be provided for e Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =	Calculations fro Calculations fro 27.2(A _N x P) Required TSS r Net increase in Average annual Com al 28.96 0.33 8.39 0.29 33 7234 1	m RG-348 emoval resultin impervious are precipitation, i acres acres acres inches	Pages 3-2 ng from the proposed developm ea for the project	27 to 3-30		1. The Required Load F	Reduction for the total project: C Page 3-29 Equation 3.3: L _M = 2 L _{M TOTAL PROJECT} = F A _N = N P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = L L _{M TOTAL PROJECT} =	Comal 28.96 0.33 8.39 0.29 33	rom RG-348 removal resulting finin impervious area final precipitation, include acres acres acres acres inches	Pages 3-27 rom the proposed developme or the project	7 to 3-30	1. The Requ
Page 3-29 Equation 3.3: L _M = 2 where: L _{M TOTAL PROJECT} = R A _N = N P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 area within the limits of the plan * = P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Total drainage basin/Outfall Area No. = Total drainage basin/outfall area =	27.2(A _N x P) Required TSS r Net increase in Average annual Com al 28.96 0.33 8.39 0.29 33 7234 1	emoval resultin impervious are precipitation, i acres acres acres inches	ng from the proposed developm ea for the project		Image: Constraint of the sector of the se	Site Data: Determine Predevelop Total post-develop	Page 3-29 Equation 3.3: $L_M = 2$ $L_M TOTAL PROJECT = R$ $A_N = N$ P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = R	Comal 28.96 0.33 8.39 0.29 33	acres acres acres acres acres	rom the proposed developme or the project		whe Site Da
where: L _{M TOTAL PROJECT} = R A _N = N P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 area within the limits of the plan * = Total post-development impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for end Total drainage basin/Outfall Area No. = Total drainage basin/outfall area =	Required TSS r let increase in Average annual 28.96 0.33 8.39 0.29 33 7234 1	impervious are precipitation, i acres acres acres inches	ea for the project	nent = 80% of ir	ncreased load	Site Data: Determine Predevelop Total post-develop	L _{M TOTAL PROJECT} = F A _N = N P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P =	Required TSS Net increase Average annu 28.96 0.33 8.39 0.29 33	in impervious area fa al precipitation, incl acres acres acres inches	or the project	ent = 80% of increased load	Site Dat
where: L _{M TOTAL PROJECT} = R A _N = N P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 area within the limits of the plan * = Total post-development impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = Q Drainage Basin Parameters (This information should be provided for end Total drainage basin/Outfall Area No. = Total drainage basin/outfall area =	Required TSS r let increase in Average annual 28.96 0.33 8.39 0.29 33 7234 1	impervious are precipitation, i acres acres acres inches	ea for the project	nent = 80% of ir	ncreased load	Site Data: Determine Predevelop Total post-develop	L _{M TOTAL PROJECT} = F A _N = N P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P =	Required TSS Net increase Average annu 28.96 0.33 8.39 0.29 33	in impervious area fa al precipitation, incl acres acres acres inches	or the project	ent = 80% of increased load	Site Da
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P = A Site Data: Determine Required Load Removal Based on the Entire Project 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 * = P = Curroral Project area in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = Curroral Parameters (This information should be provided for e Curroral Project area in the plan area = Curroral Parameters (This information should be provided for e Curroral Parameters (This information should be provided for e Curroral Parameters (This information should be provided for e Curroral Parameters (This information should be provided for e Curroral Parameters (This information should be provided for e Curroral Parameters (This information should be provided for e Curroral Parameters (This information should be provided for e) Curroral Parameters (This information should be provided for e) Curroral Parameters (This information should be provided for e) Curroral Parameters (This information should be provided for e) Curroral Parameters (This information should be provided for e) Curroral Parameters (This information should be provided for e) Curroral Parameters (This information should be provided for e) Curroral Parameters (This information should be provided for e) Curroral Parameters (This provided for e) Cu	Com al 28.96 33 39 0.29 33 7234 1 1	precipitation, i acres acres acres inches				Predevelop Total post-develop	P = A e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P =	Comal 28.96 0.33 8.39 0.29 33	al precipitation, incl acres acres acres inches		Image: section of the sectio	
Site Data: Determine Required Load Removal Based on the Entire Project 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 * = P = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Total drainage basin/Outfall Area No. =	Com al 28.96 0.33 8.39 0.29 33 7234 1	acres acres acres inches	Incnes		Image: sector	Predevelop Total post-develop	e Required Load Removal Based on the Entire Project County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P =	Comal 28.96 0.33 8.39 0.29 33	acres acres acres inches	165	Image: sector	
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 area within the limits of the plan * = Total post-development impervious cover fraction * = P = * The values entered in these fields should be for the total project area. * The values entered in these fields should be for the total project area. * The values entered in these fields should be provided for e * The values entered in these fields areas leaving the plan area = * Drainage Basin Parameters (This information should be provided for e Total drainage basin/outfall area =	Com al 28.96 0.33 8.39 0.29 33 7234 1	acres acres acres acres				Predevelop Total post-develop	County = Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} =	28.96 0.33 8.39 0.29 33	acres acres inches		Image: select	
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 area within the limits of the plan * = Total post-development impervious area within the limits of the plan * = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Drainage Basin/Outfall Area No. =	28.96 0.33 8.39 0.29 33 7234 1 1 bach basin):	acres acres acres acres			Image: Constraint of the sector of	Total post-develop	Total project area included in plan * = ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} =	28.96 0.33 8.39 0.29 33	acres acres inches		Image: section of the section of t	Total
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 * = P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Total drainage basin/outfall area =	0.33 8.39 0.29 33 7234 1 1 bach basin):	acres acres acres acres				Total post-develop	ment impervious area within the limits of the plan * = oment impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} =	0.33 8.39 0.29 33	acres acres inches		Image: select	Total
Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =	0.29 33 7234 1 1 <u>ach basin):</u>	inches				Total post-develop	oment impervious area within the limits of the plan* = Total post-development impervious cover fraction * = P = L _{M TOTAL PROJECT} =	8.39 0.29 33	acres inches			Total
P = L _{M TOTAL PROJECT} = * The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e- Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =	33 7234 1 <u>ach basin):</u>						P =	33				
The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = <u>2. Drainage Basin Parameters (This information should be provided for empirication should </u>	7234 1 bach basin):	lbs.				* The values entered in	L _{M TOTAL PROJECT} =					
The values entered in these fields should be for the total project area. Number of drainage basins / outfalls areas leaving the plan area = <u>2. Drainage Basin Parameters (This information should be provided for empirication should </u>	1 Pach basin):	lbs.				* The values entered in		7234	lbs.			
Number of drainage basins / outfalls areas leaving the plan area = 2. Drainage Basin Parameters (This information should be provided for e- Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =						* The values entered in						
2. Drainage Basin Parameters (This information should be provided for e Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =							a areas notas should be for the total project died.					* The value
2. Drainage Basin Parameters (This information should be provided for e Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =												
Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =						Number of dra	ainage basins / outfalls areas leaving the plan area =	1				I
Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =												
Drainage Basin/Outfall Area No. = Total drainage basin/outfall area =								a ak b				2. Drainage
Total drainage basin/outfall area =	B-15					2. Drainage Basin Para	meters (This information should be provided for e	<u>ach basin):</u>				2. Drainage
							Drainage Basin/Outfall Area No. =	B-16	•			
	0.11	acres					Total drainage basin/outfall area =	0.04	acres			
Predevelopment impervious area within drainage basin/outfall area =		acres				Predevelopment	t impervious area within drainage basin/outfall area =	0.00	acres			Pre
Post-development impervious area within drainage basin/outfall area = Post-development impervious fraction within drainage basin/outfall area =	0.02 0.18	acres					t impervious area within drainage basin/outfall area =	0.01	acres			Post
L _{M THIS BASIN} =		lbs.				Post-development in	npervious fraction within drainage basin/outfall area = L _{M THIS BASIN} =	0.25 9	Ibs.			Post-de
							-M THIS BASIN -	3	105.			
3. Indicate the proposed BMP Code for this basin.						3. Indicate the propose	d BMP Code for this basin.					3. Indicate t
Proposed BMP = V							Proposed BMP =	/egetated F	ter Strips			
Removal efficiency =	85	percent					Removal efficiency =	85	percent			
4. Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin b	y the selected	d BMP Type.				4. Calculate Maximum	TSS Load Removed (L _R) for this Drainage Basin b	y the select	ed BMP Type.			4. Calculate
RG-348 Page 3-33 Equation 3.7: $L_R = (E_R)^2$	BMP efficiency	() x P x (A, x 3	$34.6 + A_{\rm D} \times 0.54$				RG-348 Page 3-33 Equation 3.7: L _R = (1 A × O E 4)		
							RG-346 Fage 3-35 Equation 3.7. L _R - (cy) x F x (A x 34.0	+ Ap X 0.34)		
· · · · · · · · · · · · · · · · · · ·		-	the BMP catchment area			where:	A _C = T	otal On-Site	drainage area in the	BMP catchment area		whe
· · · · · · · · · · · · · · · · · · ·			he BMP catchment area				•			BMP catchment area		
· · ·		-	e BMP catchment area catchment area by the propose	od RMP					-	MP catchment area		
	SS Load Territo						L _R =	SS Load rer	noved from this cate	hment area by the proposed	d BMP	
A _C =	0.11	acres					A _C =	0.04	acres			
A ₁ =	(01,000)	acres					A ₁ =	0.01	acres			
A _P =		acres					A _P =	0.03	acres			
L _R =	21	lbs					L _R =	10	lbs			
5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfa	ui area					5. Calculate Fraction of	f Annual Runoff to Treat the drainage basin / outfa	all area				5. Calculate
Desired L _{M THIS BASIN} =	21	lbs.					Desired L _{M THIS BASIN} =	10	Ibs.			
F =	1.01						F =	0.98				
6. Calculate Capture Volume required by the BMP Type for this drainage	<u>basin /</u> outfa	ll area. Ca	Calculations from RG-348	Pages 3-34	to 3-36	6. Calculate Capture Ve	olume required by the BMP Type for this drainage	basin / out	fall area	ulations from RG-348	Pages 3-34 to 3-36	6. Calculate
Rainfall Depth =	4.00	inches				—	Rainfall Depth =	3.33	inches			
Post Development Runoff Coefficient =	0.19						Raintail Deptn = Post Development Runoff Coefficient =	0.23				
On-site Water Quality Volume =	302	cubic feet					On-site Water Quality Volume =	112	cubic feet			
c	Calculations fro	m RG-348 Pa	ages 3-36 to 3-37					Calculations	rom RG-348 Page	es 3-36 to 3-37		
Off-site area draining to BMP =	0.00	acres										
Off-site Impervious cover draining to BMP =		acres					Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	0.00	acres acres			
Impervious fraction of off-site area =	0						Impervious fraction of off-site area =	0				
Off-site Runoff Coefficient = Off-site Water Quality Volume =	0.00	cubic feet					Off-site Runoff Coefficient =	0.00	oubic fact			
	v						Off-site Water Quality Volume =	0	cubic feet			
Storage for Sediment =	60						Storage for Sediment =	22				
Total Capture Volume (required water quality volume(s) x 1.20) =	362	cubic feet				Total Capture Vol	lume (required water quality volume(s) x 1.20) =	134	cubic feet			Total

TSS REMOVAL CALCULATIONS: B-16

TSS REMOVAL CALCULATIONS: B-17

JUNCHIUV	al Calculations 04-20-2009			Project Name:	T Bar MC	amn Ev	nansion	
				Date Prepared:			pansion	
				Dato Freparea				
dditional ir	formation is provided for cells with a red triang	le in the up	per right c	orner. Place the	cursor ove	er the ce	ell.	
ext shown ir	blue indicate location of instructions in the Technica	I Guidance N	Manual - RO	G-348.				
	shown in red are data entry fields.	10 000		1.000				
haracters s	shown in black (Bold) are calculated fields. Cha	inges to the	ese fields v	will remove the eq	quations u	sed in tl	ne sprea	dsheet.
The Density	d Lond Deduction for the total and a total	Calculations fr			Pages 3-27 t	o 2 20		
. The Require	d Load Reduction for the total project:		0111 KG-340		rayes 5-21 i	0 3-30		
	Page 3-29 Equation 3.3: L_{M} =	27.2(A _N x P)						
where:				Iting from the propose	d developmen	t = 80% o	fincreased	load
				area for the project				
	P =	Average annua	al precipitation	n, incnes				
Site Data:	Determine Required Load Removal Based on the Entire Project	t						
	County =							
P	Total project area included in plan * = redevelopment impervious area within the limits of the plan * =		acres acres					
	st-development impervious area within the limits of the plan* =		acres					
	Total post-development impervious cover fraction * =		inch					
	P =	33	inches					
	LM TOTAL PROJECT =	7234	lbs.					
The values of	→ M TOTAL PROJECT mtered in these fields should be for the total project area		100.					
mo values e	merea in aloss heldeshedd be for the total project ales							
Nun	nber of drainage basins / outfalls areas leaving the plan area =	1						
Drainage Ba	sin Parameters (This information should be provided for	each basin):						
	Drainage Basin/Outfall Area No. =	B-17	•					
Durada	Total drainage basin/outfall area =		acres					
	velopment impervious area within drainage basin/outfall area = velopment impervious area within drainage basin/outfall area =	0.00 0.11	acres					
Post-develo	oppment impervious fraction within drainage basin/outfall area =	0.16	00100					
	L _{M THIS} BASIN =	99	lbs.					
Indicate the	proposed BMP Code for this basin.							
	Proposed BMP =	Vegetated Fi	ter Strips					
	Proposed BMP = Removal efficiency =		ter Strips percent					
Calculate M	Removal efficiency =	85	percent					
. Calculate Ma		85	percent	<u>e.</u>				
. Calculate Ma	Removal efficiency =	85 by the selecte	percent					
	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R =	85 by the selecter (BMP efficience	percent ed BMP Type cy) x P x (A ₁ x	x 34.6 + A _P x 0.54)				
. Calculate Ma where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C =	85 by the selecter (BMP efficience Total On-Site of	percent ed BMP Type cy) x P x (A ₁ x drainage area	x 34.6 + A _P x 0.54) a in the BMP catchmen				
	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _I =	85 by the selecter (BMP efficience Total On-Site of Impervious are	percent ad BMP Type (y) x P x (A ₁ y drainage area a proposed in	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment	area			
	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		
	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment	area rea	BMP		
	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		
	$\label{eq:Removal efficiency} \end{tabular} = $$$ aximum TSS Load Removed (L_R) for this Drainage Basin $$$ RG-348 Page 3-33 Equation 3.7: $$ L_R = $$$$$$$$$ A_C = $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$	85 by the selecter (BMP efficience Total On-Site of Impervious area Pervious area TSS Load rem 0.68	percent ad BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in oved from thi	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		
	$\label{eq:Removal efficiency} \end{tabular} = $$$ aximum TSS Load Removed (L_R) for this Drainage Basin $$$ RG-348 Page 3-33 Equation 3.7: $$ L_R = $$$$$$$$ A_C = $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$	85 by the selecter (BMP efficience Total On-Site of Impervious area Pervious area TSS Load rem 0.68 0.11	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		Image: Constraint of the sector of
	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area Pervious area TSS Load rem 0.68 0.11	percent ad BMP Type (y) x P x (A ₁ x) drainage area a proposed in remaining in oved from thi acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		
	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area Pervious area TSS Load rem 0.68 0.11 0.57	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		Image: Constraint of the sector of
	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area Pervious area TSS Load rem 0.68 0.11 0.57	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		Image: Constraint of the sector of
where:	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		Image: Constraint of the sector of
where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _C = A _I = A _P = L _R = A _C = A _L =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115	percent ad BMP Typ (xy) x P x (A ₁ x) drainage area ta proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		Image: Constraint of the sector of
where:	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115	percent ad BMP Type by) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		Image: Constraint of the sector of the se
where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_P = A_R =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115	percent ad BMP Typ (xy) x P x (A ₁ x) drainage area ta proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP		Image: Constraint of the sector of the se
where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _C = A _I = A _P = L _R = A _C = A _L =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115	percent ad BMP Typ (xy) x P x (A ₁ x) drainage area ta proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea			Image: Constraint of the sector of
where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_P = A_R =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115 1.00	percent ed BMP Type cy) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea he proposed l		34 to 3-36	Image: Constraint of the sector of
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where:	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115 1.00	percent ed BMP Type cy) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a s catchment area by t	area rea he proposed l		34 to 3-36	Image: Constraint of the sector of
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where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_C = A_I = A_P = L _R = A_C = A_R = A_P = L _R = action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115 1.00 e basin / outfice 4.00 0.17	percent ad BMP Type by) x P x (A ₁ x) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs.	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a s catchment area by t	area rea he proposed l		34 to 3-36	Image: strain
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where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_C = A_I = A_C = A_I = A_C = A_I = A_C = A_I = A_P = L_R = action of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = appture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115 1.00 e basin / outfice 4.00 0.17	percent ad BMP Type by) x P x (A ₁ x) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs lbs. all area. inches cubic feet	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a s catchment area by t	area rea he proposed l		34 to 3-36	Image: state s
where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_R =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115 1.00 re basin / outfing 4.00 0.17 1725 Calculations fr	percent ad BMP Type by) x P x (A ₁ x) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. all area. inches cubic feet om RG-348	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a s catchment area by t	area rea he proposed l		34 to 3-36	
where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_I = A_P = L_R = A_C = A_P = L_R = action of Annual Runoff to Treat the drainage basin / out Desired L_M THIS BASIN = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP =	85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115 1.00 e basin / outf 4.00 0.17 1725 Calculations fr 0.00	percent ad BMP Type by) x P x (A ₁ x) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. all area. inches cubic feet om RG-348 acres	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a s catchment area by t	area rea he proposed l		34 to 3-36	Image <tr< td=""></tr<>
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where:	Removal efficiency = aximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_I = A_I = A_R =	85 by the selects (BMP efficience Total On-Site of Impervious area TSS Load rem 0.68 0.11 0.57 115 fall area 115 1.00 e basin / outfing 4.00 0.17 1725 Calculations fr 0.00 0.00	percent ad BMP Type by) x P x (A ₁ x) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. all area. inches cubic feet om RG-348 acres	x 34.6 + A _P x 0.54) a in the BMP catchment n the BMP catchment a s catchment area by t	area rea he proposed l		34 to 3-36	Image <tr< td=""></tr<>
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	-	ABBREVIA	TIONS	
	FH OE PP R.O.W. SS SS SW TELE. UE UT D.R.C.C.	EASEMEN, FIRE HYD OVERHEAL POWER PH RIGHT-OH SANITARY SIDEWALK TELEPHON UNDERGR UNDERGR WATER VA T. DEED RELO	T RANT O ELECTRIC OLE SEWER LINE SEWER LINE VE OUND ELECTRIC OUND TELEPHONE ILVE CORDS COMAL TEXAS	E
		<i>!!CAU</i> Contractor Exact Lo Depth of Facilities Pr Construction CAUTI CONT 1–800–D	to Verify cation & of Exist rior to any n Activities ON!!! ON!!! ACT: IG-TESS	
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SCAL		AS SHOWN	DGN. BY	: <u>DJM</u>
DATE		APRIL 2024		: JS/CJ
	NO. <u>17</u> /ITTED:	758-0001-00		
			SURV. BY: <u>EI</u> F.B. NO	
DA PRO	RREN J. 1378	MCAFEE	n <i>Malla</i> 8/2024	SHEET NO. 13 OF 17

	nmission on Environmental Quality							Texas Cor
TSS Remov	al Calculations 04-20-2009			Project Name: Date Prepared:		amp Ex	pansion	TSS Remov
	nformation is provided for cells with a red triang				cursor ove	r the ce	<u>اار ا</u>	Additional
Characters	n blue indicate location of instructions in the Technica shown in red are data entry fields. shown in black (Bold) are calculated fields. Cha				quations u	sed in t	he spreadsheet.	Text shown in Characters Characters
1. The Require	ed Load Reduction for the total project:	Calculations f	rom RG-348		Pages 3-27 to	o 3-30		<u>1. The Require</u>
	Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)						
where:	A _N =		in impervious	lting from the propose area for the project n, inches	d developmen	t = 80% c	f increased load	where:
Site Data:	Determine Required Load Removal Based on the Entire Project County =	Comal	•					Site Data:
P	Total project area included in plan * = redevelopment impervious area within the limits of the plan * =		acres acres					F
	st-development impervious area within the limits of the plan* =	8.39	acres					Total po
	Total post-development impervious cover fraction * =	0.29	inches					
			incirco					
	L _{M TOTAL PROJECT} =	7234	lbs.					
* The values of	entered in these fields should be for the total project area							* The values
Nur	nber of drainage basins / outfalls areas leaving the plan area =	1						Nu
2. Drainage Ba	asin Parameters (This information should be provided for	each basin):						<u>2. Drainage B</u>
	Drainage Basin/Outfall Area No. =	B-18	•					
	Total drainage basin/outfall area =	0.56	acres					
	velopment impervious area within drainage basin/outfall area =	0.00	acres					Prede
	evelopment impervious area within drainage basin/outfall area = opment impervious fraction within drainage basin/outfall area =	0.45	acres					Post-de Post-devel
1 001 00101	L _{M This Basin} =	404	lbs.					
3 Indicate the	proposed BMP Code for this basin.							3. Indicate the
J. mulcate the								5. Maicate the
	Proposed BMP = Removal efficiency =		percent					
			Protection of Marked Streets					
4. Calculate M	<u>aximum TSS Load Removed (L_R) for this Drainage Basin</u>	by the select	ed BMP Typ	<u>e.</u>				4. Calculate M
	RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficiend	cy) x P x (A _l	x 34.6 + A _P x 0.54)				
where		Tatal On Cita		in the DMD established	-			
where:	······································		-	a in the BMP catchme n the BMP catchment				where:
				the BMP catchment a				
		TSS Load rem	-					
				s catchment area by t	he proposed E	BMP		
				s catchment area by t	he proposed E	BMP		
		0.56	acres	s catchment area by t	he proposed E	3MP		
	A ₁ =	0.45	acres acres	s catchment area by t	he proposed E	3MP		
			acres	s catchment area by t	he proposed E	BMP		
	A _I = A _P =	<mark>0.45</mark> 0.11	acres acres acres	s catchment area by t	he proposed E	BMP		
	A _I = A _P =	<mark>0.45</mark> 0.11	acres acres acres	s catchment area by t	he proposed E	BMP	Image: select	
5. Calculate Fi	A _I = A _P =	0.45 0.11 438	acres acres acres	s catchment area by t	he proposed E	BMP		<u>5. Calculate F</u>
5. Calculate Fi	A _l = A _P = L _R =	0.45 0.11 438	acres acres acres	s catchment area by t	he proposed E	3MP	Image: select	<u>5. Calculate F</u>
5. Calculate Fi	A _I = A _P = L _R = raction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} =	0.45 0.11 438 fall area 438	acres acres acres lbs		he proposed E	3MP	Image: select	5. Calculate F
5. Calculate Fi	A _l = A _P = L _R =	0.45 0.11 438 fall area 438	acres acres acres lbs		he proposed E	3MP	Image: select	<u>5. Calculate F</u>
	A _I = A _P = L _R = raction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} =	0.45 0.11 438 <u>fall area</u> 438 1.00	acres acres acres lbs	Calculations from RG			 	
	A _I = A _P = L _R = Caction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F =	0.45 0.11 438 <u>fall area</u> 438 1.00	acres acres acres lbs					
	A _I = A _P = L _R = <u>raction of Annual Runoff to Treat the drainage basin / out</u> Desired L _{M THIS BASIN} = F = <u>apture Volume required by the BMP Type for this drainage</u> Rainfall Depth =	0.45 0.11 438 <u>fall area</u> 438 1.00 <u>te basin / outf</u>	acres acres acres lbs				34 to 3-36	
	A _I = A _P = L _R = <u>raction of Annual Runoff to Treat the drainage basin / out</u> Desired L _{M THIS BASIN} = F = <u>apture Volume required by the BMP Type for this drainage</u> Rainfall Depth = Post Development Runoff Coefficient =	0.45 0.11 438 fall area 438 1.00 te basin / outf 4.00 0.63	acres acres acres lbs lbs. fall area.					
	A _I = A _P = L _R = <u>raction of Annual Runoff to Treat the drainage basin / out</u> Desired L _{M THIS BASIN} = F = <u>apture Volume required by the BMP Type for this drainage</u> Rainfall Depth =	0.45 0.11 438 <u>fall area</u> 438 1.00 <u>te basin / outf</u>	acres acres acres lbs lbs.					
	A _I = A _P = L _R = <u>raction of Annual Runoff to Treat the drainage basin / out</u> Desired L _{M THIS BASIN} = F = <u>apture Volume required by the BMP Type for this drainage</u> Rainfall Depth = Post Development Runoff Coefficient =	0.45 0.11 438 fall area 438 1.00 te basin / outf 4.00 0.63 5113	acres acres acres lbs lbs. fall area. inches cubic feet	Calculations from RG				
	A _I = A _P = L _R = <u>raction of Annual Runoff to Treat the drainage basin / out</u> Desired L _{M THIS BASIN} = F = <u>apture Volume required by the BMP Type for this drainage</u> Rainfall Depth = Post Development Runoff Coefficient =	0.45 0.11 438 fall area 438 1.00 e basin / outf 4.00 0.63 5113 Calculations f	acres acres acres lbs lbs. fall area. inches cubic feet					
	A _i = A _P = L _R = raction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume =	0.45 0.11 438 fall area 438 1.00 e basin / outf 4.00 0.63 5113 Calculations f 0.00	acres acres acres lbs lbs. lbs. fall area. inches cubic feet rom RG-348 acres	Calculations from RG				
	A _i = A _P = L _R = <u>raction of Annual Runoff to Treat the drainage basin / out</u> Desired L _{M THIS BASIN} = F = <u>apture Volume required by the BMP Type for this drainag</u> Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	0.45 0.11 438 fall area 438 1.00 e basin / outf 4.00 0.63 5113 Calculations f	acres acres acres lbs lbs. fall area. inches cubic feet	Calculations from RG				
	A _I = A _P = L _R = raction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	0.45 0.11 438 fall area 438 1.00 e basin / outf 4.00 0.63 5113 Calculations f 0.00 0.00 0.00	acres acres acres lbs lbs. fall area. inches cubic feet rom RG-348 acres acres	Calculations from RG				
	A _i = A _P = L _R = raction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	0.45 0.11 438 fall area 438 1.00 e basin / outf 4.00 0.63 5113 Calculations f 0.00 0.00 0.00	acres acres acres lbs lbs. lbs. fall area. inches cubic feet rom RG-348 acres	Calculations from RG				
	A _I = A _P = L _R = raction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	0.45 0.11 438 fall area 438 1.00 e basin / outf 4.00 0.63 5113 Calculations f 0.00 0.00 0.00	acres acres acres lbs lbs. fall area. inches cubic feet rom RG-348 acres acres	Calculations from RG				<u>5. Calculate Francesco</u>

TSS REMOVAL CALCULATIONS: B-19

Com	mission on Environmental Quality							Texas Comr	mi
emova	al Calculations 04-20-2009			Project Name: Date Prepared:		amp Expansion		TSS Removal	10
				Date Prepared:	4/11/2024				
	formation is provided for cells with a red triang				cursor ove	er the cell.		Additional inf	or
wn in	blue indicate location of instructions in the Technica	I Guidance N	/lanual - RC	G-348.				Text shown in b	olu
ters s	hown in red are data entry fields.							Characters sh	no
ters s	hown in black (Bold) are calculated fields. Cha	inges to the	se fields v	vill remove the eq	quations u	sed in the sprea	dsheet.	Characters sh	no
equire	d Load Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 to	o 3-30		1. The Required	Lo
	Page 3-29 Equation 3.3: L_{M} =	27 2(AN X P)							
here:				Iting from the proposed	d developmen	t = 80% of increased	load	where:	
				area for the project					
	P =	Average annua		1, inches					
Data: [Determine Required Load Removal Based on the Entire Project	t						Site Data: D)ete
	County =								
De	Total project area included in plan * = edevelopment impervious area within the limits of the plan * =		acres						- diam
	t-development impervious area within the limits of the plan [*] =		acres acres					Pree Total post-	
	Total post-development impervious cover fraction * =	0.29							uc
	P =	33	inches						
		700.4	0.2						
	L _{M TOTAL PROJECT} =		lbs.						
lues ei	ntered in these fields should be for the total project area							* The values en	ter
Num	ber of drainage basins / outfalls areas leaving the plan area =	1						Numb	oor
num								Nullis	
ge Bas	sin Parameters (This information should be provided for	each basin):						2. Drainage Basi	in l
	Draina na Daain/Outfall Area Na	P 40							
	Drainage Basin/Outfall Area No. =	B-19							
	Total drainage basin/outfall area =	0.22	acres						
Predev	elopment impervious area within drainage basin/outfall area =	0.00	acres					Predeve	
	elopment impervious area within drainage basin/outfall area =	0.03	acres					Post-deve	
-develo	pment impervious fraction within drainage basin/outfall area =	0.14 27	lbs.					Post-develop	me
	L _M this basin =	21	IDS.						
te the	proposed BMP Code for this basin.							3. Indicate the p	ro
	Proposed BMP =	Vocatated Ei	tor Strine						
	Removal efficiency =		percent						
ate Ma	<u>ximum TSS Load Removed (L_R) for this Drainage Basin</u>	by the selecte	ed BMP Type	<u>ə.</u>				4. Calculate Max	cim
	RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficience	y) x P x (A _l >	(34.6 + A _P x 0.54)					
here:			-	in the BMP catchmer				where:	
				the BMP catchment					
			-	the BMP catchment a				_	
	L _R =	155 Load len		s catchment area by t	ne proposed i				
	A _C =	0.22	acres						
	A ₁ =	0.03	acres						
	A _P =		acres						
	L _R =		lbs						
ate Fra	action of Annual Runoff to Treat the drainage basin / out	fall area						5. Calculate Frac	ctic
	Desired		11						
	Desired L _{M THIS BASIN} =	32	lbs.						
	F =	1.00							
ate Ca	pture Volume required by the BMP Type for this drainag	le basin / outf	all area.	Calculations from RG	-348	Pages 3-34 to 3-36		6. Calculate Cap	otu
	Rainfall Depth =	4.00	inches						
	Post Development Runoff Coefficient = On-site Water Quality Volume =	0.16 497	cubic feet						
		Calculations f	om PC 349	Pages 2 26 to 2 27					
		Calculations fr		Pages 3-36 to 3-37					
	Off-site area draining to BMP =	0.00	acres						
	Off-site Impervious cover draining to BMP =	0.00	acres						
	Impervious fraction of off-site area = Off-site Runoff Coefficient =	0							
	Off-site Water Quality Volume =	0.00	cubic feet						
	Storage for Sediment =	99							
	ture Volume (required water quality volume(s) x 1.20) =	596	cubic feet					Total Capt	

TSS REMOVAL CALCULATIONS: B-20

TOOP	imission on Environmental Quality							
155 Remova	al Calculations 04-20-2009			Project Name:	T Bar M C	amp Ex	xpansion	
				Date Prepared:	4/11/2024			
	formation is provided for cells with a red triang				cursor ove	r the c	ell.	
	blue indicate location of instructions in the Technica	I Guidance	Manual - R	G-348.				
	hown in red are data entry fields.							
Characters s	shown in black (Bold) are calculated fields. Cha	anges to the	ese fields v	will remove the eq	quations us	sed in t	the sprea	dsheet.
The Desudant	d Lond Daduction for the total main to	Calculations fr	om BC 249		Doroc 2.07 tr	2 20		
. The Require	d Load Reduction for the total project:	Carculations in	OIII RG-346		Pages 3-27 to	0 3-30		
	Page 3-29 Equation 3.3: L _M =	27 2(A., x P)						
		27.2(A _N x T)						
where:	LM TOTAL PROJECT =	Required TSS	removal resu	Iting from the propose	d development	= 80%	ofincreased	load
				area for the project				
		Average annua						
Site Data:	Determine Required Load Removal Based on the Entire Project County =							
	Total project area included in plan * =		acres					
	edevelopment impervious area within the limits of the plan * =	0.33	acres					
Total pos	st-development impervious area within the limits of the plan * =		acres					
	Total post-development impervious cover fraction * =		inches					
	P =	33	inches					
		7004	lbc					
	LM TOTAL PROJECT =		Ibs.					
The values e	ntered in these fields should be for the total project area							
Num	ber of drainage basins / outfalls areas leaving the plan area =	1					_	
							_	
Drainage D-	sin Parameters (This information should be provided for	aach hasin)						
Блаппауе Ба	אויים מימוויפינפי קירוופ וווטרווומנוטרו אוטעום שפ פרטעום פס דסר	each Dashij:						
	Drainage Basin/Outfall Area No. =	B-20						
Dreader	Total drainage basin/outfall area =		acres					
	relopment impervious area within drainage basin/outfall area = relopment impervious area within drainage basin/outfall area =		acres					
	pment impervious fraction within drainage basin/outfall area =		46163					
	$L_{\rm M}$ This basis		lbs.					
3. Indicate the	proposed BMP Code for this basin.							
	Drence of DMD -	Manager and Tri	ten Otalian					
	Proposed BMP = Removal efficiency =		percent					
			porcont					
. Calculate Ma	ximum TSS Load Removed (L _R) for this Drainage Basin	by the select	ed BMP Typ	<u>e.</u>				
		(DMD		040.4				
	RG-348 Page 3-33 Equation 3.7: L_R =	(BMP efficience	cy) x P x (A _l	x 34.6 + A _P x 0.54)				
whore:	Δ	Total On Site	drainago aros	in the RMP estermo	at aroa			
where:			-	a in the BMP catchme				
where:	A _I =	Impervious are	a proposed i	n the BMP catchment	area			
where:	A _I = A _P =	Impervious area	ea proposed i remaining in	n the BMP catchment the BMP catchment a	area rea			
where:	A _I = A _P =	Impervious area	ea proposed i remaining in	n the BMP catchment	area rea	3MP		
where:	A _I = A _P = L _R =	Impervious area Pervious area TSS Load rem	ea proposed i remaining in loved from th	n the BMP catchment the BMP catchment a	area rea	BMP		
where:	A _I = A _P = L _R =	Impervious area Pervious area TSS Load rem 0.16	ea proposed i remaining in loved from th acres	n the BMP catchment the BMP catchment a	area rea	3MP		
where:	A ₁ = A _P = L _R = A _C = A ₁ =	Impervious area Pervious area TSS Load rem 0.16 0.06	ea proposed i remaining in loved from th acres acres	n the BMP catchment the BMP catchment a	area rea	BMP		
where:	A ₁ = A _P = L _R = A _C = A ₁ = A ₂ =	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10	ea proposed i remaining in oved from th acres acres acres	n the BMP catchment the BMP catchment a	area rea	3MP		
where:	A ₁ = A _P = L _R = A _C = A ₁ =	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10	ea proposed i remaining in loved from th acres acres	n the BMP catchment the BMP catchment a	area rea	3MP		
where:	A ₁ = A _P = L _R = A _C = A ₁ = A ₂ =	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10	ea proposed i remaining in oved from th acres acres acres	n the BMP catchment the BMP catchment a	area rea	3MP		
	A ₁ = A _P = L _R = A _C = A ₁ = A _P = L _R =	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60	ea proposed i remaining in oved from th acres acres acres	n the BMP catchment the BMP catchment a	area rea	3MP		
	A ₁ = A _P = L _R = A _C = A ₁ = A ₂ =	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60	ea proposed i remaining in oved from th acres acres acres	n the BMP catchment the BMP catchment a	area rea	BMP		- - - -
	A _l = A _P = L _R = A _C = A _I = A _P = L _R = L _R =	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60	a proposed i remaining in noved from th acres acres acres lbs	n the BMP catchment the BMP catchment a	area rea	3MP		- - - -
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	$\begin{array}{l} A_{l} = \\ A_{P} = \\ L_{R} = \\ \\ A_{C} = \\ \\ A_{l} = \\ \\ A_{P} = \\ \\ L_{R} = \\ \\ \end{array}$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60	a proposed i remaining in noved from th acres acres acres lbs	n the BMP catchment the BMP catchment a	area rea	3MP		- - - -
	A _l = A _P = L _R = A _C = A _I = A _P = L _R = L _R =	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60	a proposed i remaining in noved from th acres acres acres lbs	n the BMP catchment the BMP catchment a	area rea	3MP		- - - -
. Calculate Fra	$\begin{array}{l} A_{l} = \\ A_{P} = \\ L_{R} = \\ \\ A_{C} = \\ \\ A_{l} = \\ \\ A_{P} = \\ \\ L_{R} = \\ \\ \end{array}$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60	a proposed i remaining in noved from th acres acres acres lbs	n the BMP catchment the BMP catchment a	area rea he proposed E		-34 to 3-36	
. Calculate Fra	$A_{I} = A_{P} = L_{R} = L_{R} = A_{C} = A_{I} = A_{I} = A_{P} = L_{R} = A_{P} = L_{R} = L_{R$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60	a proposed i remaining in noved from th acres acres acres lbs	n the BMP catchment a the BMP catchment a is catchment area by t	area rea he proposed E		-34 to 3-36	- - - -
. Calculate Fra	$A_{I} = A_{P} = A_{P} = L_{R} = A_{C} = A_{C} = A_{I} = A_{P} = A_{I} = A_{P} = A_{P} = L_{R} = A_{R} = L_{R} = A_{R} = A_{R$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60 1.00 ge basin / outf	a proposed i remaining in noved from th acres acres acres lbs lbs.	n the BMP catchment a the BMP catchment a is catchment area by t	area rea he proposed E			- - - -
. Calculate Fra	$A_{I} = A_{P} = A_{P} = L_{R} = A_{C} = A_{C} = A_{C} = A_{I} = A_{P} = A_{P} = A_{P} = A_{P} = L_{R} = A_{R} = A_{R$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60 1.00 re basin / outf	a proposed i remaining in noved from th acres acres acres lbs	n the BMP catchment a the BMP catchment a is catchment area by t	area rea he proposed E			- - - -
5. Calculate Fra	$A_{I} = A_{P} = A_{P} = L_{R} = A_{C} = A_{C} = A_{I} = A_{P} = A_{I} = A_{P} = A_{P} = L_{R} = A_{R} = L_{R} = A_{R} = A_{R$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 <u>fall area</u> 60 <u>1.00</u> <u>te basin / outf</u> 4.00 0.29	a proposed i remaining in noved from th acres acres acres lbs lbs.	n the BMP catchment a the BMP catchment a is catchment area by t	area rea he proposed E		-34 to 3-36	Image: Constraint of the sector of
5. Calculate Fra	$A_{I} = A_{P} = A_{P} = L_{R} = A_{C} = A_{C} = A_{I} = A_{P} = A_{I} = A_{P} = A_{P} = A_{P} = A_{R} = A_{R$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 <u>fall area</u> 60 <u>1.00</u> <u>te basin / outf</u> 4.00 0.29	a proposed i remaining in noved from th acres acres acres lbs lbs.	n the BMP catchment a the BMP catchment a is catchment area by t	area rea he proposed E			Image: Constraint of the sector of
5. Calculate Fra	$A_{I} = A_{P} = A_{P} = L_{R} = A_{C} = A_{C} = A_{I} = A_{P} = A_{I} = A_{P} = A_{P} = A_{P} = A_{R} = A_{R$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 <u>ffall area</u> 60 <u>1.00</u> <u>te basin / outf</u> 4.00 0.29 685	a proposed i remaining in noved from th acres acres acres lbs lbs. all area. inches cubic feet	n the BMP catchment a is catchment area by t	area rea he proposed E			- - - -
5. Calculate Fra	$A_{I} = A_{P} = A_{P} = L_{R} = A_{C} = A_{C} = A_{I} = A_{P} = A_{I} = A_{P} = A_{P} = A_{P} = A_{R} = A_{R$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 <u>fall area</u> 60 <u>1.00</u> <u>te basin / outf</u> 4.00 0.29	a proposed i remaining in noved from th acres acres acres lbs lbs. all area. inches cubic feet	n the BMP catchment a the BMP catchment a is catchment area by t	area rea he proposed E			Image: Constraint of the sector of
5. Calculate Fra	$A_{l} = A_{P} = \\ L_{R} = \\ A_{C} = \\ A_{C} = \\ A_{I} = \\ A_{P} = \\ L_{R} = \\ L_{R} = \\ R = \\ R = \\ R = \\ Posired L_{M THIS BASIN} = \\ F = \\ Post Development Runoff Coefficient = \\ On-site Water Quality Volume = \\ On-site Water Quality Volume = \\ Post Development Runoff Coefficient = \\ On-site Water Quality Volume = \\ P $	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60 1.00 ge basin / outf 4.00 0.29 685 Calculations fr	a proposed i remaining in noved from th acres acres acres Ibs Ibs Ibs Ibs.	n the BMP catchment a is catchment area by t	area rea he proposed E			- - - -
5. Calculate Fra	$A_{I} =$ $A_{P} =$ $L_{R} =$ $A_{C} =$ $A_{I} =$ $A_{P} =$ $L_{R} =$ $L_{R} =$ $C_{I} = C_{I} = C_{I$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 fall area 60 1.00 ge basin / outf 4.00 0.29 685 Calculations fr	a proposed i remaining in noved from th acres acres acres lbs lbs. all area. inches cubic feet	n the BMP catchment a is catchment area by t	area rea he proposed E			Image: Constraint of the sector of
5. Calculate Fra	$A_{l} = A_{P} = \\ L_{R} = \\ A_{C} = \\ A_{C} = \\ A_{I} = \\ A_{P} = \\ L_{R} = \\ L_{R} = \\ R = \\ R = \\ R = \\ Posired L_{M THIS BASIN} = \\ F = \\ Post Development Runoff Coefficient = \\ On-site Water Quality Volume = \\ On-site Water Quality Volume = \\ Post Development Runoff Coefficient = \\ On-site Water Quality Volume = \\ P $	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 <u>ffall area</u> 60 <u>1.00</u> <u>tfall area</u> 60 <u>1.00</u> <u>tfall area</u> 60 <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>1.00</u> <u>0.29</u> <u>685</u> <u>Calculations fr</u> 0.00 0.00	a proposed i remaining in noved from th acres acres acres Ibs Ibs Ibs.	n the BMP catchment a is catchment area by t	area rea he proposed E			
5. Calculate Fra	$\begin{array}{l} A_{I} = \\ A_{P} = \\ L_{R} = \\ L_{R} = \\ A_{I} = \\ A_{P} = \\ A_{P} = \\ L_{R} = \\ L_{R} = \\ \begin{array}{l} action of Annual Runoff to Treat the drainage basin / out \\ Desired L_{MTHIS BASIN} = \\ L_{R} = \\ \end{array} \\ \begin{array}{l} F = \\ pture Volume required by the BMP Type for this drainage \\ \\ Rainfall Depth = \\ Post Development Runoff Coefficient = \\ On-site Water Quality Volume = \\ \end{array} \\ \begin{array}{l} Off\text{-site area draining to BMP =} \\ \\ Off\text{-site Impervious cover draining to BMP =} \\ \\ Impervious fraction of off-site area = \\ \\ Off\text{-site Runoff Coefficient =} \\ \end{array} \end{array}$	Impervious area Pervious area TSS Load rem 0.16 0.06 0.10 60 <u>ffall area</u> 60 1.00 <u>re basin / outf</u> 4.00 0.29 685 Calculations fr 0.00 0.00 0.00	a proposed i remaining in noved from th acres acres acres Ibs Ibs Ibs. Ibs. Ibs. Cubic feet cubic feet acres acres	n the BMP catchment a is catchment area by t	area rea he proposed E			Image: Constraint of the sector of
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		ABBREVIATIONS	
	ESMT FH PP R.O.W. SS SW TELE: UE UT MV D.R.C.C.	SANITARY SEWER LINE SIDEWALK TELEPHONE UNDERGROUND ELECTRIC UNDERGROUND TELEPHONE WATER DESCREDED COMM	
	48 HC	!!CAUTION!! Contractor to Verify Exact Location & Depth of Exist Facilities Prior to any Construction Activities CONTACT: 1-800-DIG-TESS DURS PRIOR TO CONSTRUCTI	ON
NO.	DATE	REVISIONS	APP.
С	ENTER	FOR CHRISTIAN GROWTH,	INC
,	TCE CONS	BAR M CAMP EXPANSION Q ATTACHMENT "F STRUCTION PLANS TATIVE FILTER STRI (7 OF 9)	—
	Texas Boar 4350 Lockhi	Record San Antonio, Texas 78249•210.494.5	
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	STATE OF	TEXAS Dan Malla 5/8/2024	

	ission on Environmental Quality								 Texas C
TSS Removal C	Calculations 04-20-2009			Project Name:		amp Ex	pansion		 TSS Rem
				Date Prepared:	4/11/2024				
Additional infor	mation is provided for cells with a red triang	le in the up	ber right c	orner. Place the	cursor ove	r the ce	ell.		 Additiona
	e indicate location of instructions in the Technica	I Guidance N	lanual - R	G-348.					 Text show
	own in red are data entry fields. own in black (Bold) are calculated fields. Cha	ngos to the	co fielde y	vill romovo the o	nuations u	od in t	a chroa	deboot	 Characte Characte
Characters sho	own in black (Bold) are calculated fields. Cha	inges to the	se heids v	will remove the e	quations us	sea in u	ie sprea	usneet.	 Unaracle
1. The Required Lo	oad Reduction for the total project:	Calculations fr	om RG-348		Pages 3-27 to	0 3-30			 1. The Req
	Page 3-29 Equation 3.3: L_{M} =	27.2(A _N x P)							
where:	L _{M TOTAL PROJECT} =	Required TSS	removal resu	Iting from the propose	d development	: = <mark>80% o</mark>	fincreased	load	 whe
				area for the project					
	P =	Average annua	l precipitatio	n, inches					
Site Data: Dete	ermine Required Load Removal Based on the Entire Project	:t							Site Da
	County = Total project area included in plan * =	Comal 28.96	acres						
Prede	velopment impervious area within the limits of the plan * =	0.33	acres						
Total post-de	evelopment impervious area within the limits of the plan* = Total post-development impervious cover fraction * =	8.39	acres						Tota
	P =	0.29	inches						
	L _{M TOTAL PROJECT} =	7234	lbs.						
* The values enter	red in these fields should be for the total project area	•							 * The valu
Number	of drainage beains / sutfalls areas lossing the plan area -								
Number	of drainage basins / outfalls areas leaving the plan area =	1							
2. Drainage Basin	Parameters (This information should be provided for	<u>each basin):</u>							 2. Drainage
	Drainage Basin/Outfall Area No. =	B-21							
		Living (Dracids))							
Predevelor	= Total drainage basin/outfall area = pment impervious area within drainage basin/outfall area	0.06	acres acres						 Pr
Post-develop	oment impervious area within drainage basin/outfall area =	0.00	acres						 Pos
Post-developme	ent impervious fraction within drainage basin/outfall area =	0.17							 Post-de
	L _{M THIS BASIN} =		11					1	
		9	lbs.						
3. Indicate the pro	posed BMP Code for this basin.	9	lbs.						 3. Indicate
3. Indicate the pro	posed BMP Code for this basin.								 <u>3. Indicate</u>
3. Indicate the pro									<u>3. Indicate</u>
	posed BMP Code for this basin. Proposed BMP = Removal efficiency =	Vegetated Fi 85	<mark>ter Strips</mark> percent						
	posed BMP Code for this basin. Proposed BMP =	Vegetated Fi 85	<mark>ter Strips</mark> percent	<u>.</u>					
	posed BMP Code for this basin. Proposed BMP = Removal efficiency =	Vegetated Fi 85 by the selecte	ter Strips percent ed BMP Typ						
4. Calculate Maxin	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R =	Vegetated Fi 85 by the selector (BMP efficience	t <mark>er Strips</mark> percent ed BMP Typ y) x P x (A ₁)	(34.6 + A _P x 0.54)					4. Calculate
	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C =	Vegetated Fi 85 by the selecter (BMP efficiencer Total On-Site of	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area	< 34.6 + A _P x 0.54) in the BMP catchme					4. Calculat
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4. Calculate Maxin	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _L = A _P =	Vegetated Fi 85 by the selecter (BMP efficience Total On-Site of Impervious area	ter Strips percent ad BMP Typ y) x P x (A ₁) drainage area a proposed in remaining in	x 34.6 + A _P x 0.54) in the BMP catchme in the BMP catchment	area Irea	BMP			4. Calculat
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4. Calculate Maxin	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = L_R = A_C = A_P = L_R = A_P = L_R = A_P = L_R =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10	ter Strips percent ad BMP Type y) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment the BMP catchment a	area Irea	BMP			4. Calculat
4. Calculate Maxin	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = A_C = A_R = A_R =	Vegetated Fil 85 by the selector (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10	ter Strips percent ad BMP Typ y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres	x 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment the BMP catchment a	area Irea				4. Calculate
4. Calculate Maxin	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = L_R = A_C = A_P = L_R = A_P = L_R = A_P = L_R =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10	ter Strips percent ad BMP Type y) x P x (A ₁ x drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment the BMP catchment a	area Irea	BMP			4. Calculate
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_R = L_R = L_R = A_C = A_C = L_R = A_C = A_R =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 0.96	ter Strips percent ad BMP Typ y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) In the BMP catchment the BMP catchment a s catchment area by t	area rea he proposed E		34 to 3.36		4. Calculate whe
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_C = A_R = L_R = L_R = A_C = A_C = L_R = A_C = A_R = A	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 0.96	ter Strips percent ad BMP Typ y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment the BMP catchment a	area rea he proposed E		34 to 3-36		4. Calculat who 5. Calculat
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_I = A_P = L_R = A_C = A_I = A_P = L_R = A_P = L_R = A_P = L_R = The proposed BMP - Type for this drainage The proposed BMP - Type for this drainage	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 0.96 e basin / outfa	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) In the BMP catchment the BMP catchment a s catchment area by t	area rea he proposed E		34 to 3-36		4. Calculat who 5. Calculat
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = A_C = A_I = A_P = L_R = on of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = re Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 6.96 e basin / outfit 2.80 0.18	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs.	x 34.6 + A _P x 0.54) In the BMP catchment the BMP catchment a s catchment area by t	area rea he proposed E		34 to 3-36		4. Calculat who 5. Calculat
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_I = A_P = L_R = A_P = L_R = A_P = L_R = on of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = re Volume required by the BMP Type for this drainage Rainfall Depth =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 0.96 e basin / outfa	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs	x 34.6 + A _P x 0.54) In the BMP catchment the BMP catchment a s catchment area by t	area rea he proposed E		34 to 3-36		4. Calculat who 5. Calculat
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = A_C = A_I = A_P = L_R = on of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = re Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 6.96 e basin / outfit 2.80 0.18	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs.	x 34.6 + A _P x 0.54) In the BMP catchment the BMP catchment a s catchment area by t	area rea he proposed E		34 to 3-36		4. Calculat who 5. Calculat
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ on of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = re Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 6 e basin / outfit 2.80 0.18 109	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet	x 34.6 + A _P x 0.54) In the BMP catchment the BMP catchment a s catchment area by t	area rea he proposed E		34 to 3-36		4. Calculat who 5. Calculat
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_C = A_R = L_R = A_C = A_R = A	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 6 e basin / outfit 2.80 0.18 109 Calculations fr	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet om RG-348	c 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed E		34 to 3-36		4. Calculate whe
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ on of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = re Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site area draining to BMP =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 fall area 10 c.96 e basin / outfit 2.80 0.18 109 Calculations fr 0.00 0.00	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet	c 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed E		34 to 3-36		4. Calculate whe
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_I =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ ton of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = re Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 6 fall area 10 0.96 e basin / outfa 2.80 0.18 109 Calculations fr 0.00 0.00 0.00	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet om RG-348 acres	c 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed E		34 to 3-36		4. Calculate whe
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_C = A_L = A_C = A_L = A_R = A_R = A_R = A_R = A_R = A_R = A_R = C_R = C	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 fall area 10 c.96 e basin / outfit 2.80 0.18 109 Calculations fr 0.00 0.00	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet om RG-348 acres	c 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed E		34 to 3-36		4. Calculate whe
4. Calculate Maxin where:	posed BMP Code for this basin. Proposed BMP = Removal efficiency = num TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_C =$ $A_I =$ $A_R =$ $L_R =$ $A_C =$ $A_I =$ $A_R =$ A	Vegetated Fil 85 by the selecter (BMP efficience Total On-Site of Impervious area TSS Load rem 0.06 0.01 0.05 10 fall area 10 fall area 10 c.96 e basin / outfa 2.80 0.18 109 Calculations fr 0.00 0.00	ter Strips percent ad BMP Type y) x P x (A ₁) drainage area a proposed in remaining in oved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet om RG-348 acres	c 34.6 + A _P x 0.54) in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed E		34 to 3-36		3. Indicate

TSS REMOVAL CALCULATIONS: B-22

I Calculations 04-20-2009			Project Name: Date Prepared:		amp Ex	pansion		
formation is provided for cells with a red triang blue indicate location of instructions in the Technic				cursor ove	r the ce	211.		
hown in red are data entry fields.	al Guiuance I	vianuai - r.u	5-340.					
hown in black (Bold) are calculated fields. Ch	anges to the	ese fields v	will remove the eq	uations u	sed in t	he sprea	dsheet.	
						opred		
Load Reduction for the total project:	Calculations f	rom RG-348		Pages 3-27 to	0 3-30			
Page 3-29 Equation 3.3: L_{M} =	27.2(A _N x P)							
			Iting from the propose	d developmen	t = 80% o	fincreased	load	
			area for the project					
P =	Average annu	al precipitatio	n, inches					
etermine Required Load Removal Based on the Entire Proje	ect							
County =	Comal	•						
Total project area included in plan * =		acres						
edevelopment impervious area within the limits of the plan * = t-development impervious area within the limits of the plan* =		acres acres						
Total post-development impervious cover fraction * =								
P =		inches						
L _{M TOTAL PROJECT} =	1	lbs.						
ntered in these fields should be for the total project are	a.							
		_						
per of drainage basins / outfalls areas leaving the plan area =	1	1						
in Parameters (This information should be provided for	eacn basin):							
Drainage Basin/Outfall Area No. =	B-22	1						
Total drainage basin/outfall area =		acres						
elopment impervious area within drainage basin/outfall area = elopment impervious area within drainage basin/outfall area =		acres						
oment impervious fraction within drainage basin/outfall area =		00103						
L _{M THIS BASIN} =		lbs.						
proposed BMP Code for this basin.								
Proposed BMP =	Venetated E	ter Strine						
Removal efficiency =		percent						
		1						
<u>ximum TSS Load Removed (L_R) for this Drainage Basir</u>	by the select	ed BMP Typ	<u>e.</u>					
RG-348 Page 3-33 Equation 3.7: L _R =	BMP efficien	cv) x Ρ x (Δ. ·	$x 34.6 + A_{\rm D} \times 0.54$					
A _C =	Total On-Site	drainage area	a in the BMP catchme	nt area				
		-	n the BMP catchment					
A _P =	Pervious area	remaining in	the BMP catchment a	rea				
L _R =	TSS Load rem	noved from thi	s catchment area by t	he proposed E	BMP			
	0.10	acres						
A _C =	1	ucres						
A _l =	0.02	acres						
A _I = A _P =	0.02 0.08	acres acres						
A _l =	0.02 0.08	acres						
A _I = A _P =	0.02 0.08	acres acres						
A _I = A _P =	0.02 0.08	acres acres						
A _I = A _P =	0.02 0.08 21	acres acres						
A _l = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u>	0.02 0.08 21	acres acres Ibs						
A _I = A _P = L _R =	0.02 0.08 21	acres acres						
A _I = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} =	0.02 0.08 21 tfall area	acres acres Ibs						
A _l = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u>	0.02 0.08 21 tfall area	acres acres Ibs						
A _I = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} =	tfall area 21 1.02	acres acres Ibs Ibs.	Calculations from RG	-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F =	tfall area 21 1.02	acres acres Ibs Ibs.	Calculations from RG	-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>oture Volume required by the BMP Type for this draina</u>	 0.02 0.08 21 ttfall area 21 1.02 ge basin / outt 	acres acres Ibs Ibs.	Calculations from RG	-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F =	 0.02 0.08 21 ttfall area 21 1.02 ge basin / outt 4.00 	acres acres Ibs Ibs.	Calculations from RG	-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>oture Volume required by the BMP Type for this draina</u> Rainfall Depth =	 0.02 0.08 21 11 1.02 1.02 1.02 1.02 4.00 0.20 	acres acres Ibs Ibs.	Calculations from RG	-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Dest Development Runoff Coefficient =</u>	 0.02 0.08 21 11 1.02 1.02 1.02 1.02 4.00 0.20 	acres acres lbs lbs. fall area.	Calculations from RG	-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Dest Development Runoff Coefficient =</u>	 0.02 0.08 21 1.02 1.02 <u>ge basin / outt</u> 4.00 0.20 292 	acres acres lbs lbs. lbs. fall area. inches cubic feet		-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Dest Development Runoff Coefficient =</u>	 0.02 0.08 21 11 1.02 1.02 1.02 1.02 4.00 0.20 	acres acres lbs lbs. lbs. fall area. inches cubic feet	Calculations from RG	-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Oture Volume required by the BMP Type for this draina</u> Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume =	 0.02 0.08 21 21 1.02 1.02 <u>ge basin / outt</u> 4.00 0.20 292 Calculations f 0.00 	acres acres lbs lbs. lbs. acres		-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Oture Volume required by the BMP Type for this draina</u> Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	 0.02 0.08 21 21 1.02 1.02 9 4.00 0.20 292 Calculations f 0.00 0.00 	acres acres lbs lbs. lbs. all area. inches cubic feet		-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Oture Volume required by the BMP Type for this draina</u> Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	 0.02 0.08 21 21 1.02 1.02 9 9 4.00 0.20 292 Calculations f 0.00 0 0 	acres acres lbs lbs. lbs. acres		-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Oture Volume required by the BMP Type for this draina</u> Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	 0.02 0.08 21 21 1.02 1.02 9 9 9 0.20 292 Calculations f 0.00 0.00 0.00 	acres acres lbs lbs. lbs. acres		-348	Pages 3-	34 to 3-36		
A _I = A _P = L _R = <u>Ction of Annual Runoff to Treat the drainage basin / ou</u> Desired L _{M THIS BASIN} = F = <u>Oture Volume required by the BMP Type for this draina</u> Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site Water Quality Volume = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	 0.02 0.08 21 21 1.02 1.02 9 9 9 0.20 292 Calculations f 0.00 0.00 0.00 	acres acres lbs lbs. lbs. acres cubic feet rom RG-348 acres acres		-348	Pages 3-	34 to 3-36		

TSS REMOVAL CALCULATIONS: B-23

CC Dame	al Calculations 04-20-2009			Design 4 M	TRANKO	ome Er	noncier		
SS Kelliov				Project Name: Date Prepared:		-	pansion		
dditional i	nformation is provided for cells with a red triang	le in the un	per right c	orner Place the		or the ce	511		
	n blue indicate location of instructions in the Technica					i the ce	=11.		
	shown in red are data entry fields.			2001F					
Characters	shown in black (Bold) are calculated fields. Cha	inges to the	ese fields v	will remove the e	quations u	sed in t	he sprea	dsheet.	
. The Require	ed Load Reduction for the total project:	Calculations fr	rom RG-348		Pages 3-27 t	o 3-30			
	Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)							
where:				lting from the propose	d developmen	t = 80% o	of increased	load	
		Net increase i Average annua		area for the project					
				n, inches					
Site Data:	Determine Required Load Removal Based on the Entire Project County =	t Comal							
	Total project area included in plan * =	28.96	acres						
	Predevelopment impervious area within the limits of the plan * = pst-development impervious area within the limits of the plan* =	0.33	acres						
Total po	Total post-development impervious cover fraction * =	8.39 0.29	acres						
	P=	33	inches						
	I	7234	Ibs.						
The values	LM TOTAL PROJECT =		105.						
the failed									
Nu	mber of drainage basins / outfalls areas leaving the plan area =	1							
2. Drainage B	asin Parameters (This information should be provided for	each basin).							
a brannago b									
	Drainage Basin/Outfall Area No. =	B-23							
	Total drainage basin/outfall area =	0.09	acres						
	evelopment impervious area within drainage basin/outfall area =	0.00	acres						
	evelopment impervious area within drainage basin/outfall area = opment impervious fraction within drainage basin/outfall area =	0.03 0.33	acres						
FOSI-deve	L _{M THIS BASIN} =	27	lbs.						
	-Mi THIS DAGIN								
3. Indicate the	proposed BMP Code for this basin. Proposed BMP = Removal efficiency =								
	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin	85 by the select	percent						
	Proposed BMP = Removal efficiency =	85 by the select	percent						
	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R =	85 by the selecter (BMP efficience	percent ed BMP Typ cy) x P x (A ₁ ;		nt area				
4. Calculate N	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C =	85 by the select (BMP efficienc Total On-Site	percent ed BMP Typ cy) x P x (A ₁ x drainage area	x 34.6 + A _P x 0.54)					
4. Calculate N	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _L = A _P =	85 by the select (BMP efficience Total On-Site Impervious are Pervious area	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea				
4. Calculate N	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _L = A _P =	85 by the select (BMP efficience Total On-Site Impervious are Pervious area	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in	x 34.6 + A _P x 0.54) a in the BMP catchme n the BMP catchment	area rea	BMP			
4. Calculate N	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _L = A _P =	85 by the select (BMP efficience Total On-Site Impervious are Pervious area	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP			
4. Calculate N	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R =	85 by the select (BMP efficienc Total On-Site Impervious area Pervious area TSS Load rem	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	3MP			
4. Calculate N	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = A_C = A_C = A_P = A_C = A_R =	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.06	ed BMP Typ ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	BMP			
4. Calculate N	$\begin{array}{l} \mbox{Proposed BMP} = \\ \mbox{Removal efficiency} = \\ \mbox{laximum TSS Load Removed (L_R) for this Drainage Basin} \\ \mbox{RG-348 Page 3-33 Equation 3.7: } L_R = \\ \mbox{A}_C = \\ \mbox{A}_L = \\ \mbox{A}_P = \\ \mbox{L}_R = \\ \mbox{L}_R = \\ \mbox{A}_L = \\$	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from this acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	3MP			
4. Calculate N	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = A_C = A_C = A_P = A_C = A_R =	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.06	ed BMP Typ ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	3MP			
4. Calculate M where:	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L_R = A_C = A_C = A_I = A_P = L_R = A_C = A_C = A_P = A_C = A_R =	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.03 0.06 30	ed BMP Typ ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	3MP			
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4. Calculate M where:	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A _C = A _L = A _P = L _R = A _P = L _R = A _P = L _R = Resolution of Annual Runoff to Treat the drainage basin / out	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.06 30 fall area	percent ed BMP Typ cy) x P x (A ₁ ; drainage area a proposed in remaining in noved from thi acres acres acres acres lbs	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea	3MP			
4. Calculate N where: 5. Calculate F	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_L =	85 by the selecter (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.06 30 fall area 30	percent ed BMP Typ cy) x P x (A ₁ : drainage area a proposed in remaining in noved from thi acres acres acres Ibs	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a	area rea he proposed B		34 to 3-36		
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4. Calculate N where: 5. Calculate F	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = A_C = A_L = A_C = A_L =	85 by the selectric (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.03 0.03 0.03 0.03 1.00 fall area 30 1.00 e basin / outfice 4.00	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres lbs lbs.	x 34.6 + A _P x 0.54) a in the BMP catchmen n the BMP catchment the BMP catchment a s catchment area by t	area rea he proposed B		34 to 3-36		
4. Calculate N where: 5. Calculate F	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_C =$ $A_{I} =$ $A_{P} =$ $L_R =$ $A_C =$ $A_I =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ L _R = $A_P =$ $L_R =$ $A_P =$ $L_R =$ $A_P =$ $L_R =$ $A_P =$ $L_R =$ $A_P =$ $B_R =$ $A_P =$	85 by the selectric (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.03 0.06 30 fall area 30 1.00 e basin / outfing 4.00 0.27 359	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres lbs lbs. acres inches cubic feet	x 34.6 + A _P x 0.54) a in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed B		34 to 3-36		
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4. Calculate N where: 5. Calculate F	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_I =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ $A_R =$ $A_P =$ $L_R =$ L _R = raction of Annual Runoff to Treat the drainage basin / out Desired L _{M THIS BASIN} = F = apture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP =	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.06 30 fall area 30 1.00 e basin / outf 4.00 0.27 359 Calculations fr 0.00	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres lbs lbs. inches cubic feet om RG-348	x 34.6 + A _P x 0.54) a in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed B		34 to 3-36		
4. Calculate N where: 5. Calculate F	Proposed BMP = Removal efficiency = laximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_L =$ $A_C =$ $A_I =$ $A_P =$ $L_R =$ $A_R =$ $A_P =$ $L_R =$ $A_R =$ A	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.06 30 fall area 30 1.00 e basin / outf 4.00 0.27 359 Calculations fr 0.00 0	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet cubic feet cubic feet	x 34.6 + A _P x 0.54) a in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed B		34 to 3-36		
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. Calculate M where: 5. Calculate F	Proposed BMP = Removal efficiency = Iaximum TSS Load Removed (L _R) for this Drainage Basin RG-348 Page 3-33 Equation 3.7: L _R = $A_C =$ $A_C =$ $A_I =$ $A_C =$ $A_I =$ $A_C =$ $A_R =$ $A_$	85 by the select (BMP efficience Total On-Site Impervious area TSS Load rem 0.09 0.03 0.06 30 fall area 30 fall area 30 1.00 e basin / outf 4.00 0.27 359 Calculations fr 0.00 0.00 0.00	percent ed BMP Typ cy) x P x (A ₁ x drainage area a proposed in remaining in noved from thi acres acres acres lbs lbs. lbs. all area. inches cubic feet cubic feet cubic feet	x 34.6 + A _P x 0.54) a in the BMP catchment the BMP catchment a s catchment area by t Calculations from RG	area rea he proposed B		34 to 3-36		

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	FH OE PP R.O.W. SS SW TELE UE UT WV D.R.C.C.	EASEMEN FIRE HYL OVERHEA POWER H RIGHT-O, SANITARY SIDEWALK TELEPHO, UNDERGK UNDERGK UNDERGK T. DEED RE COUNTY C.T. OFFICIAL	C, GAS, TELEPHONE, CA T DRANT D ELECTRIC POLE F-WAY SEWER LINE SOUND ELECTRIC ROUND TELEPHONE ALVE CORDS COMAL	ABLE	
	48 HC	Contractor Exact Lo Depth of Facilities P	ACT: DIG-TESS		1
NO.	DATE	REVI	SIONS		APP.
	TCE CONS	FOR CHRIST BAR M CAMP Q ATTAC STRUCTIC FATIVE F (8 O	PEXPANSIC HMENT NPLA ILTER	"F" NS -	-
	Texas Boa 4350 Lockhil	d of Professional Engineers I-Selma Road, Suite 100•Sai	IDDDI and Land Surveyors Reg n Antonio, Texas 78249		
	ALE:	AS SHOWN APRIL 2024		BY: <u>DJN</u> BY: <u>JS/</u>	
JO	B NO. <u>17</u>	758-0001-00			
SU	IBMITTED:		SURV. BY: F.B. NO	ENGINEERI	NG
	DARREN J.	MCAFEE		SHEET	5

exas Commission on Environmental Quality							
SS Removal Calculations 04-20-2009			Project Name: Date Prepared:		amp Ex	pansion	
dditional information is provided for cells with a red triang	le in the up	per right c	orner. Place the	cursor ove	r the ce	ell.	
ext shown in blue indicate location of instructions in the Technica	al Guidance	Manual - RO	G-348.				
c <mark>haracters shown in red are data entry fields.</mark> Characters shown in black (Bold) are calculated fields. Cha	anges to the	aco fielde y	will romove the ex	nuatione ur	od in t	ho oprog	de
maracters shown in black (Bold) are calculated helds. Cha	anges to the			juacions us	seu in u	ne sprea	us
The Required Load Reduction for the total project:	Calculations f	rom RG-348		Pages 3-27 to	3-30		
	07.0/A						
Page 3-29 Equation 3.3: L _M =	27.2(A _N x P)						
where: L _{M TOTAL PROJECT} =	Required TSS	removal resu	Iting from the propose	d development	= 80% o	f increased	lo
		•	area for the project				
P =	Average annu	al precipitation	n, inches				
Site Data: Determine Required Load Removal Based on the Entire Project	1						
County = Total project area included in plan * =		acres					
Predevelopment impervious area within the limits of the plan * =	0.33	acres					
Total post-development impervious area within the limits of the plan* = Total post-development impervious cover fraction * =		acres					
P =		inches					
L _{M TOTAL PROJECT} =		lbs.					
The values entered in these fields should be for the total project area	a.						
Number of drainage basins / outfalls areas leaving the plan area =	1						
Drainage Basin Parameters (This information should be provided for	each basin):						
Drainage Basin/Outfall Area No. =	B-24	•					
Total drainage basin/outfall area = Predevelopment impervious area within drainage basin/outfall area =		acres					-
Post-development impervious area within drainage basin/outfall area =	0.10	acres					
Post-development impervious fraction within drainage basin/outfall area =		lha					
L _{M THIS BASIN} =	90	lbs.					
Indicate the proposed BMP Code for this basin.							
	Venetated	tor Stairs					
Proposed BMP = Removal efficiency =	-	percent					
			-				
Calculate Maximum TSS Load Removed (L _R) for this Drainage Basin	by the select	ed BMP Type	e.				
RG-348 Page 3-33 Equation 3.7: L _R =	(BMP efficien	cy)xPx(A _I)	(34.6 + A _P x 0.54)				
		-	in the BMP catchmer				
	-		the BMP catchment				
			the BMP catchment a s catchment area by t		MP		
A _C =	0.20	acres					
A1 =		acres					
A _P = L _R =		acres Ibs					
L _R =	55	601					
Calculate Fraction of Annual Runoff to Treat the drainage basin / out	tfall area						
Desired L _{M THIS BASIN} =	99	lbs.					
	4.00						
C	1 1 1 1 1						
F =			1				
		fall area.	Calculations from RG	-348	Pages 3-	-34 to 3-36	
		fall area.	Calculations from RG	-348	Pages 3-	-34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth =	ge basin / out 4.00	fall area. inches	Calculations from RG	-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient =	ge basin / out 4.00 0.36		Calculations from RG	-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth =	ge basin / out 4.00 0.36	inches	Calculations from RG	-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient =	ge basin / out 4.00 0.36 1038	inches cubic feet		-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainag Rainfall Depth = Post Development Runoff Coefficient =	4.00 0.36 1038 Calculations f	inches cubic feet	Calculations from RG	-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP =	<u>e basin / out</u> 4.00 0.36 1038 Calculations f	inches cubic feet rom RG-348 acres		-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume =	<u>e basin / out</u> 4.00 0.36 1038 Calculations f 0.00 0.00	inches cubic feet rom RG-348		-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	ge basin / out 4.00 0.36 1038 Calculations f 0.00 0.00 0 0.00	inches cubic feet rom RG-348 acres acres		-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area =	ge basin / out 4.00 0.36 1038 Calculations f 0.00 0.00 0 0.00	inches cubic feet rom RG-348 acres		-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient =	ge basin / out 4.00 0.36 1038 Calculations f 0.00 0.00 0 0.00 0	inches cubic feet rom RG-348 acres acres		-348	Pages 3-	34 to 3-36	
Calculate Capture Volume required by the BMP Type for this drainage Rainfall Depth = Post Development Runoff Coefficient = On-site Water Quality Volume = Off-site area draining to BMP = Off-site Impervious cover draining to BMP = Impervious fraction of off-site area = Off-site Runoff Coefficient = Off-site Runoff Coefficient =	ge basin / out 4.00 0.36 1038 Calculations f 0.00 0 0.00 0 0.00 0 0.00 0 0.208	inches cubic feet rom RG-348 acres acres		-348	Pages 3-	34 to 3-36	

et.

ABBREVIATIONS E.G.T.C. ______ ELECTRIC, GAS, TELEPHONE, CABLE ESMT ______ EASEMENT FH ______ FIRE HYDRANT OF ______ OVERVIEW, FUR FURTHER OVERHEAD ELECTRIC POWER POLE 0E _____ _ RIGHT-OF-WAY R.O.W. SANITARY SEWER LINE SIDEWALK TELEPHONE TELE. UNDERGROUND ELECTRIC UE _____ UNDERGROUND TELEPHONE WV ______ WATER VALVE D.R.C.C.T. _____ DEED RECORDS COMAL COUNTY TEXAS 0.P.R.C.C.T. _____ OFFICIAL PUBLIC RECORDS COMAL COUNTY TEXAS !!CAUTION!! Contractor to Verify Exact Location & Depth of Exist Facilities Prior to any Construction Activities CAUTION!!! CONTACT: 1-800-DIG-TESS 48 HOURS PRIOR TO CONSTRUCTION NO. DATE REVISIONS APP. CENTER FOR CHRISTIAN GROWTH, INC T BAR M CAMP EXPANSION TCEQ ATTACHMENT "F" CONSTRUCTION PLANS -VEGETATIVE FILTER STRIPS (9 OF 9) QUIDDITY Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290 4350 Lockhill-Selma Road, Suite 100 • San Antonio, Texas 78249 • 210.494.5511 DGN. BY: <u>DJM</u> AS SHOWN SCALE: DATE: _____ DWN. BY: JS/CJ APRIL 2024 JOB NO. 17758-0001-00 DWG. NO. NONE SUBMITTED: SURV. BY: ENGINEERING F.B. NO. NONE Dann Miller * 5/8/2024 e * : DARREN J. MCAFEE 137808 SHEET NO. 16 CENSE! OF 17

exas Cor	nmission on Environmental Quality							
SS Remov	al Calculations 04-20-2009			Project Name:	T Bar M C	amp Expansion		
				Date Prepared:				
		to the disc second		Disco disc		n Alexana II		
	nformation is provided for cells with a red triang		-		cursor ove	r the cell.		
	n blue indicate location of instructions in the Technica	l Guidance I	Manual - RG	-348.				
	shown in red are data entry fields.							
haracters	shown in black (Bold) are calculated fields. Cha	nges to the	ese fields w	vill remove the e	quations u	sed in the sprea	dsheet.	
The Require	ed Load Reduction for the total project:	Calculations f	rom RG-348		Pages 3-27 to	o 3-30		
	Page 3-29 Equation 3.3: L_{M} =	27.2(A _N x P)						
where:	LM TOTAL PROJECT =	Required TSS	removal result	ting from the propose	d developmen	t = 80% of increased	load	
	A _N =	Net increase i	in impervious a	rea for the project				
	P =	Average annu	al precipitation	, inches				
Site Data:	Determine Required Load Removal Based on the Entire Project	t						
	County =	Comal						
	Total project area included in plan *=	28.96	acres					
	redevelopment impervious area within the limits of the plan * =	0.33	acres					
l otal po	st-development impervious area within the limits of the plan* =	8.39 0.29	acres					
	Total post-development impervious cover fraction * = P =	33	inchos					
	P =	33	inches					
	↓M TOTAL PROJECT =	7234	lbs.					
The values e	entered in these fields should be for the total project area							
Nur	mber of drainage basins / outfalls areas leaving the plan area =	1						
Drainage Ba	asin Parameters (This information should be provided for	each basin):						
	Drainage Basin/Outfall Area No. =	Bypass-1						
	Total drainage basin/outfall area =	6.99	acres					
Prede	evelopment impervious area within drainage basin/outfall area =	0.00	acres					
	evelopment impervious area within drainage basin/outfall area =	0.41	acres					
	opment impervious fraction within drainage basin/outfall area =	0.06						
	L _{M THIS BASIN} =	368	lbs.					



TSS REMOVAL CALCULATIONS: BYPASS-2

_									
is Con	nmission on Environmental Quality								
Remov	al Calculations 04-20-2009			Project Name:	T Bar M C	amp Ex	pansion		
				Date Prepared:	4/11/2024				
onal ir	formation is provided for cells with a red triang	e in the up	per right co	rner. Place the	cursor ove	er the ce	II.		
nown ir	blue indicate location of instructions in the Technica	I Guidance M	Manual - RG	-348.					
	shown in red are data entry fields.								
	shown in black (Bold) are calculated fields. Cha	nges to the	so fields w	ill remove the ev	uations u	cod in th	o e nroa	dehoot	
ciers.	shown in black (bold) are calculated helds. Ona	inges to the	se neids w	in remove the ev	Juadons u	Seama	ie spied	usneet	
Poquiro	d Load Reduction for the total project:	Calculations fr	om PC 349		Pages 3-27 t	0 2 20			
vequire	a Load Reduction for the total project.	Calculations II	011110-540		rayes 5-27 t	0 3-30			
		07.0/A							
	Page 3-29 Equation 3.3: L_{M} =	21.2(A _N X P)	-						
				····· •	d. d			l l	
where:				ing from the propose	a developmen	t = 80% o	increased	load	
			-	rea for the project					
	P =	Average annua	al precipitation	, inches					
- D-t	Determine Demind Land Demond Develop the Entire Device								
e Data:	Determine Required Load Removal Based on the Entire Project County =	Comal							
	Total project area included in plan * =	28.96	acres						
P	redevelopment impervious area within the limits of the plan * =	0.33	acres						
	st-development impervious area within the limits of the plan* =	8.39	acres						
	Total post-development impervious cover fraction * =	0.29							
	P =	33	inches						
	L _{M TOTAL PROJECT} =	7237	lbs.						
aluoco	entered in these fields should be for the total project area								
aiuese	intered in these herds should be for the total project area	•							
Nun	nber of drainage basins / outfalls areas leaving the plan area =	1							
na ge Ba	sin Parameters (This information should be provided for	each basin):							
	Drainage Basin/Outfall Area No. =	Bypass-2	1						
	Total drainage basis/sutfall area =	5 75	20105						
Prede	Total drainage basin/outfall area = velopment impervious area within drainage basin/outfall area =	5.75 0.00	acres						
	velopment impervious area within drainage basin/outlan area =	0.00	acres						
	opment impervious fraction within drainage basin/outlan area =	0.00	0100						
	L _{M THIS BASIN} =	0	lbs.						

TSS REMOVAL CALCULATIONS: BYPASS-3

exas Con	nmission on Environmental Quality						
SS Remov	al Calculations 04-20-2009			Project Name:	T Bar M C	amp Expa	nsion
				Date Prepared:			
				Duto i ropulou.			
dditional in	nformation is provided for cells with a red triang	le in the up	per right co	orner. Place the	cursor ove	r the cell.	
	blue indicate location of instructions in the Technica						
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lalacters	shown in black (bold) are calculated helds. Cha	inges to the	ese lielus w	nii tettiove ute e	quations us	seu in the	spreausneet.
The Pequire	d Load Reduction for the total project:	Calculations f	rom RG-348		Pages 3-27 to	3-30	
The Require	a Load Reduction for the total project.	Calculations	10111 KG-346		rayes 5-27 to	5-50	
		07.04					
	Page 3-29 Equation 3.3: L_{M} =	27.2(A _N x P)					
01.00							
where:				ting from the propose	d development	t = 80% of in	creased load
				rea for the project			
	P =	Average annu	al precipitation	, inches			
Site Data:	Determine Required Load Removal Based on the Entire Project						
	County =	Comal					
D	Total project area included in plan * = redevelopment impervious area within the limits of the plan * =	28.96 0.33	acres				
	st-development impervious area within the limits of the plan [*] =		acres				
Total po	Total post-development impervious cover fraction * =		acres				
	P =	33	inches				
	L _{M TOTAL PROJECT} =	7237	lbs.				
	ntered in these fields should be for the total project area		100.				
ine values e	intered in these lields should be for the total project area						
Num	nber of drainage basins / outfalls areas leaving the plan area =	1					
Drainage Ba	sin Parameters (This information should be provided for	each basin):					
	Drainage Basin/Outfall Area No. =	Bypass-3					
	Total drainage basin/outfall area =	2.48	acres				
	velopment impervious area within drainage basin/outfall area =	0.00	acres				
	velopment impervious area within drainage basin/outfall area =	0.00	acres				
Post-develo	opment impervious fraction within drainage basin/outfall area =	0.00	Nin a				
	L _{M THIS BASIN} =	0	lbs.				

		ABBREVIA	TIONS		
	ESMT FH OE PP R.O.W. SS SS SW TELE UE UT WV D.R.C.C.	EASEMENT FIRE HYDH OVERHEAD POWER PC RIGHT-OF SANITARY SIDEWALK TELEPHOM UNDERGRC UNDERGRC UNDERGRC 	RANT DELECTRIC DLE SEWER LINE E DUND ELECTRIC DUND TELEPHONE LVE FORDS COMAL EXAS	DABLE	
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sc	Texas Boa 4350 Lockhi	AS SHOWN	DGN.	BY: <u>DJ</u> I	и
DA	ALE:	AS SHOWN APRIL 2024	DWN.	BY: <u>DJM</u> BY: <u>JS/</u>	
DA JO	ALE:	AS SHOWN	DWN.	BY: <u>DJI</u> BY: <u>JS/</u> NONE QUIDDIT ENGINEER	CJ



Attachment G

INSPECTION, MAINTENANCE, REPAIR, AND RETROFIT PLAN

Project: <u>T Bar M Camp Expansion</u> Address: <u>2549 Hwy 46 W</u> City, State, Zip: <u>New Braunfels, Texas 78132</u>

Bioretention Maintenance and Monitoring Procedure

The primary maintenance requirement for bioretention areas is that of inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Plants that are appropriate for the site, climatic, and watering conditions should be selected for use in the bioretention cell. Appropriately selected plants will aid in reducing fertilizer, pesticide, water, and overall maintenance requirements. Bioretention system components should blend over time through plant and root growth, organic decomposition, and the development of a natural soil horizon. These biologic and physical processes over time will lengthen the facility's life span and reduce the need for extensive maintenance.

Routine maintenance should include a semi-annual health evaluation of the trees and shrubs and subsequent removal of any dead or diseased vegetation. Diseased vegetation should be treated as needed using preventative and low-toxic measures to the extent possible. BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water. Routine inspections for areas of standing water within the BMP and corrective measures to restore proper infiltration rates are necessary to prevent the creation of mosquito and other vector habitat. In addition, bioretention BMPs are susceptible to invasion by aggressive plant species such as cattails, which increase the chances of standing water and subsequent vector production if not routinely maintained.

To maintain the treatment area's appearance, it may be necessary to prune and weed. Furthermore, mulch replacement is suggested when erosion is evident or when the site begins to look unattractive. Specifically, the entire area may require mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas.

New Jersey's Department of Environmental Protection states in their bioretention systems standards that accumulated sediment and debris removal (especially at the inflow point) will normally be the primary maintenance function. Other potential tasks include replacement of dead vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment, unclogging the underdrain, and repairing overflow structures.



Other recommended maintenance guidelines include:

- *Inspections.* BMP facilities should be inspected at least twice a year (once during or immediately following wet weather) to evaluate facility operation. During each inspection, erosion areas inside and downstream of the BMP must be identified and repaired or revegetated immediately.
- *Sediment Removal.* Remove sediment from the facility when sediment depth reaches 3 inches or when the sediment interferes with the health of vegetation or ability of the facility to meet required drawdown times. Sediment removal should be performed at least every 2 years.
- *Drain Time.* When the drain time exceeds 72 hours as observed in the observation well, the filter media should be removed and replaced with more permeable material.
- Vegetation. All dead and diseased vegetation considered beyond treatment shall be removed and replaced during semi-annual inspections. Diseased trees and shrubs should be treated during inspections. Re-mulch any bare areas by hand whenever needed. Replace mulch annually in the spring, or more frequently if needed, in landscaped areas of the basin where grass or groundcover is not planted. Grass areas in and around bioretention facilities must be mowed at least twice annually to limit vegetation height to 18 inches. More frequent mowing to maintain aesthetic appeal may be necessary in landscaped areas.
- *Debris and Litter Removal.* Debris and litter will accumulate in the facility and should be removed during regular mowing operations and inspections.
- *Filter Underdrain.* Clean underdrain piping network to remove any sediment buildup every 5 years, or as needed to maintain design drawdown time.
- *Record Keeping.* The Applicant shall maintain records of inspections for the previous five (5) years. The records shall indicate who made the inspections and on what date. In addition, the records shall indicate what the inspector found and what measures were taken to correct the situation.

Vegetative Filter Strips Maintenance and Monitoring Procedures

Once a vegetated area is well established, little additional maintenance is generally necessary. The key to establishing a viable vegetated feature is the care and maintenance it receives in the first few months after it is planted. Once established, all vegetated BMPs require some basic maintenance to ensure the health of the plants including:

- *Pest Management.* An Integrated Pest Management (IPM) Plan should be developed for vegetated areas. This plan should specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.
- Seasonal Mowing and Lawn Care. If the filter strip is made up of turf grass, it should be mowed as needed to limit vegetation height to 18 inches, using a mulching mower (or removal of clippings). If native grasses are used, the filter may require less frequent mowing, but a minimum of twice annually.



Grass clippings and brush debris should not be deposited on vegetated filter strip areas. Regular mowing should also include weed control practices, however herbicide use should be kept to a minimum (Urbonas et al., 1992). Healthy grass can be maintained without using fertilizers because runoff usually contains sufficient nutrients. Irrigation of the site can help assure a dense and healthy vegetative cover.

- Inspection. Inspect filter strips at least twice annually for erosion or damage to vegetation; however, additional inspection after periods of heavy runoff is most desirable. The strip should be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. More frequent inspections of the grass cover during the first few years after establishment will help to determine if any problems are developing, and to plan for long-term restorative maintenance needs. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and restored to meet specifications. Construction of a level spreader device may be necessary to reestablish shallow overland flow.
- Debris and Litter Removal. Trash tends to accumulate in vegetated areas, particularly along highways. Any filter strip structures (i.e. level spreaders) should be kept free of obstructions to reduce floatables being flushed downstream, and for aesthetic reasons. The need for this practice is determined through periodic inspection, but should be performed no less than 4 times per year.
- Sediment Removal. Sediment removal is not normally required in filter strips, since the vegetation normally grows through it and binds it to the soil. However, sediment may accumulate along the upstream boundary of the strip preventing uniform overland flow. Excess sediment should be removed by hand or with flat-bottomed shovels.
- Grass Reseeding and Mulching. A healthy dense grass should be maintained on the filter strip. If areas are eroded, they should be filled, compacted, and reseeded so that the final grade is level. Grass damaged during the sediment removal process should be promptly replaced using the same seed mix used during filter strip establishment. If possible, flow should be diverted from the damaged areas until the grass is firmly established. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and restored to meet specifications. Corrective maintenance, such as weeding or replanting should be done more frequently in the first two to three years after installation to ensure stabilization. Dense vegetation may require irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established.
- *Record Keeping.* The Applicant shall maintain records of inspections for the previous five (5) years. The records shall indicate who made the inspections and on what date. In addition, the records shall indicate what the inspector found and what measures were taken to correct the situation.



T Bar M Camp Expansion Water Pollution Abatement Plan Permanent Stormwater

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's entity having ownership or control of the property (such as without limitation, an owner's association, new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity assumes such obligation in writing or ownership is transferred.

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

Signature of Responsible Party

0/23

Date



Attachment H

PILOT-SCALE FIELD TESTING PLAN

No pilot study BMPs are being proposed.



Attachment I

MEASURE FOR MINIMIZING SURFACE STREAM CONTAMINATION

Temporary BMPs are to be placed before the start of construction to prevent sediment from leaving the site. These temporary BMPs include a stabilized construction entrance, concrete washout, silt fence, silt fence with rock berm, tree protection, and a temporary sedimentation basin. The proposed permanent BMPs are bioretention and vegetative filter strips. Runoff from the impervious areas will be treated and directed to an onsite detention pond that will discharge flow to conditions less than or equal to existing. All disturbed areas will be re-vegetated after construction activities have been completed.



AGENT AUTHORIZATION SECTION

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

I	John MacDonald ,
	Print Name
	President,
	Title - Owner/President/Other
of	Center for Christian Growth, Inc,
	Corporation/Partnership/Entity Name
have authorized _	Darren J. McAfee, PE
	Print Name of Agent/Engineer
of	Quiddity Engineering, LLC
	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:

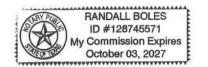
- 1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to \$10,000 per day per violation.
- 2. For those submitting an application who are not the property 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

THE STATE OF Texas § County of Cama §

GIVEN under my hand and seal of office on this 10 day of $N_{overaber}$, 2023.



PUBLIC Bo

Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 17/3/2027



APPLICATION FEE FORM SECTION

Application Fee Form

Texas Commission on Environmenta Name of Proposed Regulated Entity: Regulated Entity Location: <u>2549 Hwy</u>	T Bar M Camp Expan					
Name of Customer: Center for Christ						
Contact Person: John MacDonald		e: 210-546-0053				
Customer Reference Number (if issu						
Regulated Entity Reference Number	(if issued):RN					
Austin Regional Office (3373)						
Hays	Travis	🗌 will	iamson			
San Antonio Regional Office (3362)						
Bexar	Medina	Uva	Ide			
Comal	Kinney		lide			
			to the Terres			
Application fees must be paid by che Commission on Environmental Qua		and the second				
form must be submitted with your						
-		-				
Austin Regional Office	_	an Antonio Regional Of				
Mailed to: TCEQ - Cashier		vernight Delivery to: TO	CEQ - Cashier			
Revenues Section		2100 Park 35 Circle				
Mail Code 214		uilding A, 3rd Floor				
P.O. Box 13088		ustin, TX 78753				
Austin, TX 78711-3088	(5	512)239-0357				
Site Location (Check All That Apply)	:					
Recharge Zone	Contributing Zone	Transiti	ion Zone			
Type of Plan	1	Size	Fee Due			
Water Pollution Abatement Plan, C	Contributing Zone					
Plan: One Single Family Residential	Dwelling	Acres	\$			
Water Pollution Abatement Plan, C	Contributing Zone					
Plan: Multiple Single Family Reside	ntial and Parks	Acres	\$			
Water Pollution Abatement Plan, C	Contributing Zone					
Plan: Non-residential		28.957 Acres	\$ 6,500			
Sewage Collection System		L.F.	\$			
Lift Stations without sewer lines		Acres	\$			
Underground or Aboveground Stor	rage Tank Facility	Tanks	\$			
Piping System(s)(only)		Each	\$			
Exception		Each	\$			
Extension of Time		/ Each	\$			
	Signa	iture: J. h. M	5 10			
			1 of 2			

Date: 11/10/23

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	
a den na a de la composition	5 < 10	\$3,000	
	10 < 40	\$4,000	
	40 < 100	\$6,500	
	100 < 500	\$8,000	
	≥ 500	\$10,000	
Non-residential (Commercial, industrial,	< 1	\$3,000	
institutional, multi-family residential, schools, and	1 < 5	\$4,000	
other sites 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

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

Exception Requests

Project	Fee		
Exception Request	\$500		



CORE DATA FORM SECTION



TCEQ Core Data Form

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

SECTION I: General Information

1. Reason fo	r Submis	sion (If other is c	hecked pleas	e descr	ribe in s	space	provide	əd.)				
New Per	mit, Regis	tration or Authori	zation (Core I	Data Fo	orm sho	ould be	subm	itted w	ith the p	orogram applicatio	n.)	
Renewal (Core Data Form should be submitted with the renewal form)						Other						
2. Customer Reference Number (if issued) Follow this link to search				3. Re	gulated	Entity Reference	e Number <i>(i</i>	if issued)				
CN 6048	80377				<u>l or RN</u> entral Re			RN				
SECTION	II: Cu	stomer Info	ormation									
4. General Cu	ustomer li	nformation	5. Effective	e Date f	for Cus	stome	r Infor	mation	Updat	es (mm/dd/yyyy)		
New Cust		ne (Verifiable wit		Update Secretar					roller of	Change in f Public Accounts)	-	Entity Ownership
The Custor	mer Nan	ne submitted	here may	be up	dated	l auto	matie	cally l	based	on what is cu	rrent and	active with the
Texas Sec	retary of	State (SOS)	or Texas C	compt	roller	of Pu	ublic	Ассо	unts (CPA).		
6. Customer	Legal Nar	ne (If an individual	l, print last nam	e first: e	eg: Doe,	John)		lf	new Cu	stomer, enter previ	ious Custome	er below:
Center for	Christia	an Growth, Iı	nc.									
7. TX SOS/CF	•	Number	8. TX State) (11 digit	ts)		9. Federal Tax ID (9 digits) 10. DUNS Number (if applicable)				
004852010	01		1751671	9204	204 TaxExempt							
11. Type of C	ustomer:	🖂 Corporati	on			Individ	ual	Partnership: 🔲 General 🔲 Limited				
Government:	City 🗌 🤇	County 🗌 Federal 🗌] State 🗌 Othe	r		Sole P	roprie	torship		Other:		
12. Number o								13. Independently Owned and Operated?				
0-20 🛛	21-100	101-250	251-500		501 ar	nd high	er		Yes Yes	L No		
14. Custome	r Role (Pro	posed or Actual) -	- as it relates to	the Reg	gulated	Entity li	isted or	n this foi	rm. Plea	se check one of the	following	
□Owner □Occupation	nal License	ee 🗌 Respo	tor insible Party			wner & oluntar	•		plicant	Other:		
	2549 H	Iwy 46 W										
15. Mailing Address:		<u> </u>				•						
	City	New Braunt	fels	S	tate	ΤX		ZIP	781	32	ZIP + 4	
16. Country I	Mailing Inf	formation (if outsi	de USA)				17. E	-Mail /	Addres	S (if applicable)		
							joh	nmac	@tba	rm.org		
18. Telephon	e Numbei	•		19. Ex	xtensi	on or (Code			20. Fax Numbe	r (if applical	ble)
(830) 620-4263 (()	-						

SECTION III: Regulated Entity Information

 21. General Regulated Entity Information (If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)

 ☑ New Regulated Entity
 □ Update to Regulated Entity Name

 □ Update to Regulated Entity
 □ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).

22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.)

T Bar M Camp Expansion

	2549 Hy	wy 46 W							
23. Street Address of		,							
the Regulated Entity: (<u>No PO Boxes)</u>	City	New Braunfels	State	TX	ZIP	78132		ZIP + 4	4731
24. County	Comal					•			•
	E	nter Physical Loc	ation Descript	ion if no sti	reet addres	s is provide	ed.		
25. Description to Physical Location:		The site is located within the city limits of New Braunfels, located off the intersection of SH 46 and FM 1863, approximently 1.45 miles northwest of Loop 337.							
26. Nearest City						State		Nea	rest ZIP Code
New Braunfels						ΤХ		781	.32
27. Latitude (N) In Decin	nal:			28. L	.ongitude (\	W) In Decim	nal:		
Degrees	Minutes	Se	conds	Degre	ees	Minu	utes		Seconds
29	2	43	18.40		98		11		0.22
29. Primary SIC Code (4 digits) 30. Secondary SIC Code (4 digits) 31. Primary NAICS Code (5 or 6 digits) 32. Secondary NAICS Code (5 or 6 digits)						CS Code			
7032	7032 7999			721214			71390	90	
33. What is the Primary	Business o	f this entity? (De	o not repeat the SIC	or NAICS des	cription.)				
family and day recr	eation ca	mp							
		2549 Hwy 46 W							
34. Mailing									
Address:	City	New Braunfels	State	ТХ	ZIP	781	32	ZIP + 4	4731
35. E-Mail Address				john	mac@tbarr	n.org			•
36. Telepho	one Number		37. Extensio	on or Code		38. F	ax Numb	oer (if appli	cable)
(830) 6	20-4263						()	-	
39. TCEQ Programs and ID form. See the Core Data Form i				ermits/registra	tion numbers	that will be a	iffected by	the updates	submitted on this
Dam Safety	District	S	🛛 Edwards Aqu	uifer	Emissi	ons Inventory	/ Air	Industrial	Hazardous Waste
Municipal Solid Waste	New Se	ource Review Air	OSSF		Petrole	eum Storage	Tank	PWS	
	<u> </u>				<u> </u>				
Sludge	Storm Storm	Water	Title V Air		Tires			Used Oil	
Voluntary Cleanup	Waste	Water	Wastewater	Agriculture	U Water	Rights		Other:	

SECTION IV: Preparer Information

40. Name:	Darren J. M	IcAfee, P.E.		41. Title:	Project Manager
42. Tele	phone Number	43. Ext./Code	44. Fax Number	45. E-Mail	Address
(210)	546-0053		() -	dmcafee	@quiddity.com

SECTION V: Authorized Signature

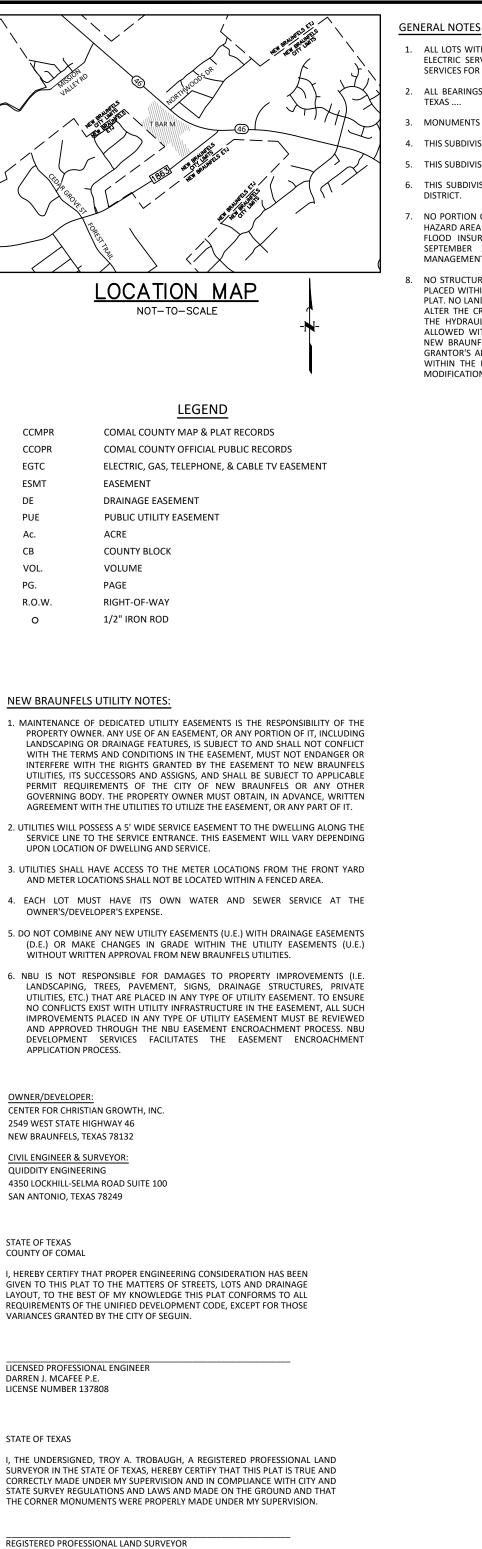
46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified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

Company:	Center for Christian Growth, Inc.	Job Title:	President		
Name (In Print):	John MacDonald			Phone:	(830) 620- 4263

Je Mille Signature: Date:



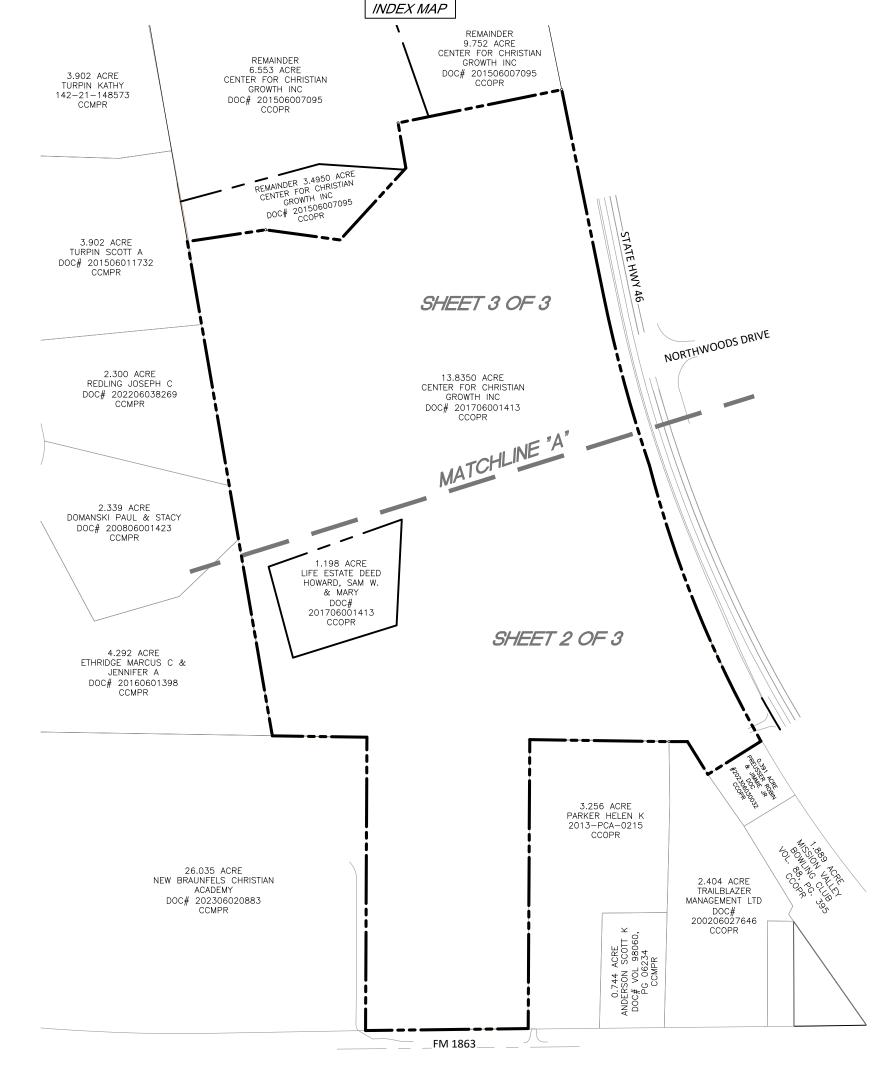
PRELIMINARY PLAT



TROY A. TROBAUGH LICENSE NUMBER 6241

- ALL LOTS WITHIN THE SUBDIVISION WILL BE PROVIDED WATER, SEWER AND ELECTRIC SERVICE BY NEW BRAUNFELS UTILITIES. TELEPHONE AND CABLE SERVICES FOR THE SUBDIVISION WILL BY PROVIDED BY XXX.
- ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED UPON THE
- 3 MONUMENTS WERE FOUND AT
- 4. THIS SUBDIVISION IS WITHIN THE EDWARDS AQUIFER RECHARGE ZONE.
- THIS SUBDIVISION IS WITHIN THE CITY LIMITS OF NEW BRAUNFELS, TEXAS.
- 6. THIS SUBDIVISION IS WITHIN THE NEW BRAUNFELS INDEPENDENT SCHOOL
- NO PORTION OF THIS SUBDIVISION IS LOCATED WITHIN ANY SPECIAL FLOOD HAZARD AREA (100 YR. FLOOD) , AS DEFINED BY THE COMAL COUNTY, TEXAS, FLOOD INSURANCE RATE MAP NUMBER 48091C0435F, EFFECTIVE DATE SEPTEMBER 2, 2009 AS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.
- NO STRUCTURES, WALLS OR OTHER OBSTRUCTIONS OF ANY KIND SHALL BE PLACED WITHIN THE LIMITS OF THE DRAINAGE EASEMENTS SHOWN ON THIS PLAT. NO LANDSCAPING, FENCES, OR OTHER TYPE OF MODIFICATIONS WHICH ALTER THE CROSS SECTIONS OF THE DRAINAGE EASEMENTS OR DECREASE THE HYDRAULIC CAPACITY OF THE EASEMENT, AS APPROVED, SHALL BE ALLOWED WITHOUT THE APPROVAL OF THE CITY ENGINEER. THE CITY OF NEW BRAUNFELS SHALL HAVE THE RIGHT OF INGRESS AND EGRESS OVER GRANTOR'S ADJACENT PROPERTY TO REMOVE ANY OBSTRUCTIONS PLACED WITHIN THE LIMITS OF SAID DRAINAGE EASEMENTS AND TO MAKE ANY MODIFICATIONS OR IMPROVEMENTS WITHIN SAID DRAINAGE EASEMENTS.

- SHALL PREVENT WATER FROM LEAVING THE STREET
- MAINTAINED BY PROPERTY OWNER.
- 13. PERMANENT WATER QUALITY CONTROLS ARE REQUIRED FOR THIS
- 14. PROPOSED LAND USES: FAMILY AND DAY CAMP.



SEE SHEET 3 OF 3 FOR LINE AND CURVE TABLES

9. FUTURE DEVELOPMENT IS SUBJECT TO CHAPTER 114 (STREETS, SIDEWALKS AND OTHER PUBLIC SPACES) OF THE NEW BRAUNFELS CODE OF ORDINANCES.

10. THE ELEVATION OF THE LOWEST FLOOR OF A STRUCTURE SHALL BE AT LEAST 10 INCHES ABOVE THE FINISHED GRADE OF THE SURROUNDING GROUND, WHICH SHALL BE SLOPED IN A FASHION SO AS TO DIRECT STORMWATER AWAY FROM THE STRUCTURE. PROPERTIES ADJACENT TO STORMWATER CONVEYANCE STRUCTURES MUST HAVE A FLOOR SLAB ELEVATION OR BOTTOM OF FLOOR JOISTS A MINIMUM OF ONE FOOT ABOVE THE 100-YEAR WATRER FLOW ELEVATION IN THE STRUCTURE, DRIVEWAYS SERVING HOUSES. ON THE DOWNHILL SIDE OF THE STREET SHALL HAVE A PROPERLY SIZED CROSS SWALE PREVENTING RUNOFF FROM ENTERING THE GARAGE AND

11. NON-RESIDENTIAL SUBDIVISIONS ARE NOT SUBJECT TO PARK LAND DEDICATION AND DEVELOPMENT REQUIREMENTS. HOWEVER AT SUCH TIME ANY DWELLING UNITS ARE CONSTRUCTED, THE OWNER OF THE LOT SHALL CONTACT THE CITY AND COMPLY WITH THE ORDINANCE FOR EACH DWELLING

12. ALL DRAINAGE EASEMENTS WITHIN THE LOTS WILL BE OWNED AND

SUBDIVISION PLAT IN ACCORDANCE WITH THE CITY OF NEW BRAUNFELS DRAINAGE AND EROSION CONTROL DESIGN MANUAL.

TXDOT NOTES:

1. FOR RESIDENTIAL DEVELOPMENT DIRECTLY ADJACENT TO STATE RIGHT-OF-WAY. THE DEVELOPER SHALL BE RESPONSIBLE FOR ADEQUATE SETBACK AND/OR SOUND ABATEMENT MEASURES FOR FUTURE NOISE MITIGATION

2. THE OWNER/DEVELOPER IS RESPONSIBLE FOR PREVENTING ANY ADVERSE IMPACT TO THE EXISTING DRAINAGE SYSTEM WITHIN THE HIGHWAY RIGHT-OF-WAY. OUTFALLS FOR WATER QUALITY AND/OR DETENTION PONDS TREATING IMPERVIOUS COVER RELATED TO THE DEVELOPMENT AND STRUCTURE FOR REDUCTION IN DISCHARGE VELOCITY WILL NOT ENCROACH BY STRUCTURE OR GRADING INTO ROW OR INTO AREAS OF ROW RESERVATION OR DEDICATION. FOR PROJECTS IN THE EDWARD'S AQUIFER RECHARGE, TRANSITION, CONTRIBUTING ZONES, PLACEMENT OF PERMANENT STRUCTURAL BEST MANAGEMENT PRACTICE DEVICES OR VEGETATIVE FILTER STRIPS WITHIN STATE ROW OR INTO AREAS OF ROW RESERVATION OF DEDICATION WILL NOT BE ALLOWED. NO NEW EASEMENTS OF ANY TYPE SHOULD BE LOCATED IN AREAS OF ROW RESERVATION OR DEDICATION.

3. MAXIMUM ACCESS POINTS TO STATE HIGHWAY FROM THIS PROPERTY WILL BE REGULATED AS DIRECTED BY TXDOT'S, "ACCESS MANAGEMENT MANUAL" AND DETERMINED BASED ON AN APPROVED TRAFFIC IMPACT ANALYSIS. INTERNAL ACCESS SHOULD BE PROVIDED BETWEEN THE LOTS. WHERE TOPOGRAPHY OR OTHER EXISTING CONDITIONS MAKE IT INAPPROPRIATE OR NOT FEASIBLE TO CONFORM TO THE CONNECTION SPACING INTERVALS, THE LOCATION OF REASONABLE ACCESS WILL BE DETERMINED WITH CONSIDERATION GIVEN TO TOPOGRAPHY, ESTABLISHED PROPERTY OWNERSHIP, UNIQUE PHYSICAL LIMITATION, AND/OR PHYSICAL DESIGN CONSTRAINTS. THE SELECTED LOCATION SHOULD SERVE AS MANY PROPERTIES AND INTERESTS AS POSSIBLE TO REDUCE THE NEED FOR ADDITIONAL DIRECT ACCESS TO THE HIGHWAY. IN SELECTING LOCATIONS FOR FULL MOVEMENT INTERSECTIONS, PREFERENCE WILL BE GIVEN TO PUBLIC ROADWAYS THAT ARE ON LOCAL THOROUGHFARE PLANS.

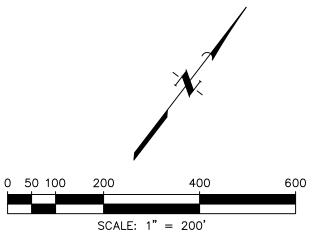
4. IF SIDEWALKS ARE REQUIRED BY APPROPRIATE CITY ORDINANCE, A SIDEWALK PERMIT MUST BE APPROVED BY TXDOT, PRIOR TO CONSTRUCTION WITHIN STATE RIGHT-OF-WAY. LOCATIONS OF SIDEWALKS WITHIN STATE RIGHT-OF-WAY SHALL BE AS DIRECTED BY TXDOT.

5. ANY TRAFFIC CONTROL MEASURES (LEFT-TURN LANE, RIGHT-TURN SIGNAL, ETC.) FOR ANY ACCESS FRONTING A STATE MAINTAINED ROADWAY SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER

PRELIMINARY PLAT ESTABLISHING T BAR M CAMP EXPANSION

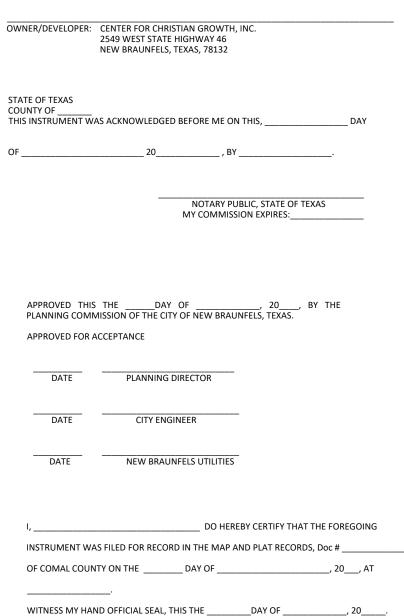
BEING A TOTAL OF 28.957 ACRES OF LAND OUT OF THE CHRISTIAN PAPE SURVEY NO. 831, ABSTRACT NO. 777, CITY OF NEW BRAUNFELS COMAL COUNTY, TEXAS; CONTAINING ALL OF THAT CERTAIN CALLED 15.033 ACRE TRACT CENTER FOR CHRISTIAN GROWTH, INC. DOC. NO. 201706001413; AND ALL OF THE CALLED 4.721 ACRE TRACT CENTER FOR CHRISTIAN GROWTH, INC. DOC. NO. 201606028096; AND A PORTION OF THE CALLED 61.423 ACRE TRACT CENTER FOR CHRISTIAN GROWTH, INC. DOC NO. 201506007095 RECORDED IS THE OFFICIAL PUBLIC RECORDS OF COMAL COUNTY, TEXAS.





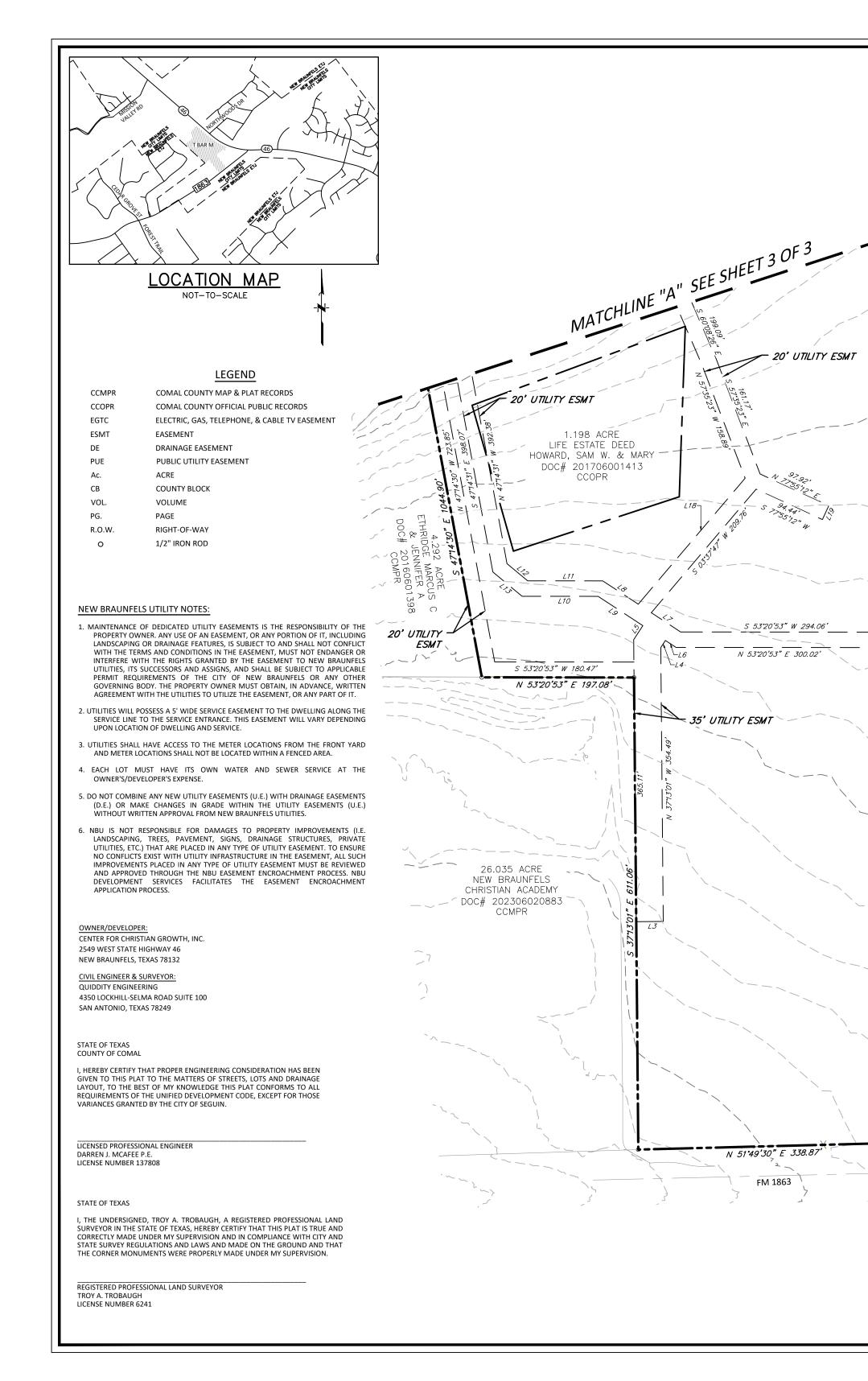
STATE OF TEXAS COUNTY OF

I (WE) THE UNDERSIGNED OWNER(S) OF THE LAND SHOWN ON THIS PLAT, AND DESIGNATED HEREIN SUBDIVISION TO THE CITY OF NEW BRAUNFELS. COUNTY OF COMAL, TEXAS, AND WHOSE NAME IS SUBSCRIBED HERETO, DO HEREBY SUBDIVIDE SUCH PROPERTY AND DEDICATE TO THE USE OF THE PUBLIC ALL STREETS, ALLEYS, PARKS, DRAINS, EASEMENTS, AND PUBLIC PLACES THEREON SHOWN FOR THE PURPOSES AND CONSIDERATION THEREIN EXPRESSED.

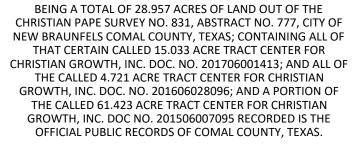


COUNTY CLERK, COMAL COUNTY, TEXAS

DEPUTY

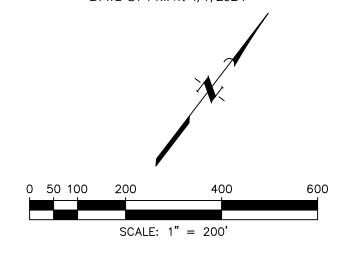








DATE OF PRINT: 4/1/2024

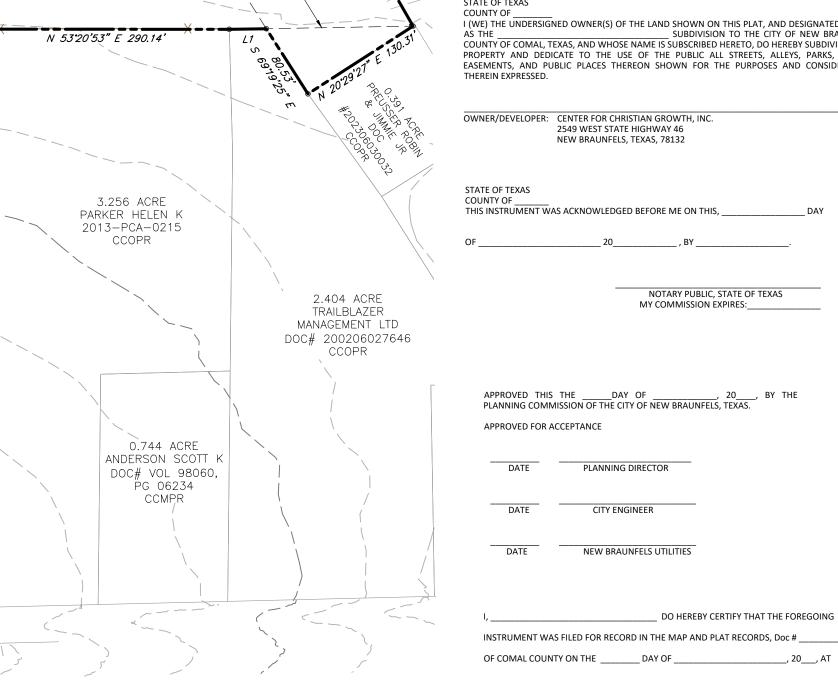




I (WE) THE UNDERSIGNED OWNER(S) OF THE LAND SHOWN ON THIS PLAT, AND DESIGNATED HEREIN AS THE _________SUBDIVISION TO THE CITY OF NEW BRAUNFELS, COUNTY OF COMAL, TEXAS, AND WHOSE NAME IS SUBSCRIBED HERETO, DO HEREBY SUBDIVIDE SUCH PROPERTY AND DEDICATE TO THE USE OF THE PUBLIC ALL STREETS, ALLEYS, PARKS, DRAINS, EASEMENTS, AND PUBLIC PLACES THEREON SHOWN FOR THE PURPOSES AND CONSIDERATION

WITNESS MY HAND OFFICIAL SEAL, THIS THE ______DAY OF _____

20____, BY THE



STATE HWY

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247.9

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20' UTILITY ESMT

60' RIGHT-OF-WAY-

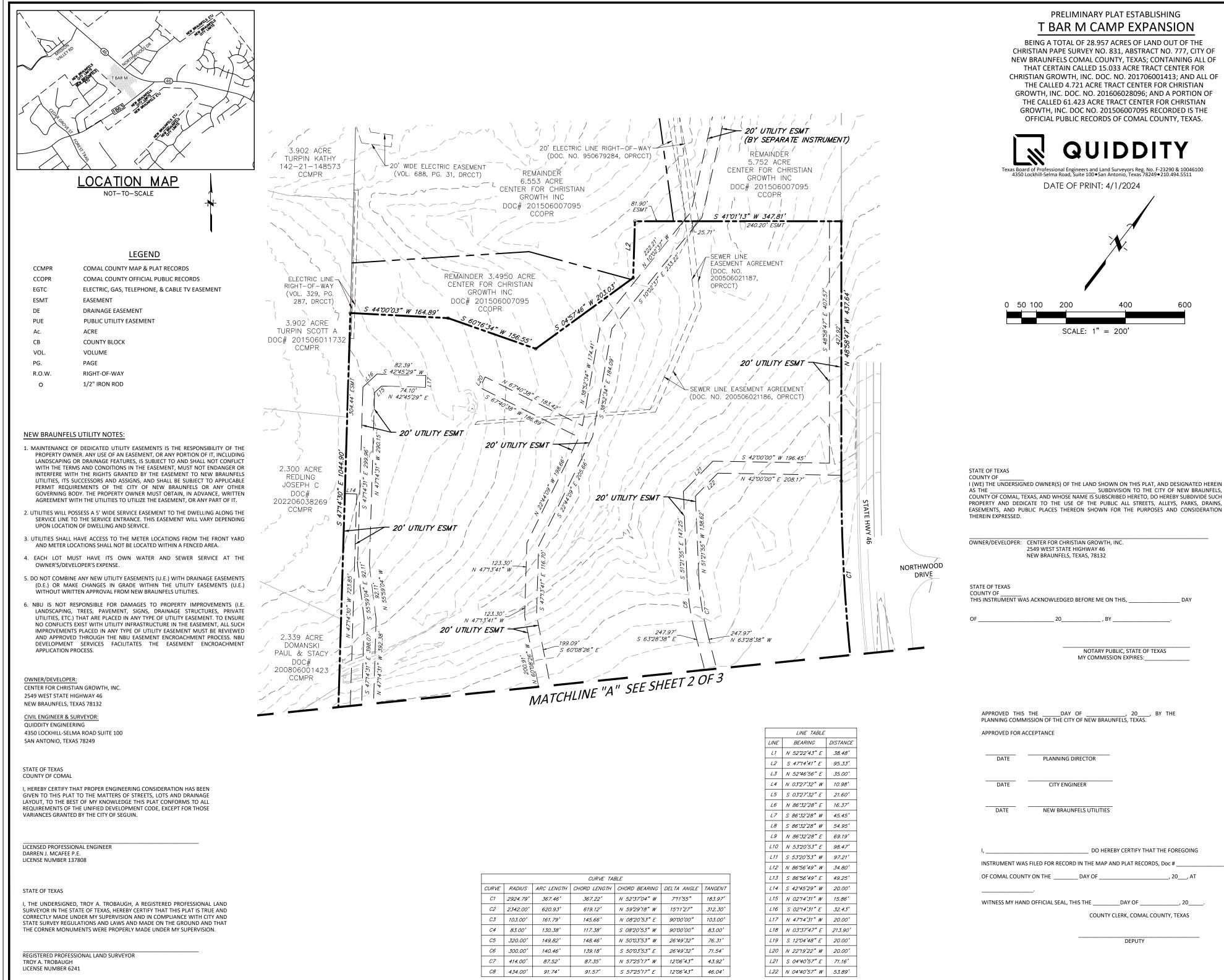
(VOL. 199, PG. 838, DRCCT)

__, 20___, AT

COUNTY CLERK, COMAL COUNTY, TEXAS

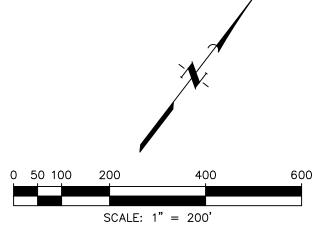
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INSTRUMENT WAS FILED FOR RECORD IN T	HE MAP	AND PLAT RECO	DRDS, Doc #	
OF COMAL COUNTY ON THE DAY	Y OF		, 20_	, AT
·				
WITNESS MY HAND OFFICIAL SEAL, THIS TH	IE	DAY OF		20
	COUNT			VAC

SHEET 3 OF 3

	LINE TABLE	
LINE	BEARING	DISTANC
L1	N 52°22'43" E	38.48
L2	S 47"14'41" E	95.33 ⁻
L3	N 52*46'56" E	35.00
L4	N 03°27'32" W	10.98'
L5	S 03°27'32" E	21.60
L6	N 86°32'28" E	16.37'
L7	S 86°32'28" W	45.45
L8	S 86°32'28" W	54.95
L9	N 86°32'28" E	69.19'
L10	N 53°20'53" E	98.47
L11	S 53°20'53" W	97.21
L12	N 86°56'49" W	34.80
L13	S 86*56'49" E	49.25
L14	S 42°45'29" W	20.00
L15	N 02°14'31" W	15.86'
L16	S 02*14'31" E	32.43
L17	N 47°14'31" W	20.00
L18	N 03°37'47" E	213.90
L19	S 12°04'48" E	20.00
L20	N 2219'22" W	20.00
L21	S 04°40'57" E	71.16'
L22	N 04°40'57" W	53.89'