Bryan W. Shaw, Ph.D., P.E., *Chairman*
Toby Baker, *Commissioner*
Jon Niermann, *Commissioner*
Richard A. Hyde, P.E., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

December 3, 2015

RECEIVED

DEC 23 2015

COUNTY ENGINEER

Mr. Brad Wuest
Wuest Legacy Partners, Ltd.
26495 Natural Bridge Caverns Road
San Antonio, Texas 78266

Re: Edwards Aquifer, Comal County

NAME OF PROJECT: Natural Bridge Caverns; Located at 26495 Natural Bridge Caverns Road; San Antonio, Texas

TYPE OF PLAN: Request for Exception (EXC); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer

Investigation No. 1282407; Regulated Entity No. RN106385081; Additional ID No. 13-15091801

Dear Mr. Wuest:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the request for exception for the above referenced project submitted to the San Antonio Regional Office by Zara Environmental, LLC on behalf of Natural Bridge Caverns on September 18, 2015. The request for exception proposed in the submittal is in general compliance with 30 TAC §213. Therefore, approval of the exception is hereby granted. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this letter.

BACKGROUND

The Natural Bridge Caverns site acreage is 450.087 acres. A Water Pollution Abatement Plan (WPAP) was approved by letter dated April 20, 2004 for expansion of an existing parking lot and expansion of a joint entry road between Natural Bridge Caverns and Natural Bridge Wildlife Ranch. Prior to the 2004 WPAP, there was 6.82 acres of existing impervious cover. The 2004 WPAP increased the impervious cover by 1.15 acres between the two sites, but only 0.69 acres was located on the Natural Bridge Caverns site.

A second WPAP was approved on May 3, 2012 for the construction of a challenge course and zip lines between three tower structures. This WPAP increased the impervious cover by 0.20 acres resulting in an impervious cover total of 7.71 acres.

A WPAP Modification was approved by letter dated September 21, 2012 for the construction of eleven buildings, sidewalks, an activity pad, a wood deck, a ramp down to the cave entrance, and the expansion of the parking lot. The impervious cover for this project was 4.89 acres increasing the total site impervious cover to 12.60 acres (2.79 percent).

This Request for Exception proposes the construction of a tunnel to connect the Discovery Village area to the Ballroom Chamber of Natural Bridge Caverns and allow for tours of portions of the cave that were previously only accessible by off trail wild cave tours. The tunnel will consist of two sections, a trenched section and a blasted section. The trenched section will be constructed by excavating a trench approximately 125 feet in length and 15 feet wide until reaching bedrock suitable for blasting. The proposed tunnel exit will be located beneath Building 11 (Area III) which is a part of the approved construction for the WPAP Modification.

EXCEPTION REQUEST

The Natural Bridge Caverns seeks an exception to the 30 TAC 213.5(f)(2) requirement that all regulated activities be suspended immediately upon discovery of a sensitive feature during construction, replacement or rehabilitation. Specifically that voids encountered in the blasted portion of the tunnel not be sealed, and that work not be required to stop whenever a void is encountered.

EXCEPTION JUSTIFICATION

Equivalent water quality protection of the Edwards Aquifer will be achieved through temporary Best Management Practices during construction, which include excluding surface water from entering the tunnel entrance by constructing berms around the entrance, and protecting the berms from flow in an ephemeral creek with pinned rock gabions. Strict adherence to a spill response and prevention plan will minimize the risk of contaminants entering the Edwards Aquifer due to spills in the tunnel area. To further protect against spills, all equipment that are not required to be located in the tunnel, for example, air compressors, will be placed on the surface with all necessary spill containment precautions taken. In addition, no sensitive karst features within the buffer extending 200 feet in all directions from the trench will be impacted by construction.

The Natural Bridge Caverns proposes to submit monthly reports to the San Antonio Regional Office documenting all voids encountered in the dolomitic member and basal nodular member of the Kainer Formation of the Edwards Group and the Glen Rose Formation of the Trinity Group. A licensed Professional Geoscientist will prepare the reports which will include a hand sketch of the void, dimensions, location within the tunnel and disposition of the void, for example, left open or stabilized due to structural concerns.

This action is taken under authority delegated by the Executive Director of the Texas Commission on Environmental Quality. If you have any questions or require additional information, please contact Dianne Pavlicek-Mesa, P.G., of the Edwards Aquifer Protection Program of the San Antonio Regional Office at 210-403-4074.

Sincerely,

Lynn Bumguardner, Water Section Manager
San Antonio Region Office
Texas Commission on Environmental Quality

LB/DPM/eg

cc: Mr. Brian Cowan, P.G., Zara Environmental, LLC
Mr. Thomas H. Hornseth, P.E., Comal County Engineer
Mr. Scott Halty, San Antonio Water System
Mr. Roland Ruiz, Edwards Aquifer Authority

Bryan W. Shaw, Ph.D., *Chairman*
Toby Baker, *Commissioner*
Richard A. Hyde, P.E., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 22, 2015

RECEIVED
SEP 24 2015
COUNTY ENGINEER

Mr. Thomas H. Hornseth, P.E.
Comal County Engineer
195 David Jonas Drive
New Braunfels TX 78132-3710

Re: Edwards Aquifer, Bexar County
PROJECT NAME: Natural Bridge Caverns, located at 26495 Natural Bridge Caverns Road, San Antonio, Texas

PLAN TYPE: Application for an Exception Request, 30 Texas Administration Code (TAC) Chapter 213; Edwards Aquifer Protection Program

Dear Mr. Hornseth:

The referenced application is being forwarded to you pursuant to the Edwards Aquifer Rules. The Texas Commission on Environmental Quality (TCEQ) is required by 30 TAC Chapter 213 to provide copies of all applications to affected incorporated cities and underground water conservation districts for their comments prior to TCEQ approval. More information regarding this project may be obtained from the TCEQ Central Registry website at http://www.tceq.state.tx.us/permitting/central_registry/.

Please forward your comments to this office by October 22, 2015.

The Texas Commission on Environmental Quality appreciates your assistance in this matter and your compliance efforts to ensure protection of the State's environment. If you or members of your staff have any questions regarding these matters, please feel free to contact the San Antonio Region Office at (210) 490-3096.

Sincerely

Todd Jones
Water Section Work Leader
San Antonio Regional Office

TJ/eg

TCEQ-R13
SEP 18 2015
SAN ANTONIO

Texas Commission on Environmental Quality

Edwards Aquifer Application Cover Page

Our Review of Your Application

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

Administrative Review

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

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

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.

3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.

4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

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

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.

6. If the geologic assessment was completed before October 1, 2004 and the site contains "possibly sensitive" features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

Technical Review

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

2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be clearly marked, features identified in the geologic assessment should be flagged, roadways marked and the alignment of the Sewage Collection System and manholes should be staked at the time the application is submitted. If the site is not marked the application may be returned.

3. We evaluate the application for technical completeness and contact the applicant and agent via Notice of Deficiency (NOD) to request additional information and identify technical deficiencies. There are two deficiency response periods available to the applicant. There are 14 days to resolve deficiencies noted in the first NOD. If a second NOD is issued, there is an additional 14 days to resolve deficiencies. If the response to the second notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, the application must be withdrawn or if not withdrawn the application will be denied and the application fee will be forfeited.

4. The program has 90 calendar days to complete the technical review of the application. If the application is technically adequate, such that it complies with the Edwards Aquifer rules, and is protective of the Edwards Aquifer during and after construction, an approval letter will be issued. Construction or other regulated activity may not begin until an approval is issued.

Mid-Review Modifications

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

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

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

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

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

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

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

1. Regulated Entity Name: Natural Bridge Caverns						**2. Regulated Entity No.:** RN 106385081			
3. Customer Name: Wuest Legacy Partners, Ltd./Wuest Millennial Partners, Ltd.						**4. Customer No.:** CN 602569725			
5. Project Type: (Please circle/check one)	New		Modification			Extension		Exception ☑	
6. Plan Type: (Please circle/check one)	WPAP ☐	CZP	SCS	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: (Please circle/check one)	Residential		Non-residential ☑			**8. Site (acres):**			4.25
9. Application Fee:	$500		**10. Permanent BMP(s):**			N/A			
11. SCS (Linear Ft.):	N/A		**12. AST/UST (No. Tanks):**			N/A			
13. County:	Comal		**14. Watershed:**			Bear Creek/Dry Comal Creek			

Application Distribution

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

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

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

Austin Region			
County:	**Hays**	**Travis**	**Williamson**
Original (1 req.)	___	___	___
Region (1 req.)	___	___	___
County(ies)	___	___	___
Groundwater Conservation District(s)	___Edwards Aquifer Authority ___Barton Springs/ Edwards Aquifer ___Hays Trinity ___Plum 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.)	___	1 ✓	___	___	___
Region (1 req.)	___	1 ✓	___	___	___
County(ies)	___	1 ✓	___	___	___
Groundwater Conservation District(s)	___ Edwards Aquifer Authority ___Trinity-Glen Rose	1 ✓ Edwards Aquifer Authority	___Kinney	___EAA ___Medina	___EAA ___Uvalde
City(ies) Jurisdiction	___Castle Hills ___Fair Oaks Ranch ___Helotes ___Hill Country Village ___Hollywood Park ___San Antonio (SAWS) ___Shavano Park	___Bulverde ___Fair Oaks Ranch ___Garden Ridge ___New Braunfels ___Schertz 1 ✓ San Antonio (SAWS)	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.

Brian Cowan, P.E.
Print Name of Customer/Authorized Agent

Signature of Customer/Authorized Agent — Date: 9/18/15

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

General Information Form

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.

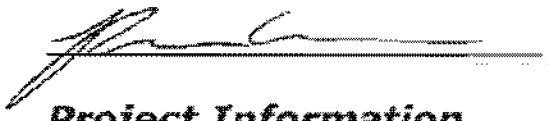
Signature

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: Brian Cowan

Date: 09/18/2015

Signature of Customer/Agent:



Project Information

1. Regulated Entity Name: Natural Bridge Caverns
2. County: Comal
3. Stream Basin: Bear Creek & Dry Comal Creek
4. Groundwater Conservation District (If applicable): Edwards Aquifer Authority
5. Edwards Aquifer Zone:

   ☒ Recharge Zone
   ☐ Transition Zone

6. Plan Type:

   ☐ WPAP
   ☐ SCS
   ☐ Modification
   ☐ AST
   ☐ UST
   ☒ Exception Request

7. Customer (Applicant):

Contact Person: Brad Wuest, Manager Wuest Capital Management, LLC
Entity: Wuest Legacy Partners, Ltd. By Wuest Capital Management, LLC Its General Partner
Mailing Address: 26495 Natural Bridge Caverns Road
City, State: San Antonio, Texas Zip: 78266-2671
Telephone: 210-651-6101 FAX: 210-651-6144
Email Address: bwuest@naturalbridgecaverns.com

8. Agent/Representative (If any):

Contact Person: Brian Cowan, P.G.
Entity: Zara Environmental, LLC
Mailing Address: 1707 FM 1626
City, State: Manchaca, Texas Zip: 78652
Telephone: 512-632-8409 FAX: 866-908-9137
Email Address: brian@zaraenvironmental.com

9. Project Location:

☐ The project site is located inside the city limits of _____.
☒ The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of San Antonio, Texas.
☐ 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.

26495 Natural Bridge Caverns Road, San Antonio, Texas, also called FM 3009. On the west side of FM 3009 approximately 7.3 miles north of IH-35

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: 10/18/2015

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
- ☒ 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: Tourist Cave and associated surface attractions

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:

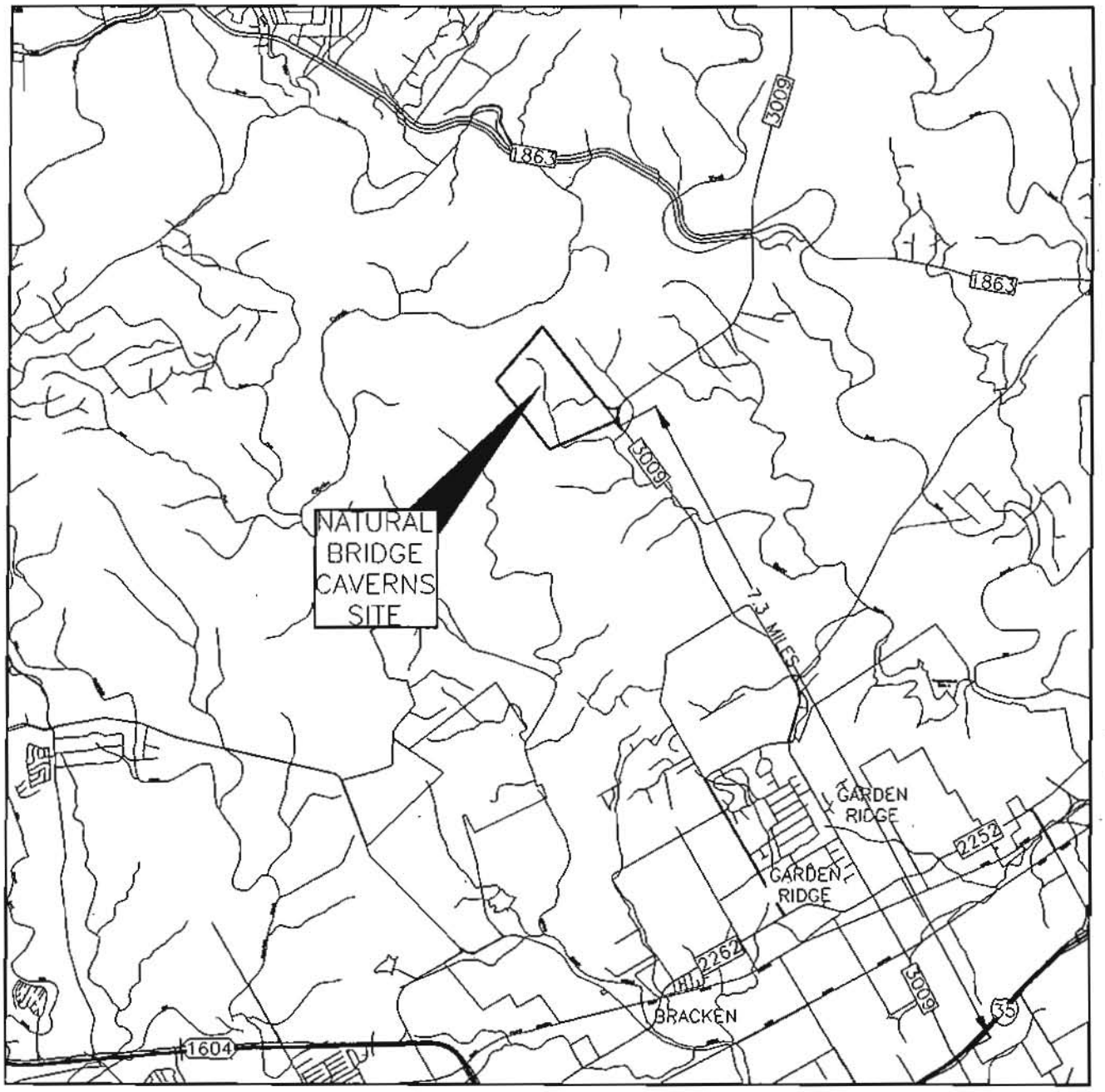
- ☐ TCEQ cashier
- ☐ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
- ☒ San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

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. ☒ 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.

ROAD MAP

ATTACHMENT A



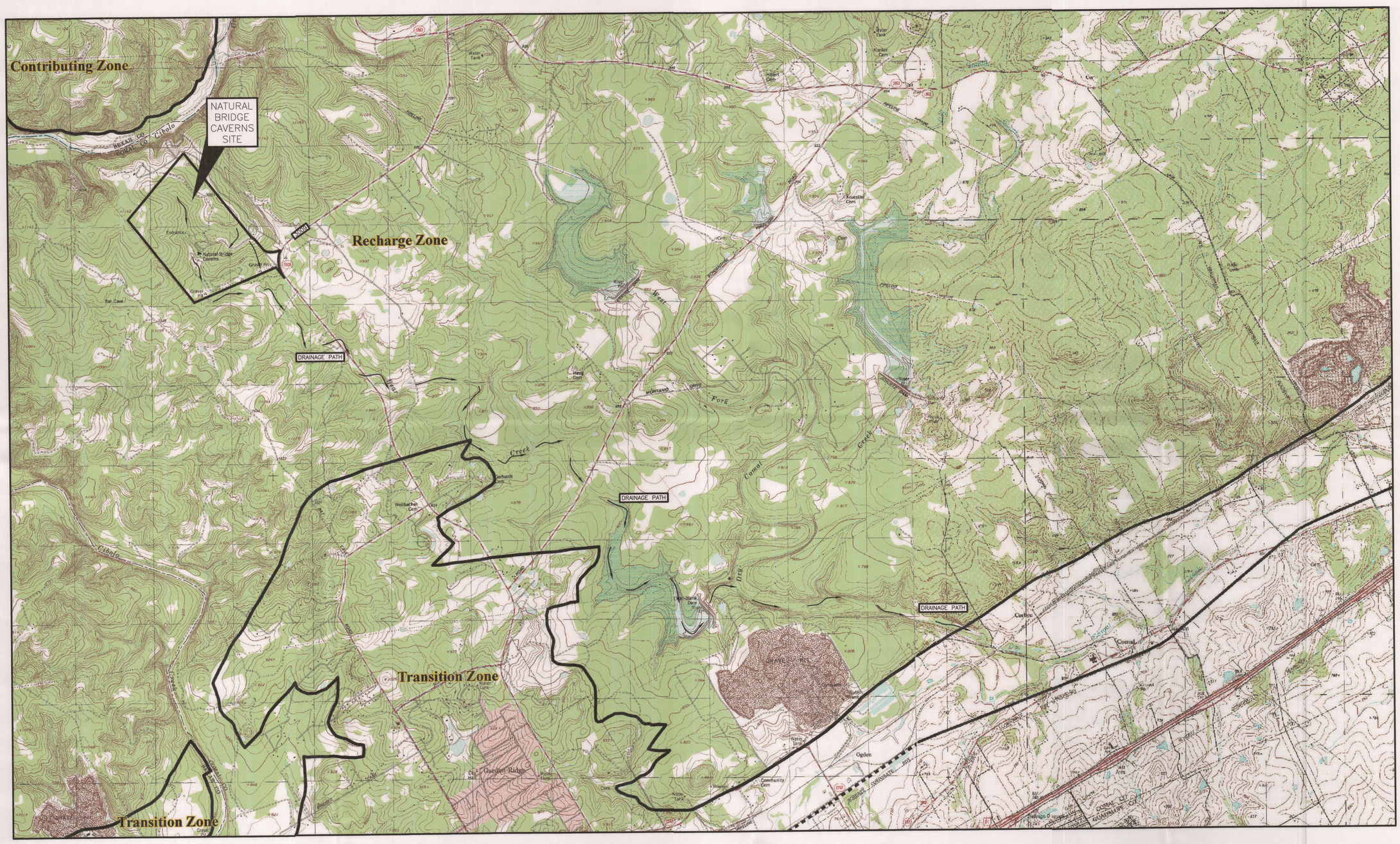
N

SCALE: 1"=8000'

NATURAL BRIDGE CAVERNS
26495 NATURAL BRIDGE CAVERNS RD (FM 3009)
WUEST LEGACY PARTNERS, LTD./
WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

BAT CAVE AND WEST NEW BRAUNFELS USGS QUADRANGLE MAP

ATTACHMENT B


Contributing Zone
NATURAL BRIDGE CAVERNS SITE
Recharge Zone
Transition Zone
Transition Zone
DRAINAGE PATH
DRAINAGE PATH
DRAINAGE PATH
Bat Cave
Natural Bridge Caverns
Entrance
Well
Gravel Pit
Gravel Pit
Cibolo
Creek
Comal
Creek
Dry
Fork
Creek
Creek
Ogden
Garden Ridge
Comal
Curtis
Water Tank
Water Tank
Community Cem
Gerhardt Cem
Wellbacher Cem
Hilbert Cem
Kranitz Cem
Knuestle Cem
Harris Cem
Fire-Black Dam
Fire-Black Dam
Water Tank
Water Tank
Water Tank

NATURAL BRIDGE CAVERNS

ATTACHMENT C – PROJECT DESCRIPTION

Site Location and Description: Natural Bridge Caverns have been a popular tourist attraction since 1888. Natural Bridge Caverns is located within the Edwards Aquifer Recharge Zone on 450.078 acres, in Comal County, Texas. The development is located on the west side of FM 3009 approximately 7.3 miles north of Interstate Highway 35. The 450.078 acre development is composed of three parcels:

Property	Acreage
Wuest Legacy Partners, Ltd. (100)	99.811 acres
Wuest Millennium Partners, Ltd. (150)	150.000 acres
Wuest Millennium Partners, Ltd. (200)	200.267 acres
Total	450.078 acres

The existing development consists of 12.54 acres of developed, impervious area and 442.568 acres of pervious, undeveloped area = 12.54/450.078 = 2.78%.

During the spring of 2004, a water pollution abatement plan was submitted to TCEQ for construction to widen the entry way (for the purpose of patron safety) and expansion of an existing parking lot. The 2004 water pollution abatement plan included improvements on Natural Bridge Caverns Wildlife Ranch, Inc. (127 acres) which shares the common entrance with Natural Bridge Caverns Wuest Legacy Partners, Ltd. (100 acres) and Wuest Millennium Partners, Ltd. (200 acres). This expansion installed all permanent BMPs on the Wuest Legacy Partners, Ltd. and Wuest Millennium Partners, Ltd. (hereafter referred to as "Natural Bridge Caverns") property for all constructed improvements. The permanent BMPs consisted of vegetative filter strips along the entrance road.

Prior Improvements: The existing development consists of previously constructed access roads, parking, main building & visitor's center, craft village, retail shop, stage, playgrounds, walking trails, cave entrances, rock shop, concessions building, pavilions, zip line, miniature golf, warehouse, creeks, ponds, suspended bridge and natural bridge.

Of the existing 12.54 acres of on-site impervious cover on the Wuest Legacy Partners, Ltd. and Wuest Millennium Partners, Ltd. property, approximately, with 11.65 acres is currently not being captured for treatment and 0.89 acres is being treated with vegetative strips.

Proposed Improvements: All proposed improvements and BMPs construction will occur on the property of Wuest Legacy Partners, Ltd. and Wuest Millennium Partners, Ltd.; none of the improvements are proposed on the Natural Bridge Caverns Wildlife Ranch, Inc. property.

Natural Bridge Caverns proposes to construct a tunnel to connect the "Discovery Village" area, which consists of shops, food stands, and other attractions, to the Ballroom Chamber of Natural Bridge Caverns and allow for tours of portions of the cave that were previously only accessible by off trail "wild cave tours". The tunnel will consist of two sections, a trenched section and a blasted section. The trenched section will be constructed first to allow access to bedrock suitable for blasting. The trenched section will be constructed by excavating a trench approximately 125 feet long and 15 feet wide until reaching bedrock suitable for blasting (see Temporary Stormwater Section TCEQ-0602 for details). A concrete cap will be poured in the trenched section to provide a ceiling for the top of the tunnel and

close off the tunnel from surface runoff. After the cap is poured, the trench will be filled in. A chain trencher, excavator, and skid steer will be used to excavate the trench section. Three vent shafts will be drilled on the surface in line with the tunnel to vent the tunnel during construction, provide a conduit for power/air/water during construction, and give survey points along the tunnel line. Well pads will be constructed to the standards required by the Edwards Aquifer Rules. No exception request is sought for the trench section of the tunnel.

The blasted section will be excavated using a pneumatic rock drill and skid steer loader and a diesel-powered compressor to drill holes for blasting agents. Dyno Nobel Dyno-AP underground explosives will be used for tunnel blasting. Natural Bridge Caverns is seeking an exception for voids encountered within the blasted portion of the tunnel and the specifics of the request are described in the Recharge and Transition Zone Exception Request Form (TCEQ-0628) section. The project design will provide equivalent protections to the Edwards Aquifer as is described in the Exception Request Form (TCEQ-0628).

The areas of soil disturbance during construction will extend approximately 40 feet from the proposed structures. After the completion of the tunnel, a building will be constructed to cover the trench opening, and the impervious cover associated with that building has been previously permitted through a separate WPAP.

Recharge and Transition Zone Exception Request Form

Texas Commission on Environmental Quality
30 TAC §213.9 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 **Recharge and Transition Zone Exception Request Form** is hereby submitted for TCEQ review and executive director approval. The request was prepared by:

Print Name of Customer/Agent: Brian Cowan, P.G. for Natural Bridge Caverns, Inc.
Date: 09/18/2015
Signature of Customer/Agent:



Regulated Entity Name: Natural Bridge Caverns, Inc.

Exception Request

1. ☒ **Attachment A - Nature of Exception.** A narrative description of the nature of each exception requested is attached. All provisions of 30 TAC §213 Subchapter A for which an exception is being requested have been identified in the description.
2. ☒ **Attachment B - Documentation of Equivalent Water Quality Protection.** Documentation demonstrating equivalent water quality protection for the Edwards Aquifer is attached.

Administrative Information

3. ☒ 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.
4. ☒ The applicant understands that no exception will be granted for a prohibited activity in Chapter 213.
5. ☒ The applicant understands that prior approval under this section must be obtained from the executive director for the exception to be authorized.

ATTACHMENT A – NATURE OF EXCEPTION

Natural Bridge Caverns is seeking an exception to 30 TAC 213.5 (f) (2). Specifically that voids encountered in the blasted portion of the tunnel not be sealed, and that work not be required to stop whenever a void is encountered. Leaving encountered voids open will provide a more aesthetically pleasing experience for guests and opportunities for education about groundwater flow through karst limestone and the sensitivity of the Edwards Aquifer. Given the highly karstic nature of the area around Natural Bridge Caverns, stoppage of work for all void encounters in the blasted portion of the tunnel would result in significant and costly delays in tunneling. Tunneling is anticipated to take approximately 18 months to complete.

We propose to submit monthly reports to the TCEQ San Antonio Office documenting all voids encountered and their disposition. A licensed Professional Geologist or a person trained by a licensed Professional Geologist will prepare the reports. Reports will include a hand sketch of the void, dimensions, location within the tunnel, and the disposition of the void (i.e. left open, stabilized due to structural concerns, etc.).

Based on well logs, observations in Natural Bridge Caverns and an analysis of geologic maps, the contact between the Edwards Group Limestones and the upper member of the Glen Rose limestone is thought to occur at approximately 970 feet above sea level. At the location of the proposed tunnel, the Edwards Group is approximately 20 feet thick; however the thickness likely varies based on topography and undulation of the geologic strata. Because of the well-known hydrologic connection between the Edwards Group and Glen Rose limestone, we propose to treat the entire tunnel as if it is within the Edwards Group even though only the the upper 20 feet of the tunnel will be within the Edwards Group.

TCEQ guidelines[1] indicate the following: "*The natural buffer around the cave should extend a minimum of 50 feet in all directions around the delineated cave footprint as well as any associated openings and sinkholes. Where the boundary of the drainage area to the cave lies more than 50 feet from the footprint, the buffer should extend to the boundary of the drainage area or 200 feet, whichever is less.*" Because the tunnel will function hydrologically similar to a cave, the analysis area for this exception request includes a buffer area extending 200 feet in all directions from the entrance. The 200 foot distance is the most protective buffer area described in section 5.1.3 Caves. The trench and blasted portions of the tunnel are within the Dolomitic Member and Basal Nodular Member of the Edwards Group and the Glen Rose Formation of the Trinity Group. The project design will provide equivalent protections to the Edwards Aquifer as is described in Attachment B (TCEQ-0628).

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[1] Addendum Sheet to RG-348. Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices RG-348 (Revised July 2005)

ATTACHMENT B – DOCUMENTATION OF EQUIVELANT WATER QUALITY PROTECTION

The project will provide equivalent protections to the Edwards Aquifer. During the construction phase, temporary BMPs, careful management of potential pollutants, and adherence to a spill response plan will protect the Edwards Aquifer. To keep surface runoff from entering the trench and tunnel during construction, spoils from trenching will be used to create a berm around the trench. A small portion of the trench will be within the 100-year floodplain as it is mapped by FEMA, therefore, the berm will be at least 18 inches higher than the natural grade and at a minimum elevation of 991 feet, which is higher in elevation than the 100-year floodplain. Pinned rock gabions will be placed along the upstream sides of the berm within the 100-year floodplain to ensure that any abnormally high flow cannot erode the berms and flow into the trench or tunnel during construction. The significant temporary BMP's we propose are provided as an abundance of caution. BMPs and detailed drawings of the berm and pinned rock gabion are shown in the Temporary Stormwater Section (TCEQ-0602).

No karst features are known within 200 feet of the trenched section of the tunnel, which will be the only portion of the tunnel that will disturb the ground surface. No impacts to known karst features will occur due to the distance of known features from the trench, and the installation of BMPs around the trench. Known karst features are shown in the Temporary Stormwater Section (TCEQ-0602).

Prior to commencement of tunneling, three ventilation/access shafts will be drilled to intersect the proposed tunnel alignment. These shafts will only extend to the depth of the proposed tunnel and not to the water table. Their purpose is to serve as control points to verify position during tunneling, to provide a conduit for compressed air lines, power cables and communications lines during the construction phase, and for power and communications lines during operation. All portions of the ventilation/access shafts will be installed to meet Edwards Aquifer well requirements including casing through the Edwards Group Limestone (approximately top 20 feet of shafts) and a poured concrete well pad. The pad will be approximately 6 feet by 6 feet by 6 inches with a steel utility cover over the shaft opening. A four inch curb will be poured on top of the pad on the uphill side to prevent any runoff from flowing over the pad and into the shaft opening.

During the operation phase, exclusion of potentially contaminated surface runoff from entering the tunnel will provide equivalent protections to the Edwards Aquifer. After completion of the cap, soil will be backfilled over much of the cap (leaving only the entrance exposed) and the surface will be revegetated. An exit building/pavilion will be constructed over the point where the tunnel reaches the surface. The exit tunnel will be sealed with doors installed to secure the tunnel and control access. The additional impervious cover created by that building/pavilion has already been permitted through a previous WPAP modification (Investigation No. 3044.01) approved on September 21, 2012. and identified as "Building 11". The building/pavilion will be built so that it will

divert all runoff away from the tunnel entrance. The tunnel entrance and building/pavilion will be outside of the 100-year floodplain.

To reduce the chance of a fuel or fluid leak within the tunnel during the construction phase, all air compressors and other support equipment will be staged on the surface where practical. Compressors and other support equipment will be removed at the end of construction. No fuels, chemicals, or other potential contaminants will be stored in the tunnel during or after construction. A spill response plan will be followed and is outlined in Attachment A of the Temporary Stormwater Section (TCEQ-0602).

In summary, equivalent protections for the Edwards Aquifer will be achieved through temporary BMPs during construction, which include excluding surface runoff from entering the tunnel entrance by constructing berms around the entrance, and protecting the berms from flow in an ephemeral creek with pinned rock gabions. Strict adherence to a spill response and prevention plan will minimize the risk of contaminants entering the Edwards Aquifer due to spills in the tunnel area. To further protect against spills, all equipment that are not required to be located in the tunnel (i.e. air compressors) will be placed on the surface with all necessary spill containment precautions taken. No sensitive karst features will be impacted by construction and operation as detailed above. During the operation phase, equivalent protections will be achieved by preventing runoff from entering the tunnel. A building/pavilion will be placed at the tunnel exit. The tunnel exit will be sealed and doors installed to secure and control access. The three ventilation shafts will be placed out of the 100-year floodplain and will be constructed to the standards applied to Edwards Aquifer wells.

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.

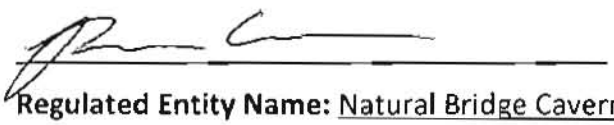
Signature

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: Brian Cowan. P.G. for Natural Bridge Caverns, Inc.

Date: 09/18/2015

Signature of Customer/Agent:



Regulated Entity Name: Natural Bridge Caverns, Inc.

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: Diesel Fuel, Engine Oil, Engine Coolant, Hydraulic Oil, Drill Oil, Cleaning Solvents,

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

   ☒ Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year.

☐ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.

☐ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.

☐ 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: Bear Creek/Dry Comal Creek

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. ☐ 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 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. ☒ 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.

NATURAL BRIDGE CAVERNS

ATTACHMENT A – SPILL RESPONSE ACTIONS

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

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

Education

(1) Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use and what is appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when spill must be reported to the TCEQ. Information available in 30 TAC 327.4 and 40 CFR 302.4.

(2) Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

(3) Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

(4) Establish a continuing education program to indoctrinate new employees.

(5) Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

(1) To the extent that the work can be accomplished safely, spills of oil, petroleum Products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.

(2) Store hazardous materials and wastes in covered containers and protect from vandalism.

(3) Place a stockpile of spill cleanup materials where it will be readily accessible.

(4) Train employees in spill prevention and cleanup.

(5) Designate responsible individuals to oversee and enforce control measures.

(6) Spills should be covered and protected from stormwater run-on during rainfall to the extent that it doesn't compromise clean up activities.

(7) Do not bury or wash spills with water.

(8) Store and dispose of used clean materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

(9) Do not allow water used for cleaning and decontamination to enter watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.

(10) Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

(11) Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup and spill reporting instructions for hazardous materials stored. or used on the project site in an open, conspicuous, and accessible location.

(12) Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed proper function.

Cleanup

(1) Clean up leaks and spills immediately.

(2) Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spills material is hazardous, then the used cleanup materials also hazardous and must be disposed of as hazardous waste.

(3) Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

(1) Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

(2) Use absorbent materials on small spills rather than hosing down or burying the spill.

(3) Absorbent materials should be promptly removed and disposed of properly.

(4) Follow the practice below for a minor spill:

a. Contain the spread of the spill.
b. Recover spilled materials.

c. Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

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

Spills should be cleaned up immediately:

(1) Contain spread of the spill.

(2) Notify the project foreman immediately.

(3) If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.

(4) If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

(5) If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

(1) Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM AND 5 PM. After hours, contact the Environmental release Hotline at 1-800832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

(2) For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110, 119, and 302, the contractor should notify the National Response Center at (800)424-8802.

(3) Notification should first be made by telephone and followed up with a written report.

(4) The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

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

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

Vehicle and Equipment Maintenance

(1) If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills.

(2) Regularly inspect onsite vehicles and equipment for leaks and repair immediately

(3) Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oils and fluids. Do not allow leaking vehicles or equipment onsite.

(4) Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.

(5) Place drip pans or absorbent materials under equipment when not in use.

(6) Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.

(7) Promptly transfer used fluids to the proper waster or recycling drums. Don't leave full drip pans or other open containers lying around.

(8) Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.

(9) Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

(1) If fueling must occur on site, use designated areas, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills.

(2) Discourage "topping off" of fuel tank. Always use secondary containment, such as drain pan, when fueling to catch spill/leaks.

Concrete Trucks

Concrete trucks will only be allowed to washout or discharge surplus concrete or drum wash water to a washout pit.

NATURAL BRIDGE CAVERNS

ATTACHMENT B – POTENTIAL SOURCES OF CONTAMINATION

The materials of substances listed below are expected to be present onsite during construction or are potential sources of contamination:

1. Concrete
2. Petroleum based fuel and lubricant products
3. Hydraulic fluid
4. Cleaning solvents
5. Concrete truck wash out
6. Wastewater from portable restrooms (Port-o-Potties)
7. Fertilizers
8. Seed or sod

NATURAL BRIDGE CAVERNS

ATTACHMENT C – SEQUENCE OF MAJOR ACTIVITIES

The sequence of major activities for this project is as follows:

1. Install temporary controls including silt fence, earthen berm, rock gabion, and washout pit.
2. Perform the clearing, grubbing, stockpiling, and earthwork for the site.
3. Prepare for excavation of trench portion of tunnel.
4. Excavate trench portion of tunnel until reaching competent bedrock suitable for a blasted tunnel.
5. Pour concrete cap to form walls and ceiling of trenched portion of the tunnel.
6. Backfill area around and above concrete cap leaving only tunnel exit exposed.
7. Reestablish vegetation in backfilled areas not needed for construction.
8. Remove Temporary BMPs after establishing vegetation.
9. Construct blasted portion of tunnel.

The table below lists the disturbed surface area for each activity:

ACTIVITY	DISTURBED AREA (SF)
1	0.15
2	0.55
3	0.09
4	0.46
5	0.05
6	0.09
7	0.46
8	0.15
9	0.00

NATURAL BRIDGE CAVERNS

ATTACHMENT D – TEMPORARY BMPS AND MEASURES

1. There is no upgradient runoff from adjacent properties. The proposed construction is approximately 1,300 feet upstream from the property line.

2. Temporary best management practices that will be used on-site are described below:

    a. Silt fences – Silt fences will trap excess silt and other debris from discharging off the site during construction. Silt fence will be implemented prior to the start of construction.
    b. Earthen berm – A temporary earthen berm will be constructed around the trench excavation area so that it is higher in elevation than the mapped 100-year floodplain.
    c. Pinned rock gabions – Pinned rock gabions will be placed on the upstream sides of the temporary earthen berm to prevent erosion of berms by exceptionally high flow.
    d. Temporary concrete washout pit - A temporary concrete washout pit for concrete trucks will be provided as a place to dispose of unused concrete form concrete mix trucks. The washout pit will be inspected and cleaned out on a one-week interval.
    e. Hydromulch seeding for restoration of vegetation – Vegetation will be restored and allow for natural protection of the aquifer. Vegetation will be restored at the completion of construction.

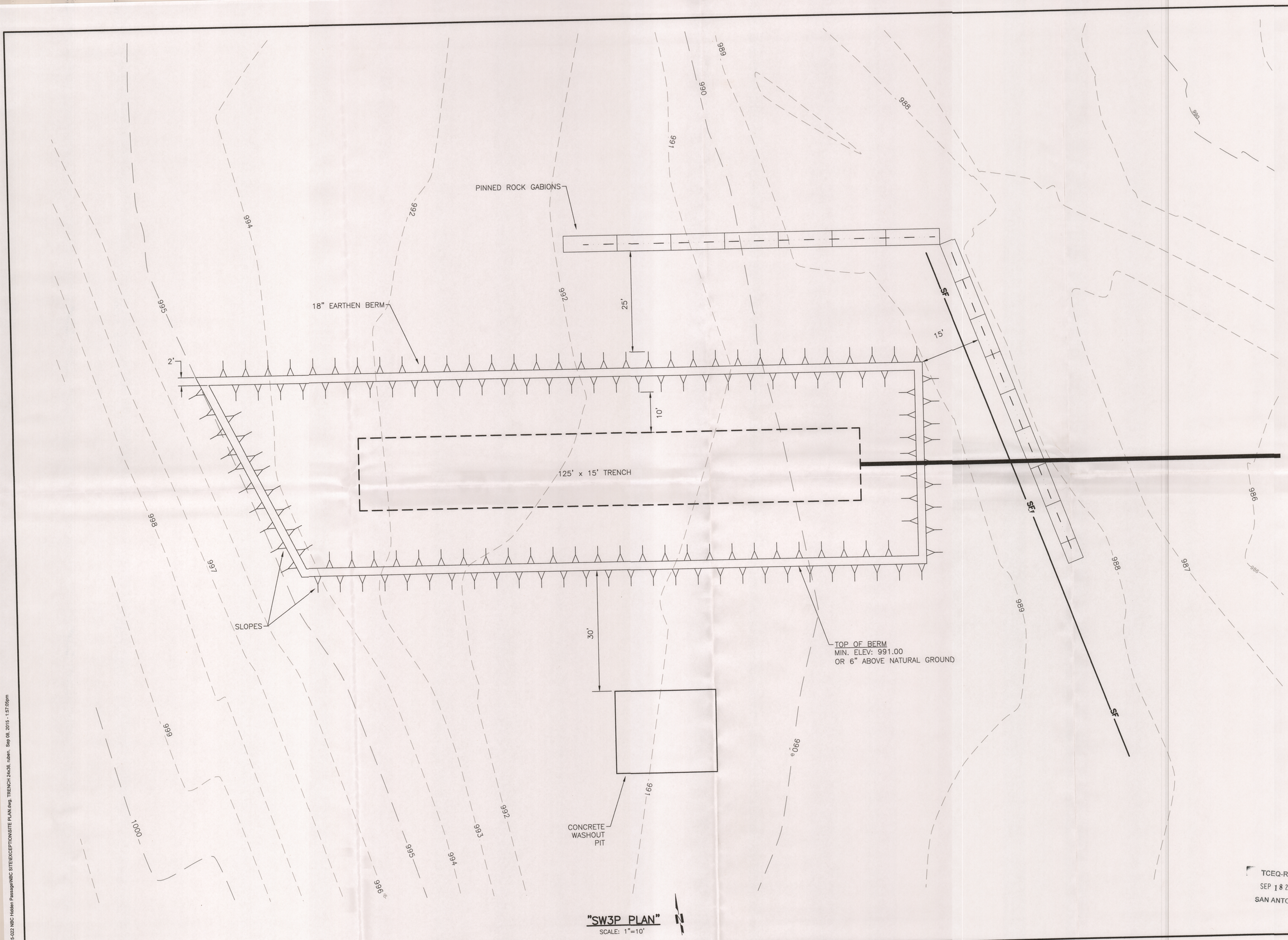
3. No sensitive features will be plugged during construction.
4. No sensitive features are within 200 feet of the trench area and all upstream runoff will be allowed to flow downstream from the trench area, therefore drainage to any downgradient karst features will be maintained.

NATURAL BRIDGE CAVERNS

ATTATCHMENT F – STRUCTURAL PRACTICES

Structural practices for the temporary filtration of storm water runoff from this site and to prevent runoff from entering the trench excavation include:

1. Silt fencing at various locations
2. Establish temporary earthen berm around trench excavation area that is higher than the mapped 100-year floodplain.
3. Place pinned rock gabions on the upstream sides of the temporary earthen berm to prevent erosion of berms by exceptionally high flow.
4. A temporary concrete washout pit for concrete trucks will be provided as a place to dispose of unused concrete from concrete mix trucks. The washout pit will be inspected and cleaned out on a one-week interval.



"SW3P PLAN"
SCALE: 1"=10'

STATE OF TEXAS
ADAM B. WALL
51112
REGISTERED
PROFESSIONAL ENGINEER
09/08/15

SLAY ENGINEERING CO., INC.
CIVIL - SURVEYING - CONSULTING
123 ALTGELT AVE.
SAN ANTONIO, TEXAS 78201
TELEPHONE (210) 734-4388
TBPE FIRM REGISTRATION NO. F1901

SLAY ENGINEERING CO., INC.

NATURAL BRIDGE CAVERNS

26495 NATURAL BRIDGE CAVERNS RD. (FM 3009)
SAN ANTONIO, TEXAS

REVISIONS

NO.	REVISION

DESIGNED BY: A.B.W.	DRAWN BY: R.M
CHECKED BY: M.M.S.	DATE: 09/8/2015
SCALE: 1" = 10'	
JOB NO. 15-022	
SHEET NO. 1 OF 1	

TCEQ-R13
SEP 18 2015
SAN ANTONIO

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NATURAL BRIDGE CAVERNS

ATTACHMENT G – DRAINAGE AREA MAP

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TCEQ-R13
SEP 18 2015
SAN ANTONIO

NO.	REVISION

DESIGNED BY: A.B.W. | DRAWN BY: R.M
CHECKED BY: M.M.S. | DATE: 09/11/2015
SCALE: 1" = 60'
JOB NO. 15-022
SHEET NO. 1 OF 1

NATURAL BRIDGE CAVERNS

26495 NATURAL BRIDGE CAVERNS RD. (FM 3009)
SAN ANTONIO, TEXAS

SITE PLAN

SLAY ENGINEERING CO., INC.

SLAY ENGINEERING CO., INC.
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TBPE FIRM REGISTRATION NO. F1901

STATE OF TEXAS
ADAM B. WALL
91112
LICENSED PROFESSIONAL ENGINEER
09/11/15

NATURAL BRIDGE CAVERNS

ATTACHMENT I – INSPECTION AND MAINTENANCE FOR BMPS

Temporary BMP's will be inspected weekly or after any rainfall. Any irregularities will be corrected immediately. These controls include the silt fencing, temporary vegetative strips, earthen berm and rock gabions. A log will be kept of the inspections and any repair and or maintenance activities shall be noted in the log.

The project manager on-site will log his name, date, and current weather conditions. In addition, a brief description of the previous weeks' weather conditions will be added, including the amount of rain, if any. The project manager will inspect the TBMP's and note their condition each week, including any repairs done within the last week.

Inspection and maintenance guidelines:

1. **Silt Fence:**
    a) Inspect all fencing weekly, and after any rainfall.
    b) Remove sediment when buildup reaches six inches.
    c) Replace or repair any sections crushed or collapsed in the course of construction activity.
    d) When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

2. **Earthen Berm:**
    a) Inspect berm weekly, and after any rainfall.
    b) Replace or repair any sections showing signs of damage or erosion.
    c) When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the berm should be revegetated.

3. **Pinned rock gabions:**
    a) Inspect gabion weekly, and after any rainfall.
    b) Replace or repair any sections showing signs of damage or failure.
    c) When construction is complete, the rock material should be disposed of in a manner that will not cause additional siltation and the prior location of the gabion should be revegetated. All non-rock components of the gabions should be disposed of properly or recycled at a suitable facility.

4. **Temporary Washout Pit:**
    a) Inspect washout pit weekly and after any rainfall. Ensure the pit is containing all concrete so that it may be disposed of properly.
    b) Replace or repair any sections showing signs of damage or failure.

c) When construction is complete, the concrete material should be disposed of in a manner that will not cause contamination of any surface water. All other components of the washout pit should be disposed of properly.

5. **Hydomulch seeding for restoration of vegetation**: Vegetation will be restored and allow for natural protection of the aquifer. Vegetation will be restored at the completion of construction.

NATURAL BRIDGE CAVERNS

ATTACHMENT J – SCHEDULE OF INTERIM AND PERMANENT SOIL STABILIZATION PRACTICES

Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen days after construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the fourteenth day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within twenty one days, temporary stabilization measures do not have to be initiated on that portion of the site. In areas experiencing droughts where the initiation of stabilization measures by the fourteenth day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.

Within 14 days of completion of construction in these areas, permanent soil stabilization practices will commence. Stabilization processes include permanent sod, seeding and hydromulch.

Application Fee Form

Texas Commission on Environmental Quality

Name of Proposed Regulated Entity: Natural Bridge Caverns

Regulated Entity Location: 26495 Natural Bridge Caverns Road, also called FM 3009

Name of Customer: Wuest Legacy Partners, Ltd./Wuest Millennium Partners, Ltd.

Contact Person: Brad Wuest Phone: 210-651-6101

Customer Reference Number (if issued):CN _____

Regulated Entity Reference Number (if issued):RN RN 106385081

Austin Regional Office (3373)

☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362)

☐ Bexar ☐ Medina ☐ Uvalde

☒ Comal ☐ Kinney

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

☐ Austin Regional Office

☐ Mailed to: TCEQ - Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☒ San Antonio Regional Office

☐ Overnight Delivery to: TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
(512)239-0357

Site Location (Check All That Apply):

☒ Recharge Zone ☐ Contributing Zone ☐ Transition Zone

Type of Plan	*Size*	*Fee Due*
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	$
Sewage Collection System	L.F.	$
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	1 Each	$ 500
Extension of Time	Each	$

Signature: Brad Wuest Date: 7-3-15

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 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $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

Extension of Time Requests

Project	*Fee*
Extension of Time Request	$150

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

I Brad Wuest
Print Name,

Manager
Title - Owner/President/Other,

of Wuest Legacy Partners, Ltd. By Wuest Capital Management, LLC Its General Partner,
Corporation/Partnership/Entity Name

have authorized Brian Cowan, P.G.
Print Name of Agent/Engineer

of Zara Environmental, 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 applicants 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.

Brad Wuest
Applicant's Signature

7-3-15
Date

THE STATE OF Texas §

County of Comal §

ERICA SPELMAN
NOTARY PUBLIC
State of Texas
Comm. Exp. 01/22/2017

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

GIVEN under my hand and seal of office on this 3rd day of July, 2015.

Erica Spelman
NOTARY PUBLIC

Erica Spelman
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 1/22/17

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

I Brad Wuest ,
Print Name

Manager ,
Title - Owner/President/Other

of Wuest Millennium Partners, Ltd. By Wuest Capital Management, LLC Its General Partner,
Corporation/Partnership/Entity Name

have authorized Brian Cowan, P.G.
Print Name of Agent/Engineer

of Zara Environmental, LLC.
Print Name of Firm

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Brad Wuest
Applicant's Signature

7-3-15
Date

THE STATE OF Texas §

County of Comal §

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

GIVEN under my hand and seal of office on this 3rd day of July, 2015.

ERICA SPELMAN
NOTARY PUBLIC
State of Texas
Comm. Exp. 01/22/2017

Erica Spelman
NOTARY PUBLIC

Erica Spelman
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 1/22/17

TCEQ Use Only

TCEQ Core Data Form

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

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

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

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☒ Other **Edwards Exception Request**

2. Attachments **Describe Any Attachments:** *(ex. Title V Application, Waste Transporter Application, etc.)*

☒ Yes ☐ No Edwards Recharge and Transition Zone Exception Request

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN 602569725		RN 106385081

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy) 9/18/2015

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

☒ Owner ☐ Operator ☐ Owner & Operator

☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other: _____

7. General Customer Information

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership

☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☒ No Change**

***If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.*

8. Type of Customer:			
☐ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A	
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☒ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)*	*If new Customer, enter previous Customer below*	*End Date:*
Wuest Millennium Partners, Ltd.		

10. Mailing Address:							
26495 Natural Bridge Caverns Road							
City	San Antonio	State	TX	ZIP	78266	ZIP + 4	2671

11. Country Mailing Information *(if outside USA)*	12. E-Mail Address *(if applicable)*

13. Telephone Number	14. Extension or Code	15. Fax Number *(if applicable)*
(210) 651-6101		(210) 651-6144

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(if applicable)*	19. TX SOS Filing Number *(if applicable)*
742925201	32036213695		

20. Number of Employees

☒ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated?

☒ Yes ☐ No

SECTION III: Regulated Entity Information

22. 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 Information ☒ No Change** *(See below)*

**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

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

Natural Bridge Caverns

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*	26495 Natural Bridge Caverns Road							
	City	San Antonio	State	TX	ZIP	78266	ZIP + 4	2671
25. Mailing Address:	26495 Natural Bridge Caverns Road							
	City	San Antonio	State	TX	ZIP	78266	ZIP + 4	7671

26. E-Mail Address:		
27. Telephone Number	28. Extension or Code	29. Fax Number *(if applicable)*
(210) 651-6101		(210) 651-6144

30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)
7999		712190	

34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*

Family Park

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	26495 Natural Bridge Caverns Road, also called FM 3009; On the west side of FM 3009 approximately 7.3 miles north of IH-35

36. Nearest City	County	State	Nearest ZIP Code
Garden Ridge	Comal	TX	78266

37. Latitude (N) In Decimal:	29.692021N		38. Longitude (W) In Decimal:	98.342691	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	41	31.27N	-98	20	33.69

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☒ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
		Exception Request		
☐ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Zara Environmental, LLC.	41. Title:	Agent

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(512) 632-8409		(866) 908-9137	brian@zaraenvironmental.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 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Zara Environmental, LLC.	Job Title:	Agent		
Name *(In Print)*:	Brian Cowan, P.G.			Phone:	(512) 632-8409
Signature:				Date:	9/18/15

TCEQ

TCEQ Use Only

TCEQ Core Data Form

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741464802	32036108226		14355410

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	City	San Antonio	State	TX	ZIP	78266	ZIP + 4	7671

26. E-Mail Address:		
27. Telephone Number	28. Extension or Code	29. Fax Number *(if applicable)*
(210) 651-6101		(210) 651-6144

30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)
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		Exception Request		
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☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

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(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Zara Environmental, LLC.	Job Title:	Agent		
Name *(In Print)*:	Brian Cowan, P.G.			Phone:	(512) 632-8409
Signature:				Date:	9/18/15

Bryan W. Shaw, Ph.D., *Chairman*
Carlos Rubinstein, *Commissioner*
Toby Baker, *Commissioner*
Zak Covar, *Executive Director*

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COUNTY ENGINEER

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 21, 2012

Mr. Brad Wuest
Wuest Legacy Partners, Ltd./
Wuest Capital Management, LLC
26495 Natural Bridge Caverns Rd.
San Antonio, TX 78266-2671

Re: Edwards Aquifer, Comal County

Name of Project: Natural Bridge Caverns; Located at 26495 Natural Bridge Caverns Rd., or on the west side of FM 3009, approximately 7.3 miles north of IH 35, San Antonio ETJ, Texas

Type of Plan: Request for the Modification of an Approved Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer

Edwards Aquifer Protection Program ID No. 3044.01; Investigation No. 1027817; Regulated Entity No. RN106385081

Dear Mr. Wuest:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP modification for the above-referenced project submitted to the San Antonio Regional Office by Slay Engineering Company, Inc. on behalf of Wuest Capital Management, LLC on August 2, 2012. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

Background

The Natural Bridge Caverns has been a tourist attraction since 1888. According to George Veni's book, *Caves & Karst of Texas*, the cave was commercialized in 1964. A WPAP (file #2142.00) was approved by letter dated April 30, 2004 for expansion of an existing parking lot and expansion of a joint entry

road shared between Natural Bridge Caverns and Natural Bridge Wildlife Ranch. Prior to the 2004 WPAP, there was 6.82 acres of existing impervious cover. The 2004 WPAP increased the impervious cover by 1.15 acres between the two sites but only 0.69 acres was located on the natural Bridge Caverns site.

A second WPAP was approved on May 3, 2012 for the construction of a challenge course and zip lines between three tower structures. This WPAP increased the impervious cover by 0.20 acres resulting in a total impervious cover of 7.71 acres.

Project Description

The proposed commercial project will have an area of approximately 4.89 acres within the larger 450.078 acre site. The project will include the construction of eleven buildings, sidewalks, an activity pad, a wood deck, a ramp down to the cave entrance, and the expansion of the parking lot. The impervious cover for this proposed project is 4.89 acres and will increase the total site impervious cover to 12.54 acres (2.79 percent). According to a letter dated, August 2, 2012, signed by Robert Boyd, P.E., with Comal County, the site in the development is acceptable for the use of on-site sewage facilities.

Permanent Pollution Abatement Measures

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, this small business will not have more than 20 percent impervious cover. Temporary BMPs, soil stabilization measures, and natural buffer areas were designed using the TCEQ technical guidance document, *Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices* (2005), and will be used during the construction phases.

Geology

A geologic assessment was conducted for the entire 450 acre site. According to the geologic assessment, a majority of the site is located in the Dolomitic member of the Kainer Formation. The project geologist evaluated 66 geologic and manmade features and scored 41 features (27 geologic and 14 manmade) as sensitive. Sensitive features NBS-09 (zone of fractures), NBS-24 (water well), NBS-31 (water well), . NBS-38 (fractures), NBS-49 (sinkhole), NBS-50 (sinkhole), NBS-51 (cave exit), NBS-52 (cave entrance), NBS-53 (water well), NBS-54 (access shaft), and NBS-55 (access shaft) are found within the vicinity of the project. Features NBS-09, NBS-38, NBS-49, and NBS-50 have natural buffer areas that extend at least 50 feet in all directions and at least 200 feet upgradient of the feature. Features NBS-24, NBS-31, NBS-51, NBS-52, NBS-54, and NBS-55 are located upgradient of the proposed project. Feature NBS-53 is a water well within the existing parking lot area. The San Antonio Regional Office did not conduct a site assessment.

Special Conditions

I. This modification is subject to all Special and Standard Conditions listed in the WPAP approval letter dated May 3, 2012.

II. The applicant requested a waiver to the requirement for other permanent BMPs for this commercial project because the development will have less than 20 percent impervious cover. Based on the TCEQ's Review of the proposed activities and the site conditions, the required waiver is hereby granted. If the percent impervious cover ever increases above 20 percent or the land use changes,

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COUNTY ENGINEER

the exemption for the whole site as described in the WPAP may no longer apply and the property owner must notify the San Antonio Regional Office of these changes.

Standard Conditions

1. Pursuant to Chapter 7 Subchapter C of the Texas Water Code, any violations of the requirements in 30 TAC Chapter 213 may result in administrative penalties.
2. The holder of the approved Edwards Aquifer protection plan must comply with all provisions of 30 TAC Chapter 213 and all best management practices and measures contained in the approved plan. Additional and separate approvals, permits, registrations and/or authorizations from other TCEQ Programs (i.e., Stormwater, Water Rights, UIC) can be required depending on the specifics of the plan.
3. In addition to the rules of the Commission, the applicant may also be required to comply with state and local ordinances and regulations providing for the protection of water quality.

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the San Antonio Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.
5. All contractors conducting regulated activities at the referenced project location shall be provided a copy of this notice of approval. At least one complete copy of the approved WPAP and this notice of approval shall be maintained at the project location until all regulated activities are completed.
6. Modification to the activities described in the referenced WPAP application following the date of approval may require the submittal of a plan to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval prior to initiating construction of the modifications.
7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.
8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.
9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with

cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

During Construction:

10. During the course of regulated activities related to this project, the applicant or agent shall comply with all applicable provisions of 30 TAC Chapter 213, Edwards Aquifer. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity.
11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.
12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.
13. Nine wells are located onsite. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.
14. If sediment escapes the construction site, the 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). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.
15. Intentional discharges of sediment laden water are not allowed. If dewatering becomes necessary, the discharge will be filtered through appropriately selected best management practices. These may include vegetated filter strips, sediment traps, rock berms, silt fence rings, etc.
16. The following records shall be maintained and made available to the executive director upon request: 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.
17. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and construction activities will not resume within 21 days. When the initiation of stabilization measures by the 14th day is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable.

After Completion of Construction:

18. 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 San Antonio Regional Office within 30 days of site completion.

19. The applicant shall be 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. The regulated entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director through San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.
20. Upon legal transfer of this property, the new owner(s) is required to comply with all terms of the approved Edwards Aquifer protection plan. If the new owner intends to commence any new regulated activity on the site, a new Edwards Aquifer protection plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.
21. An Edwards Aquifer protection plan approval or extension will expire and no extension will be granted if more than 50 percent of the total construction has not been completed within ten years from the initial approval of a plan. A new Edwards Aquifer protection plan must be submitted to the San Antonio Regional Office with the appropriate fees for review and approval by the executive director prior to commencing any additional regulated activities.
22. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

This action is taken under authority delegated by the Executive Director of the Texas Commission on Environmental Quality. If you have any questions or require additional information, please contact Charly Fritz of the Edwards Aquifer Protection Program of the San Antonio Regional Office at (210) 403-4065.

RECEIVED
OCT 0 1 2012
COUNTY ENGINEER

Sincerely,

Lynn Bumguardner, Water Section Manager
San Antonio Region Office
Texas Commission on Environmental Quality

LMB/CF/eg

Enclosure: Deed Recordation Affidavit, Form TCEQ-0625

cc: Mr. Michael Slay, P.E., Slay Engineering Company, Inc.
Mr. Scott Halty, San Antonio Water System
Mr. Roland Ruiz, Edwards Aquifer Authority
Mr. Thomas Hornseth, P.E., Comal County Engineer
TCEQ Central Records, Building F, MC 212

Bryan W. Shaw, Ph.D., *Chairman*
Carlos Rubinstein, *Commissioner*
Toby Baker, *Commissioner*
Zak Covar, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 28, 2012

RECEIVED

AUG 2 9 2012

COUNTY ENGINEER

Mr. Thomas H. Hornseth, P.E.
Comal County Engineer
195 David Jonas Drive
New Braunfels TX 78132-3710

Re: Edwards Aquifer, Bexar and Comal Counties
PROJECT NAME: Natural Bridge Wildlife Ranch, located at 26515 Natural Bridge Caverns Road, San Antonio, Texas
PLAN TYPE: Application for Approval of a Water Pollution Abatement Plan (WPAP) 30 Texas Administration Code (TAC) Chapter 213; Edwards Aquifer Protection Program
EAPP File No.: 2641.02

Dear Mr. Hornseth:

The referenced application is being forwarded to you pursuant to the Edwards Aquifer Rules. The Texas Commission on Environmental Quality (TCEQ) is required by 30 TAC Chapter 213 to provide copies of all applications to affected incorporated cities and underground water conservation districts for their comments prior to TCEQ approval.

Please forward your comments to this office by September 28, 2012.

The Texas Commission on Environmental Quality appreciates your assistance in this matter and your compliance efforts to ensure protection of the State's environment. If you or members of your staff have any questions regarding these matters, please feel free to contact the San Antonio Region Office at (210) 490-3096.

Sincerely

Todd Jones

Todd Jones
Water Section Work Leader
San Antonio Regional Office

TJ/eg

WATER POLLUTION ABATEMENT PLAN (WPAP) MODIFICATION

NATURAL BRIDGE WILDLIFE RANCH, INC. NATURAL BRIDGE WILDLIFE RANCH

26515 NATURAL BRIDGE CAVERNS RD. SAN ANTONIO, BEXAR COUNTY, TEXAS

TCEQ-R13
AUG 3 2012
SAN ANTONIO

Submitted to: TCEQ, Region 13 Office, San Antonio

August 2012

Prepared by: *WESTWARD ENVIRONMENTAL, INC.*
Boerne, Texas
Project No. 10631-08

Westward Environmental, Inc.

P.O. BOX 2205
BOERNE, TEXAS 78006
WWW.WESTWARDENV.COM

August 20, 2012

Texas Commission on Environmental Quality
Region 13 Office
14250 Judson Road
San Antonio, TX 78233-4480

Project No. 10631-08

Attn.: Lynn Bumguardner

Subject: Water Pollution Abatement Plan (WPAP) Modification
Natural Bridge Wildlife Ranch, Inc. – CN 603829599
Natural Bridge Wildlife Ranch – RN 105194187
Bexar and Comal Counties, Texas

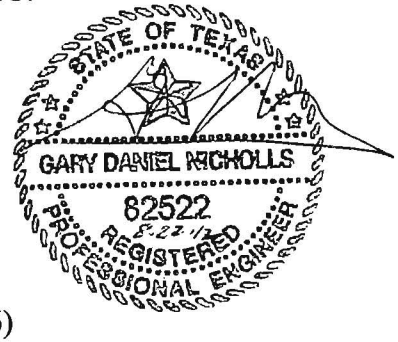
Dear Ms. Bumguardner,

On behalf of Natural Bridge Wildlife Ranch, Inc., we are submitting this WPAP Modification application to add a septic system and impervious cover (new parking areas, restrooms, barn, sidewalk and pump house) to the Natural Bridge Wildlife Ranch that is located at 26515 Natural Bridge Caverns Rd. in San Antonio, Bexar and Comal Counties, Texas.

Please find attached the original and six copies of the Natural Bridge Wildlife Ranch, Inc. WPAP Modification application. This WPAP Modification application has been prepared in accordance with the Texas Commission on Environmental Quality (30 TAC 213) and current policies for construction in the Edwards Aquifer Recharge Zone.

Please copy the office of Westward Environmental, Inc. on all correspondence including the final TCEQ determination. If your staff has any questions regarding this application, please call our office at (830) 249-8284.

Respectfully submitted,
WESTWARD ENVIRONMENTAL, INC.



Gary D. Nicholls, P.E.
Vice President

Distribution: Addressee (original + 6)
Mr. Shawn Soechting - Natural Bridge Wildlife Ranch, Inc. (2 copies)
WEI 10631-08 file

mh

Modification of a Previously Approved Plan Checklist

x General Information Form (*TCEQ-0587)*
- ATTACHMENT A - Road Map
- ATTACHMENT B - USGS / Edwards Recharge Zone Map
- ATTACHMENT C - Project Description

x Geologic Assessment Form (*TCEQ-0585)* Revised & Original GA
- ATTACHMENT A - Geologic Assessment Table, *TCEQ-0585-Table*
- Comments to the Geologic Assessment Table
- ATTACHMENT B - Soil Profile and Narrative of Soil Units
- ATTACHMENT C - Stratigraphic Column
- ATTACHMENT D - Narrative of Site Specific Geology
- Site Geologic Map(s)
- Table or list for the position of features' latitude/longitude (if mapped using GPS)

x Modification of a Previously Approved Plan (*TCEQ-0590)*
- ATTACHMENT A - Original Approval Letter and Approved Modification Letters
- ATTACHMENT B - Narrative of Proposed Modification
- ATTACHMENT C - Current Site Plan of the Approved Project

x Application Form (appropriate for the modification)
- Aboveground Storage Tank Facility Plan (*TCEQ-0575)*
- Organized Sewage Collection System Plan (*TCEQ-0582)*
- Underground Storage Tank Facility Plan (*TCEQ-0583)*
- Water Pollution Abatement Plan Application Form (*TCEQ-0584)*
- Lift Station / Force Main System Application (*TCEQ-0624)*

x Temporary Stormwater Section (*TCEQ-0602)*, if necessary
- ATTACHMENT A - Spill Response Actions
- ATTACHMENT B - Potential Sources of Contamination
- ATTACHMENT C - Sequence of Major Activities
- ATTACHMENT D - Temporary Best Management Practices and Measures
- ATTACHMENT E - Request to Temporarily Seal a Feature, if sealing a feature
- ATTACHMENT F - Structural Practices
- ATTACHMENT G - Drainage Area Map
- ATTACHMENT H - Temporary Sediment Pond(s) Plans and Calculations
- ATTACHMENT I - Inspection and Maintenance for BMPs
- ATTACHMENT J - Schedule of Interim and Permanent Soil Stabilization Practices

x Permanent Stormwater Section (*TCEQ-0600)*, if necessary
- ATTACHMENT A - 20% or Less Impervious Cover Waiver, if project is multi-family residential, a school, or a small business and 20% or less impervious cover is proposed for the site
- ATTACHMENT B - BMPs for Upgradient Stormwater
- ATTACHMENT C - BMPs for On-site Stormwater
- ATTACHMENT D - BMPs for Surface Streams
- ATTACHMENT E - Request to Seal Features, if sealing a feature
- ATTACHMENT F - Construction Plans
- ATTACHMENT G - Inspection, Maintenance, Repair and Retrofit Plan
- ATTACHMENT H - Pilot-Scale Field Testing Plan, if BMPs not based on *Complying with the Edwards Aquifer Rules: Technical Guidance for BMPs*
- ATTACHMENT I -Measures for Minimizing Surface Stream Contamination

Modification of a Previously Approved Plan Checklist (continued)

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

x Application Fee Form (*TCEQ-0574*)

x Check Payable to the "Texas Commission on Environmental Quality"

x Core Data Form (*TCEQ-10400)*

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

REGULATED ENTITY NAME: Natural Bridge Wildlife Ranch
COUNTY: Bexar and Comal STREAM BASIN: Cibolo Creek

EDWARDS AQUIFER: X RECHARGE ZONE
__ TRANSITION ZONE

PLAN TYPE: X WPAP __ AST __ EXCEPTION
__ SCS __ UST X MODIFICATION

CUSTOMER INFORMATION

1. Customer (Applicant):

Contact Person: Shawn Soechting, President
Entity: Natural Bridge Wildlife Ranch, Inc.
Mailing Address: 26515 Natural Bridge Caverns Rd.
City, State: San Antonio, TX Zip: 78266
Telephone: 830-438-7400 FAX: 830-438-3494

Agent/Representative (If any):

Contact Person: Gary Nicholls, P.E. Vice President
Entity: Westward Environmental, Inc.
Mailing Address: 4 Shooting Club Rd.
City, State: Boerne, TX Zip: 78006
Telephone: 830-249-8284 FAX: 830-249-0221

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

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

The Natural Bridge Wildlife Ranch is located at 26515 Natural Bridge Caverns Rd., in San Antonio, Texas 78266. The site is approximately 7 miles northwest of I-35 and FM 3009.

4. X **ATTACHMENT A - ROAD MAP**. A road map showing directions to and the location of the project site is attached at the end of this form.

5. X **ATTACHMENT B - USGS / EDWARDS RECHARGE ZONE MAP**. A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached behind this sheet. The map(s) should clearly show:

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

6. X Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment. **The TCEQ must be able to inspect the project site or the application will be returned.**

7. X **ATTACHMENT C - PROJECT DESCRIPTION**. Attached at the end of this form is a detailed narrative description of the proposed project.

8. Existing project site conditions are noted below:
__ Existing commercial site
__ Existing industrial site
__ Existing residential site
X Existing paved and/or unpaved roads
__ Undeveloped (Cleared)
X Undeveloped (Undisturbed/Uncleared)
X Other: Ranch Land

PROHIBITED ACTIVITIES

9. X I am aware that the following activities are prohibited on the **Recharge Zone** and are not proposed for this project:

(1) waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
(2) new feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
(3) land disposal of Class I wastes, as defined in 30 TAC §335.1;
(4) the use of sewage holding tanks as parts of organized collection systems; and
(5) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).

10. X I am aware that the following activities are prohibited on the **Transition Zone** and are not proposed for this project:

(1) waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);
(2) land disposal of Class I wastes, as defined in 30 TAC §335.1; and
(3) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

ADMINISTRATIVE INFORMATION

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

X For a Water Pollution Abatement Plan and Modifications, the total acreage of the site where regulated activities will occur.
__ For an Organized Sewage Collection System Plans and Modifications, the total linear

footage of all collection system lines.

__ For a UST Facility Plan or an AST Facility Plan, the total number of tanks or piping systems.

__ A request for an exception to any substantive portion of the regulations related to the protection of water quality.

__ A request for an extension to a previously approved plan.

12. Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

__ TCEQ cashier

__ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)

X San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

13. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

14. X No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

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:

Gary Nicholls, P.E.
Print Name of Engineer

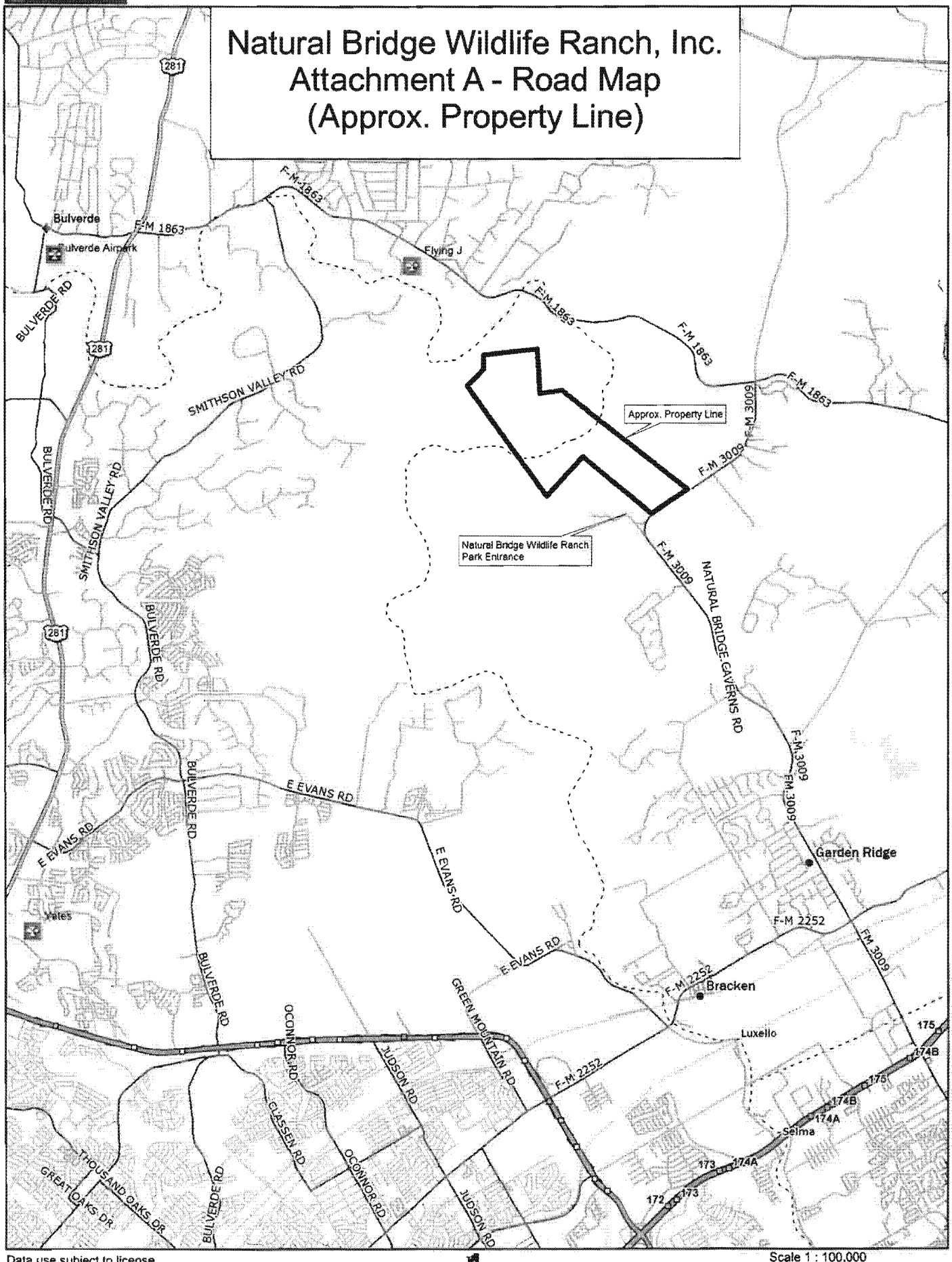
Signature of Engineer

8/20/12
Date

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

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

Natural Bridge Wildlife Ranch, Inc.
Attachment A - Road Map
(Approx. Property Line)



Data use subject to license.
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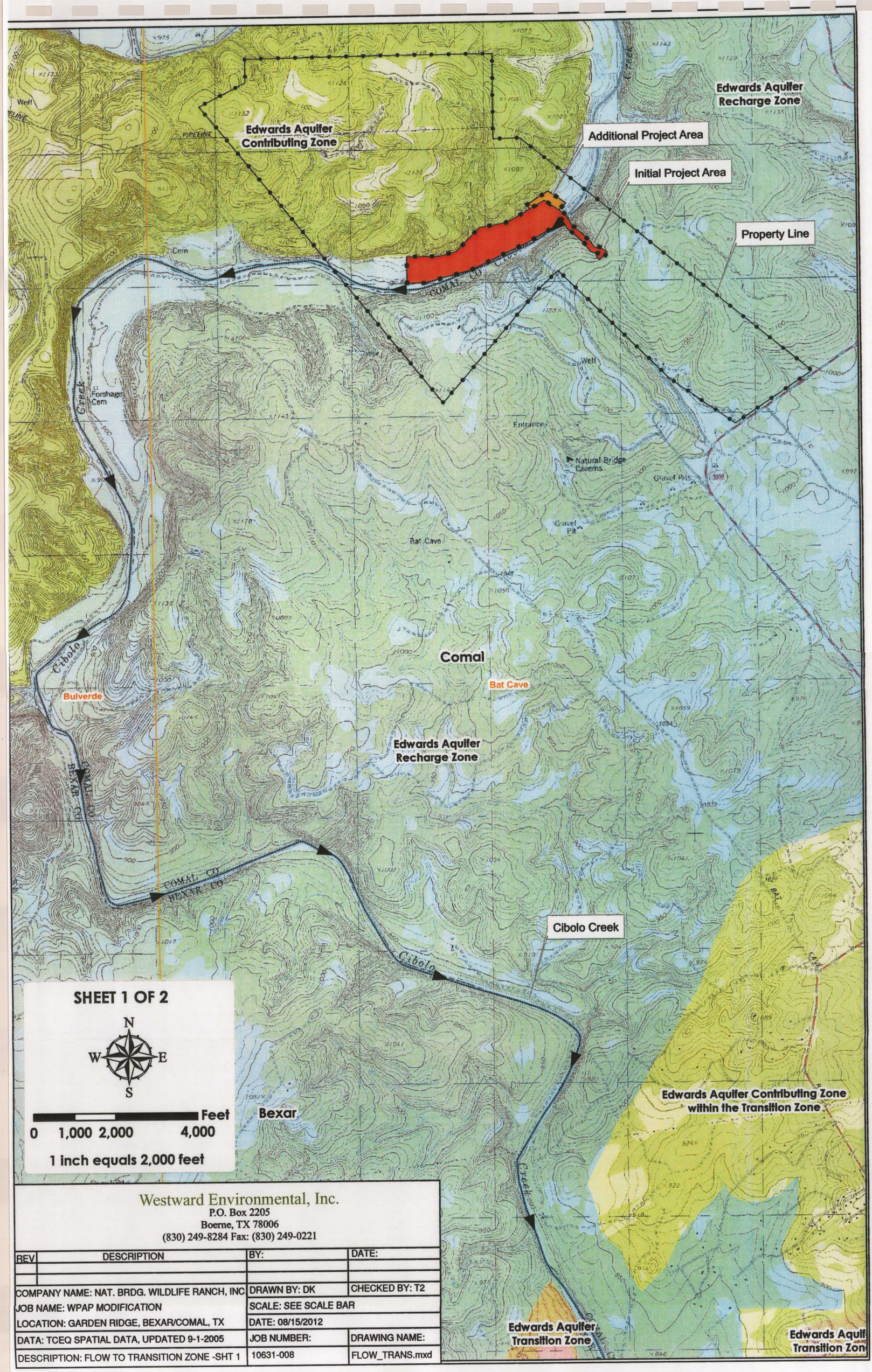
www.delorme.com

MN (4.6°E)

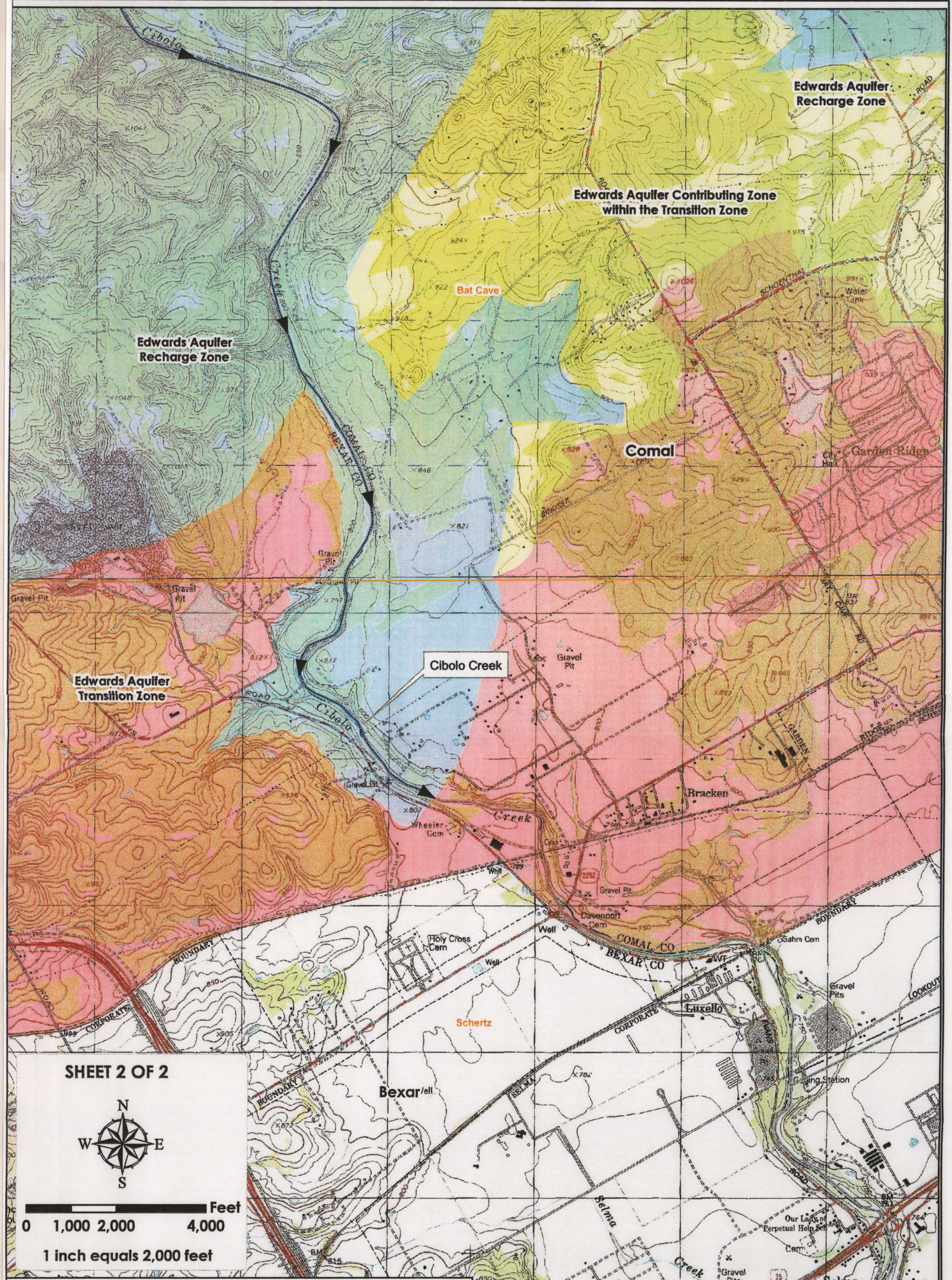
Scale 1 : 100,000

1" = 1.58 mi Data Zoom 11-0



Westward Environmental, Inc.
P.O. Box 2205
Boerne, TX 78006
(830) 249-8284 Fax: (830) 249-0221

REV	DESCRIPTION	BY:	DATE:
COMPANY NAME: NAT. BRDG. WILDLIFE RANCH, INC		DRAWN BY: DK	CHECKED BY: T2
JOB NAME: WPAP MODIFICATION		SCALE: SEE SCALE BAR	
LOCATION: GARDEN RIDGE, BEXAR/COMAL, TX		DATE: 08/15/2012	
DATA: TCEQ SPATIAL DATA, UPDATED 9-1-2005		JOB NUMBER:	DRAWING NAME:
DESCRIPTION: FLOW TO TRANSITION ZONE -SHT 1		10631-008	FLOW_TRANS.mxd



Westward Environmental, Inc.
P.O. Box 2205
Boerne, TX 78006
(830) 249-8284 Fax: (830) 249-0221

REV	DESCRIPTION	BY:	DATE:
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JOB NAME: WPAP MODIFICATION		SCALE: SEE SCALE BAR	
LOCATION: GARDEN RIDGE, BEXAR/COMAL, TX		DATE: 08/15/2012	
DATA: TCEQ SPATIAL DATA, UPDATED 9-1-2005		JOB NUMBER:	DRAWING NAME:
DESCRIPTION: FLOW TO TRANSITION ZONE -SHT 2		10631-008	FLOW-TO-TRZ-sht2

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

General Information Form Attachment C

Project Description

Natural Bridge Wildlife Ranch, Inc. proposes to install a septic system and build additional impervious cover on their wildlife ranch in the form of a new barn, parking lot, sidewalk, restrooms and pump house. These improvements will occur on the Bexar County side of the property. The paved parking lot and restroom area with septic system will be built to accommodate patrons of the wildlife ranch. A concrete sidewalk will be constructed to connect these facilities. Nearby, a barn will be built to house some of the wildlife at the ranch. Each proposed area of impervious cover will be treated by a downgradient engineered vegetated filter strip. An additional 4.5 acres was added to the project area to include the above mentioned improvements. A new Geologic Assessment (GA) was performed on the 4.5 acres and is included in this modification with the original GA for reference. No new features were discovered in the new GA. Of the surveyed 1,342 acres, 69.5 acres are now designated as the "Project Area" under this modification.

Element	Element Dimensions	Impervious Cover	Temporary BMPs	Permanent BMPs
Wildlife Barn	60 feet long 40 feet wide	0.055 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Pump House	15 feet long 15 feet wide	0.005 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Restrooms Building	70 feet long 40 feet wide	0.064 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Parking Lots	211 feet long 72 feet wide (x2)	0.674 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Sidewalk	133 feet long 8 feet wide	0.023 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips

A slight portion of the project area crosses over from the Recharge Zone to the Contributing Zone and back over to the Recharge Zone. For purposes of this WPAP, the entire project area is considered to be entirely on the Recharge Zone.

General Information Form Attachment C

Project Description (continued)

In order to mitigate stormwater runoff during construction activities three rock berms and existing natural vegetated areas will be utilized. Land disturbance will be limited to the parking lots, sidewalk, and buildings' footprints leaving hundreds of feet of natural grass land to mitigate stormwater runoff. Approximately two or three pieces of equipment will be used onsite for construction activities. The equipment will be re-fueled and parked at a designated staging area which is shown on the WPAP Site Map. A mobile fuel truck, which will service the equipment at the designated areas, will not be stored onsite.

The permanent BMPs proposed for the buildings, sidewalk and parking lots will be engineered filter strips. No more than 72 feet of impervious cover will be treated by each engineered filter strip.

Trash generated onsite will be disposed of in existing trash receptacles and handled by a licensed waste service. Existing onsite toilets will be utilized by construction workers. Once construction has been completed then the newly constructed restrooms will service patrons visiting the park.

Construction activates under this modification will only occur on the Bexar County side of Cibolo Creek. At this time, no construction activities are proposed on the Comal County side of Cibolo Creek.

Revised GA

For WPAP Modification

Westward Environmental, Inc.

P.O. BOX 2205
BOERNE, TEXAS 78006
WWW.WESTWARDENV.COM

August 10, 2012

Texas Commission on Environmental Quality
Region 13 Office
14250 Judson Road
San Antonio, TX 78233-4480

WEI Proj. No. 10631-08

Attn.: Lynn Bumguardner

Subject: Updated and Revised Geologic Assessment
Water Pollution Abatement Plan (WPAP) Modification
Natural Bridge Wildlife Ranch, Inc. – CN 603829599
Natural Bridge Wildlife Ranch – RN 105194187
Bexar and Comal Counties, Texas

Dear Ms. Bumguardner,

On behalf of Natural Bridge Wildlife Ranch, Inc., we are submitting this Updated and Revised Geologic Assessment for the above referenced project.

Overview

Westward Environmental, Inc. (WEI) originally performed a Geologic Assessment at the above referenced site on December 14, 2010 as part of a Water Pollution Abatement Plan which was subsequently submitted to the TCEQ. During this Geologic Assessment a total of twelve (12) features were identified, none of which were sensitive. A copy of the December 2010 Geologic Assessment is attached and is incorporated by reference into this updated/revised Geologic Assessment.

Geologic Narrative

On August 8, 2012, a Geologic Assessment was performed on an area not included in the original Geologic Assessment. This area has been added as part of a modification to the original approved WPAP. The Geologic Assessment on the new area was performed by Thomas O. Mathews II, PG #5321. No additional features were identified in the new area associated with the WPAP modification. In addition to performing the Geologic Assessment on the new area, the road cut area, which was part of the original Geologic Assessment, was inspected. Features S-1, S-11a and S-11b were not-sensitive solution cavities identified in the December 2010 Geologic Assessment. These features were located in the wall of the original road cut. Each of these features has been removed as result of excavation associated with the construction of the new road. There is no evidence of the features in the new road cut and it appears that they terminated in the bedrock. An updated/revised Geologic Assessment Table is included with this Geologic Assessment reflecting the removal of these features.

If your staff has any questions regarding this Geologic Assessment, please call our office at (830) 249-8284.

Respectfully submitted,
WESTWARD ENVIRONMENTAL, INC.

PG 5321

Tommy Mathews, P.G., R.E.M.
President

8-10-12



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

REGULATED ENTITY NAME: Natural Bridge Wildlife Ranch

TYPE OF PROJECT: _X_ WPAP __ AST __ SCS __ UST

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

PROJECT INFORMATION

1. _X_ Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE**.

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

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Patrick soils, 3 to 5 percent slopes, rarely flooded, (PaC)	B	1 – 5
Eckrant-Rock outcrop complex, 15 to 60 percent slopes (TaD)	C	0 - 1
Orif soils, 0 to 1 percent slopes, frequently flooded (Or)	B	0 – 5
Sunev loam, 1 to 3 percent slopes (VaB)	B	2.5 - 5
Comfort-Rock outcrop complex, 1 to 8 percent slopes (CrD)	C	.5 - 2
Eckrant-Rock outcrop complex, 8 to 30 percent slopes (ErG)	B	.5 - 2

* Soil Group Definitions (Abbreviated)

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

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

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

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

3. _X_ A **STRATIGRAPHIC COLUMN** is attached at the end of this form that shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column.

4. _X_ A **NARRATIVE DESCRIPTION OF SITE SPECIFIC GEOLOGY** is attached at the end of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.

5. _X_ Appropriate **SITE GEOLOGIC MAP(S)** are attached:

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

Applicant's Site Plan Scale	1" = 200 '
Site Geologic Map Scale	1" = 200 '
Site Soils Map Scale (if more than 1 soil type)	1" = 200 '

6. Method of collecting positional data:
   - _X_ Global Positioning System (GPS) technology.
   - __ Other method(s).

7. _X_ The project site is shown and labeled on the Site Geologic Map.

8. _X_ Surface geologic units are shown and labeled on the Site Geologic Map.

9. _X_ Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
   __ Geologic or manmade features were not discovered on the project site during the field investigation.

10. _X_ The Recharge Zone boundary is shown and labeled, if appropriate.

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

   _X_ There are _1_ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
   - __ The wells are not in use and have been properly abandoned.
   - __ The wells are not in use and will be properly abandoned.
   - _X_ The wells are in use and comply with 16 TAC Chapter 76.

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

ADMINISTRATIVE INFORMATION

12. _X_ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

Date(s) Geologic Assessment was performed: (Original December 14, 2010) (Additional August 8, 2012)
Date(s)

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

Thomas O. Mathews, PG, REM
Print Name of Geologist

(830) 249-8284
Telephone

(830) 249-0221
Fax

Thomas O Mathews II PG 5321
Signature of Geologist

8-10-12
Date

Representing: Westward Environmental, Inc.
(Name of Company)

STATE OF TEXAS
THOMAS O. MATHEWS
GEOLOGY
5321
LICENSED
PROFESSIONAL GEOSCIENTIST

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

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

GEOLOGIC ASSESSMENT TABLE — Natural Bridge Wildlife Ranch, Inc.: Road and Creek Crossing

LOCATION			FEATURE CHARACTERISTICS												EVALUATION		PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	KXX	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	≥40	<1.6	≥1.6	
S-1	29 42.44	98 20.49	SC	20	Kek	Removed by Excavation														
S-2	29 42.38	98 20.98	CD	5	Qal	4	6	1	43		-	-	F	19	24	X		X		Floodplain
S-3	29 42.35	98 21.26	CD	5	Qal	9.6	10	1	7		-	-	F	19	24	X		X		Floodplain
S-4	29 42.35	98 21.19	CD	5	Qal	12	12	2	-		-	-	F	19	24	X		X		Floodplain
S-5	29 42.35	98 21.19	CD	5	Qal	12	12	2	-		-	-	F	19	24	X		X		Floodplain
S-6	29 42.24	98 21 02	CD	5	Qal	80	90	5	-		-	-	F	19	24	X		X		Hillside
S-7	29 42.25	98 21.07	CD	5	Qal	50	80	4	-		-	-	F	19	24	X		X		Hillside
S-8	29 42.44	98 20.99	MB	30	Kgru	-	-	-	-		-	-	X	0	30	X		X		Floodplain
S-9	29 42.39	98 21.00	O	5	Kgru	30	2.67		92		1/2	0.06	O	19	24	X			X	Streambed
S-10	29 42.49	98 20.87	CD	5	Qal	7	32	4	-		-	-	F	19	24	X		X		Hillside
S-11a	29 42.47	98 20.54	SC	20	Kgru	Removed by Excavation														
S-11b	29 42.47	98 20.54	SC	20	Kgru	Removed by Excavation														

* DATUM: NAD 83

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

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

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

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

Thomas Mathews

AG 5321

8-10-12

STATE OF TEXAS
THOMAS O. MATHEWS
GEOLOGY
5321
LICENSED
PROFESSIONAL GEOSCIENTIST

Date 10-Aug-12

Sheet 1 of 1

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

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

ATTACHMENT B
Soil Profile and Narrative of Soil Units

Six different soil types are present at the site. They are the Patrick soils, 3 to 5 percent slopes (PaC); the Tarrant Association - Eckrant-Rock outcrop complex, hilly (TaD); the Orif soils, frequently flooded (Or); the Sunev loam, 1 to 3 percent slopes (VaB); the Comfort-Rock outcrop complex, undulating (CrD); and the Eckrant-Rock outcrop complex, steep (ErG).

1) Patrick soils (PaC) – 3 to 5 percent slopes, rarely flooded

The surface layer is dark grayish-brown clay loam, gravelly clay loam, or loam and is about 10 inches thick.
The subsurface layer is brown clay loam or loam with granular structure. This layer is moderately permeable, friable when moist, and strongly calcareous.

Patrick slopes are moderate and convex. The mapped areas consists soils that occupy paleoterraces on plains. Shrink-swell potential is low. Water movement in the most restrictive layer is moderately high. This soil has slow to rapid surface drainage and medium internal drainage. Permeability is moderate. Water erosion is slight or moderate.

2) Eckrant-Rock outcrop complex (TaD) – 15 to 60 percent slopes

This surface layer is very dark grayish-brown, calcareous clay loam and is about 10 inches thick. It has a moderate, fine, subanfular blocky structure.
The subsurface layer is about 8 inches thick of hard fractured limestone. Below that is hard limestone.

The Eckrant-Rock outcrop complex has rapid surface drainage and good internal drainage. This soil is mainly found on ridges and plateaus. Runoff is rapid because of the steep slopes and exposed bedrock. Shrink-swell potential is moderate. Water movement in the most restrictive layer is moderately high. The capacity to hold water is low. Water erosion is a hazard.

ATTACHMENT B (cont.)
Soil Profile and Narrative of Soil Units

3) Orif soils (Or) - 0 to 1 percent slopes, frequently flooded

The surface soil is a dark-gray, calcareous clay and is about 50 inches thick. It has medium, subangular blocky structure and is firm when moist.
The subsurface layer is gray , calcareous clay and is about 15 inches thick. This layer has weak, subangular blocky structure.

This component is on flood plains on river valleys. The parent material consists of alluvium derived from limestone. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Shrink-swell potential is low. This soil is frequently flooded.

4) Sunev loam (VaB) – 1 to 3 percent slopes

The surface layer is dark grayish-brown, moderately alkaline loam or clay loam and is about 14 inches thick.
The subsurface layer is brown, limy loam or clay loam and is about 16 inches thick. It has moderate, very fine, subangular blocky structure and fine, granular structure and is firm but crumbly when moist.

Sunev loams are located on stream terraces on plains and are well drained. Internal drainage is medium. Water movement in the most restrictive layer is moderately high. Shrink-swell potential is low. Permeability is moderate. The capacity to hold water is good. Water erosion is a hazard.

ATTACHMENT B (cont.)
Soil Profile and Narrative of Soil Units

5) Comfort-Rock outcrop complex (CrD) – 1 to 8 percent slopes

The surface layer is dark brown sxtremely stony clay about 6 iches thick. Cobbles and stones as much as 4 feet across cover about 45 percent of the surface.
The subsurface layer is extends to a depth of 13 inches. It is dark reddish brown extremely stony clay. The underlying material is indurated fractured limestone. The soil is mildly alkaline and noncalcareous throughout.

The Comfort soil is well-drained. Surface runoff is slow to medium. Permeability is slow, and the available water capacity is very low. Water erosion is a slight hazard.

6) Eckrant-Rock outcrop complex (ErG) – 8 to 30 percent slopes

The surface layer is very dark gary extremely stony clay about 10 inches thick. It is about 35 percent, by volume, cobbles and stones in the upper part and about 75 percent, by volume, stones in the lower part.
The subsurface layer is indureated fractured limestone. The soil is mderately alkaline and noncalcareous throughout.

Eckrant soils are well drained. Surface runoff is rapid. Permeability is moderately slow, and the available water capacity is very low. Water erosion is a severe hazard.

Attachment C
Stratigraphic Column [2]

System	Hydrogeologic Unit		Group, formation, or member			Map Symbol	Thickness (feet)	Lithologic Character and Field Identification
Lower Cretaceous	VIII	Edwards Aquifer	Edwards Group (Ked)	Kainer Formation	Basal Nodular Member	Kek		Shaly, nodular limestone; mudstone and miliolid grainstone. Massive, nodular and mottled, Exogyra texana.
	Lower Confining Unit		Upper member of the Glen Rose Limestone			Kgru	350-500	Gray to yellow, dense to thinly bedded liestone and marl. Alternate beds of hard limestone and marl.

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

Geologic Assessment Attachment D

Updated/Revised Geologic Narrative

Overview:

This site specific geologic narrative meets the requirements as set forth in the Texas Commission on Environmental Quality (TCEQ) *Instructions to Geologists for Geologic Assessments (GA) on the Edwards Aquifer Recharge Zone.* The original project site consisted of approximately 65 acres located within the 1,342 acre Natural Bridge Caverns Wildlife Ranch northeast of San Antonio, Texas along the Cibolo Creek that separates Bexar and Comal counties. As part of a modification to the approved WPAP an additional 4.5 acres were added to the **project area for a total of 69.5 acres**. A geologic assessment was performed over the original project site on December 14, 2010 and for the additional or new 4.5 acre area on August 8, 2012.

A total of twelve (12) features were identified and mapped during the original geologic assessment. None of the features were sensitive. Features S-1, S-11a and S-11b were not-sensitive solution cavities identified in the December 14, 2010 Geologic Assessment. These features were located in the wall of the original road cut. Each of these features has been removed as result of excavation associated with the construction of the new road. There is no evidence of the features in the new road cut and it appears that they terminated in the bedrock.

Field Work:

Field work was conducted by Westward field personnel consisting of Thomas O. Mathews PG #5321 and one field technician on December 14, 2010 and Thomas O. Mathews PG #5321 on August 8, 2012. Field transects were walked across the site using a 50-foot maximum spacing. In some areas of the property geologic or manmade features may have been altered or obscured at the time of site visit due to thick vegetative cover, historic site clearing, grubbing and agricultural ranching activities. Geologic and manmade features were field logged, photographed, labeled and GPS coordinates were collected. GPS data are included on the Geologic Assessment Table and in the Updated/Revised Geologic Assessment Table.

Stratigraphy:

There are three (3) geologic units at the site. The Basal Nodular Member of the Edwards formation, the Upper Glen Rose Limestone and Quaternary Alluvium. The Basal Nodular Member of the Edwards outcrops on the upper portion of the project. It is further exposed by the existing road cut for the ranch road leading down to the Cibolo Creek. The contact between the Basal Nodular Member and the Upper Glen Rose Limestone is exposed in the lower portion of this road cut. The Upper Glen Rose is exposed where the Cibolo Creek has down cut into it. On the portion of the project site west of the Cibolo Creek, the Glen Rose is overlain by Quaternary Alluvium at the lower elevations before outcropping on the far western edge of the project site. The published aquifer zone boundary and unit outcrops do not exactly match the field conditions. The

attached geologic map was developed utilizing field collected data and is considered to be more accurate.

Structure:

The Site is located in the Balcones Fault Zone northeast of San Antonio, Texas. There was no evidence or surface expression of any faults visible on the ground within the project boundary. The average fault trend in this section of the Balcones Fault Zone is approximately N60E. Features that were trending between N45E and N75E were assigned 10 extra points for aligning with the dominant trend.

Geologic Features:

A total of twelve (12) geologic features were identified during the original geologic assessment. Three (3) of the features are considered to be possible karst features. These possible karst features, consist of three (3) solution cavities; S-1, S-11a, and S-11b, all of which were located in the face of the road cut. One (1) of the solution cavities was within the Basal Nodular member of the Edwards and the other two (2) were within the Upper Glen Rose. Each of these features has been removed as result of excavation associated with the construction of the new road. There is no evidence of the features in the new road cut and it appears that they terminated in the bedrock.

Seven (7) features are non-karst closed depressions; and are all located on the western portion of the project site. Each of these non karst closed depressions are found within the Quaternary Alluvium. The final two (2) features consist of an active water well (man-made) and a fractured rock outcrop (other natural bedrock feature); also located on the western portion of the project site. A more detailed description is provided below.

<u>Caves</u>
No caves were observed during this geologic assessment.

<u>Closed Depressions – Non Karst</u>

S-2, S-3, S-4, S-5, S-6, S-7, and S-10: Not Sensitive
All of the non-karst closed depressions are located within the Quaternary Alluvium and do not display any karst characteristics or evidence of soil sapping.

> **S-2** measured 4' x 6' x 1' with a soil flooring. Probability of rapid infiltration is low.
>
> **S-3** is larger area measuring approximately 9'7" x 10' x 1'. The depression had fine-grained sediment and organic material infilling. Probability of rapid infiltration is low.
>
> **S-4** and **S-5** are depressions similar in size (12' x 12' x 1') approximately 15' from each other at a bearing of 54°. The floors are covered in tight black soil with a low probability of rapid infiltration for both features. Evidence of wallowing for both of these features could attribute to their formation.

S-6 and S-7 are pre-existing borrow pits located in the project area. Both pits contain tightly packed soil for the walls and flooring. Probability of rapid infiltration is low.

S-10 is a trench used for the used for burning brush. The flooring and walls of the feature are comprised of tight caliche/alluvium. Probability of rapid infiltration is low.

Faults

No evidence of faulting was identified during the assessment, nor were there any previously mapped faults identified during the literature research.

Man Made Features in Bedrock

S-8: Not Sensitive

S-8 is a water well located on the northwestern portion of the property. The well was in use at the time of this assessment. The well was cemented and properly completed. Probability of infiltration is none.

Other Feature in Bedrock

S-9: Not Sensitive

S-9 is a fractured rock outcrop located in the bottom of draw leading down to Cibolo Creek. The area was field noted as a feature that might correlate to a possible fault. After further research and field reconnaissance it was determined that **S-9** did not correlate to a fault. Hand excavation was performed on the feature and it was determined to lack a connection to the subsurface. Probability of rapid infiltration is low even though the feature has a catchment greater than 1.6 acres.

Sinkholes

No sinkholes were observed during this geologic assessment.

Solution Cavities

S-1, S-11a and S-11b: Not Sensitive – ***These features have been removed by excavation associated with the approved construction of the new road.***

These features were described in the original Geologic Assessment as follows (past tense added):

All of the solution cavities identified during the assessment are (were) located above grade and on the wall of the pre-existing road cut that leads down to Cibolo Creek.

S-1 is (was) approximately 1.2' x 1.3' x 3'deep. The floor of the feature is (was) exposed bedrock and has (had) a low rapid infiltration rate due to its location approximately 6' above the existing grade. The feature is (was) within the Basal Nodular Member

S-11a and **S-11b** are (were) located northwest of feature **S-1** well above grade on the wall of the road cut near the contact between the Edwards and Upper Glen Rose; and within the Upper Glen Rose. Both features are (were) elongated and contain no infilling. Probability of rapid infiltration is (was) low due to their location on the road cut face well above grade.

Solution Cavity Zones
No solution cavity zones were observed during the geologic assessment.

Solution-Enlarged Fractures
No solution enlarged fractures were observed during the geologic assessment.

Swallow Hole
No swallow holes were observed during this geologic assessment.

Zone – Closed Depression
No zones of closed depressions were observed during this geologic assessment.

References

Geologic Atlas of Texas, San Antonio Sheet, Bureau of Economic Geology (1983)

Hydrogeologic Map of Bexar County, Bat Cave and Bulverde Sheets, San Antonio Water Systems (1995)

Geologic Framework and Hydrogeologic Characteristics of the Edwards Aquifer Outcrop, Comal County, Texas, USGS Report 94-4117 (1994)

FEMA Base Floodplain digital database

Texas Commission on Environmental Quality (TCEQ) Instructions to Geologists for Geologic Assessments (GA) on the Edwards Aquifer Recharge Zone (2004)

Comal County Engineer's Office, GIS Data, 2010 Aerial Imagery

IMAGE: BAT CAVE NW	
ISSUE DATE:	08/14/2012
DRAWN BY:	DK
CHECKED BY:	TM
SCALE: 1" =	200'
JOB #:	10631-008

SHEET #: **1** OF 1

Westward Environmental, Inc.
P.O. Box 2205
Boerne, Texas 78006
(830) 249-8284 Fax: (830) 249-0221
TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112

REV	DESCRIPTION	BY	DATE

STATE OF TEXAS — THOMAS D. MATHEWS — 68587 — LICENSED — 5321 — PROFESSIONAL — GEOLOGIST

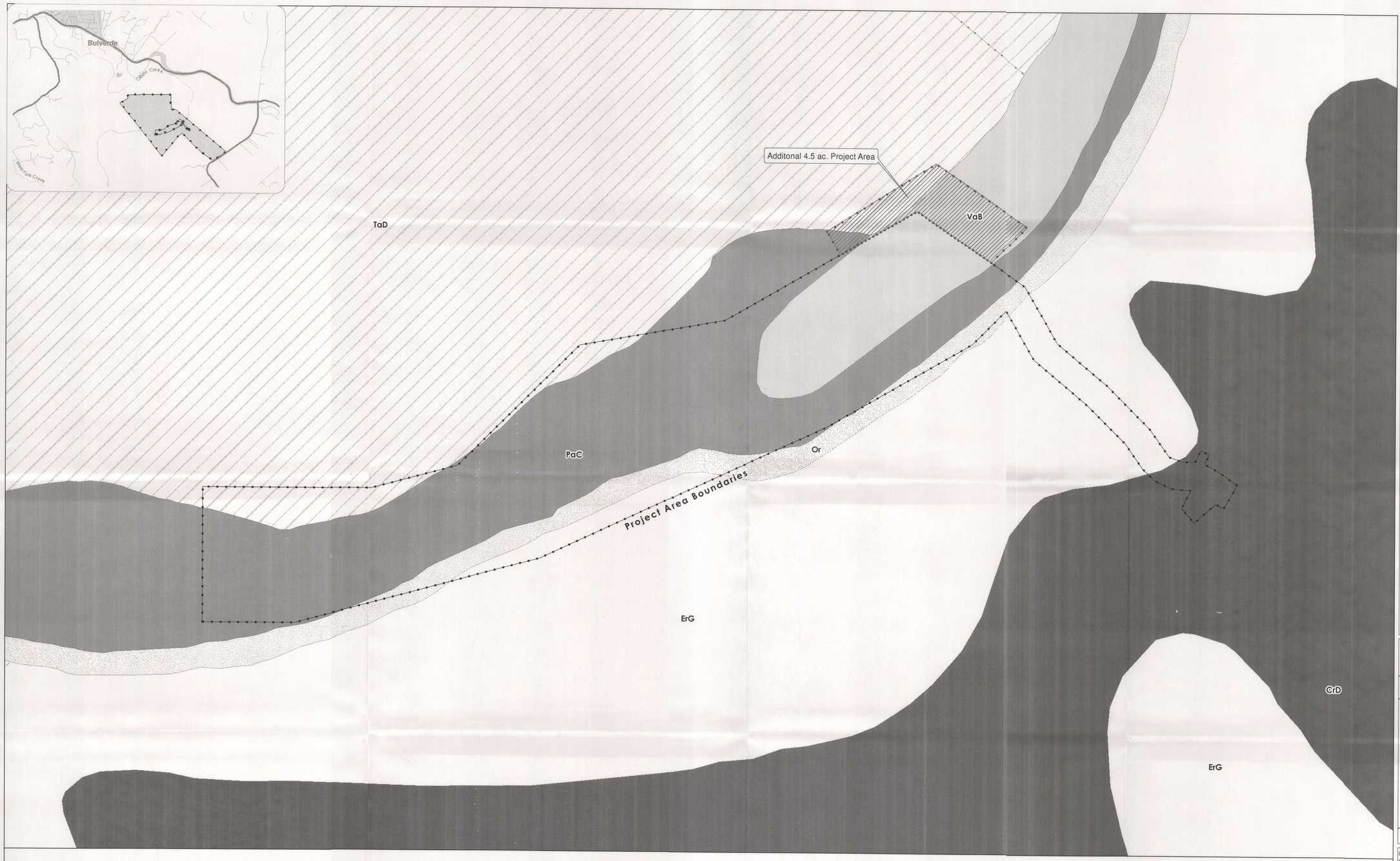
August 17, 2012

GEOLOGY MAP

WPAP MODIFICATION

NATURAL BRIDGE WILDLIFE RANCH, INC.

26515 NAT. BRIDGE CAVERNS RD, SA, TX



SOILS EXPLANATION

- Or - Orif soils, 0 to 1 percent slopes, frequently flooded
- PaC - Patrick soils, 3 to 5 percent slopes, rarely flooded
- TaD - Eckrant-Rock outcrop complex, 15 to 60 percent slopes
- VaB - Sunev loam, 1 to 3 percent slopes
- CrD - Comfort-Rock outcrop complex, 1 to 8 percent slopes
- ErG - Eckrant-Rock outcrop complex, 8 to 30 percent slopes

N W E S

0 100 200 400 Feet

1 inch equals 200 feet

Westward Environmental, Inc.
P.O. Box 2205
Boerne, Texas 78006
(830) 249-8284 Fax: 830-249-0221
TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112

SOILS MAP
WPAP MODIFICATION
NAT. BRDG. WILDLIFE RANCH, INC.
NAT. BRDG. CAVERNS RD, SA, TX

REV.	DESCRIPTION	BY	DATE

IMAGE: XXX

ISSUE DATE:	08/13/2012
DRAWN BY:	DK
CHECKED BY:	TM
SCALE: 1" =	200'
JOB #	10631-008

SHEET #: 2

OF 2

Original GA

Submitted and Approved

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

REGULATED ENTITY NAME: Natural Bridge Wildlife Ranch, Inc.: Road and Creek Crossing

TYPE OF PROJECT: _X_ WPAP __ AST __ SCS __ UST

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

PROJECT INFORMATION

1. _X_ Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE.**

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

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Patrick soils, 3 to 5 percent slopes, rarely flooded, (PaC)	B	1 – 5
Eckrant-Rock outcrop complex, 15 to 60 percent slopes (TaD)	C	0 - 1
Orif soils, 0 to 1 percent slopes, frequently flooded (Or)	B	0 – 5
Sunev loam, 1 to 3 percent slopes (VaB)	B	2.5 - 5
Comfort-Rock outcrop complex, 1 to 8 percent slopes (CrD)	C	.5 - 2
Eckrant-Rock outcrop complex, 8 to 30 percent slopes (ErG)	B	.5 - 2

* Soil Group Definitions (Abbreviated)

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

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

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

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

3. _X_ A **STRATIGRAPHIC COLUMN** is attached at the end of this form that shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column.

4. _X_ A **NARRATIVE DESCRIPTION OF SITE SPECIFIC GEOLOGY** is attached at the end

of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.

5. _X_ Appropriate **SITE GEOLOGIC MAP(S)** are attached:

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

Applicant's Site Plan Scale	1" = 200 '
Site Geologic Map Scale	1" = 200 '
Site Soils Map Scale (if more than 1 soil type)	1" = 200 '

6. Method of collecting positional data:
   - _X_ Global Positioning System (GPS) technology.
   - __ Other method(s).

7. _X_ The project site is shown and labeled on the Site Geologic Map.

8. _X_ Surface geologic units are shown and labeled on the Site Geologic Map.

9. _X_ Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
   __ Geologic or manmade features were not discovered on the project site during the field investigation.

10. _X_ The Recharge Zone boundary is shown and labeled, if appropriate.

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

   _X_ There are _1_ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
   - __ The wells are not in use and have been properly abandoned.
   - __ The wells are not in use and will be properly abandoned.
   - _X_ The wells are in use and comply with 16 TAC Chapter 76.

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

ADMINISTRATIVE INFORMATION

12. _X_ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

Date(s) Geologic Assessment was performed: December 14th, 2010
Date(s)

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

Thomas O. Mathews, PG, REM
Print Name of Geologist

(830) 249-8284
Telephone

(830) 249-0221
Fax

Thomas O Mathews PG 5321
Signature of Geologist

Jan. 19, 2011
Date

STATE OF TEXAS
THOMAS O. MATHEWS
GEOLOGY
5321
LICENSED
PROFESSIONAL GEOSCIENTIST

Representing: Westward Environmental, Inc.
(Name of Company)

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

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

GEOLOGIC ASSESSMENT TABLE			Natural Bridge Wildlife Ranch, Inc.: Road and Creek Crossing																	
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						X	Y	Z		10						<40	≥40	<1.8	≥1.8	
S-1	29 42.44	98 20.49	SC	20	Kek	1.17	1.34	3	250	10	-	-	N	5	35	X		X		Cliff
S-2	29 42.38	98 20.98	CD	5	Qal	4	6	1	43		-	-	F	19	24	X		X		Floodplain
S-3	29 42.35	98 21.26	CD	5	Qal	9.6	10	1	7		-	-	F	19	24	X		X		Floodplain
S-4	29 42.35	98 21.19	CD	5	Qal	12	12	2	-		-	-	F	19	24	X		X		Floodplain
S-5	29 42.35	98 21.19	CD	5	Qal	12	12	2	-		-	-	F	19	24	X		X		Floodplain
S-6	29 42.24	98 21 02	CD	5	Qal	80	90	5	-		-	-	F	19	24	X		X		Hillside
S-7	29 42.25	98 21.07	CD	5	Qal	50	80	4	-		-	-	F	19	24	X		X		Hillside
S-8	29 42.44	98 20.99	MB	30	Kgru	-	-	-	-		-	-	X	0	30	X		X		Floodplain
S-9	29 42.39	98 21.00	O	5	Kgru	30	2.67		92		1/2	0.06	O	19	24	X			X	Streambed
S-10	29 42.49	98 20.87	CD	5	Qal	7	32	4	-		-	-	F	19	24	X		X		Hillside
S-11a	29 42.47	98 20.54	SC	20	Kgru	3	2	0.7	218		-	-	N	5	25	X		X		Cliff
S-11b	29 42.47	98 20.54	SC	20	Kgru	1	2	3	272		-	-	N	5	25	X		X		Cliff

* DATUM: NAD 83

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

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

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

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

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

Thomas O Mathews

PG 5321

STATE OF TEXAS
THOMAS O. MATHEWS
GEOLOGY
5321
LICENSED
PROFESSIONAL GEOSCIENTIST

Date 1-19-2011

Sheet 1 of 1

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

92

Natural Bridge Wildlife Ranch, Inc.
Road and Creek Crossing

ATTACHMENT B
Soil Profile and Narrative of Soil Units

Six different soil types are present at the site. They are the Patrick soils, 3 to 5 percent slopes (PaC); the Tarrant Association - Eckrant-Rock outcrop complex, hilly (TaD); the Orif soils, frequently flooded (Or); the Sunev loam, 1 to 3 percent slopes (VaB); the Comfort-Rock outcrop complex, undulating (CrD); and the Eckrant-Rock outcrop complex, steep (ErG).

1) Patrick soils (PaC) – 3 to 5 percent slopes, rarely flooded

The surface layer is dark grayish-brown clay loam, gravelly clay loam, or loam and is about 10 inches thick.
The subsurface layer is brown clay loam or loam with granular structure. This layer is moderately permeable, friable when moist, and strongly calcareous.

Patrick slopes are moderate and convex. The mapped areas consists soils that occupy paleoterraces on plains. Shrink-swell potential is low. Water movement in the most restrictive layer is moderately high. This soil has slow to rapid surface drainage and medium internal drainage. Permeability is moderate. Water erosion is slight or moderate.

2) Eckrant-Rock outcrop complex (TaD) – 15 to 60 percent slopes

This surface layer is very dark grayish-brown, calcareous clay loam and is about 10 inches thick. It has a moderate, fine, subanfular blocky structure.
The subsurface layer is about 8 inches thick of hard fractured limestone. Below that is hard limestone.

The Eckrant-Rock outcrop complex has rapid surface drainage and good internal drainage. This soil is mainly found on ridges and plateaus. Runoff is rapid because of the steep slopes and exposed bedrock. Shrink-swell potential is moderate. Water movement in the most restrictive layer is moderately high. The capacity to hold water is low. Water erosion is a hazard.

ATTACHMENT B (cont.)
Soil Profile and Narrative of Soil Units

3) Orif soils (Or) - 0 to 1 percent slopes, frequently flooded

The surface soil is a dark-gray, calcareous clay and is about 50 inches thick. It has medium, subangular blocky structure and is firm when moist.
The subsurface layer is gray, calcareous clay and is about 15 inches thick. This layer has weak, subangular blocky structure.

This component is on flood plains on river valleys. The parent material consists of alluvium derived from limestone. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Shrink-swell potential is low. This soil is frequently flooded.

4) Sunev loam (VaB) – 1 to 3 percent slopes

The surface layer is dark grayish-brown, moderately alkaline loam or clay loam and is about 14 inches thick.
The subsurface layer is brown, limy loam or clay loam and is about 16 inches thick. It has moderate, very fine, subangular blocky structure and fine, granular structure and is firm but crumbly when moist.

Sunev loams are located on stream terraces on plains and are well drained. Internal drainage is medium. Water movement in the most restrictive layer is moderately high. Shrink-swell potential is low. Permeability is moderate. The capacity to hold water is good. Water erosion is a hazard.

ATTACHMENT B (cont.)
Soil Profile and Narrative of Soil Units

5) Comfort-Rock outcrop complex (CrD) – 1 to 8 percent slopes

The surface layer is dark brown sxtremely stony clay about 6 iches thick. Cobbles and stones as much as 4 feet across cover about 45 percent of the surface.
The subsurface layer is extends to a depth of 13 inches. It is dark reddish brown extremely stony clay. The underlying material is indurated fractured limestone. The soil is mildly alkaline and noncalcareous throughout.

The Comfort soil is well-drained. Surface runoff is slow to medium. Permeability is slow, and the available water capacity is very low. Water erosion is a slight hazard.

6) Eckrant-Rock outcrop complex (ErG) – 8 to 30 percent slopes

The surface layer is very dark gary extremely stony clay about 10 inches thick. It is about 35 percent, by volume, cobbles and stones in the upper part and about 75 percent, by volume, stones in the lower part.
The subsurface layer is indureated fractured limestone. The soil is moerately alkaline and noncalcareous throughout.

Eckrant soils are well drained. Surface runoff is rapid. Permeability is moderately slow, and the available water capacity is very low. Water erosion is a severe hazard.

Attachment C
Stratigraphic Column [2]

System	Hydrogeologic Unit		Group, formation, or member			Map Symbol	Thickness (feet)	Lithologic Character and Field Identification
Lower Cretaceous	VIII	Edwards Aquifer	Edwards Group (Ked)	Kainer Formation	Basal Nodular Member	Kek		Shaly, nodular limestone; mudstone and miliolid grainstone. Massive, nodular and mottled, Exogyra texana.
	Lower Confining Unit		Upper member of the Glen Rose Limestone			Kgru	350-500	Gray to yellow, dense to thinly bedded liestone and marl. Alternate beds of hard limestone and marl.
			Quaternary Alluvium			Qal	10 - 30	alluvial deposits of sand, gravel, silt, and clay

Natural Bridge Wildlife Ranch, Inc.
Road and Creek Crossing

Geologic Assessment Attachment D

Geologic Narrative

Overview:

This site specific geologic narrative meets the requirements as set forth in the Texas Commission on Environmental Quality (TCEQ) *Instructions to Geologists for Geologic Assessments (GA) on the Edwards Aquifer Recharge Zone.* The project site consists of approximately 65 acres located within the 1,342 acre Natural Bridge Caverns Wildlife Ranch northeast of San Antonio, Texas along the Cibolo Creek that separates Bexar and Comal counties. The geologic assessment was performed over the entire project site. A total of twelve (12) features were identified and mapped during this investigation. None of the features were sensitive.

Field Work:

Field work was conducted by Westward field personnel consisting of one registered Professional Geologist and one field technician on December 14, 2010. Field transects were walked across the site using a 50-foot spacing. In some areas of the property geologic or manmade features may have been altered or obscured at the time of site visit due to thick vegetative cover, historic site clearing, grubbing and agricultural ranching activities. Geologic and manmade features were field logged, photographed, labeled and GPS coordinates were collected. GPS data are included on the Geologic Assessment Table.

Stratigraphy:

There are three (3) geologic units at the site. The Basal Nodular Member of the Edwards formation, the Upper Glen Rose Limestone and Quaternary Alluvium. The Basal Nodular Member of the Edwards outcrops on the upper portion of the project. It is further exposed by the existing road cut for the ranch road leading down to the Cibolo Creek. The contact between the Basal Nodular Member and the Upper Glen Rose Limestone is exposed in the lower portion of this road cut. The Upper Glen Rose is exposed where the Cibolo Creek has down cut into it. On the portion of the project site west of the Cibolo Creek, the Glen Rose is overlain by Quaternary Alluvium at the lower elevations before outcropping on the far western edge of the project site. The published aquifer zone boundary and unit outcrops do not exactly match the field conditions. The attached geologic map was developed utilizing field collected data and is considered to be more accurate

Structure:

The Site is located in the Balcones Fault Zone northeast of San Antonio, Texas. There was no evidence or surface expression of any faults visible on the ground within the project boundary. The average fault trend in this section of the Balcones Fault Zone is approximately N60E. Features that were trending between N45E and N75E were assigned 10 extra points for aligning with the dominant trend.

Geologic Features:

A total of twelve (12) geologic features were identified during the geologic assessment. Three (3) of the features are considered to be possible karst features. These possible karst features, consist of three (3) solution cavities; and are all located in the face of the road cut. One (1) of the solution cavities is within the Basal Nodular member of the Edwards and the other two (2) are within the Upper Glen Rose. Seven (7) features are non-karst closed depressions; and are all located on the western portion of the project site. Each of these non karst closed depressions are found within the Quaternary Alluvium. The final two (2) features consist of an active water well (man-made) and a fractured rock outcrop (other natural bedrock feature); also located on the western portion of the project site. A more detailed description is provided below.

Caves
No caves were observed during this geologic assessment.

Closed Depressions – Non Karst
S-2, S-3, S-4, S-5, S-6, S-7, and S-10: Not Sensitive
All of the non-karst closed depressions are located within the Quaternary Alluvium and do not display any karst characteristics or evidence of soil sapping.

S-2 measured 4' x 6' x 1' with a soil flooring. Probability of rapid infiltration is low.

S-3 is larger area measuring approximately 9'7" x 10' x 1'. The depression had fine-grained sediment and organic material infilling. Probability of rapid infiltration is low.

S-4 and S-5 are depressions similar in size (12' x 12' x 1') approximately 15' from each other at a bearing of 54°. The floors are covered in tight black soil with a low probability of rapid infiltration for both features. Evidence of wallowing for both of these features could attribute to their formation.

S-6 and S-7 are pre-existing borrow pits located in the project area. Both pits contain tightly packed soil for the walls and flooring. Probability of rapid infiltration is low.

S-10 is a trench used for the used for burning brush. The flooring and walls of the feature are comprised of tight caliche/alluvium. Probability of rapid infiltration is low.

Faults
No evidence of faulting was identified during the assessment, nor were there any previously mapped faults identified during the literature research.

Man Made Features in Bedrock
S-8: Not Sensitive

S-8 is a water well located on the northwestern portion of the property. The well was in use at the time of this assessment. The well was cemented and properly completed. Probability of infiltration is none.

Other Feature in Bedrock
S-9: Not Sensitive

S-9 is a fractured rock outcrop located in the bottom of draw leading down to Cibolo Creek. The area was field noted as a feature that might correlate to a possible fault. After further research and field reconnaissance it was determined that S-9 did not correlate to a fault. Hand excavation was performed on the feature and it was determined to lack a connection to the subsurface. Probability of rapid infiltration is low even though the feature has a catchment greater than 1.6 acres.

Sinkholes
No sinkholes were observed during this geologic assessment.

Solution Cavities
S-1, S-11a and S-11b: Not Sensitive
All of the solution cavities identified during the assessment are located above grade and on the wall of the pre-existing road cut that leads down to Cibolo Creek.

S-1 is approximately 1.2' x 1.3' x 3'deep. The floor of the feature is exposed bedrock and has a low rapid infiltration rate due to its location approximately 6' above the existing grade. The feature is within the Basal Nodular Member

S-11a and **S-11b** are located northwest of feature **S-1** well above grade on the wall of the road cut near the contact between the Edwards and Upper Glen Rose; and within the Upper Glen Rose. Both features are elongated and contain no infilling. Probability of rapid infiltration in low due to their location on the road cut face well above grade.

Solution Cavity Zones
No solution cavity zones were observed during the geologic assessment.

Solution-Enlarged Fractures
No solution enlarged fractures were observed during the geologic assessment.

Swallow Hole
No swallow holes were observed during this geologic assessment.

Zone – Closed Depression
No zones of closed depressions were observed during this geologic assessment.

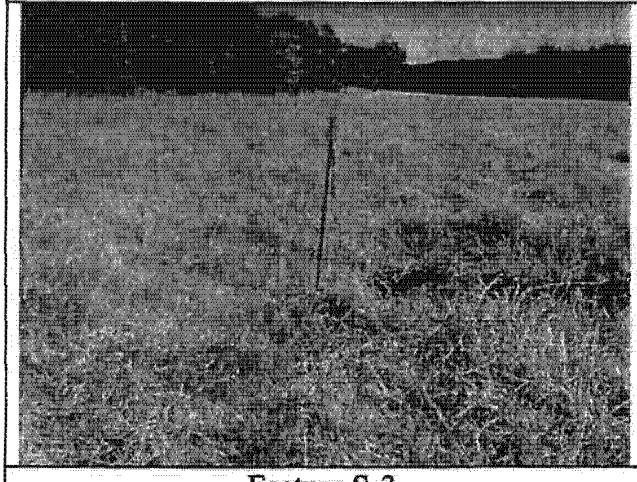
Photos



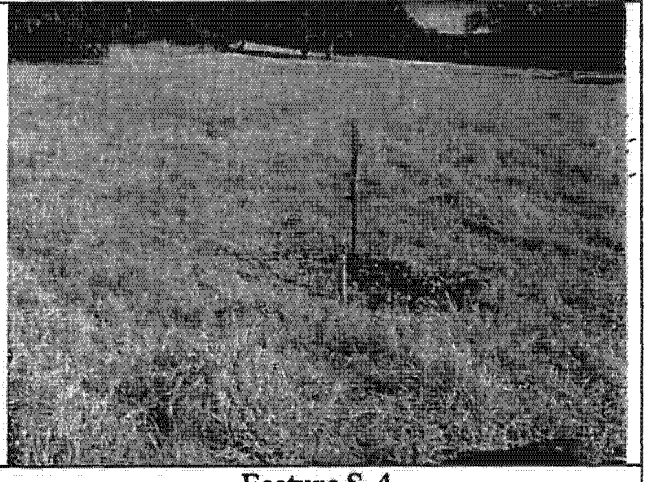
Feature S-1



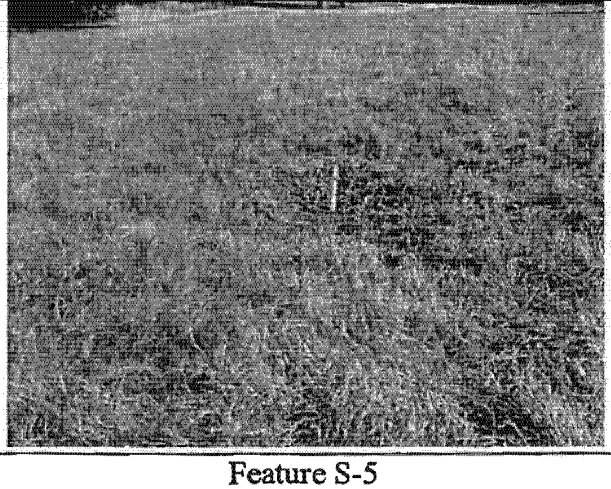
Feature S-2



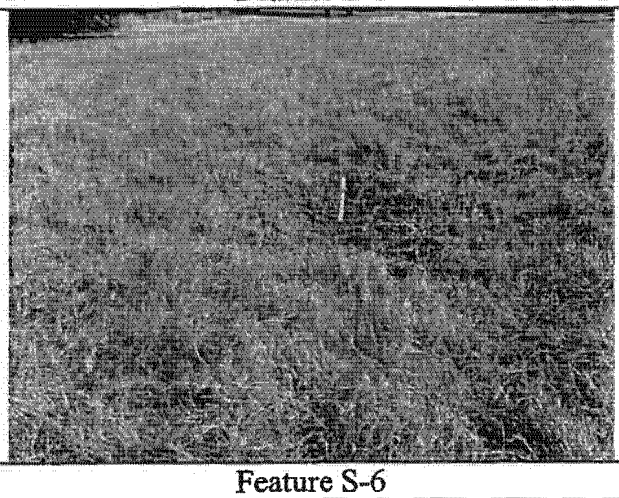
Feature S-3



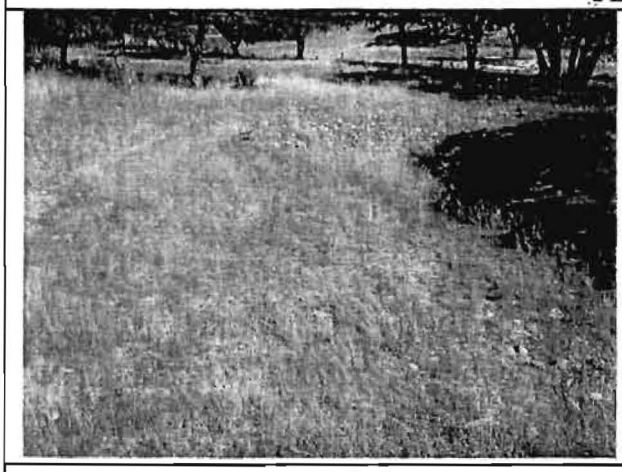
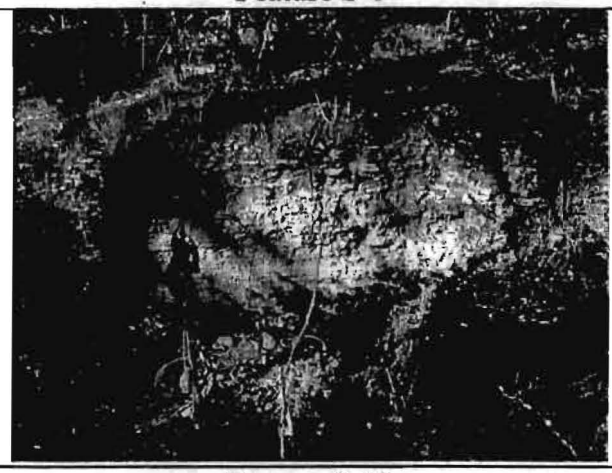
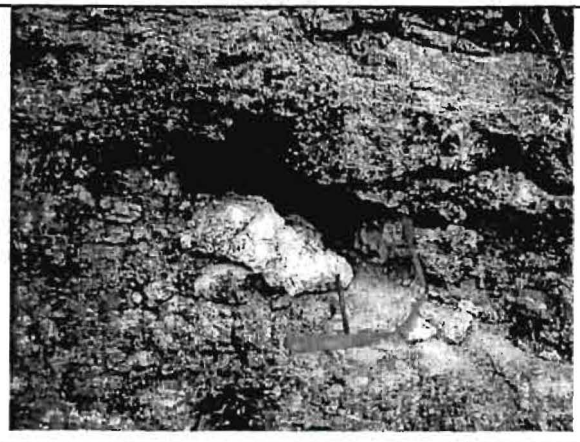
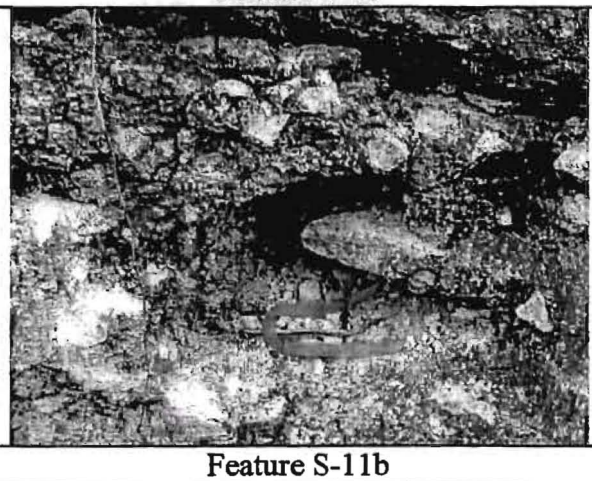
Feature S-4



Feature S-5



Feature S-6

Photos	
	
Feature S-7	Feature S-8
	
Feature S-9	Feature S-10
	
Feature S-11a	Feature S-11b

References

Geologic Atlas of Texas, San Antonio Sheet, Bureau of Economic Geology (1983)

Hydrogeologic Map of Bexar County, Bat Cave and Bulverde Sheets, San Antonio Water Systems (1995)

Geologic Framework and Hydrogeologic Characteristics of the Edwards Aquifer Outcrop, Comal County, Texas, USGS Report 94-4117 (1994)

FEMA Base Floodplain digital database

Texas Commission on Environmental Quality (TCEQ) Instructions to Geologists for Geologic Assessments (GA) on the Edwards Aquifer Recharge Zone (2004)

Comal County Engineer's Office, GIS Data, 2010 Aerial Imagery

EDWARDS AQUIFER CONTRIBUTING ZONE

Ked

Kgru

Qal

EDWARDS AQUIFER CONTRIBUTING ZONE

PROPERTY LINE

PROPOSED LOW WATER CROSSING

PROPOSED LOOP ROAD

S-10

S-11A
S-11B

S-1

S-8

S-7

S-6

S-9

S-2

EFFECTIVE 100 YEAR FLOODPLAIN BOUNDARY

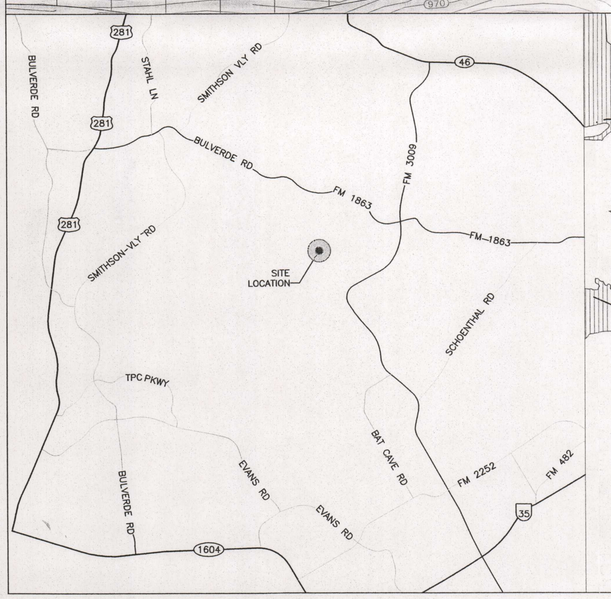
N = 13804866.05
E = 2173225.32

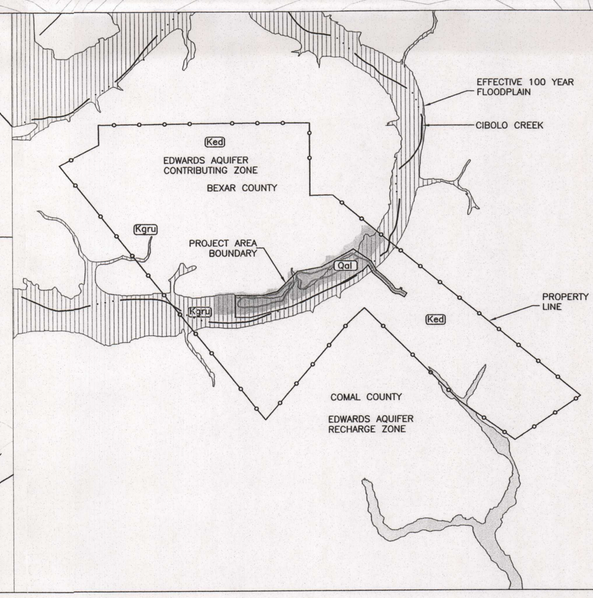
S-3

S-4

S-5

EDWARDS AQUIFER RECHARGE ZONE





PROPERTY LINE
PROJECT AREA BOUNDARY
CONTOURS EXISTING GROUND
S-1 GEOLOGIC FEATURE
EFFECTIVE 100 YEAR FLOODPLAIN BOUNDARY
PROPOSED LOOP ROAD
CIBOLO CREEK CENTERLINE

GEOLOGY
Ked
Kgru
Qal

0 200 400
1" = 200'

MAP BASED ON TEXAS STATE PLANE, SOUTH CENTRAL ZONE, NAD 83, US SURVEY FOOT

N W E S

STATE OF TEXAS
THOMAS O. MATHEWS
GEOLOGY
5321
LICENSED
PROFESSIONAL GEOSCIENTIST

Thomas O. Mathews PG 5321
1-19-11

TBPE REG. NO.: F-4524

Westward Environmental, Inc.
P.O. Box 2205
Boerne, Texas 78006
(830) 249-8284 Fax: (830) 249-0221

REV.	DESCRIPTION	BY	DATE

COMPANY NAME: NATURAL BRIDGE WILDLIFE RANCH	DRAWN BY: DK	CHECKED BY: TM
JOB NAME: WPAP/GA ROAD & CREEK CROSSING	SCALE: 1" = 200'	
LOCATION: NAT. BRIDGE CAVERNS RD., S.A., TX	DATE: 1/19/2011	
IMAGE: NONE	JOB NUMBER:	DRAWING NAME:
DESCRIPTION: GEOLOGY MAP	10631-003	GEOLOGY.dwg

Modification of a Previously Approved Plan

for Regulated Activities on the
Edwards Aquifer Recharge Zone and Transition Zone
and Relating to 30 TAC 213.4(j), Effective June 1, 1999

1. Current Regulated Entity Name: Natural Bridge Wildlife Ranch
   Original Regulated Entity Name: Natural Bridge Wildlife Ranch
   Assigned Regulated Entity Numbers (RN): 1) 105194187, 2) _____, 3) _____

   X The applicant has not changed and the Customer Number (CN) is: CN 603829599
   ___ The applicant has changed. A new Core Data Form has been provided.

2. X **Attachment A: Original Approval Letter and Approved Modification Letters:** A copy of the original approval letter and copies any letters approving modification are found at the end of this form.

3. A modification of a previously approved plan in requested for (check all that apply):

   ___ physical or operational modification of any water pollution abatement structure(s) including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;
   X change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;
   X development of land previously identified as undeveloped in the original water pollution abatement plan;
   ___ physical modification of the approved organized sewage collection system;
   ___ physical modification of the approved underground storage tank system;
   ___ physical modification of the approved aboveground storage tank system.

4. Summary of Proposed Modifications (select plan type being modified). If the approved plan has been modified more than once, copy the appropriate table below, as necessary, and complete the information for each additional modification.

WPAP Modification Summary	Approved Project	Proposed Modification
Acres	65 – project area	69.5 – project area
Type of Development	Roads/Bridge	Septic, Buildings, Parking, Sidewalk
Number of Residential Lots	0	0
Impervious Cover (acres)	5.45	0.82
Impervious Cover (%)	8.38% of the project area	1.18% of the project area
Permanent BMPs	Veg. Filter Strips	Veg. Filter Strips
Other		

SCS Modification Summary	Approved Project	Proposed Modification
Linear Feet		
Pipe Diameter		
Other		

AST Modification Summary	Approved Project	Proposed Modification
Number of ASTs		
Volume of ASTs		
Other		

UST Modification Summary	Approved Project	Proposed Modification
Number of USTs		
Volume of USTs		
Other		

5. _X_ **Attachment B: Narrative of Proposed Modification.** A narrative description of the nature of the proposed modification is provided at the end of this form. It discusses what was approved, including previous modifications, and how this proposed modification will change the approved plan.

6. _X_ **Attachment C: Current site plan of the approved project.** A current site plan showing the existing site development (i.e., current site layout) at the time this application for modification is provided at the end of this form. A site plan detailing the changes proposed in the submitted modification is required elsewhere.

___ The approved construction has not commenced. The original approval letter, and any subsequent modification approval letters are included as Attachment A to document that the approval has not expired.

___ The approved construction has commenced and has been completed. Attachment C illustrates that the site was constructed as approved.

___ The approved construction has commenced and has been completed. Attachment C illustrates that the site was **not** constructed as approved.

_X_ The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was constructed as approved.

___ The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was **not** constructed as approved.

7. _X_ The acreage of the approved plan has increased. A Geologic Assessment has been provided for the new acreage. **(Attached is the revised GA and the original GA)**

___ Acreage has not been added to **or** removed from the approved plan.

8. _X_ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

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 request for a **MODIFICATION TO A PREVIOUSLY APPROVED PLAN** is hereby submitted for TCEQ review and executive director approval. The request was prepared by:

Gary Nicholls, P.E.
Print Name of Engineer

Signature of Engineer

8/20/12
Date

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 7, 2011

Mr. Shawn Soechting
Natural Bridge Wildlife Ranch, Inc.
26515 Natural Bridge Caverns Rd.
San Antonio, TX 78266

Re: Edwards Aquifer Protection Program, Bexar and Comal County

Name of Project: Natural Bridge Wildlife Ranch Road and Creek Crossing; Located at 26515 Natural Bridge Caverns Road, seven miles northwest of I-35; San Antonio ETJ, Texas

Type of Plan: Request for the Approval of a Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer

Edwards Aquifer Protection Program San Antonio File No. 2641.01; Investigation No. 894454; Regulated Entity No. RN105194187

Dear Mr. Soechting:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP application for the above-referenced project submitted to the San Antonio Regional Office by Westward Environmental, Inc. on behalf of Natural Bridge Wildlife Ranch, Inc. on January 21, 2011. Final review of the WPAP was completed after additional material was received on March 18, 2011 and April 4, 2011. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

Project Description

The proposed commercial project will have a project area of approximately 65 acres within the larger 1,342 acre site. It will include the construction of approximately 8,823 feet of roadway, the widening and improvements to approximately 1,269 feet of roadway and the construction of a 185 foot crossing

over Cibolo Creek. The impervious cover will be 5.45 acres (8.38 percent of the project area). No wastewater is generated by this project.

Permanent Pollution Abatement Measures

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, engineered filter strips, designed using the TCEQ technical guidance document, Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 4,528 pounds of TSS generated from the 5.45 acres of impervious cover. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

The individual treatment measures will consist of engineered filter strips adjacent to the roadway surfaces. The filter strips will have a minimum length of 15 feet, slopes less than 20 percent and at least 80% vegetation cover. The filter strips have been designed to allow storm water to sheet flow through the filter strip without gullies or rills or the concentration of flow.

Additional measures include enclosing the animals within a fenced area defined in the WPAP application. The Inspection, Maintenance, Repair and Retrofit Plan will be followed for all areas within the fenced area to ensure vegetation cover will be provided.

Geology

According to the geologic assessment included with the application, three geologic units are located at the site: the Basal Nodular Member of the Edwards formation, the Upper Glen Rose Limestone and Quaternary Alluvium. Twelve karst features (eleven geologic features, one water well) were assesses as non-sensitive by the project geologist. The San Antonio Regional Office site assessment conducted on March 15, 2011 revealed the site was adequately described by the geologic assessment.

Special Conditions

1. The engineered filter strips shall be operational, with at least 80 percent vegetation cover, prior to public use of the roadways or placement of animals within the project area.

2. Notify TCEQ of any of the following: revisions to the road layout or fenced area layout, change in activities occurring at the site or change in the BMPs proposed. Modification to these items may require prior approval of a WPAP modification.

Standard Conditions

1. Pursuant to Chapter 7 Subchapter C of the Texas Water Code, any violations of the requirements in 30 TAC Chapter 213 may result in administrative penalties.

2. The holder of the approved Edwards Aquifer protection plan must comply with all provisions of 30 TAC Chapter 213 and all best management practices and measures contained in the approved plan. Additional and separate approvals, permits, registrations and/or authorizations from other

TCEQ Programs (i.e., Stormwater, Water Rights, UIC) can be required depending on the specifics of the plan.

3. In addition to the rules of the Commission, the applicant may also be required to comply with state and local ordinances and regulations providing for the protection of water quality.

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the San Antonio Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.

5. All contractors conducting regulated activities at the referenced project location shall be provided a copy of this notice of approval. At least one complete copy of the approved WPAP and this notice of approval shall be maintained at the project location until all regulated activities are completed.

6. Modification to the activities described in the referenced WPAP application following the date of approval may require the submittal of a plan to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval prior to initiating construction of the modifications.

7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.

8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

During Construction:

10. During the course of regulated activities related to this project, the applicant or agent shall comply with all applicable provisions of 30 TAC Chapter 213, Edwards Aquifer. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity.

11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.

12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.

13. One well is located onsite. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.

14. If sediment escapes the construction site, the 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). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.

15. Intentional discharges of sediment laden storm water are not allowed. If dewatering becomes necessary, the discharge will be filtered through appropriately selected best management practices. These may include vegetated filter strips, sediment traps, rock berms, silt fence rings, etc.

16. The following records shall be maintained and made available to the executive director upon request: 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.

17. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and construction activities will not resume within 21 days. When the initiation of stabilization measures by the 14th day is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable.

After Completion of Construction:

18. 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 San Antonio Regional Office within 30 days of site completion.

19. The applicant shall be 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. The regulated entity shall then be responsible for maintenance until

another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director through San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

20. Upon legal transfer of this property, the new owner(s) is required to comply with all terms of the approved Edwards Aquifer protection plan. If the new owner intends to commence any new regulated activity on the site, a new Edwards Aquifer protection plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.

21. An Edwards Aquifer protection plan approval or extension will expire and no extension will be granted if more than 50 percent of the total construction has not been completed within ten years from the initial approval of a plan. A new Edwards Aquifer protection plan must be submitted to the San Antonio Regional Office with the appropriate fees for review and approval by the executive director prior to commencing any additional regulated activities.

22. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

If you have any questions or require additional information, please contact Charly Fritz of the Edwards Aquifer Protection Program of the San Antonio Regional Office at (210) 403-4065.

Sincerely,

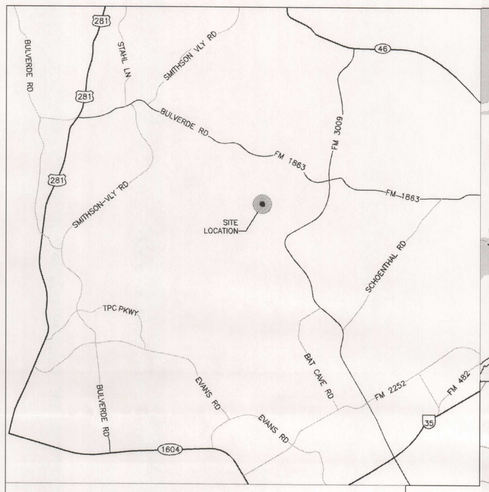
for

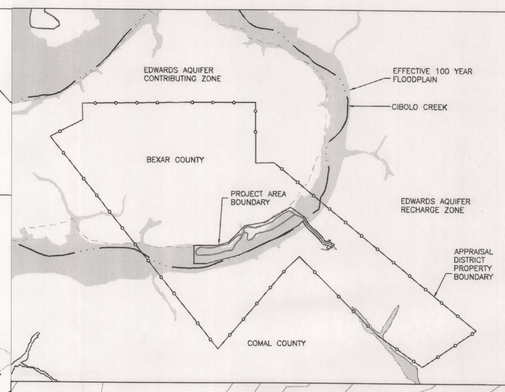
Mark R. Vickery, P.G., Executive Director
Texas Commission on Environmental Quality

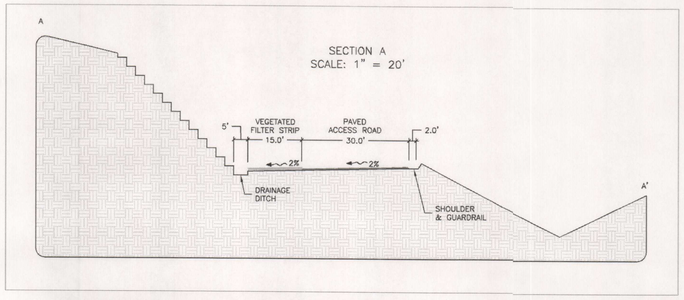
MRV/CEF/eg

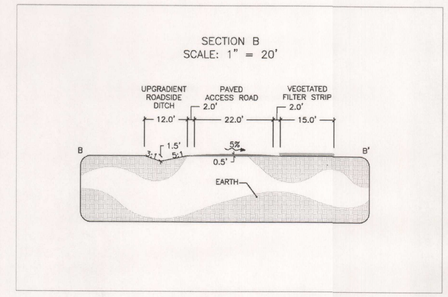
Enclosure: Deed Recordation Affidavit, Form TCEQ-0625
Change in Responsibility for Maintenance of Permanent BMPs, Form TCEQ-10263

cc: Mr. Gary Nicholls, P.E., Westward Environmental, Inc.
Mr. Scott Halty, San Antonio Water System
Ms. Renee Green, P.E., Bexar County Public Works
Mr. Tom Hornseth, P.E., Comal County
Mr. Karl Dreher, General Manager, Edwards Aquifer Authority
Mr. George Wissmann, Trinity Glen Rose GCD
TCEQ Central Records, Building F, MC 212









TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
WATER POLLUTION ABATEMENT PLAN
GENERAL CONSTRUCTION NOTES

1. WRITTEN CONSTRUCTION NOTIFICATION MUST BE GIVEN TO THE APPROPRIATE TCEQ REGIONAL OFFICE NO LATER THAN 48 HOURS PRIOR TO COMMENCEMENT OF THE REGULATED ACTIVITY. INFORMATION MUST INCLUDE THE DATE ON WHICH THE REGULATED ACTIVITY WILL COMMENCE, THE NAME OF THE APPROVED PLAN FOR THE REGULATED ACTIVITY, AND THE NAME OF THE PRIME CONTRACTOR AND THE NAME AND TELEPHONE NUMBER OF THE CONTACT PERSON.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED WATER POLLUTION ABATEMENT PLAN AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON-SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.

3. IF ANY SENSITIVE FEATURE IS DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. CALL WESTWARD ENVIRONMENTAL AT (830) 249-8284 SO A PROFESSIONAL GEOLOGIST MAY OBSERVE AND RATE THE FEATURE. THE APPROPRIATE TCEQ REGIONAL OFFICE MUST BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE TCEQ HAS REVIEWED AND APPROVED THE METHODS TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY.

4. NO TEMPORARY ABOVEGROUND HYDROCARBON AND HAZARDOUS SUBSTANCE STORAGE TANK SYSTEM IS INSTALLED WITHIN 150 FEET OF A DOMESTIC, INDUSTRIAL, IRRIGATION OR PUBLIC WATER SUPPLY WELL OR OTHER SENSITIVE FEATURE.

5. PRIOR TO COMMENCEMENT OF CONSTRUCTION, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY SELECTED, INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS AND GOOD ENGINEERING PRACTICES. CONTROLS SPECIFIED IN THE TEMPORARY STORM WATER SECTION OF THE APPROVED EDWARDS AQUIFER PROTECTION PLAN ARE REQUIRED DURING CONSTRUCTION. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THE CONTROLS MUST REMAIN IN PLACE UNTIL DISTURBED AREAS ARE REVEGETATED AND THE AREAS HAVE BECOME PERMANENTLY STABILIZED.

6. 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).

7. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS NOT LATER THAN WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%. A PERMANENT STAKE MUST BE PROVIDED THAT CAN INDICATE WHEN THE SEDIMENT OCCUPIES 50% OF THE BASIN VOLUME.

8. 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).

9. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE MUST BE STORED ON-SITE WITH PROPER E&S CONTROLS. FOR STORAGE OR DISPOSAL OF SPOILS AT ANOTHER SITE ON THE EDWARDS AQUIFER RECHARGE ZONE, THE OWNER OF THE SITE MUST RECEIVE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN FOR THE PLACEMENT OF FILL MATERIAL OR MASS GRADING PRIOR TO THE PLACEMENT OF SPOILS AT THE OTHER SITE.

10. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS AFTER THE E&S CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARY OR PERMANENTLY CEASE IS PRECLUDED BY WEATHER CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 21 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF SITE. IN AREAS EXPERIENCING DROUGHTS WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY HAS TEMPORARILY OR PERMANENTLY CEASED IS PRECLUDED BY SEASONAL ARID CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE.

11. THE FOLLOWING RECORDS SHALL BE MAINTAINED AND MADE AVAILABLE TO THE TCEQ UPON REQUEST: 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.

12. THE HOLDER OF ANY APPROVED EDWARDS AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:

A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS AND DIVERSIONARY STRUCTURES;

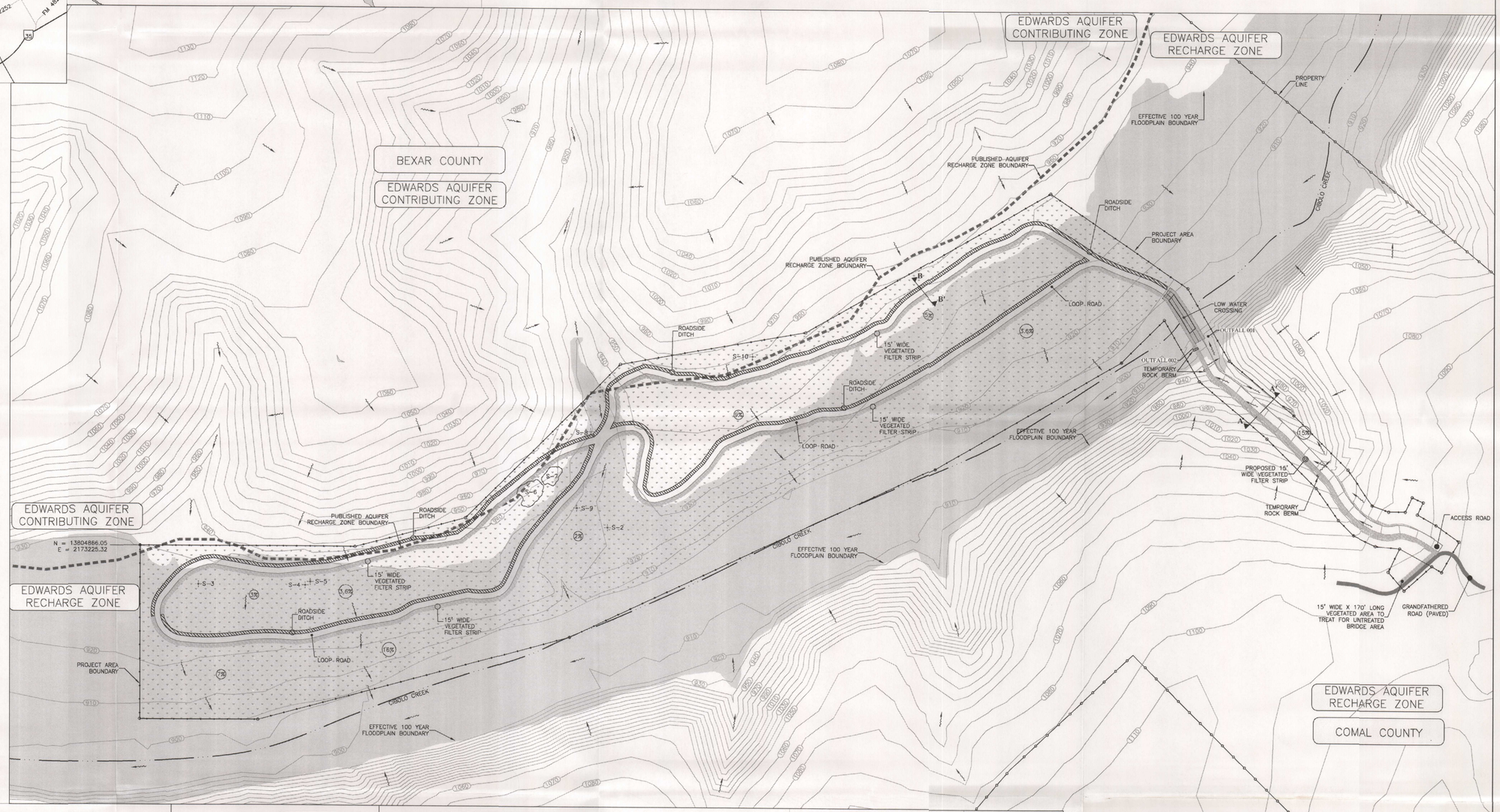
B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;

C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

AUSTIN REGIONAL OFFICE
2800 S. HWY 35, SUITE 100
AUSTIN, TEXAS 78704
PHONE (512) 339-2929
FAX (512) 339-3795

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

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

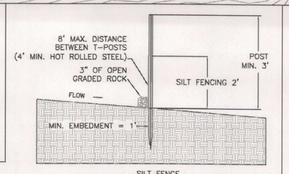


1. ROCK BERM

SHOULD BE SECURED WITH A WOVEN WIRE SHEATING, MAX. OPENING 1" AND MIN. WIRE DIAM. 20 GAUGE GALVANIZED. SECURE WITH SHOAT RINGS.

INSTALLATION:
AGGREGATE USED SHOULD BE COMPRISED OF OPEN GRADED 3-5" DIAMETER ROCK. BERM SHOULD BE PLACED PERPENDICULAR TO FLOW LINE. SIDE SLOPE MUST BE 2:1 OR FLATTER. WIRE SHEATING MUST BE SECURED WITH TIE WIRE SO THEY OVERLAP AT LEAST 2". BERM SHOULD BE BURIED IN A TRENCH APPROX. 4" DEEP.

MAINTENANCE:
INSPECT BERMS EVERY 14 CALENDAR DAYS AND WITHIN 24 HRS OF THE CONCLUSION OF EACH RAINFALL
GREATER THAN OR EQUAL TO 0.5" OR INSPECT WEEKLY. REMOVE SEDIMENT AND OTHER DEBRIS WHEN BUILDUP REACHES 6". REPLACE WHEN ROCK BECOMES CLOGGED WITH SEDIMENT.



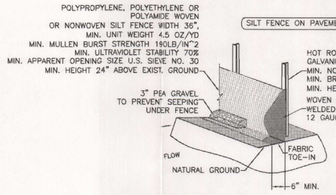
SILT FENCE

N.T.S.

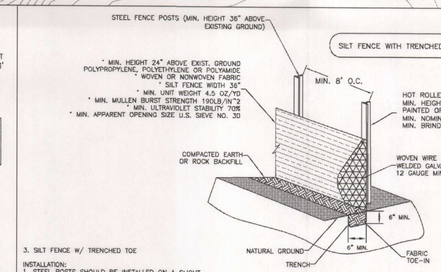
2. SILT FENCE

INSTALLATION:
FOLLOW CONTOUR WHEN INSTALLING
USING HOT ROLLED STEEL T-POSTS AT 8' INTERVALS. WHERE WATER CONCENTRATES, THE MAXIMUM SPACING SHOULD BE 6'.
A MINIMUM DEPTH OF 3" OPEN GRADED ROCK USED AS ANCHOR. AVOID SPACE BETWEEN FENCE AND GROUND. INSTALL PERPENDICULAR TO FLOW ON A SLIGHT ANGLE AND SO THAT THE MAX. DRAINAGE AREA IS ¼ ACRE/100' OF FENCE.
A 3' INTERVAL IS REQUIRED WHERE ENDS OF FABRIC MEET.

MAINTENANCE:
INSPECT EVERY 14 CALENDAR DAYS AND WITHIN 24 HRS OF THE CONCLUSION OF EACH RAINFALL GREATER THAN OR EQUAL TO 0.5" OR INSPECT WEEKLY. REMOVE SEDIMENT AND OTHER DEBRIS WHEN BUILDUP REACHES 6". REPLACE TORN FABRIC OR FENCING.



N.T.S.



3. SILT FENCE W/ TRENCHED TOE

INSTALLATION:
1. STEEL POSTS SHOULD BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POSTS MUST BE EMBEDDED A MIN. OF 1' DEEP AND SPACED NOT MORE THAN 8' ON CENTER. WHERE WATER CONCENTRATES, THE MAX. SPACING SHOULD BE 6'.

2. LAY OUT FENCING DOWN SLOPE OF DISTURBED AREA, FOLLOWING THE CONTOUR AS CLOSELY AS POSSIBLE.

3. THE TOE OF THE SILT FENCE SHOULD BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWN-SLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (E.G. PAVEMENT OR ROCK OUTCROP), WEIGHT FABRIC FLAP WITH 3 IN. OF PEA GRAVEL ON UPHILL SIDE TO PREVENT FLOW FROM SEEPING UNDER FENCE.

4. THE TRENCH MUST BE A MIN. OF 6 IN. DEEP AND 6 IN. WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
5. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST. THERE SHOULD BE A 3-FOOT OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.

PROPERTY LINE
PROJECT AREA BOUNDARY
CONTOURS FINISHED GROUND
CONTOURS EXISTING GROUND
GEOLOGIC FEATURE
EDWARDS AQUIFER ZONE BOUNDARY
EXISTING VEGETATION
LOOP ROAD
CIBOLO CREEK CENTERLINE
TEMPORARY ROCK BERM
VEGETATED FILTER STRIP
ROADSIDE DITCH
STAGING AND STOCKPILE AREAS (ENCLOSED BY SILT FENCE)
EFFECTIVE 100 YEAR FLOODPLAIN

0 200 400
1" = 200'

MAP BASED ON TEXAS STATE PLANE, SOUTH CENTRAL ZONE, NAD 83, US SURVEY FOOT

N W E S

STATE OF TEXAS
GARY DANIEL NICHOLLS
82522
LICENSED PROFESSIONAL ENGINEER
8-22-12

TBPE REG. NO.: F-4524

Westward Environmental, Inc.
P.O. Box 2205
Boerne, Texas 78006
(830) 249-8284 Fax: (830) 249-0221

REV.	DESCRIPTION	BY	DATE

COMPANY NAME: NATURAL BRIDGE WILDLIFE RANCH	DRAWN BY: DK	CHECKED BY: GDN
JOB NAME: WPAP MODIFICATION	SCALE: 1" = 200'	
LOCATION: NAT. BRIDGE CAVERNS RD., S.A., TX	DATE: 08/17/2012	
IMAGE: NONE	JOB NUMBER:	DRAWING NAME:
DESCRIPTION: CURRENT CONDITIONS	10631-008	CUR-COND.dwg

Natural Bridge Wildlife Ranch, Inc.
WPAP Modifications

Modification of a Previously Approved Plan Attachment B

Proposed Modification

Natural Bridge Wildlife Ranch, Inc. proposes to install a septic system and build additional impervious cover on their wildlife ranch in the form of a new barn, parking lot, sidewalk, restrooms and pump house. These improvements will occur on the Bexar County side of the property. The paved parking lot and restroom area with septic system will be built to accommodate patrons of the wildlife ranch. Concrete sidewalks will be constructed to connect these facilities. Nearby, a barn will be built to house some of the wildlife at the ranch. Each proposed area of impervious cover will be treated by a downgradient engineered filter strip. An additional 4.5 acres was added to the project area to include the above mentioned improvements. A new Geologic Assessment (GA) was performed on the 4.5 acres and is included in this modification with the original GA for reference. No new features were discovered in the new GA. Of the surveyed 1,342 acres, 69.5 acres are now designated as the "Project Area" under this modification.

The project will consist of several phases: 1) the placement of rock berms inside the roadside ditch. 2) The cut and fill of four pads for the construction of the barn, restrooms, sidewalk and pump house. 3) A slight road adjustment to the existing loop road in order to located the proposed barn outside of the 100-year floodplain. 4) Form and pour concrete for the proposed sidewalk and building slabs. 5) The erection of the restrooms and prefabricated barn. 6) Excavate approximately six inches of soil in order to place base and chip seal on grade for the proposed parking lots. 7) The installation of a septic system for the proposed restrooms. 8) Installation and maintenance of the engineered filter strips.

Element	Element Dimensions	Impervious Cover	Temporary BMPs	Permanent BMPs
Wildlife Barn	60 feet long 40 feet wide	0.055 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Pump House	15 feet long 15 feet wide	0.005 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Restrooms Building	70 feet long 40 feet wide	0.064 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Parking Lots	211 feet long 72 feet wide (x2)	0.674 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips
Sidewalk	133 feet long 8 feet wide	0.023 acres	Rock Berms and Existing Natural Vegetation	Engineered Filter Strips

Modification of a Previously Approved Plan Attachment B

Proposed Modification (continued)

In order to mitigate stormwater runoff during construction activities three rock berms and existing natural vegetation will be utilized. Land disturbance will be limited to the parking lots, sidewalk, and the building footprints leaving hundreds of feet of natural grass land to mitigate stormwater runoff. Approximately two or three pieces of equipment will be used onsite for construction activities. The equipment will be re-fueled and parked at a designated staging area which is shown on the WPAP Site Map. A mobile fuel truck, which will service the equipment at the designated areas, will not be stored onsite.

The permanent BMPs proposed for the buildings, sidewalk and parking lots will be engineered filter strips. No more than 72 feet of impervious cover will be treated by each engineered filter strip.

Trash generated onsite will be disposed of in existing trash receptacles and handled by a licensed waste service. Existing onsite toilets will be utilized by construction workers. Once construction has been completed then the newly constructed restrooms will service patron visiting the park.

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

REGULATED ENTITY NAME: Natural Bridge Wildlife Ranch

REGULATED ENTITY INFORMATION

1. The type of project is:
   - ___ Residential: # of Lots: _____
   - ___ Residential: # of Living Unit Equivalents: _____
   - ___ Commercial
   - ___ Industrial
   - X Other: Private Wildlife Preserve

2. Total site acreage (size of property): Project area = 69.5acres/Total Survey = 1,342acres

3. Projected population: None

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	5,425	÷ 43,560 =	0.124
Parking/Sidewalk	30,396	÷ 43,560 =	0.697
Other paved surfaces	0	÷ 43,560 =	0
Total Impervious Cover	35,821	÷ 43,560 =	0.822
Total Impervious Cover ÷ Total Acreage **(Project Area)** x 100 =			**1.18 %**

5. X **ATTACHMENT A - Factors Affecting Water Quality.** A description of any factors that could affect surface water and groundwater quality is provided at the end of this form.

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

FOR ROAD PROJECTS ONLY (N/A)
Complete questions 7-12 if this application is exclusively for a road project.

7. Type of project:
   - N/A 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:
   - N/A Concrete
   - ___ Asphaltic concrete pavement
   - ___ Other: _____

9. Length of Right of Way (R.O.W.): N/A feet.
Width of R.O.W.: _____ feet.
L x W = _____ Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.
Paved private ranch road – No ROW

10. Length of pavement area: N/A feet.
Width of pavement area: _____ feet.
L x W = _____ Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.
Pavement area _____ acres ÷ R.O.W. area _____ acres x 100 = ___% impervious cover.

11. N/A A rest stop will be included in this project.
__ A rest stop will **not** be included in this project.

12. N/A Maintenance and repair of existing roadways that do not require approval from the TCEQ Executive Director. Modifications to existing roadways such as widening roads/adding shoulders totaling more than one-half (1/2) the width of one (1) existing lane require prior approval from the TCEQ.

STORMWATER TO BE GENERATED BY THE PROPOSED PROJECT

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

WASTEWATER TO BE GENERATED BY THE PROPOSED PROJECT

14. The character and volume of wastewater is shown below:

100% Domestic	100 gallons/day
__% Industrial	_____ gallons/day
__% Commingled	_____ gallons/day

TOTAL 100 gallons/day - Based on 25 patrons per day.

15. Wastewater will be disposed of by:
X **On-Site** Sewage Facility (OSSF/Septic Tank):
X **ATTACHMENT C - Suitability Letter from Authorized Agent.** An on-site sewage facility will be used to treat and dispose of the wastewater. The appropriate licensing authority's (authorized agent) written approval is provided at the end of this form. It states that the land is suitable for the use of an on-site sewage facility or identifies areas that are not suitable.
X Each lot in this project/development is at least one (1) acre (43,560 square feet) in size. The system will be designed by a licensed professional engineer or registered sanitarian and installed by a licensed installer in compliance with 30 TAC Chapter 285.

N/A Sewage Collection System (Sewer Lines):
__ Private service laterals from the wastewater generating facilities will be connected to an existing SCS.
__ Private service laterals from the wastewater generating facilities will be connected to a proposed SCS.

__ The SCS was previously submitted on _____.
__ The SCS was submitted with this application.
__ The SCS will be submitted at a later date. The owner is aware that the SCS may not be installed prior to Executive Director approval.

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

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

SITE PLAN REQUIREMENTS

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

17. The Site Plan must have a minimum scale of 1" = 400'.
Site Plan Scale: 1" = 200 '.

18. 100-year floodplain boundaries
X Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
__ No part of the project site is located within the 100-year floodplain.

The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s):
San Antonio River Authority (SARA) Sept. 29, 2010 (Bexar County)
Comal County Engineers Office Sept. 2010 (Comal County)

19. X The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Show lots, recreation centers, buildings, roads, etc.
__ The layout of the development is shown with existing contours. Finished topographic contours will not differ from the existing topographic configuration and are not shown.

20. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):
X There is 1 (#) well 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.
X 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.
X No **sensitive** geologic or manmade features were identified in the Geologic Assessment.
__ **ATTACHMENT D - Exception to the Required Geologic Assessment**. An exception to the Geologic Assessment requirement is requested and explained at the end of this form.

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

23. X Areas of soil disturbance and areas which will not be disturbed.

24. X Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.

25. X Locations where soil stabilization practices are expected to occur.

26. X Surface waters (including wetlands).

27. X Locations where stormwater discharges to surface water or sensitive features.
__ There will be no discharges to surface water or sensitive features.

ADMINISTRATIVE INFORMATION

28. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

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

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:

Gary Nicholls, P.E.
Print Name of Engineer

Signature of Engineer

8/20/12
Date

WPAP Attachment A

Factors Affecting Water Quality

The major factor that could potentially affect water quality is sediment in stormwater runoff from the disturbed soils. More remote factors include fuels and lubricants from vehicles and equipment and trash/debris items.

During construction, normal vehicle maintenance such as changing air filters, tires and batteries will be performed on site; major vehicle maintenance will occur offsite. A mobile fuel truck will be utilized onsite to fuel the mobile equipment. The mobile fuel truck will be stored off site. Spills or leaks will be cleaned up in a timely manner and will be disposed of properly. Trash receptacles are already located onsite for use by employees and visitors.

WPAP Attachment B

Volume and Character of Stormwater

During construction the stormwater from disturbed areas may carry an increased level of total suspended solids (TSS); however, rock berms and downgradient natural vegetation will intercept and treat these stormwater flows. The rock berms will filter stormwater flows prior to leaving the active project areas and flow into the Cibolo Creek. In addition, hundreds of feet of natural vegetation downgradient of the new construction will also treat stormwater flows. Due to the use of these BMPs during and after construction, the character of stormwater runoff which is expected to occur from the proposed project will be essentially the same as prior to the proposed project. The runoff coefficient for the impervious areas is 0.90 and runoff coefficient for predevelopment is 0.03, per TCEQ guidance.

WPAP Attachment C

Suitability Letter from Authorized Agent

Please see the attached Bexar County letter for the proposed OSSF.

COUNTY OF BEXAR

PUBLIC WORKS DEPARTMENT

233 N. Pecos La Trinidad, Suite 420
San Antonio, Texas 78207-3188
Main 210-335-6700 Fax 210-335-6713

10 August 2012

Mr. Tracey Lehmann, P.E.
Manager Development Services
San Antonio Water System
2800 US HWY 281 N
San Antonio, TX 78212-3106

RE: Natural Bridge Wildlife Ranch Road and Creek Crossing Project

Dear Mr. Lehmann:

Based on the information submitted by Greg Johnson, P.E., the above referenced subdivision has been reviewed by the Environmental Services Division and is found to meet the minimum requirements of the Regulations for On-Site Sewage Facilities, Bexar County, Texas (2006), for a proposed subdivision not served by sanitary sewer.

Prior to installation, each individual lot owner will be required to obtain approval of a site specific design (which meets Bexar County construction requirements) for conditions unique to that lot. This letter does not guarantee approval of any and all lots within the proposed subdivision or the use of specific types of on-site systems.

Sincerely,

Andrew Winter, P.E.
Bexar County Environmental Engineer

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

REGULATED ENTITY NAME: Natural Bridge Wildlife Ranch

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

1. Fuels for construction equipment and hazardous substances which will be used during construction:

   ___ Aboveground storage tanks with a cumulative storage capacity of less that 250 gallons will be stored on the site for less than one (1) year.
   ___ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
   ___ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An **Aboveground Storage Tank Facility Plan** application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
   X Fuels and hazardous substances will not be stored on-site.

2. X **ATTACHMENT A - Spill Response Actions**. A description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is provided at the end of this form.

3. X Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

4. X **ATTACHMENT B - Potential Sources of Contamination.** Describe in an attachment at the end of this form any other activities or processes which may be a potential source of contamination.
   ___ There are no other potential sources of contamination.

SEQUENCE OF CONSTRUCTION

5. X **ATTACHMENT C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is provided at the end of this form. For each activity described, an estimate of the total area of the site to be disturbed by each activity is given.

6. X Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: Cibolo Creek

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

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

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

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

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

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

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

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

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

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

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

10. X **ATTACHMENT G - Drainage Area Map**. A drainage area map is provided at the end of this form to support the following requirements. **(See attached WPAP Mod. Site Plan)**

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

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

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

X There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area. **(A combination of erosion and sediment controls will be used with existing natural vegetation. A sediment basin and or sediment traps will not be used)**

11. N/A **ATTACHMENT H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure has been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are provided as at the end of this form.

12. X **ATTACHMENT I - Inspection and Maintenance for BMPs.** A plan for the inspection of temporary BMPs and measures and for their timely maintenance, repairs, and, if necessary, retrofit is provided at the end of this form. A description of documentation procedures and recordkeeping practices is included in the plan.

13. X All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.

14. X If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).

15. X Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.

16. X Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

SOIL STABILIZATION PRACTICES

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

17. X **ATTACHMENT J - Schedule of Interim and Permanent Soil Stabilization Practices.** A schedule of the interim and permanent soil stabilization practices for the site is attached at the end of this form.

18. X Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.

19. X Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

ADMINISTRATIVE INFORMATION

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

21. X If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.

22. X Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

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

Gary Nicholls, P.E.
Print Name of Engineer

Signature of Engineer

8/20/12
Date

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

Temporary Stormwater Section Attachment A

As outlined in the Technical Guidance Manual (RG-348) the following Spill Response Actions will be followed. Please reference to the onsite stormwater plan for responsible personnel.

Spill Response Actions

Education

(1) Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when a spill must be reported to the TCEQ.

(2) Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

(3) Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

(4) Establish a continuing education program to indoctrinate new employees.

(5) Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

(1) To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.

(2) Store hazardous materials and wastes in covered containers and protect from vandalism.

(3) Place a stockpile of spill clean-up materials where it will be readily accessible.

(4) Train employees in spill prevention and cleanup.

(5) Designate responsible individuals to oversee and enforce control measures.

(6) Spills should be covered and protected from stormwater run-on during rainfall to the extent that it doesn't compromise clean up activities.

(7) Do not bury or wash spills with water.

Spill Response Actions (continued)

(8) Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

(9) Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.

(10) Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

(11) Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

(12) Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

(1) Clean up leaks and spills promptly.

(2) Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.

(3) Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

(1) Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

(2) Use absorbent materials on small spills rather than hosing down or burying the spill.

Spill Response Actions (continued)

Minor Spills

(3) Absorbent materials should be promptly removed and disposed of properly.

(4) Follow the practice below for a minor spill:

(5) Contain the spread of the spill.

(6) Recover spilled materials.
(7) Clean the contaminated area and properly dispose of contaminated materials.

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

Spills should be cleaned up promptly:

(1) Contain spread of the spill.

(2) Notify the project foreman immediately.

(3) If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.

(4) If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

(5) If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills
For significant or hazardous spills that are in reportable quantities:

1) Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

Spill Response Actions (continued)

Significant/Hazardous Spills (continued)

(2) For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.

(3) Notification should first be made by telephone and followed up with a written report.

(4) The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

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

In the event of a reportable spill, the following Emergency Response Agencies can be contacted for assistance. Always inform your supervisor of a reportable spill immediately. Follow company policy when responding to an emergency.

State Emergency Response Commission	(512) 463-7727
National Response Center	(800) 424-8802
US EPA Region 6, Dallas, 24-hr Number	(866) 372-7745
National Weather Service	(281) 337-5074
TCEQ 24-hr	(800) 832-8224
TCEQ Region 13 San Antonio	(210) 490-3096

Vehicle and Equipment Maintenance

(1) If maintenance must occur on-site, use a designated area and a secondary containment, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills.

(2) Regularly inspect on-site vehicles and equipment for leaks and repair immediately.

(3) Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site.

Spill Response Actions (continued)

Vehicle and Equipment Maintenance (continued)

(4) Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.

(5) Place drip pans or absorbent materials under paving equipment when not in use.

(6) Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.

(7) Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.

(8) Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.

(9) Store cracked batteries in a non- leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Major vehicle and equipment maintenance will occur off-site.

Vehicle and Equipment Fueling

(1) If fueling must occur on site, use designated areas, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills.

(2) Discourage "topping off" of fuel tanks.

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

Vehicle fueling will occur with a mobile fuel truck.

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

DETAILED TELEPHONE SPILL REPORT FORM

Date of Incident: _____

Location of Incident: _____

Description of material spilled: _____

Quantity of material spilled: _____

Cause of spill: _____

Authorities notified: _____

Remediation/clean-up action: _____

_____

_____

_____

Corrective measures taken for prevention of reoccurrence: _____

_____

_____

_____

Signature: _____

Notes: _____

_____

_____

_____

Emergency Number for the National Response Center 1-800-424-8802

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

Temporary Stormwater Section Attachment B

Potential Sources of Contamination

Potential sources of contamination in the project area are disturbed soils, fuels and lubricants from vehicles and equipment, and trash/debris items.

Temporary Stormwater Section Attachment C

Sequence of Major Activities

Construction will first begin with the placement of rock berms along the roadside ditch downgradient of the proposed construction. Equipment will be moved to the site and staged at the specified location shown on the WPAP Site Map. Clearing of vegetation and topsoil will begin for the building's pad sites. The proposed barn and restroom foundation pads will be created by cutting into the hillside at the back of the buildings and using that material to fill at the front. The barn will have a finished pad of 941.5 feet amsl with the restrooms at approximately 950 feet amsl. Both pads will be sloped away from the building so rainwater runoff from the roof line will drain through the engineered filter strips. Piping to the new septic system will be laid out while workers constructed the forms for the pouring of the concrete for both foundations. Walls and a roof will be erected. Both buildings will consist of an A-frame roof line which will drain to the north and south. A swale at the base of each cut will direct flows around the buildings and through existing natural vegetation. A slight road adjustment to the existing loop road will occur in order to locate the proposed barn outside of the 100-year floodplain. The newly realigned loop road segment will be built in accordance with the original WPAP road design with hundreds of feet of natural vegetation mitigating stormwater runoff during construction activities.

In conjunction with the foundation work with the barn and restrooms, the sidewalk and pump house will also be excavated, formed and poured at the same time. The side walk will drain to an engineered filter strip. Once the walls and roof are constructed on the pump house then an engineered vegetated filter strip will treat the runoff from the roof. The roof line on the pump house will drain in one direction so that the engineered vegetated filter strip is downgradient of the pump house.

Two proposed parking areas no more than 72 feet wide will be utilized for parking by patrons visiting the park. Approximately six inches of soil will be excavated in order to place compacted base for the parking lots. Chip seal will then be used to pave the parking area. Due to the parking area being located inside the 100-year floodplain, an on grade design will be utilized so that there is not an increase in volume of fill inside the floodplain. Culverts will be installed in the roadside ditch in order for upgradient stormwater flows to bypass the parking areas (see the Inset – Modification Area Map). A vegetated swale upgradient from each parking lot will direct upgradient flows around the parking lots and into the roadside ditch. The parking lots will be constructed on grade so that stormwater flows from the parking surface to the engineered filter strips utilizing the natural topography.

Temporary Stormwater Section Attachment C

Sequence of Major Activities (continued)

The landowner will limit land disturbance in the area in order to keep the aesthetics of the wildlife ranch. If areas are disturbed then native grass seed will be applied and watered as necessary to promote growth during the stabilization period.

Temporary Stormwater Section Attachment D

Temporary Best Management Practices (TBMPs) and Measures

7a) Pollution of surface water, groundwater or stormwater that originates upgradient from the construction areas will be mitigated by the use of existing natural vegetation and rock berms in the roadside ditch. The construction will only disturb 0.82 acres of land which is surrounded by thick native grass.

7b) Pollution of surface water, groundwater or stormwater that originates on-site or flows off site will be mitigated by the use of hundreds of feet of natural vegetation downgradient of the proposed construction areas which will filter runoff before entering Cibolo Creek. Rock berms will be utilized in the roadside ditch downgradient from the construction activities.

7c) The prevention of pollutants from entering surface streams, sensitive features or the aquifer will be mitigated by a natural vegetation which exists along the downgradient side of the proposed construction areas and rock berms. No sensitive features exist on site. Construction activates which disturb soil for the proposed improvements will be limited to the maximum extent possible.

7d) No sensitive features were identified in the original Geologic Assessment on the 65 acre project area or in the additional 4.5 acre Geologic Assessment. Rock berms and natural vegetation will be used as pollution prevention measures.

Any possibly sensitive geologic feature discovered during construction will be handled in the following manner. Sediment that can be easily removed from the area adjacent to the feature without disturbing the feature will be removed. Then a rock berm or silt fences will be placed around the feature to control and filter any potential flows into the feature. Work around the feature and upgradient of the feature will stop until a Professional Geologist is called to the site to observe and rate the feature. If the feature is determined to be sensitive in accordance with TAC 213 rules, the TCEQ will be notified and an appropriate method for addressing the feature will be formulated and submitted for TCEQ approval. Work will not resume in the area of the feature until the TCEQ approved method for addressing the feature has been carried out.

Temporary Stormwater Section Attachment F

Structural Practices

Temporary best management practices for the proposed barn, restrooms, parking lot, septic system and pump house includes natural vegetation and rock berms. The natural vegetation and rock berms are used to limit runoff discharge of sediment. Natural vegetative buffers will be left in place in areas not disturbed and will treat runoff from upgradient disturbed areas. Disturbance will be limited to the footprints of the buildings and parking lot.

Temporary Stormwater Section Attachment I

Inspection and Maintenance for BMPs

The rock berms should be inspected weekly or after rainfall greater than 0.5". Written documentation of these inspections should be kept during the course of construction at the project site (see following example Inspection Form.) If a rock berm is no longer able to properly filter the sediment from the stormwater due to contamination from silt, it should be replaced.

During construction, stormwater discharges will be authorized under the TPDES General Permit No. TXR150000 for construction activities. Requirements of the general permit include maintaining a Stormwater Pollution Prevention Plan (SWP3) and performing inspections of the best management practices utilized to control stormwater pollution.

Temporary Stormwater Section Attachment J

Schedule of Soil Stabilization Practices

Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity has temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of the site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.

Examples of soil stabilization practices may include establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Soil stabilization practices to be implemented at this site include establishment of permanent vegetation by hydro-seeding native grasses, placement of sod, and/or preservation of existing vegetation.

		Rock Berm			
Date	Inspector Signature	>6" silt retained	Rock berm clogged	Comments	Additional Comments

* If the answer to any of the above questions is "yes", perform maintenance/repair/replacement as described below or in accordance with TCEQ Technical Guidance on BMPs.

Rock Berm

* >6" of silt retained - remove silt, place in protected area
* rock berm clogged - the rock berm should be replaced when accumulated silt, washout or damage to berm occurs

Permanent Stormwater Section
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

REGULATED ENTITY NAME: Natural Bridge Wildlife Ranch

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

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

2. X These practices and measures have been designed, and will be constructed, operated, and maintained to insure that 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site caused by the regulated activity is removed. These quantities have been calculated in accordance with technical guidance prepared or accepted by the executive director.

   X The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.

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

   _____

   _____

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

4. N/A 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.

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

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

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

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

__ **ATTACHMENT A - 20% or Less Impervious Cover Waiver.** This 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 found at the end of this form.

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

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

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

X 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 identified as **ATTACHMENT B** at the end of this form.

__ If no surface water, groundwater or stormwater originates upgradient from the site and flows across the site, an explanation is provided as **ATTACHMENT B** at the end of this form.

__ If 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, an explanation is provided as **ATTACHMENT B** at the end of this form.

7. **ATTACHMENT C - BMPs for On-site Stormwater.**

X 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 identified as **ATTACHMENT C** at the end of this form.

__ If 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, an explanation is provided as **ATTACHMENT C** at the end of this form.

8. X **ATTACHMENT D - BMPs for Surface Streams.** A description of the BMPs and measures that prevent pollutants from entering surface streams, sensitive features, or the aquifer is provided at the end of this form. Each feature identified in the Geologic Assessment as "sensitive" has been addressed.

9. X The applicant understands that to the extent practicable, BMPs and measures must maintain flow to naturally occurring sensitive features identified in either the geologic assessment, executive director review, or during excavation, blasting, or construction.

X The permanent sealing of or diversion of flow from a naturally-occurring "sensitive" or "possibly sensitive" feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed for any naturally-occurring "sensitive" or "possibly sensitive" features on this site.

__ **ATTACHMENT E - Request to Seal Features.** A request to seal a naturally-occurring "sensitive" or "possibly sensitive" feature, that includes a justification as to why no reasonable and practicable alternative exists, is found at the end of this form. A request and justification has been provided for each feature.

10. X **ATTACHMENT F - Construction Plans.** Construction plans and design calculations for the proposed permanent BMPs and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information have been signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed permanent BMPs and measures are provided at the end of this form. Design Calculations, TCEQ

Construction Notes, all man-made or naturally occurring geologic features, all proposed structural measures, and appropriate details must be shown on the construction plans.

11. X **ATTACHMENT G - Inspection, Maintenance, Repair and Retrofit Plan.** A plan for the inspection, maintenance, repair, and, if necessary, retrofit of the permanent BMPs and measures is provided at the end of this form. The plan has been prepared and certified by the engineer designing the permanent BMPs and measures. The plan has been signed by the owner or responsible party. The plan includes procedures for documenting inspections, maintenance, repairs, and, if necessary, retrofits as well as a discussion of record keeping procedures.

12. X The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.

— Pilot-scale field testing (including water quality monitoring) may be required for BMPs that are not contained in technical guidance recognized by or prepared by the executive director.

— **ATTACHMENT H - Pilot-Scale Field Testing Plan.** A plan for pilot-scale field testing is provided at the end of this form.

13. X **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 provided at the end of this form. The measures address increased stream flashing, the creation of stronger flows and in-stream velocities, and other in-stream effects caused by the regulated activity which increase erosion that results in water quality degradation.

Responsibility for maintenance of permanent BMPs and measures after construction is complete.

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

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

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:

Gary Nicholls, P.E.
Print Name of Engineer

Signature of Engineer

8/20/12
Date

Permanent Stormwater Section Attachment B

BMPs for Upgradient Stormwater

Permanent stormwater controls are those that are to remain in place after construction has been completed.

Pollution of surface water, groundwater or stormwater that originates upgradient from the new buildings and parking lots will be mitigated by the use of existing natural vegetation and the swale at the base of the cut which will direct flows around the buildings. A vegetated swale upgradient from each parking lot will also direct upgradient flows around the parking lots and into the roadside ditch. Engineered filter strips will mitigate stormwater runoff from the proposed improvements.

Permanent Stormwater Section Attachment C

BMPs for On-site Stormwater

Pollution of surface water, groundwater or stormwater that originates on-site or flows off site including pollution caused by contaminated stormwater from the site will be mitigated by the use of engineered vegetated filter strips and hundreds of feet of existing natural vegetation.

On-site stormwater generated from the new buildings and parking lot will be mitigated by engineered filter strips which will be located as shown on the WPAP Site Map and hundreds of feet of existing natural vegetation.

Permanent Stormwater Section Attachment D

BMPs for Surface Streams

The prevention of pollutants from entering surface streams, sensitive features or the aquifer will be mitigated by the engineered filter strips as shown on the attached WPAP Site Map and hundreds of feet of natural vegetation downgradient of the proposed improvements. Water that originates on-site in the developed portions of the site will be treated in the engineered filter strips. Upgradient stormwater will be directed around the barn and restrooms through grading of the site. No sensitive features were identified in the original Geologic Assessment on the 65 acre project area or in the additional 4.5 acre Geologic Assessment. Any discharges during construction activities will be managed in accordance with the TPDES TXR150000 permit.

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

Permanent Stormwater Section Attachment F

Construction Plans

Engineered filter strips (15 feet wide) will be utilized as the permanent BMP. See the attached WPAP Site Map for proposed locations.

Permanent Stormwater Section Attachment G

Inspection, Maintenance, Repair and Retrofit Plan

Vegetative Filter Strips
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 insure 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.

Inspection, Maintenance, Repair and Retrofit Plan Continued

- ***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.

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification

Permanent Stormwater Section Attachment G

Inspection, Maintenance, Repair and Retrofit Plan (continued)

A logbook should be kept to document the date and results of inspections and to record maintenance and repairs made to the permanent BMP. These records should be located onsite. (An example form is attached)

- Access to the site will be authorized at a gate near the entrance of the park located at 26515 Natural Bridge Caverns Rd. San Antonio, Bexar County, Texas 78266. For questions please call 830-438-7400.

- Mr. Shawn Soechting – of Natural Bridge Wildlife Ranch, Inc. will be responsible for maintaining the BMP(s) on the Natural Bridge Wildlife Ranch. Mr. Soechting can be reached at (Office 830-438-7400).

Name and signature of responsible party for maintenance of BMP(s)

Print Name: Shawn Soechting – Natural Bridge Wildlife Ranch, Inc.

Signature: Shawn Soechting Date: 8/17/12

Name and Signature of Engineer

Print Name: Gary Nicholls, P.E. – Westward Environmental, Inc.

Signature: Date: 8/22/12

Natural Bridge Wildlife Ranch, Inc.
WPAP Modification
Permanent Stormwater Section Attachment I

Measures for Minimizing Surface Stream Contamination

Surface stream contamination will be minimized due to the engineered filter strips and the downgradient natural vegetation which will treat runoff from the proposed new buildings and parking lots. These measures will minimize stream contamination and does not change the way water enters the Cibolo Creek from existing site conditions.

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

I **Shawn Soechting**,
Print Name

President,
Title - Owner/President/Other

of **Natural Bridge Wildlife Ranch, Inc.**,
Corporation/Partnership/Entity Name

have authorized **Gary Nicholls, P.E.**
Print Name of Engineer

of **Westward Environmental, Inc.**
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:

Shawn Soechting
Applicant's Signature

7/31/12
Date

THE STATE OF Texas §

County of Comal §

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

GIVEN under my hand and seal of office on this 31st day of July, 2012.

SHAWN E. HUNGATE
Notary Public, State of Texas
My Commission Expires
MARCH 6, 2014

Shawn Hungate
NOTARY PUBLIC

Shawn Hungate
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 3-6-2014

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Form

NAME OF PROPOSED REGULATED ENTITY: Natural Bridge Wildlife Ranch
REGULATED ENTITY LOCATION: 26515 Natural Bridge Caverns Rd. San Antonio, Texas 78266
NAME OF CUSTOMER: Natural Bridge Wildlife Ranch, Inc.
CONTACT PERSON: Shawn Soechting PHONE: 830-438-7400
(Please Print)

Customer Reference Number (if issued): CN 603829599 (nine digits)

Regulated Entity Reference Number (if issued): RN 105194187 (nine digits)

Austin Regional Office (3373) ☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362) ☒ Bexar ☒ Comal ☐ Medina ☐ Kinney ☐ Uvalde

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

☐ **Austin Regional Office**

☒ **San Antonio Regional Office**

☐ **Mailed to TCEQ:**
TCEQ – Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☐ **Overnight Delivery to TCEQ:**
TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
512/239-0347

Site Location (Check All That Apply): ☒ Recharge Zone ☒ Contributing Zone ☐ Transition Zone

Type of Plan	Size	Fee Due
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	100+ (1,342) Acres	$ 10,000
Sewage Collection System	L.F.	$
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	Each	$
Extension of Time	Each	$

Shawn Soechting
Signature

7/31/12
Date

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2[illegible] for projects located in the Austin Region.

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

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Schedule
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 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $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

Extension of Time Requests

PROJECT	FEE
Extension of Time Request	$150

AMERICAN BANK OF TEXAS
www.abtexasna.com

11564

88-922/1149
15

NATURAL BRIDGE WILDLIFE RANCH, INC
26515 NATURAL BRIDGE CAVERNS RD 830-438-7400
SAN ANTONIO, TX 78266

7/31/2012

PAY TO THE ORDER OF Texas Commission on Environmental Quality $**10,000.00

Ten Thousand and 00/100********** DOLLARS

Texas Commission on Environmental Quality

MEMO WPAP Modification

Shawn Spalding MP
AUTHORIZED SIGNATURE

⑈011564⑈ ⑆114909220⑆ ⑈048895⑈

TCEQ Use Only

TCEQ Core Data Form

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

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

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

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☒ Other **(EAPP) WPAP Modification**

2. Attachments **Describe Any Attachments:** *(ex. Title V Application, Waste Transporter Application, etc.)*

☒ Yes ☐ No — Water Pollution Abatement Plan Modification Application

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN 603829599		RN 105194187

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy)

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

☐ Owner ☐ Operator ☒ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other: _____

7. General Customer Information

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☒ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:	☒ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☐ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)* — *If new Customer, enter previous Customer below* — *End Date:*

Natural Bridge Wildlife Ranch, Inc.

10. Mailing Address: 26515 Natural Bridge Caverns, Rd.

City	San Antonio	State	TX	ZIP	78266	ZIP + 4	2671

11. Country Mailing Information *(If outside USA)*

12. E-Mail Address *(If applicable)*

13. Telephone Number (830) 438-7400

14. Extension or Code

15. Fax Number *(If applicable)* (830) 438-3494

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(If applicable)*	19. TX SOS Filing Number *(If applicable)*
	17422891436		

20. Number of Employees

☐ 0-20 ☒ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated?

☒ Yes ☐ No

SECTION III: Regulated Entity Information

22. 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 Information ☒ No Change** *(See below)*

If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

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

Natural Bridge Wildlife Ranch

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*	26515 Natural Bridge Caverns, Rd.							
	City	San Antonio	State	TX	ZIP	78266	ZIP + 4	2671
25. Mailing Address:	26515 Natural Bridge Caverns, Rd.							
	City	San Antonio	State	TX	ZIP	78266	ZIP + 4	2671

26. E-Mail Address:		
27. Telephone Number	28. Extension or Code	29. Fax Number *(if applicable)*
(830) 438-7400		(830) 438-3494

30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)
8399		813312	

34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*

Wildlife Ranch

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	Approximately 7 miles northwest of I-35 and FM 3009

36. Nearest City	County	State	Nearest ZIP Code
San Antonio	Bexar/Comal	TX	78266

37. Latitude (N) In Decimal:	29.708333333		38. Longitude (W) In Decimal:	98.342666667	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	42	30	98	20	34

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
☐ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☒ Other: Unknown

SECTION IV: Preparer Information

40. Name:	Matt Bellos	41. Title:	Project Manager

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(830) 249-8284		(830) 249-0221	mbellos@westwardenv.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 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Natural Bridge Wildlife Ranch, Inc.	Job Title:	President
Name *(In Print)*:	Shawn Soechting	Phone:	(830) 438-7400
Signature:	Shawn Soechting 80	Date:	7/31/12

Bryan W. Shaw, Ph.D., *Chairman*
Carlos Rubinstein, *Commissioner*
Toby Baker, *Commissioner*
Zak Covar, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 6, 2012

RECEIVED
AUG 10 2012
COUNTY ENGINEER

Mr. Thomas H. Hornseth, P.E.
Comal County Engineer
195 David Jonas Drive
New Braunfels TX 78132-3710

Re: Edwards Aquifer, Comal County
PROJECT NAME: Natural Bridge Caverns, located at 26495 Natural Bridge Caverns Road, San Antonio, Texas
PLAN TYPE: Application for Approval of a Water Pollution Abatement Plan (WPAP) 30 Texas Administration Code (TAC) Chapter 213; Edwards Aquifer Protection Program
EAPP File No.: 3044.01

Dear Mr. Hornseth:

The referenced application is being forwarded to you pursuant to the Edwards Aquifer Rules. The Texas Commission on Environmental Quality (TCEQ) is required by 30 TAC Chapter 213 to provide copies of all applications to affected incorporated cities and underground water conservation districts for their comments prior to TCEQ approval.

Please forward your comments to this office by September 6, 2012.

The Texas Commission on Environmental Quality appreciates your assistance in this matter and your compliance efforts to ensure protection of the State's environment. If you or members of your staff have any questions regarding these matters, please feel free to contact the San Antonio Region Office at (210) 490-3096.

Sincerely

Todd Jones
Water Section Work Leader
San Antonio Regional Office

TJ/eg

WATER POLLUTION ABATEMENT PLAN MODIFICATION

FOR

NATURAL BRIDE CAVERNS

BY

WUEST LEGACY PARTNERS, LTD.

WUEST MILLENNIUM PARTNERS, LTD.

SAN ANTONIO, TEXAS

July 2012

TCEQ-R13
AUG 04 2012 RECEIVED
SAN ANTONIO AUG 10 2012
COUNTY ENGINEER

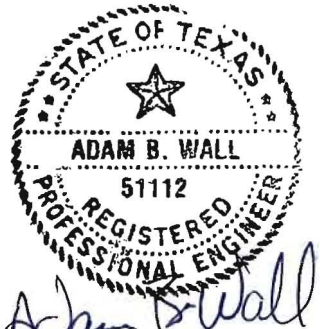
Prepared By:



EST. 1982

Slay Engineering Company, Inc.

Civil – Surveying – Consulting
123 Altgelt Avenue
San Antonio, Texas 78201
(210) 734-4388
TBPE Firm 1901



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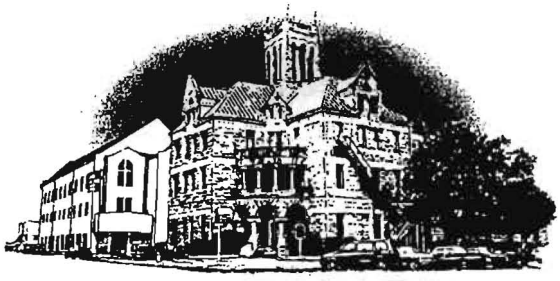


Comal County

OFFICE OF COMAL COUNTY ENGINEER

August 2, 2012

Mr. Bo Wall, P.E.
Slay Engineering Co., Inc.
123 Altgelt Avenue
San Antonio, TX 78201

Re: Natural Bridge Caverns WPAP Modification On-Site Sewage Facility Suitability Letter, within Comal County, Texas

Dear Mr. Wall:

In accordance with TAC §213.5(b)(4)(F)(ii), Comal County has found that the entire referenced site (except for areas listed below) is suitable for the use of private sewage facilities and will meet the special requirements for on-site sewage facilities located on the Edwards Aquifer recharge zone as specified in TAC §285.40-42 based on the following information submitted to our office on January 26, 2011:

- The Geologic Assessment, prepared by Zara Environmental, LLC
- The Water Pollution Abatement Plan, prepared by Slay Engineering Co., Inc.

Areas that are not Suitable

The Geologic Assessment identified 30 recharge features as sensitive. Because the site will be used as a small business and all improvements on the site are less than 20%, the Water Pollution Abatement Plan requested a waiver to the requirements for other permanent BMPs and measures. Below is a list of said sensitive features:

Feature ID	Latitude	Longitude	Feature ID	Latitude	Longitude	Feature ID	Latitude	Longitude
NBS-01	29.68790	-98.34064	NBS-29	29.69102	-98.34255	NBS-63	29.691646	-98.342130
NBS-03	29.68928	-98.33741	NBS-30	29.69128	-98.34183	NBS-64	29.687877	-98.342057
NBS-08	29.68758	-98.34467	NBS-31	29.69154	-98.34237	NBS-65	29.689363	-98.34142
NBS-09	29.68878	-98.34231	NBS-32	29.69323	-98.34046	NBS-66	29.69202	-98.34183
NBS-10	29.68923	-98.34145	NBS-34	29.69503	-98.33706			
NBS-11	29.68923	-98.34066	NBS-35	29.69525	-98.34324			
NBS-15	29.69121	-98.33742	NBS-37	29.68987	-98.34623			
NBS-16	29.68982	-98.34183	NBS-38	29.69291	-98.34405			
NBS-18	29.69258	-98.33585	NBS-39	29.69700	-98.34467			
NBS-19	29.69290	-98.33507	NBS-40	29.69818	-98.34296			
NBS-20	29.69251	-98.33712	NBS-41	29.69806	-98.34213			
NBS-21	29.69167	-98.33873	NBS-43	29.69901	-98.34202			
NBS-24	29.68999	-98.34249	NBS-62	29.69602	-98.35184			

195 David Jonas Drive • New Braunfels, Texas 78130 • (830) 608-2090 FAX (830) 608-2009

Table of Contents

Water Pollution Abatement Plan Modification

at

Natural Bridge Caverns

for

Wuest Legacy Partners, Ltd.
Wuest Millennium Partners, Ltd.
San Antonio, Texas 78266

NATURAL BRIDGE CAVERNS

July 2012

prepared By:

Slay Engineering Co., Inc.
123 Altgelt Avenue
San Antonio, Texas 7820
Ph.: 210-734-4388
Fax: 210-734-6401

EST. 1982
Slay Engineering Company, Inc.

1_____General Information Form

2 _____Geologic Assessment Form

3_____Modification of a Previously Approved Plan

4_____Water Pollution Abatement Plan Application Form

5_____Temporary Stormwater Section

6_____Permanent Stormwater Section

7_____Authorization of Managers of Wuest Capital Mgmt. to Sign Docs. on Behalf of Wuest Millennium

8_____Authorization to Managers of Wuest Capital Mgmt. to Sign Docs. on Behalf of Wuest Legacy Partners

9_____Agent Authorization forms for Slay Engineering Co., Inc.

10_____Fee Application Form

11_____Core Data Form 10400 Wuest Legacy Partners, Ltd.

12_____Core Data Form 10400 Wuest Millennium Partners, Ltd.

13_____Notice of Intent

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

REGULATED ENTITY NAME: Natural Bridge Caverns
COUNTY: COMAL STREAM BASIN: BEAR CREEK & DRY COMAL CREEK

EDWARDS AQUIFER: X RECHARGE ZONE
__ TRANSITION ZONE

PLAN TYPE: __ WPAP __ AST __ EXCEPTION
__ SCS __ UST X MODIFICATION

CUSTOMER INFORMATION

1. Customer (Applicant):

Contact Person: Brad Wuest, ManagerWuest Capital Management, LLC

Entity: Wuest Legacy Partners, Ltd. By Wuest Capital Management, LLC Its General Partner
Mailing Address: 26495 Natural Bridge Caverns Rd
City, State: San Antonio, Texas Zip: 78266-2671
Telephone: 210-651-6101 FAX: 210-651-6144

Contact Person: Brad Wuest, ManagerWuest Capital Management, LLC

Entity: Wuest Millennium Partners, Ltd. By Wuest Capital Management, LLC Its General Partner
Mailing Address: 26495 Natural Bridge Caverns Rd
City, State: San Antonio, Texas Zip: 78266-2671
Telephone: 210-651-6101 FAX: 210-651-6144

Agent/Representative (If any):

Contact Person: Michael M. Slay, P.E.
Entity: Slay Engineering Company, Inc.
Mailing Address: 123 Altgelt Ave.
City, State: San Antonio, Texas Zip: 78201
Telephone: 210-734-4388 FAX: 210-734-6401

2. __ This project is inside the city limits of_____.
X This project is outside the city limits but inside the ETJ (extra-territorial jurisdiction) of San Antonio, Texas.
__ This project is not located within any city's limits or ETJ.

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

26495 Natural Bridge Caverns Rd., also called FM 3009,
On the west side of FM 3009 approximately 7.3 miles north of Interstate Highway 35

4. X **ATTACHMENT A - ROAD MAP**. A road map showing directions to and the location of the project site is attached at the end of this form.

5. X **ATTACHMENT B - USGS / EDWARDS RECHARGE ZONE MAP**. A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached behind this sheet. The map(s) should clearly show:

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

6. X Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment. **The TCEQ must be able to inspect the project site or the application will be returned.**

   Note: Customer is available during business hours to identify location of the improvements to TCEQ staff.

7. X **ATTACHMENT C - PROJECT DESCRIPTION**. Attached at the end of this form is a detailed narrative description of the proposed project.

8. Existing project site conditions are noted below:
   ___ Existing commercial site
   ___ Existing industrial site
   ___ Existing residential site
   X Existing paved and/or unpaved roads
   X Undeveloped (Cleared)
   X Undeveloped (Undisturbed/Uncleared)
   X Other: Park

PROHIBITED ACTIVITIES

9. X I am aware that the following activities are prohibited on the **Recharge Zone** and are not proposed for this project:

   (1) waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
   (2) new feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
   (3) land disposal of Class I wastes, as defined in 30 TAC §335.1;
   (4) the use of sewage holding tanks as parts of organized collection systems; and
   (5) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).

10. N/A I am aware that the following activities are prohibited on the **Transition Zone** and are not proposed for this project:

(1) waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);
(2) land disposal of Class I wastes, as defined in 30 TAC §335.1; and
(3) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

ADMINISTRATIVE INFORMATION

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

X For a Water Pollution Abatement Plan and Modifications, the total acreage of the site where regulated activities will occur.
__ For an Organized Sewage Collection System Plans and Modifications, the total linear footage of all collection system lines.
__ For a UST Facility Plan or an AST Facility Plan, the total number of tanks or piping systems.
__ A request for an exception to any substantive portion of the regulations related to the protection of water quality.
__ A request for an extension to a previously approved plan.

12. Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

__ TCEQ cashier
__ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
X San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

13. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

14. X No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

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:

Brad Wuest
Print Name of Customer/Agent

Signature of Customer/Agent

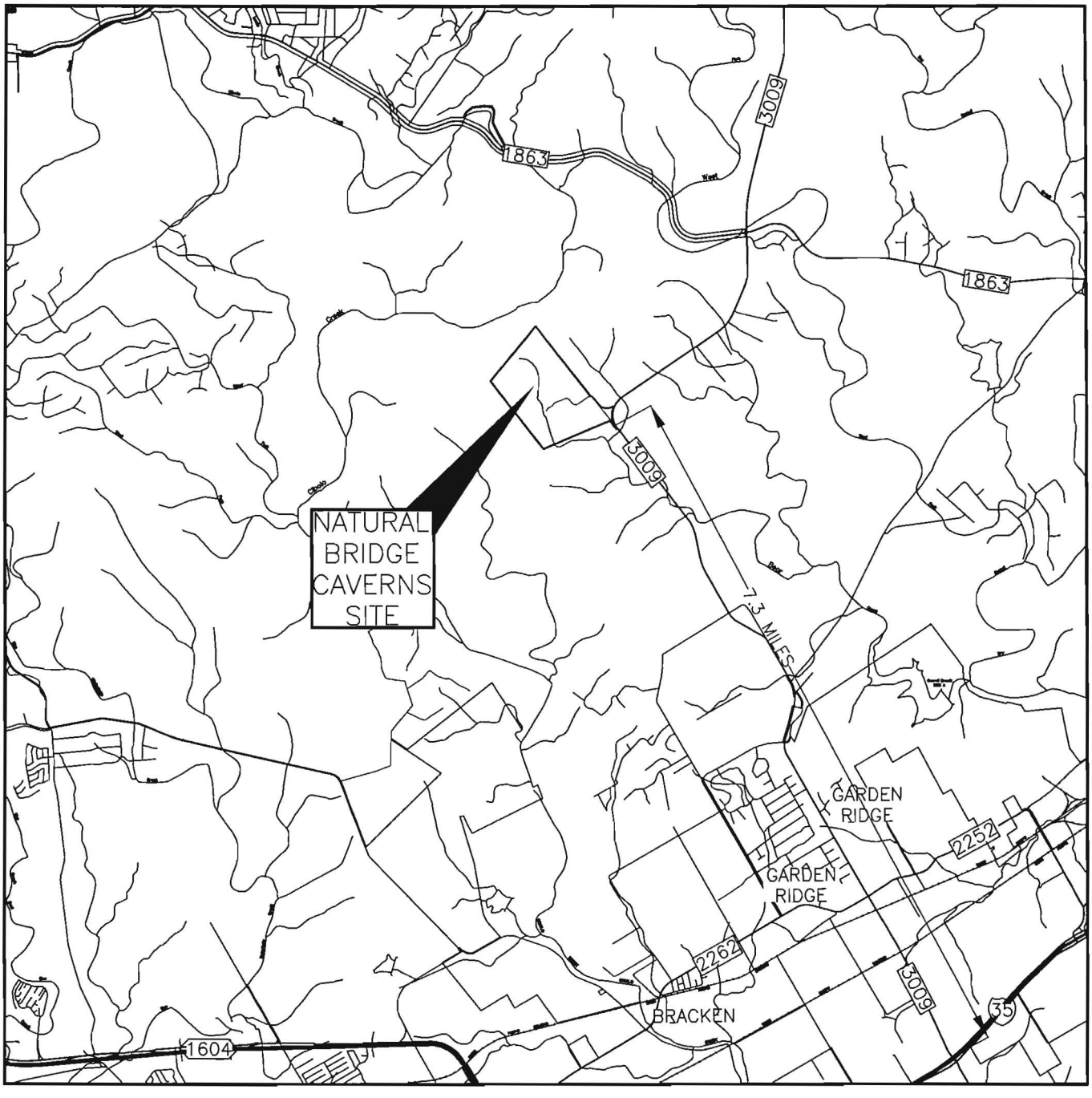
7-31-12
Date

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

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

ROAD MAP

ATTACHMENT A



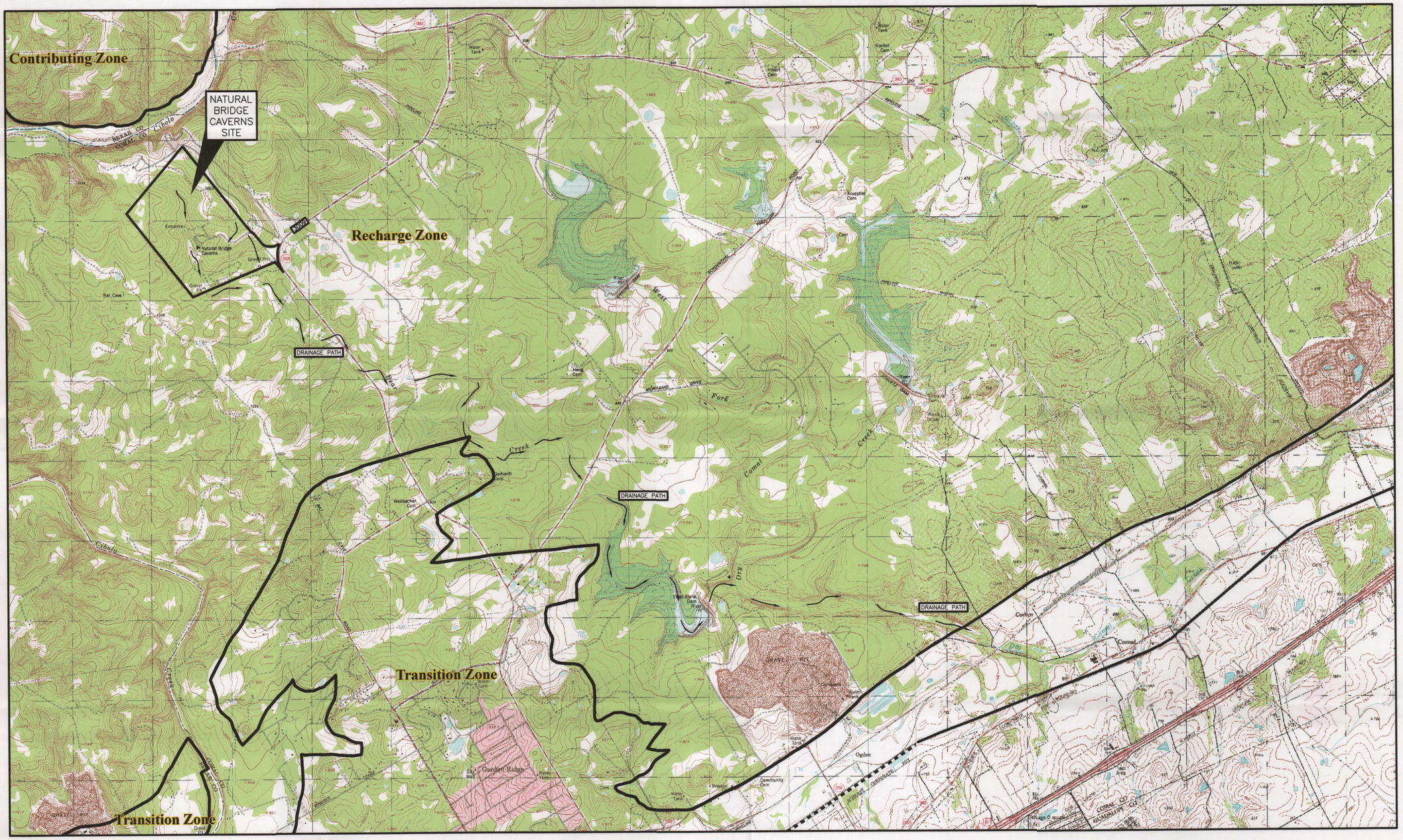
N

NATURAL BRIDGE CAVERNS
26495 NATURAL BRIDGE CAVERNS RD (FM 3009)
WUEST LEGACY PARTNERS, LTD./
WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

SCALE: 1"=8000'

BAT CAVE AND WEST NEW BRAUNFELS USGS QUADRANGLE MAP

ATTACHMENT B


Contributing Zone
NATURAL BRIDGE CAVERNS SITE
Recharge Zone
Transition Zone
Transition Zone
DRAINAGE PATH
DRAINAGE PATH
DRAINAGE PATH
Cibolo
Creek
Comal
Creek
Dry
Comal
Creek
Dry
Comal
Creek
Natural Bridge Caverns
Entrance
Gravel Pit
Bat Cave
Weilbacher Cem.
Kunkel Cem.
Kruesler Cem.
Ogden
Community Cem.
Garden Ridge
Water Tank
Water Tank
Water Tank

NATURAL BRIDGE CAVERNS

ATTACHMENT C – PROJECT NARRATIVE

Site Location and Description: Natural Bridge Caverns have been a popular tourist attraction since 1964. Natural Bridge Caverns is located within the Edwards Aquifer Recharge Zone on 450.078 acres, in Comal County, Texas. The development is located on the west side of FM 3009 approximately 7.3 miles north of Interstate Highway 35. The 450.078 acres development is composed of three parcels:

Property	Acreage
Wuest Legacy Partners, Ltd. (100)	99.811 acres
Wuest Millennium Partners, Ltd. (150)	150.000 acres
Wuest Millennium Partners, Ltd. (200)	200.267 acres
Total	450.078 acres

The existing development consists of 7.71 acres of developed, impervious area and 442.568 acres of pervious, undeveloped area = 7.71/450.078 = 1.71%.

A water pollution abatement plan was submitted to TCEQ to construct a challenge course and zip lines in March 2012. The water pollution abatement plan included improvements on Natural Bridge Caverns Wuest Legacy Partners, Ltd. (100 acres) and Wuest Millennium Partners, Ltd. (350 acres). Permanent BMPs were installed on the Wuest Legacy Partners, Ltd. and Wuest Millennium Partners, Ltd. property for all constructed improvements. The permanent BMPs consisted of vegetative filter strips along the entrance road.

Prior Improvements: The existing development consists of previously constructed access roads, parking, visitor's center, retail shop, concessions, playgrounds, walking trails, cave entrances, rock shop, pavilions, ropes course, zip lines, warehouse, portable buildings, water wells, signs, fencing, and a suspended bridge.

Of the existing 7.71 acres of on-site impervious cover on the Wuest Legacy Partners, Ltd. and Wuest Millennium Partners, Ltd. property, approximately 6.82 acres is currently not being captured for treatment and 0.89 acres is being treated with vegetative strips.

Proposed Improvements: The proposed improvements occur in five separate areas: Area I, Area II, Area III, Area IV and Area V as shown on the site plan.

Area I consists of Buildings 1 and 2 with restrooms and require water, OSSF and power.

Area II consists of Buildings 3, 4, 5 and Activity Pad 6. Building 4 has restrooms requiring water, OSSF and power. Buildings 3 and 5 are craft areas requiring water, sanitary sewer for sinks and power. Activity Pad 6 is proposed as a flat concrete pad with a small building and pavilions requiring water and power. Access to the proposed improvements is by existing sidewalks. The existing east west walk will be widened by 10 feet; walks and service access to the buildings are planned. An existing undersized walk culvert will be removed and replaced.

Area III consists of Buildings 7 8, 9, 10, and 11, requiring water, sanitary sewer for sinks, power and walks. Access to the proposed improvements is by pedestrian bridge over a dry creek and service drive.

Area IV is an expansion to the existing parking lot. There are two areas of expansion: (A) a substantial expansion to the north adds overflow parking spaces, (B) adds a monument sign and walks.

Area V consists of adding Stairs and a Landing to the Visitors Center exterior. It also includes the following: Wood Deck/Patio, ADA Ramp and a standalone building that will require water, sanitary sewer for sinks and power.

The proposed impervious cover for Areas I, II, III, IV and V is listed below:

Proposed Impervious Cover:

Area		Impervious Area	Type
I	Building 1	4,400 SF	Metal Roof
	Building 2	2,000 SF	Metal Roof
	Walk	6,600 SF	Concrete
	TOTAL	13,000 SF or 0.30 acres	
II	Building 3	2,200 SF	Metal Roof
	Building 4	1,800 SF	Metal Roof
	Building 5	6,500 SF	Metal Roof
	Activity Pad 6	5,750 SF	Concrete/ Metal Roof
	Walk	13,800 SF	Concrete/Asphalt
	TOTAL	30,050 SF or 0.69 acres	
III			
	Building 7	6,500 SF	Metal Roof
	Building 8	6,500 SF	Metal Roof
	Building 9	6,500 SF	Metal Roof
	Building 10	6,500 SF	Metal Roof
	Building 11	3,000 SF	Metal Roof
	Pedestrian Bridge	1,000 SF	Concrete, Metal, Wood
	Walk	25,000 SF	Concrete/Asphalt
	TOTAL	55,000 SF or 1.26 acres	
IV	Parking Lot Exp.		
	(A)	90,000 SF	Concrete/Asphalt
	(B)	5,000 SF	Concrete
	TOTAL	95,000 SF or 2.18 acres	
V	Visitors Center Patio, Stairs, ADA Ramp & Building		
	Deck/Patio	5,000 SF	Wood/Metal Roof
	Stairs/Landing	1,000 SF	Metal/Concrete
	ADA Ramp	3,000 SF	Concrete
	Building 12	4,000 SF	Metal Roof
	Walk	7,000 SF	Concrete/Asphalt
	TOTAL	20,000 SF or 0.46 acres	

The total proposed impervious cover will be 4.89 acres.

Property	Total Existing Impervious Cover	Existing Treated Impervious Cover	Total Proposed Impervious Cover	Total Treated Imper. Cover	Total Proposed Imper. Cover
Wuest Legacy Partners, Ltd. (100)	7.65 ac.	0.86 ac.	4.89 ac.	0.86 ac.	12.54 ac.
Wuest Millennium Partners, Ltd. (150)	0.01 ac.	0.00 ac.	0.00 ac.	0.00 ac.	0.01 ac.
Wuest Millennium Partners, Ltd. (200)	0.05 ac.	0.03 ac.	0.00 ac.	0.03 ac.	0.05 ac
Total	7.71 ac.	0.89 ac.	4.89 ac.	0.89 ac.	12.54 ac

The total impervious cover is 12.54 acres, which includes the additional 5.13acres for the proposed improvements. The total existing treated impervious cover is 0.89 acres. The proposed total of impervious cover being treated is 0.89 acres. The proposed percentage of impervious cover for the site

= 12.54/450.078 = 2.78 %.

Sensitive Features

Area I

The nearest sensitive geologic feature: NBS -38, NBS-49, NBS-50, NBS-51 and NBS-54 are found in the vicinity of the proposed Building 1 and 2. Building 1 and 2 are not within the buffer zones of these geologic features. Feature NBS-38 is down gradient and 300 feet southeast of the Building 1; identified as an enlarged fracture measuring 7 by 1 meter and 0.6 meters deep. Feature NBS-49 and NBS-50 are sinkholes approximately 220 feet upgradient. Feature NBS-51, the exit tunnel to the cavern system, is approximately 70 feet up-gradient. Feature NBS-54, a man made access shaft, is upgradient approximately 250 feet.

Area II

The nearest sensitive geologic features: NBS-09, NBS-24, NBS -31, NBS-52, and NBS-55, are found in the vicinity of proposed Buildings 3, 4, 5 and Activity Pad 6. NBS-52, the Natural Bridge Caverns entrance, is upgradient of Buildings 3, 4, 5 and 6. None of these structures are located in the sensitive features buffer zone. Features NBS-31, NBS-52, NBS-55 are up-gradient. Feature NBS-09 is approximately 550 feet down-gradient, and identified as a fracture zone between two mapped faults located in a dry creek bed. Feature NBS-24 is approximately 300 feet down-gradient and is a manmade feature in bedrock, (water well).

Area III

The nearest sensitive geologic features: NBS-09, NBS-24, NBS -31, NBS-52, and NBS-55, are found in the vicinity of proposed Buildings 7, 8, 9, 10 and 11. None of these structures are located in the sensitive features buffer zone. Features NBS-31, NBS-52, NBS-55 are up-gradient. Feature NBS-09 is approximately 550 feet down-gradient,

and identified as a fracture zone between two mapped faults located in a dry creek bed. Feature NBS-24 is approximately 400 feet down-gradient, a manmade feature in bedrock, (water well).

Area IV

The nearest sensitive geologic features to each parking lot expansion follow:

(A) Feature NBS -49, NBS-50, NBS-53 and NBS-54. Features NBS-49 and NBS-50 are sinkholes, 55 feet down gradient; the parking lot expansion does not lie within the buffer zone. Feature NBS-54, a man made access shaft, down gradient approximately 120 feet and 58 feet away from the parking lot expansion along the same contour. The parking lot expansion does not lie within the buffer zone of NBS-54. Feature NBS-53, is a manmade well with pump house and ground storage tank, located down gradient approximately 125 feet. Although the parking lot expansion lies within the 200 feet buffer zone, parking lot runoff is diverted by way of curb and gutter, away from this feature. Feature NBS-53 well casing is surrounded by a concrete apron which does not allow runoff access to the aquifer.

(B) Feature NBS-53, is a manmade well with casing surrounded by a concrete apron and includes a pump house and ground storage tank. A portion of the walk, curb and gutter expansion lies within the buffer zone.

Area V

The nearest sensitive geologic features: NBS-09, NBS-24, NBS-29, NBS -31, NBS-52, NBS-55 and NBS-53 are found in the vicinity of proposed Stairs/Landing, Wood Deck/Patio, ADA Ramp and Building 12. The ADA Ramp and Building 12 are located outside the buffer zones. The stairs/landing and wood deck/patio structure are located down gradient but within the 50 feet buffer zone of NBS-52; but will be designed to direct runoff away from NBS-52. Features NBS-29, NBS-31, NBS-55 and NBS-63 are manmade features and the proposed improvements are not within their buffer zones. Feature NBS-09 is approximately 950 feet down-gradient, and identified as a fracture zone between two mapped faults located in a dry creek bed.

The areas of soil disturbance during construction will extend approximately 50' from the proposed improvements.

Treatment Method:

Temporary BMPs, (vegetative strips, filter fabric fence, rock berms, concrete washout pits) will be established prior to construction to protect sensitive features. In addition, temporary buffer zones will be staked to identify sensitive features buffer zones.

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

REGULATED ENTITY NAME: Natural Bridge Caverns

TYPE OF PROJECT: X WPAP __ AST __ SCS __ UST

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

PROJECT INFORMATION

1. X Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE.**

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

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Comfort rock outcrop	A	1.75
Tolocant rock outcrop	A	1.75
Rumple-Comfort association	B	1.75

* 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.

3. X A **STRATIGRAPHIC COLUMN** is attached at the end of this form that shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column.

4. X A **NARRATIVE DESCRIPTION OF SITE SPECIFIC GEOLOGY** is attached at the end of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.

5. X Appropriate **SITE GEOLOGIC MAP(S)** are attached:

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

Applicant's Site Plan Scale	1" = 200 '
Site Geologic Map Scale	1" = 200 '
Site Soils Map Scale (if more than 1 soil type)	1" = 200 '

6. Method of collecting positional data:

X Global Positioning System (GPS) technology.
__ Other method(s).

7. X The project site is shown and labeled on the Site Geologic Map.

8. X Surface geologic units are shown and labeled on the Site Geologic Map.

9. X Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
__ Geologic or manmade features were not discovered on the project site during the field investigation.

10. X The Recharge Zone boundary is shown and labeled, if appropriate.

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

__ There are 9 (#) 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.
X The wells are in use and comply with 16 TAC Chapter 76.
__ There are no wells or test holes of any kind known to exist on the project site.

ADMINISTRATIVE INFORMATION

12. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

Date(s) Geologic Assessment was performed: April 24 - June 3, 2011
Date(s)

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

Brian D Cowan
Print Name of Geologist

(512) 632-8409
Telephone

(866) 908-9137
Fax

Signature of Geologist

March 28, 2011
Date

STATE OF TEXAS
BRIAN D COWAN
GEOLOGY
11180
LICENSED
PROFESSIONAL GEOSCIENTIST

Representing: Zara Environmental
(Name of Company)

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

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

Modification of a Previously Approved Plan
for Regulated Activities on the
Edwards Aquifer Recharge Zone and Transition Zone
and Relating to 30 TAC 213.4(j), Effective June 1, 1999

1. Current Regulated Entity Name: Wuest Legacy Partners, Ltd. and Wuest Millennium Partners, Ltd.
Original Regulated Entity Name: Wuest Legacy Partners, Ltd. and Wuest Millennium Partners, Ltd.
Assigned Regulated Entity Numbers (RN): 1) 106385081

X The applicant has not changed and the Customer Number (CN) is:
Wuest Legacy Partners, Ltd.: CN 602569725
Wuest Millennium Partners, Ltd.: CN 604074393
___ The applicant has changed. A new Core Data Form has been provided.

2. X **Attachment A: Original Approval Letter and Approved Modification Letters:** A copy of the original approval letter and copies any letters approving modification are found at the end of this form.

3. A modification of a previously approved plan in requested for (check all that apply):

___ physical or operational modification of any water pollution abatement structure(s) including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;
___ change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;
X development of land previously identified as undeveloped in the original water pollution abatement plan;
___ physical modification of the approved organized sewage collection system;
___ physical modification of the approved underground storage tank system;
___ physical modification of the approved aboveground storage tank system.

4. Summary of Proposed Modifications (select plan type being modified). If the approved plan has been modified more than once, copy the appropriate table below, as necessary, and complete the information for each additional modification.

WPAP Modification Summary	Approved Project	Proposed Modification
Acres	450.98	4.89
Type of Development	Commercial	Commercial
Number of Residential Lots	N/A	N/A
Impervious Cover (acres)	7.71	12.54
Impervious Cover (%)	1.71	2.78
Permanent BMPs	Filter Strips	N/A
Other	_____	_____

SCS Modification Summary	Approved Project	Proposed Modification
Linear Feet	_____	_____
Pipe Diameter	_____	_____
Other	_____	_____

AST Modification Summary	Approved Project	Proposed Modification
Number of ASTs	_____	_____
Volume of ASTs	_____	_____
Other	_____	_____

UST Modification Summary	Approved Project	Proposed Modification
Number of USTs		
Volume of USTs		
Other		

5. X **Attachment B: Narrative of Proposed Modification**. A narrative description of the nature of the proposed modification is provided at the end of this form. It discusses what was approved, including previous modifications, and how this proposed modification will change the approved plan.

6. X **Attachment C: Current site plan of the approved project.** A current site plan showing the existing site development (i.e., current site layout) at the time this application for modification is provided at the end of this form. A site plan detailing the changes proposed in the submitted modification is required elsewhere.

___ The approved construction has not commenced. The original approval letter, and any subsequent modification approval letters are included as Attachment A to document that the approval has not expired.

___ The approved construction has commenced and has been completed. Attachment C illustrates that the site was constructed as approved.

___ The approved construction has commenced and has been completed. Attachment C illustrates that the site was **not** constructed as approved.

X The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was constructed as approved.

___ The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was **not** constructed as approved.

7. ___ The acreage of the approved plan has increased. A Geologic Assessment has been provided for the new acreage.

X Acreage has not been added to **or** removed from the approved plan.

8. ___ 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.

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 request for a **MODIFICATION TO A PREVIOUSLY APPROVED PLAN** is hereby submitted for TCEQ review and executive director approval. The request was prepared by:

Brad Wuest
Print Name of Customer/Agent

Signature of Customer/Agent

7-31-12
Date

Bryan W. Shaw, Ph.D., *Chairman*
Carlos Rubinstein, *Commissioner*
Toby Baker, *Commissioner*
Zak Covar, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 3, 2012

Mr. Brad Wuest, Manager
Wuest Legacy Partners, Ltd.
26495 Natural Bridge Caverns Rd.
San Antonio, TX 78266-2671

Re: Edwards Aquifer Protection Program, Comal County

Name of Project: Natural Bridge Caverns; Located on the west side of FM 3009 approximately 7.3 miles north of IH 35, San Antonio ETJ, Texas

Type of Plan: Request for the Approval of a Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer

Edwards Aquifer Protection Program ID No. 3044.00; Investigation No. 997666; Regulated Entity No. RN106385081

Dear Mr. Wuest:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP application for the above-referenced project submitted to the San Antonio Regional Office by Slay Engineering Company, Inc. on behalf of Wuest Legacy Partners and Wuest Millennium Partners, Ltd. on April 2, 2012. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

Background

The Natural Bridge Caverns has been a tourist attraction since 1888. According to George Veni's book, *Caves & Karst of Texas*, the cave was commercialized in 1964. A WPAP (File #2142.00) was approved by letter dated April 30, 2004 for expansion of an existing parking lot and expansion of a joint entry road shared between Natural Bridge Caverns and Natural Bridge Wildlife Ranch. Prior to the 2004 WPAP, there was 6.82 acres of existing impervious cover. The 2004 WPAP increased the impervious cover by 1.15 acres between the two sites but only

0.69 acres was located on the Natural Bridge Caverns site. The increase in total suspended solids generated by the new impervious cover was treated by vegetative filter strips.

Project Description

The proposed commercial project will have an area of approximately 0.80 acres within the larger 450.078 acre site. It will include the construction of a challenge course and zip lines between three tower structures. The increase in impervious cover will be 0.2 acres resulting in a total impervious cover of 7.71 acres (1.71 percent). No new wastewater will be generated by this project.

Permanent Pollution Abatement Measures

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, an engineered vegetative filter strip, designed using the TCEQ technical guidance document, *Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices* (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 179 pounds of TSS generated from the 0.20 acres of impervious cover. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

The individual treatment measures will consist of an engineered filter strip with a minimum width of 15 feet, a length of approximately 550 feet, a slope less than 20 percent and a vegetation coverage of 80 percent or greater. The filter strip is located along 0.20 acres of existing roadway that leads to the visitor's center.

Geology

A geologic assessment was conducted for the entire 450 acre site. According to the geologic assessment, a majority of the site is located in the Dolomitic member of the Kainer Formation. The project geologist evaluated 66 geologic and manmade features and scored 41 features (28 geologic and 13 manmade) as sensitive. Sensitive features NBS-09 (zone of fractures), NBS-24 (water well), NBS-31 (water well), NBS-52 (cave entrance), and NBS-55 (manmade access shaft), are found in the vicinity of the proposed project. Features NBS-31, NBS-52, and NBS-55 are located upgradient and more than 50 feet away from the activities. Features NBS-09 and NBS-24 are located downgradient and more than 200 feet away from the activities. The San Antonio Regional Office site assessment conducted on April 23, 2012 found the site was adequately described by the geologic assessment.

Special Conditions

1. The engineered filter strip must be operational (i.e., 80 percent vegetative cover) prior to use of the challenge course and zip lines.

Standard Conditions

1. Pursuant to Chapter 7 Subchapter C of the Texas Water Code, any violations of the requirements in 30 TAC Chapter 213 may result in administrative penalties.

2. The holder of the approved Edwards Aquifer protection plan must comply with all provisions of 30 TAC Chapter 213 and all best management practices and measures contained in the approved plan. Additional and separate approvals, permits, registrations and/or authorizations from other TCEQ Programs (i.e., Stormwater, Water Rights, UIC) can be required depending on the specifics of the plan.

3. In addition to the rules of the Commission, the applicant may also be required to comply with state and local ordinances and regulations providing for the protection of water quality.

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the San Antonio Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.

5. All contractors conducting regulated activities at the referenced project location shall be provided a copy of this notice of approval. At least one complete copy of the approved WPAP and this notice of approval shall be maintained at the project location until all regulated activities are completed.

6. Modification to the activities described in the referenced WPAP application following the date of approval may require the submittal of a plan to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval prior to initiating construction of the modifications.

7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.

8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

During Construction:

10. During the course of regulated activities related to this project, the applicant or agent shall comply with all applicable provisions of 30 TAC Chapter 213, Edwards Aquifer. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity.

11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.

12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.

13. Nine wells are located onsite. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.

14. If sediment escapes the construction site, the 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). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.

15. Intentional discharges of sediment laden storm water are not allowed. If dewatering becomes necessary, the discharge will be filtered through appropriately selected best management practices. These may include vegetated filter strips, sediment traps, rock berms, silt fence rings, etc.

16. The following records shall be maintained and made available to the executive director upon request: 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.

17. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and construction activities will not resume within 21 days. When the initiation of stabilization measures by the 14th day is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable.

After Completion of Construction:

18. 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 San Antonio Regional Office within 30 days of site completion.

19. The applicant shall be 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. The regulated entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director through San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

20. Upon legal transfer of this property, the new owner(s) is required to comply with all terms of the approved Edwards Aquifer protection plan. If the new owner intends to commence any new regulated activity on the site, a new Edwards Aquifer protection plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.

21. An Edwards Aquifer protection plan approval or extension will expire and no extension will be granted if more than 50 percent of the total construction has not been completed within ten years from the initial approval of a plan. A new Edwards Aquifer protection plan must be submitted to the San Antonio Regional Office with the appropriate fees for review and approval by the executive director prior to commencing any additional regulated activities.

22. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

If you have any questions or require additional information, please contact Charly Fritz of the Edwards Aquifer Protection Program of the San Antonio Regional Office at (210) 403-4065.

Sincerely,

Zak Covar, Executive Director
Texas Commission on Environmental Quality

ZC/CF/eg

Enclosure: Deed Recordation Affidavit, Form TCEQ-0625

Change in Responsibility for Maintenance of Permanent BMPs, Form TCEQ-10263

cc: Mr. Michael Slay, P.E., Slay Engineering Company, Inc.
Mr. Scott Halty, San Antonio Water System
Mr. Karl Dreher, General Manager, Edwards Aquifer Authority
Mr. Thomas Hornseth, P.E., Comal County Engineer
TCEQ Central Records, Building F, MC 212

NATURAL BRIDGE CAVERNS

ATTACHMENT B – Narrative of Proposed Modifications

A water pollution abatement plan was submitted and approved by TCEQ to construct a challenge course and zip lines. The zip line towers and challenge course are now constructed, while the ancillary building and walks are not completed. The permanent BMPs, vegetative filter strips along the entrance road, are established.

The proposed improvements occur in five separate areas: Area I, Area II, Area III, Area IV and Area V. The improvements will provide additional attractions and activities for visitors to the park.

Area I consists of Buildings 1 that provides restrooms and concessions. Building 2 is a covered pavilion area.

Area II consists of Buildings 3 and 5 are activity areas for crafts, while Building 4 is for restrooms. Activity pad 6 is a concrete pad used for outdoor games. The existing asphalt walk will be widened 10 feet and an existing walk culvert will be removed and replaced.

Area III Area IV consists of Buildings 7, 8, 9, 10, and 11, a pedestrian bridge and service drive. These buildings are activity or craft areas and will includes walks.

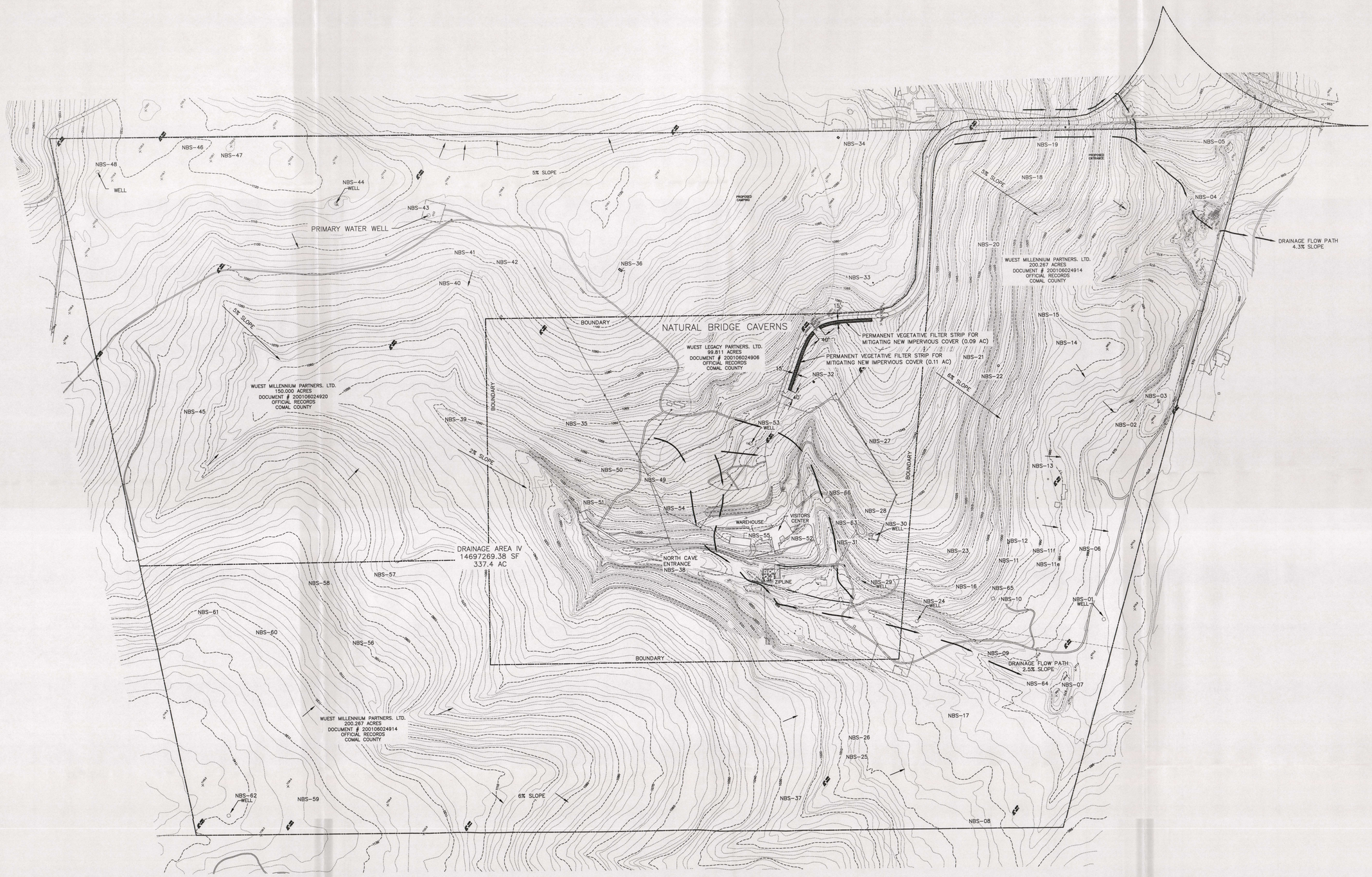
Area IV is an expansion to the existing parking lot for overflow parking and includes sidewalks and monument sign with recirculating water fountain. .

Area V consists of adding to the Entrance Building exterior a patio/wood deck, stairs/landing, ADA ramp and a standalone structure, Building 12, for activities.

The proposed improvements in Areas I, II, III, IV and V will increase impervious cover 4.89 acres.

EXHIBIT 2

LIMITED SITE PLAN



NOTE: FOR PROPOSED CONTOURS, SEE "LIMITED SITE PLAN" SHOWING PROPOSED IMPROVEMENTS.

OVERALL SITE PLAN

0 200 400

SCALE: 1"=200'

SLAY ENGINEERING CO., INC.
CIVIL - SURVEYING - CONSULTING
123 ALTGELT AVE.
SAN ANTONIO, TEXAS 78201
TELEPHONE (210) 734-4388
TBPE FIRM REGISTRATION NUMBER: F1901

SLAY ENGINEERING CO., INC.

NATURAL BRIDGE CAVERNS

26495 NATURAL BRIDGE CAVERNS ROAD (FM 3009)
WUEST LEGACY PARTNERS,LTD./ WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

EXHIBIT C-1 (F0590) OVERALL SITE PLAN

REVISIONS

NO.	REVISION

DESIGNED BY:	DRAWN BY:
A.B.W.	S.M.R.
CHECKED BY:	DATE:
M.M.S.	07/29/2012

JOB NO. 10-071

SHEET NO. 1 OF 1

TICKET BOOTH

ZIPLINE

TOWER 1

NBS-29 WELL

2% SLOPE

2% SLOPE

QUEUING PAD

STORAGE

4' WALK

RAIL

AREA OF SOIL DISTURBANCE/ WORK AREA

CHALLENGE COURSE

NOTE:
HYDROMULCH DISTURBED SOIL/WORK AREAS

ZIPLINE

DRAINAGE PATH

TOWER 2

1000

995

1005

1010

LIMITED SITE PLAN

SCALE: 1"=50'

EXHIBIT C-2 (F0590)

DATE: 07-25-2012

JOB NO.: 10-071

SLAY
ENGINEERING CO., INC.
123 ALTGELT AVENUE
SAN ANTONIO, TEXAS 78201
PH. (210) 734-4388
FAX (210) 734-6401
TBPE FIRM REGISTRATION
NO. F1901

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

REGULATED ENTITY NAME: Natural Bridge Caverns

REGULATED ENTITY INFORMATION

1. The type of project is:
   - __ Residential: # of Lots: _____
   - __ Residential: # of Living Unit Equivalents: _____
   - X Commercial
   - __ Industrial
   - __ Other: _____

2. Total site acreage (size of property): 450.078 acres

3. 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	49,900	÷ 43,560 =	1.15
Parking	95,000	÷ 43,560 =	2.18
Other paved surfaces	68,150	÷ 43,560 =	1.56
Total Impervious Cover	213,050	÷ 43,560 =	4.89
Total Impervious Cover ÷ Total Acreage x 100 = (4.89/450.078) * 100 = 1.09 %			

5. X **ATTACHMENT A - Factors Affecting Water Quality.** A description of any factors that could affect surface water and groundwater quality is provided at the end of this form.

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

FOR ROAD PROJECTS ONLY N/A
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 ÷ 43,560 Ft^2/Acre = ____ acres.

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

11. __ A rest stop will be included in this project.
__ A rest stop will **not** be included in this project.

12. __ Maintenance and repair of existing roadways that do not require approval from the TCEQ Executive Director. Modifications to existing roadways such as widening roads/adding shoulders totaling more than one-half (1/2) the width of one (1) existing lane require prior approval from the TCEQ.

STORMWATER TO BE GENERATED BY THE PROPOSED PROJECT

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

WASTEWATER TO BE GENERATED BY THE PROPOSED PROJECT

14. The character and volume of wastewater is shown below:
__% Domestic 10,000 gallons/day
__% Industrial _____ gallons/day
__% Commingled _____ gallons/day

TOTAL____ gallons/day

15. Wastewater will be disposed of by:
X **On-Site** Sewage Facility (OSSF/Septic Tank):
X **ATTACHMENT C - Suitability Letter from Authorized Agent.** An on-site sewage facility will be used to treat and dispose of the wastewater. The appropriate licensing authority's (authorized agent) written approval is provided at the end of this form. It states that the land is suitable for the use of an on-site sewage facility or identifies areas that are not suitable.
__ 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 NBC On-Site System (name) Treatment Plant. The treatment facility is:
- __ existing.
- __ proposed.

16. X All private service laterals will be inspected as required in 30 TAC §213.5.

SITE PLAN REQUIREMENTS

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

17. The Site Plan must have a minimum scale of 1" = 400'.
Site Plan Scale: 1" = 200'.

18. 100-year floodplain boundaries
- X Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
- __ No part of the project site is located within the 100-year floodplain.

The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s):
FIRM Panel 48091C0405F – See Exhibit 1

19. X The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Show lots, recreation centers, buildings, roads, etc.
- __ The layout of the development is shown with existing contours. Finished topographic contours will not differ from the existing topographic configuration and are not shown.

20. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):
- X There are 9 (#) 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.
  - X 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:
- X All **sensitive** geologic or manmade features identified in the Geologic Assessment are shown and labeled.
- __ No **sensitive** geologic or manmade features were identified in the Geologic Assessment.
- __ **ATTACHMENT D - Exception to the Required Geologic Assessment**. An exception to the Geologic Assessment requirement is requested and explained at the end of this form.

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

23. X Areas of soil disturbance and areas which will not be disturbed.

24. X Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.

25. X Locations where soil stabilization practices are expected to occur.

26. N/A Surface waters (including wetlands).

27. X Locations where stormwater discharges to surface water or sensitive features. There will be no discharges to surface water or sensitive features.

ADMINISTRATIVE INFORMATION

28. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

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

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:

Brad Wuest
Print Name of Customer/Agent

Signature of Customer/Agent

7-31-12
Date

NATURAL BRIDGE CAVERNS

ATTACHMENT A – FACTORS AFFECTING SURFACE WATER QUALITY

There are a few factors that may affect surface water quality. The existing development has a parking lot and drive, a source of possible pollutants is automobiles and buses. Petroleum products and other fluids from the vehicles may affect surface water quality. Additionally, airborne pollutants that land on the roof of the structures may affect surface water quality.

The proposed foundations for the buildings and sidewalks are concrete. A source of possible pollutants is the wash down water for the concrete mix trucks, which will be directed to a designated concrete washout pit. The petroleum products and other fluids from the petroleum powered construction equipment may affect surface water quality. The airborne pollutants that land on the roofs may affect surface water quality. The proposed OSSF excavation and installation may affect water quality with sediment from spoils. The adhesives in connecting the PVC sanitary sewer and waterlines may affect water quality.

The proposed metal stairs and landing may affect the water quality due to preparation and painting of the metal surfaces. The saw dust from cutting the wood for the deck and patio, and wood sealer may affect water quality.

The proposed expansion of the parking lot may affect the water quality during clearing grubbing, placement and compaction of base, primer and hot mix asphaltic concrete. The paint used in marking pavement may affect water quality.

NATURAL BRIDGE CAVERNS

ATTACHMENT B – VOLUME AND CHARACTER OF STORMWATER

The quality of the stormwater runoff from the proposed buildings, activity area and parking lot will be similar to a recreation area. Runoff from the stairs, ADA ramps, wood deck/patio and sidewalks and parking lot will be contaminated by airborne pollutants which come to rest on the surface and form patrons tracking oils and other pollutants on their shoes from the parking lot. The runoff from the roofs will be contaminated by airborne pollutants which come to rest on the surface.

Volume:

Existing Conditions:

Natural Bridge Caverns consists of three tracts of land for a total of 450.078 acres and was divided up into five (5) drainage areas based upon the topography of the site. The total drainage area of 451.83 acres, includes an additional 1.75 acres from the shared entrance. Drainage area #1 is 15.17 acres of undeveloped ranch land along the east property line that sheet flows to the east. Drainage area #2 is 53.35 acres consisting of undeveloped ranch land and entry road that drains towards the southeast towards FM 3009 by way of a dry creek. Drainage area #3 is 33.25 acres consisting of undeveloped ranch land, a few structures and drains towards FM 3009 by way of a dry creek. Drainage area #4 is 342.10 acres consisting of undeveloped ranch land and the developed area of Natural Bridge Caverns; and is in the upper watershed of Bear Creek. Drainage area #5 is 7.96 acres of undeveloped ranch land along the south property line that sheet flows south.

The rational method, a hydrologic method for computing runoff coefficients, time of concentration and rainfall intensities for corresponding storm events, and runoff for acreage this size was employed to calculate the volume of runoff.

Proposed Conditions:

The same five (5) watershed areas apply for the proposed conditions. The development is not altering any of the drainage boundaries or making improvements except to Watershed #4. No new impervious cover is being added to watersheds #1, 2, 3 and 5. Watershed # 4 impervious area will increase by 4.89 acres. After construction, the runoff coefficient and stormwater runoff is estimated to be:

Existing and Proposed Runoff Calculations Are Under A Separate Tab in this Report.

ATTACHMENT "C"
SUITABILITY LETTER

ATTACHMENT "C-1"
SITE EVALUATION

LAND STEWARDSHIP SERVICES, LLC
1822 FM 473
Boerne, Texas 78006

July 22, 2012

Travis Wuest
Wuest Legacy Partners, Ltd.
26495 Natural Bridge Caverns Road
San Antonio, Texas 78266

RE: Site Evaluation for On-Site Septic Systems for Natural Bridge Caverns Digi Lab at Natural Bridge Caverns Road

Dear Mr. Wuest,

On July 20, 2012 I visited the site of the proposed Natural Bridge Caverns Digi Lab. The property is located in the southern part of Comal County, on the west side of Farm to Market 3009 off Natural Bridge Caverns Road.

The topography consists of gently sloping terrain with very shallow soils on the tops and the slopes with some depth of soil in the low areas and an abundance of exposed limestone rock. The terrain is generally rolling with only minor low areas. Slopes range from 1% in the low areas to 30% on the steeper slopes out of the low areas. The area for the Natural Bridge Caverns Digi Lab has very shallow soils with an abundance of limestone rock exposed. The shallow soils and limestone rock could pose problems for certain on-site septic systems. There are some drainage areas near the Natural Bridge Caverns Digi Lab that would need to be taken into consideration when designing the on-site septic system and disposal area. The area in consideration is covered in a mixed brush, grass and forb community consisting of, but not limited to juniper, oak, kidney wood, persimmon, algerita, bumelia, mountain laurel, and numerous other shrub species. The open areas are vegetated with native grasses and forbs.

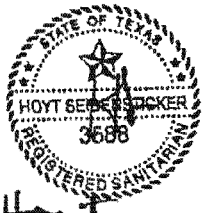
The area in consideration appears to have very shallow soils with limestone rock as a subsoil parent material.

A sharp shooter was used to attempt to dig test holes, test hole 1 and test hole 2, in the location of the disposal system revealing between 0 to 6 inches of topsoil with limestone rock underneath. The majority of the area has exposed limestone rock.

Please be advised that a complete site and soil evaluation will be required. The area chosen for disposal with a restrictive horizon of limestone rock will require an alternative system of a low pressure dosing system, evapotranspirative system, or aerobic treatment unit with either spray distribution or drip irrigation.

If you have any questions please give me a call at (210) 414-6603

Sincerely,



Hoyt Seidensticker, RS 3588

LAND STEWARDSHIP SERVICES, LLC
1822 FM 473
Boerne, Texas 78006

July 22, 2012

Travis Wuest
Wuest Legacy Partners, Ltd.
26495 Natural Bridge Caverns Road
San Antonio, Texas 78266

RE: Site Evaluation for On-Site Septic Systems for Natural Bridge Caverns Craft Village at Natural Bridge Caverns Road

Dear Mr. Wuest,

On July 20, 2012 I visited the site of the proposed Natural Bridge Caverns Craft Village. The property is located in the southern part of Comal County, on the west side of Farm to Market 3009 off Natural Bridge Caverns Road.

The topography consists of gently sloping terrain with very shallow soils on the tops and the slopes with some depth of soil in the low areas and an abundance of exposed limestone rock. The terrain is generally rolling with only minor low areas. Slopes range from 1% in the low areas to 30% on the steeper slopes out of the low areas. The area for the Natural Bridge Caverns Craft Village has very shallow soils with an abundance of limestone rock exposed. The shallow soils and limestone rock could pose problems for certain on-site septic systems. There is some drainage areas near the Natural Bridge Caverns Craft Village that would need to be taken into consideration when designing the on-site septic system and disposal area. The area in consideration is covered in a mixed brush, grass and forb community consisting of, but not limited to juniper, oak, kidney wood, persimmon, algerita, bumelia, mountain laurel, and numerous other shrub species. The open areas are vegetated with native grasses and forbs.

The area in consideration appears to have very shallow soils with limestone rock as a subsoil parent material.

A sharp shooter was used to attempt to dig test holes test hole 3 and test hole 4, in the location of the disposal system revealing between 0 to 6 inches of topsoil with limestone rock underneath and in much of the area exposed.

Please be advised that a complete site and soil evaluation will be required. The area chosen for disposal with a restrictive horizon of limestone rock will require an alternative system of a low pressure dosing system, evapotranspirative system, or aerobic treatment unit with either spray distribution or drip irrigation.

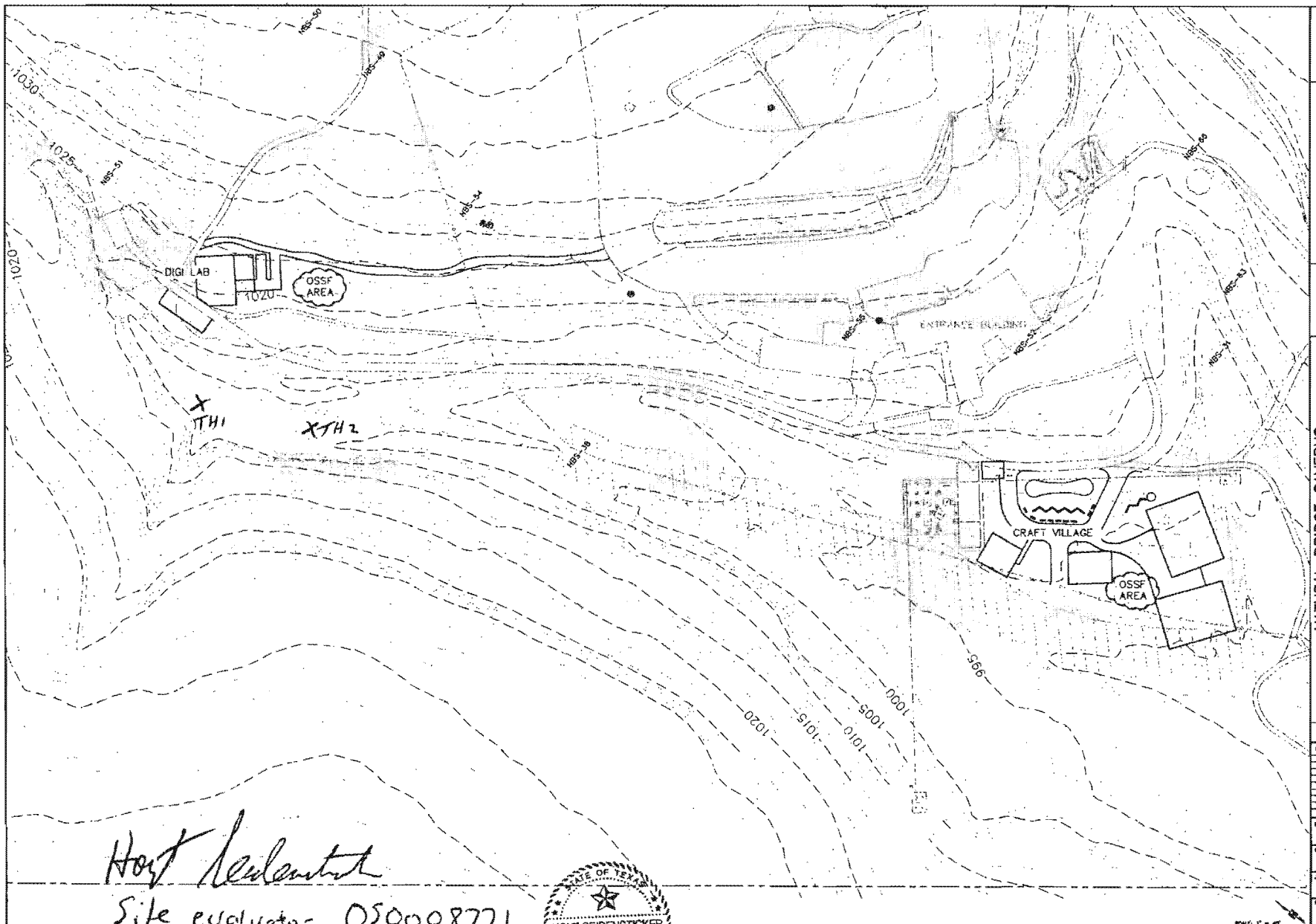
If you have any questions please give me a call at (210) 414-6603

Sincerely,



Hoyt Seidensticker

Hoyt Seidensticker, RS 3588



Hoyt Seidensticker

Site evaluator OSO008771

STATE OF TEXAS
HOYT SEIDENSTICKER
3588
REGISTERED SANITARIAN

SLAY ENGINEERING CO., INC.
CIVIL - SURVEYING - CONSULTING
133 ALBERT AVE.
SAN ANTONIO, TEXAS 78201
TELEPHONE (210) 734-4388
TBPE FIRM REGISTRATION NUMBER F1901

NATURAL BRIDGE CAVERNS
26495 NATURAL BRIDGE CAVERNS ROAD (FM 3009)
WUEST LEGACY PARTNERS,LTD./ WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

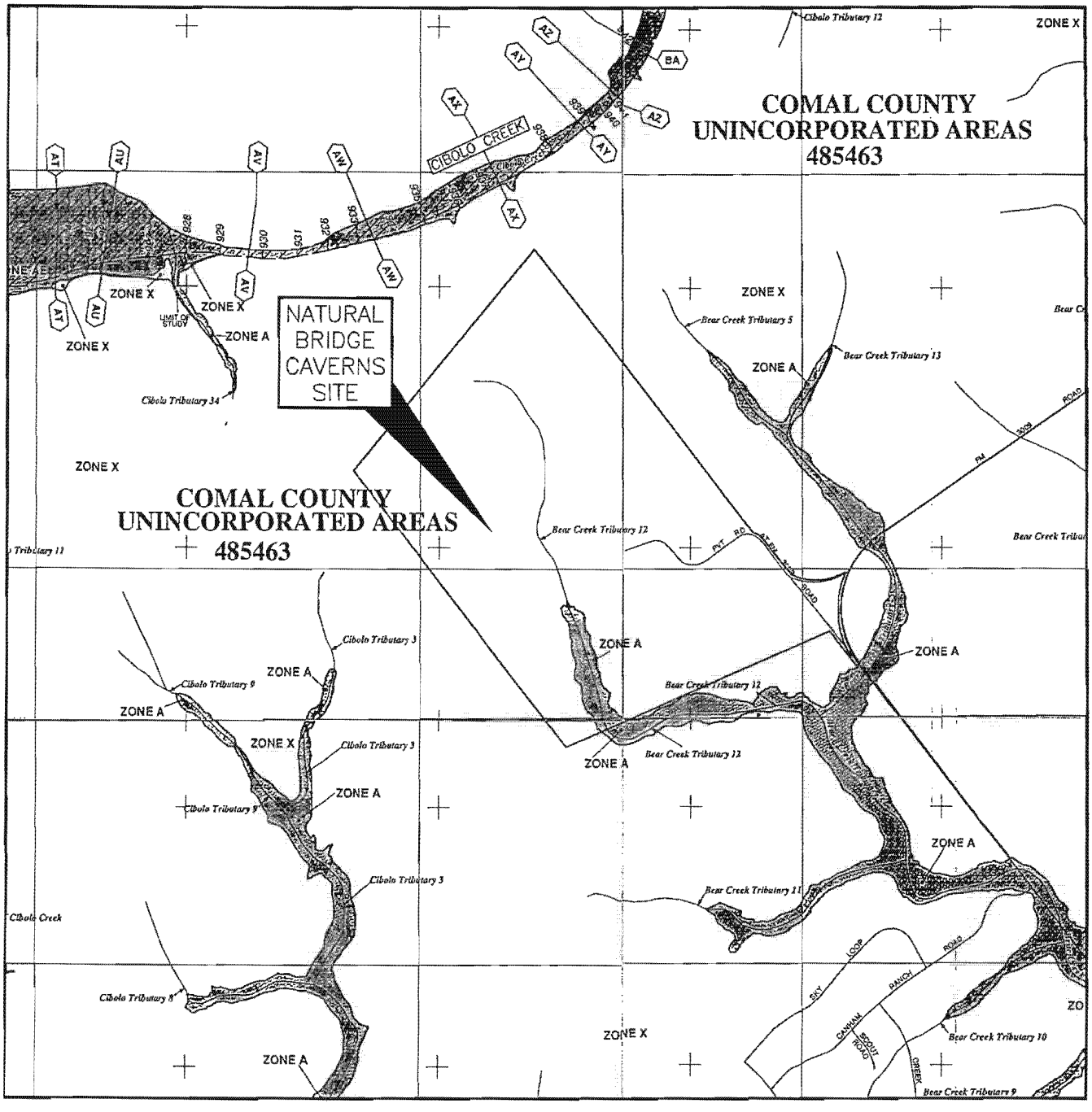
REVISIONS

NO.	REVISION

DESIGNED BY: A.S.W. DRAWN BY: S.M.R.
CHECKED BY: M.M.S. DATE: 07/11/2013
JOB NO. 10-071
SHEET NO. ___ OF X

FEMA FLOOD MAP

EXHIBIT 1



FEMA FLOOD MAPS REFERENCED ABOVE: MAP NUMBERS – 48091C0405F, 48091C0415F

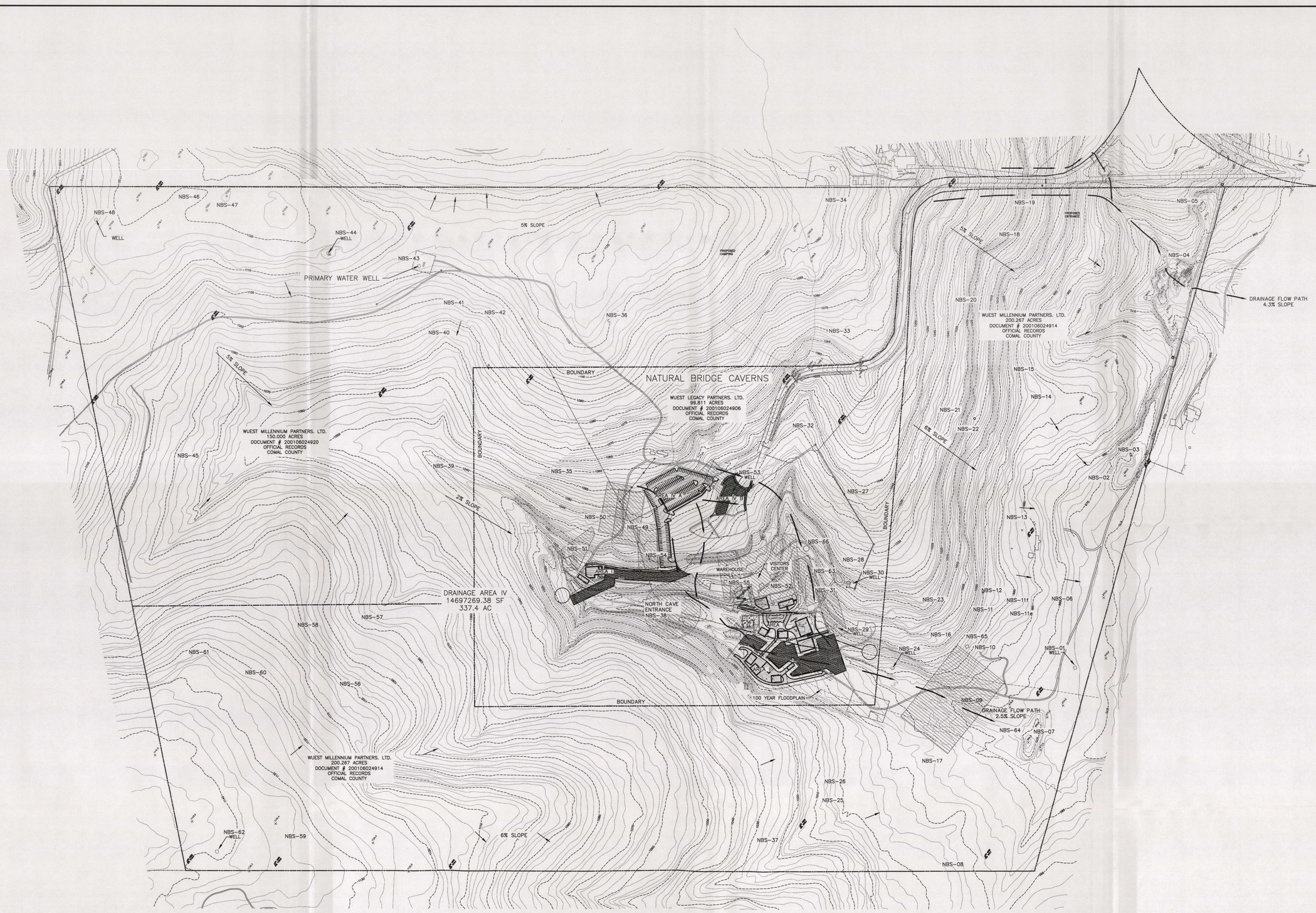
N

NATURAL BRIDGE CAVERNS
26495 NATURAL BRIDGE CAVERNS RD (FM 3009)
WUEST LEGACY PARTNERS, LTD./
WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

SCALE: 1"=2000'

SITE PLAN

SITE PLAN



NOTE: FOR PROPOSED CONTOURS, SEE "LIMITED SITE PLAN" SHOWING PROPOSED IMPROVEMENTS.

OVERALL SITE PLAN

0 200 400

SCALE: 1"=200'

SLAY ENGINEERING CO., INC.
CIVIL – SURVEYING – CONSULTING
123 ALTGELT AVE.
SAN ANTONIO, TEXAS 78201
TELEPHONE (210) 734-4388
TBPE FIRM REGISTRATION NUMBER: F1901

NATURAL BRIDGE CAVERNS

26495 NATURAL BRIDGE CAVERNS ROAD (FM 3009)
WUEST LEGACY PARTNERS,LTD./ WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

OVERALL SITE PLAN

REVISIONS

NO.	REVISION

DESIGNED BY:	DRAWN BY:
A.B.W.	S.M.R.
CHECKED BY:	DATE:
M.M.S.	07/29/2012

JOB NO. 10-071

SHEET NO. 1 OF 1

50 LF TRIANGULAR FILTER DIKE

LIMITS OF CONSTRUCTION

AREA IV A
PROPOSED OVERFLOW PARKING

AREA IV B

ANCILLARY WATER WELL &
STORAGE TANK
NBS-53
WELL

260 LF SILT FENCE

EXISTING PARKING

NBS-50

50 LF TRIANGULAR FILTER DIKE

NBS-49

NBS-51

NBS-54

EXISTING PARKING

DRAINAGE PATH

AREA I

OSSF

VISITORS CENTER

NBS-55

WAREHOUSE

NBS-52

142 LF SILT FENCE

NBS-31

WELL SHAFT
PAVILION

SPRAY
FIELD

ADA RAMP

170 LF SILT FENCE

182 LF SILT FENCE

77 LF SILT FENCE

WELL

NBS-38

AREA II

NBS-29

236 LF SILT FENCE

BOUNDARY

DRAINAGE PATH

NORTH
CAVE
ENTRANCE

AREA OF SOIL
DISTURBANCE/
WORK AREA

OSSF

NOTE:
HYDROMULCH DISTURBED
SOIL/WORK AREAS

122 LF SILT FENCE

NOTE:
HYDROMULCH DISTURBED SOIL/WORK AREAS

DRAINAGE PATH

SPRAY
FIELD

95 LF SILT FENCE

AREA III

65 LF SILT FENCE

180 LF SILT FENCE

LIMITED SITE PLAN

SCALE: 1"=120'

EXHIBIT C

DATE: 07-29-2012

JOB NO.: 10-071

SLAY
ENGINEERING CO., INC.
123 ALTGELT AVENUE
SAN ANTONIO, TEXAS 78201
PH. (210) 734-4388
FAX (210) 734-6401
TBPE FIRM REGISTRATION
NO. F1901

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

REGULATED ENTITY NAME: Natural Bridge Caverns

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

1. Fuels for construction equipment and hazardous substances which will be used during construction:

   ___ Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year.
   ___ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
   ___ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An **Aboveground Storage Tank Facility Plan** application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
   X Fuels and hazardous substances will not be stored on-site.

2. X **ATTACHMENT A - Spill Response Actions**. A description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is provided at the end of this form.

3. N/A Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

4. X **ATTACHMENT B - Potential Sources of Contamination.** Describe in an attachment at the end of this form any other activities or processes which may be a potential source of contamination.
   ___ There are no other potential sources of contamination.

SEQUENCE OF CONSTRUCTION

5. X **ATTACHMENT C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is provided at the end of this form. For each activity described, an estimate of the total area of the site to be disturbed by each activity is given.

6. X Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: Bear Creek/Dry Comal Creek

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

on the site plan.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

11. N/A **ATTACHMENT H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure has been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are provided as at the end of this form.

12. X **ATTACHMENT I - Inspection and Maintenance for BMPs.** A plan for the inspection of temporary BMPs and measures and for their timely maintenance, repairs, and, if necessary, retrofit is provided at the end of this form. A description of documentation procedures and recordkeeping practices is included in the plan.

13. X All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.

14. X If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).

15. N/A Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.

16. X Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

SOIL STABILIZATION PRACTICES

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

17. X **ATTACHMENT J - Schedule of Interim and Permanent Soil Stabilization Practices.** A schedule of the interim and permanent soil stabilization practices for the site is attached at the end of this form.

18. X Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.

19. X Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

ADMINISTRATIVE INFORMATION

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

21. X If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.

22. X Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

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

Brad Wuest
Print Name of Customer/Agent

Signature of Customer/Agent

7-31-12
Date

NATURAL BRIDGE CAVERNS

ATTACHMENT A – SPILL RESPONSE ACTIONS

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

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

Education

(1) Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use and what is appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when spill must be reported to the TCEQ. Information available in 30 TAC 327.4 and 40 CFR 302.4.

(2) Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

(3) Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

(4) Establish a continuing education program to indoctrinate new employees.

(5) Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

(1) To the extent that the work can be accomplished safely, spills of oil, petroleum Products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.

(2) Store hazardous materials and wastes in covered containers and protect from vandalism.

(3) Place a stockpile of spill cleanup materials where it will be readily accessible.

(4) Train employees in spill prevention and cleanup.

(5) Designate responsible individuals to oversee and enforce control measures.

(6) Spills should be covered and protected from stormwater run-on during rainfall to the extent that it doesn't compromise clean up activities.

(7) Do not bury or wash spills with water.

(8) Store and dispose of used clean materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

(9) Do not allow water used for cleaning and decontamination to enter watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.

(10) Contain water overflow or minor water spillage and do not allow it to discharge to drainage facilities or watercourses.

(11) Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup and spill reporting instructions for hazardous materials stored. or used on the project site in an open, conspicuous, and accessible location.

(12) Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed proper function.

Cleanup

(1) Clean up leaks and spills immediately.

(2) Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spills material is hazardous, then the used cleanup materials also hazardous and must be disposed of as hazardous waste.

(3) Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

(1) Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

(2) Use absorbent materials on small spills rather than hosing down or burying the spill.

(3) Absorbent materials should be promptly removed and disposed of properly.

(4) Follow the practice below for a minor spill:
   a. Contain the spread of the spill.
   b. Recover spilled materials.

c. Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

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

Spills should be cleaned up immediately:

(1) Contain spread of the spill.

(2) Notify the project foreman immediately.

(3) If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.

(4) If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

(5) If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

(1) Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM AND 5 PM. After hours, contact the Environmental release Hotline at 1-800832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

(2) For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110, 119, and 302, the contractor should notify the National Response Center at (800)424-8802.

(3) Notification should first be made by telephone and followed up with a written report.

(4) The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

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

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

Vehicle and Equipment Maintenance

(1) If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills.

(2) Regularly inspect onsite vehicles and equipment for leaks and repair immediately

(3) Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oils and fluids. Do not allow leaking vehicles or equipment onsite.

(4) Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.

(5) Place drip pans or absorbent materials under paving equipment when not in use.

(6) Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.

(7) Promptly transfer used fluids to the proper waster or recycling drums. Don't leave full drip pans or other open containers lying around.

(8) Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.

(9) Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery. treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

(1) If fueling must occur on site, use designated areas, located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills.

(2) Discourage "topping off" of fuel tank. Always use secondary containment, such as drain pan, when fueling to catch spill/leaks.

Concrete Trucks

Concrete trucks will only be allowed to washout or discharge surplus concrete or drum wash water to a washout pit.

NATURAL BRIDGE CAVERNS

ATTACHMENT B – POTENTIAL SOURCES OF CONTAMINATION

The materials of substances listed below are expected to be present onsite during construction or are potential sources of contamination:

1. Concrete and Rebar
2. HDPE Pipe
3. PVC Pipe and Adhesive
4. Conduit and Wire
5. Detergents
6. Fertilizers
7. Herbicides
8. Petroleum Based Products (Asphalt, Fuel, Etc.)
9. Cleaning Solvents
10. Treated and Untreated Wood Products
11. Seed or Sod
12. Paints
13. Concrete truck wash out
14. Waste Water from Portable Restrooms (Port-o-Potties)

NATURAL BRIDGE CAVERNS

ATTACHMENT C – SEQUENCE OF MAJOR ACTIVITIES

Construction of the five areas will occur over the course of several years. The general construction sequence is listed below for each area. The specific order of the building construction is flexible and may change over the course of time from that listed below:

A. Area II, Buildings 3, 4 and 5, Activity Pad and Area V, ADA ramps construction sequence:
   1. Install temporary controls including silt fence, staking and flagging of buffer zones and temporary vegetative strips, rock berm and washout pit.
   2. Perform the clearing, grubbing, stockpiling, and earthwork for the site.
   3. Construct utility lines to buildings 3, 4 and 5.
   4. Prepare for construction of buildings 3, 4 and 5 and activity pad foundations.
   5. Pour foundations for buildings 3, 4, 5 and activity pad.
   6. Construct sanitary sewer collection line to OSSF for Area II
   7. Construct OSSF and spray field.
   8. Construct buildings 3, 4 and 5, complete ancillary items of activity pad.
   9. Remove and replace existing walk culvert.
   10. Construct the paved areas and sidewalks for Area II
   11. Clear area for ADA ramp, remove existing walk and cover and perform initial grading.
   12. Set forms and rebar for ADA concrete ramps.
   13. Pour ADA concrete ramps.
   14. Remove Temporary BMPs after establishing vegetation.

The table below lists the disturbed area for each activity for Area 1, Buildings 4 and 5 and Area V, ADA ramps:

ACTIVITY	DISTURBED AREA (SF)
1	2,000
2	15,000
3	35,000
4	15,000
5	15,000
6	1,000
7	1,000
8	30,000
9	1,000
10	30,000
11	5,000
12	5,000
13	3,000
14	2,000

Buildings 1 and 2 sequence and disturbed areas are similar to Buildings 4 and 5 but construction will not occur concurrently with Buildings 1 and 2.

B. Area V, Wood Deck/Patio, Stairs/Landing and Building 12 construction sequence:
   1. Install temporary controls including silt fence, staking and flagging of buffer zones and temporary vegetative strips and washout pit.
   2. Perform the clearing, grubbing, stockpiling, and earthwork for the area.
   3. Construct utility lines to building 12.
   4. Prepare for construction of building 12, stairs/landing and wood deck/patio foundations.
   5. Pour foundations for buildings 12, stairs/landing and wood deck/patio.
   6. Construct building 12, complete stairs/landing and wood deck/patio.
   7. Construct sidewalks.
   8. Remove Temporary BMPs after establishing vegetation.

The table below lists the disturbed area for each activity for Area III, Buildings 7, 8, 9, 10, 11 and pedestrian bridge:

ACTIVITY	DISTURBED AREA (SF)
1	1,000
2	30,000
3	1,000
4	30,000
5	20,000
6	20,000
7	5,000
8	1,000

C. Area III, building 7, 8, 9, 10 and 11 may occur simultaneously with the construction sequence:

   1. Install temporary controls including silt fence, staking and flagging of buffer zones and temporary vegetative strips and washout pit.
   2. Perform the clearing, grubbing, stockpiling, and earthwork for the area.
   3. Construct utility lines to building 7, 8, 9, 10 and 11.
   4. Prepare for construction of buildings 7, 8, 9, 10, 11 and pedestrian bridge foundations.
   5. Pour foundations for buildings 7, 8, 9, 10, 11 and pedestrian bridge spread footing.
   6. Construct buildings 7, 8, 9, 10 and 11 and erect pedestrian bridge.
   7. Construct paved area and sidewalks.
   8. Remove Temporary BMPs after establishing vegetation.

The table below lists the disturbed area for each activity for Area III, Buildings 7, 8, 9, 10, 11 and pedestrian bridge:

ACTIVITY	DISTURBED AREA (SF)
1	1,000
2	98,000
3	5,000
4	60,000
5	60,000
6	40,000
7	50,000
8	1,000

D. Area IV, parking lot construction sequenced:

1. Install temporary controls including silt fence, triangular sediment filter dikes, staking and flagging of buffer zones and temporary vegetative strips and washout pit.
2. Perform the clearing, grubbing, stockpiling and earthwork for the area.
3. Prepare subgrade for construction of pavement and walks.
4. Place base material and compact.
5. Place HMAC.
6. Construct islands, landscaping, gates, walks and monument sign.
7. Stripe lot.
8. Remove Temporary BMPs after establishing vegetation.

The table below lists the disturbed area for each activity for Area IV:

ACTIVITY	DISTURBED AREA (SF)
1	1,000
2	120,000
3	120,000
4	132,000
5	120,000
6	20,000
7	5,000
8	1,000

NATURAL BRIDGE CAVERNS

ATTACHMENT D – TEMPORARY BMPS AND MEASURES

1. There is no upgradient runoff to our site. The proposed construction is approximately 1300 feet upstream from the property line.

2. Temporary best management practices that will be used on-site are described below:

    a. Silt fences – Silt fences will trap excess silt and other debris from discharging off the site during construction. Silt fence will be implemented prior to the start of construction.
    b. Temporary Vegetative Strips – 50 feet wide vegetative strips will be established in the vicinity of the construction.
    c. Rock filter berm – A rock filter berm will act as protection for tower 1.
    d. Buffer Zone – A minimum 200 feet buffer zone will be established up and down-gradient and either side of the sensitive feature, NBS-09. This sensitive feature is approximately 750 feet downstream of the wash out pit and separated from the construction by undeveloped ranch land.
    e. Hydromulch seeding for restoration of vegetation – Vegetation will be restored and allow for natural protection of the aquifer. Vegetation will be restored at the completion of construction.

3. No on-site sensitive feature will be plugged during construction.

NATURAL BRIDGE CAVERNS

ATTACHMENT E – REQUEST TO TEMPORARILY SEAL A FEATURE

NBS-52 is a sink hole and the entrance to Natural Bridge Caverns. The Visitors Center was constructed adjacent to the sink hole and lies within the buffer zone. The proposed improvements to the Visitors Center exterior will provide stairs and a landing from the building. A wood deck/patio is proposed next to the proposed stairs. To improve access, an ADA ramp is planned to address the 15 feet differential from the Visitors Center to the path leading from the cave exit. Building 12 will provide space for visitor's convenience near the craft and activity areas. All improvements are within the buffer zone for NBS-52, but located down gradient. Runoff from these proposed improvements will be directed away from NBS-52. Temporary erosion measures, including filter fabric fence to address construction runoff draining away from the feature. Collection of all construction material waste will be performed each day to prevent any debris from being blown toward the cave entrance.

NATURAL BRIDGE CAVERNS

ATTATCHMENT F – STRUCTURAL PRACTICES

Structural practices for the temporary filtration of storm water runoff from this site include:

1. Silt fencing at various locations
2. Establish temporary vegetative strip boundaries.
3. Rock filtration device will be installed downstream of Area II.
4. A temporary concrete washout pit for concrete trucks will be provided as a place to dispose of unused concrete form concrete mix trucks.
5. Runoff during and post construction will be directed away from NBS-52. Presently the Visitors Center is constructed within the buffer zone of NBS-52, and its runoff directed away from the feature. No improvements to the exterior of the Visitors Center will direct runoff to NBS-52, and improvements are down gradient.



NATURAL BRIDGE CAVERNS

26495 NATURAL BRIDGE CAVERNS ROAD (FM 3009)
WUEST LEGACY PARTNERS,LTD./ WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

DRAINAGE AREA MAP

REVISIONS		
NO.	REVISION	

DESIGNED BY: A.B.W. | DRAWN BY: S.M.R.
CHECKED BY: M.M.S. | DATE: 07/29/2012
JOB NO. 10-071
SHEET NO. 1 OF 1

SLAY ENGINEERING CO., INC.

SLAY ENGINEERING CO., INC.
CIVIL – SURVEYING – CONSULTING
123 ALTGELT AVE.
SAN ANTONIO, TEXAS 78201
TELEPHONE (210) 734-4388
TBPE FIRM REGISTRATION NUMBER: F1901

NATURAL BRIDGE CAVERNS

ATTACHMENT I – INSPECTION AND MAINTENANCE FOR BMPS

Temporary BMP's will be inspected weekly or after any rainfall. Any irregularities will be corrected immediately. These controls include the silt fencing, temporary vegetative strips, rock berm and buffer zone as shown on the plans. A log will be kept of the inspections and any repair and or maintenance activities shall be noted in the log.

The project manager on-site will log his name, date, and current weather conditions. In addition, a brief description of the previous weeks' weather conditions will be added, including the amount of rain, if any. The project manager will inspect the TBMP's and note their condition each week, including any repairs done within the last week.

Inspection and maintenance guidelines:

1. **Silt Fence:**
    a) Inspect all fencing weekly, and after any rainfall.
    b) Remove sediment when buildup reaches six inches.
    c) Replace or repair any sections crushed or collapsed in the course of construction activity.
    d) When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

2. **Temporary Vegetative Filter Strips:** Temporary vegetative filter strips will be inspected weekly and after any rainfall. Any construction debris and trash will be removed and properly disposed of properly.

3. **Rock filter dams:** Rock filter dams will trap excess silt and other debris from running into lows. Rock filter dams will be implemented prior to the start of construction.

4. **Hydomulch seeding for restoration of vegetation**: Vegetation will be restored and allow for natural protection of the aquifer. Vegetation will be restored at the completion of construction.

5. **Buffer Zone:** The buffer zone will be staked and flagged and the limits monitored to confirm they are being honored.

NATURAL BRIDGE CAVERNS

ATTACHMENT J – SCHEDULE OF INTERIM AND PERMANENT SOIL STABILIZATION PRACTICES

Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen days after construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the fourteenth day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within twenty one days, temporary stabilization measures do not have to be initiated on that portion of the site. In areas experiencing droughts where the initiation of stabilization measures by the fourteenth day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.

Within 14 days of completion of construction in these areas, permanent soil stabilization practices will commence. Stabilization processes include permanent sod, seeding and hydromulch. (Please refer to the City of San Antonio Specifications: Item #516 and #520, see attached.)

ITEM

516 SODDING

516.1. DESCRIPTION: *This item shall govern for the furnishing and planting of Bermuda, St. Augustine, Buffalo 609 or other acceptable grass sod on the areas designated on the plans or as directed by the Engineer. All planting shall be completed as soon as practical to avoid erosion of topsoil and graded areas in advance of acceptance of the work.*

516.2. MATERIALS: The sod shall consist of live, growing grass secured from sources where the soil is fertile. All grass sod shall have a healthy, virile root system of dense, thickly matted roots throughout the soil of the sod for a minimum thickness of 1 inch. The Contractor shall not use sod from areas where the grass is thinned out, or where the grass roots have been dried out by exposure to air and sun to such an extent as to damage its ability to grow when transplanted. The sod shall be free from noxious weeds or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted. Sources from which sod is to be obtained shall be subject to approval by the Engineer.

A. Block Sod. Use block sod free from noxious weeds, Johnson grass, other grasses, or any matter deleterious to the growth and subsistence of the sod.

B. Fertilizer. A pelleted or granulated fertilizer shall be used with an analysis of 16-8-8. (The figures in the analysis represent the percent of nitrogen, phosphoric acid, and potash nutrients respectively.) At least 50% of the nitrogen component must be of a slow-release formulation such as urea-based and plastic resin-coated fertilizers. Ensure that fertilizer is in an acceptable condition for distribution in containers labeled with the analysis. Fertilizer is subject to testing by the Texas A&M Feed and Fertilizer Control Service in accordance with the Texas Fertilizer Law.

C. Water. Use water that is clean and free of industrial wastes and other substances harmful to the growth of vegetation.

D. Mulch. When mulch is specified below the sod, use straw mulch consisting of oat, wheat or rice straw or hay mulch of either Bermudagrass or prairie grasses. Use straw or hay mulch free of Johnson grass and other noxious and foreign materials. Keep the mulch dry and do not use molded or rotted material.

E. Tacking Methods. Use a tacking agent applied in accordance with the manufacturer's recommendations or a crimping method on all straw or hay mulch operations. Tacking agents must be approved before use, or may be specified on the plans.

516.3. EQUIPMENT: Provide the machinery, tools and equipment necessary for proper prosecution of the work. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.

516.4. CONSTRUCTION:

A. General. Cultivate the area to a depth of 4 in. before placing the sod. Plant the sod specified and mulch, if required, after the area has been completed to lines and grades as shown on the plans. Where rolling is specified by the following sub-articles, the roller shall be a light corrugated drum roller.

B. Planting Season. All planting shall be done between the average date of the last freeze in the spring and six weeks prior to the average date for the first freeze in the fall according to the U.S. Weather Bureau for the area.

C. Block Sodding. At locations shown on plans or where directed by the Engineer, sod blocks shall be carefully placed on the prepared areas. The fertilizer shall then be applied and thoroughly watered. When sufficiently dry, the sodded area shall be rolled or tamped to form a thoroughly compacted, solid mat. Any voids left in the block sodding shall be filled with additional sod and tamped.

D. Watering. Sod shall be thoroughly watered immediately after planting and subsequently at such intervals to promote growth or as directed by the Engineer. Furnish and operate equipment to distribute water at a uniform and controllable rate. Ensure that watering does not erode soil or plantings. Apply water in the required quantity where shown on the plans or as directed by the Engineer.

E. Fertilizing. The fertilizer shall be applied uniformly over the sodded areas and in the manner directed. The fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected. Distribution of fertilizer shall meet the approval of the Engineer. Unless otherwise indicated on the plans, fertilizer shall be applied uniformly at the average rate of 300 pounds per acre for all types of sod.

F. Finishing. Where applicable, the shoulders, slopes, and ditches shall be smoothed after planting has been completed and shaped to conform to the cross-section previously provided and existing at the time sodding operations were begun. Any excess dirt from the planting operations shall be spread uniformly over adjacent areas or disposed of as directed by the Engineer so that the completed surfaces will present a sightly appearance. Keep sod along edges of curbs, driveways, walkways, etc., trimmed until acceptance.

G. Sequence of Sodding. It is the intent of this specification that all sodding be placed and watered twice a week, unless intervening rains make watering unnecessary. Watering shall be required for at least thirty (30) days after planting to establish growth or until acceptance of the work by the City. If the season is inappropriate, the Engineer may require that the sodding operations be advanced or retarded as may seem advisable. All areas shall be covered with live sod before final acceptance. Any blocks which show no signs of life shall be replaced with live sod before the work shall be measured for payment.

516.5. MEASUREMENT: Measurement of acceptable "Sodding," complete in place, will be by the square yard. Fertilizer, mulch, and water will not be measured for payment.

516.6. PAYMENT: "Sodding," measured as provided above, will be paid for at the contract unit price bid per square yard, which price shall be full compensation for furnishing, hauling and placing all materials, for all fertilizer and water required and for all labor, tools, equipment and incidentals necessary to complete the work.

516.7. BID ITEM:

Item 516.1 - Bermuda Sodding - per square yard

Item 516.2 - St. Augustine Sodding - per square yard

Item 516.3 - Buffalo 609 Sodding - per square yard

ITEM

520 HYDROMULCHING

520.1. DESCRIPTION: *This item shall govern for preparing ground, providing for sowing of seeds, mulching with 70/30 wood/cellulous blend fiber mulch, and other management practices along and across such areas as are designated on the plans and in accordance with these specifications. All areas shall be covered with live grass before acceptance.*

520.2. MATERIALS:

A. Seeds. All seed must meet the requirements of the Texas Seed Law including the labeling requirements for showing purity, germination, name and type of seed. Seed furnished shall be of the previous season's crop for the date of the project. Each variety of seed shall be furnished and delivered in separate bags or containers. A sample of each variety shall be furnished for analysis and testing when directed by the Engineer. The amount of seed planted per acre shall be of the type specified below and shall equal or exceed the following percentages for purity and germination or an equivalent amount of pure live seed.

- Common Name: Bermuda and Giant Bermuda grass (hulled)
- Scientific Name: Cynodon Dactylon
- Purity: 95%
- Germination: 90%

Annual Rye grass will be free of Johnson grass, field bind weed, dodder seed, and free of other seed to the limits allowable under the Federal Seed Act and applicable State Seed Laws.

Annual Rye grass will be added into slurry between October 1 and March 15. No additional cost will be charged to the City.

B. 70/30 Wood/Cellulose Blend Fiber Mulch. Wood/Cellulose blend fiber mulch shall consist of 70% long wood grain fibers produced from grinding clean, whole wood chips and 30% cellulose fiber produced from ground newsprint. Mulch fibers shall be free of abrasive or hard contaminants which would inhibit hydraulic pumping. The mulch fibers must maintain uniform suspension in water under agitation and shall blend with grass seed, fertilizer, and other additives to form homogeneous slurry. Upon application, the mulch material shall form a blotter-like mat covering the ground. This mat shall have the characteristics of water absorption and percolation and shall cover and bond grass seed in contact with the soil. The wood fiber mulch shall be dyed green to aid visual metering during application. The dye shall be biodegradable and not inhibit plant growth. The wood fiber mulch shall also conform to the following specifications:

1. Percent moisture content (maximum) 12.5% ±3.0%

2. Percent organic matter

   a. Wood fiber (minimum) 70% ±0.8% O.D. Basis[1]

[1] Oven Dry Basis

b.	Paper fiber (maximum)	30.0% ±0.8% O.D. Basis
3.	Percent ash content	1.0% +0.2% O.D. Basis
4.	Ph	4.8% ±0.5%
5.	Water holding capacity (minimum)	1,000 Grams of water per 100 grams of fiber

The wood fiber mulch shall be packaged in units' not exceeding 100 lbs. and shall be suitable for outdoors storage for up to six months. The package shall contain, on current labels, the manufacturer's name and address, net weight, and customer service telephone number.

C. Fertilizers. Fertilizer shall have a chemical analysis of 15-15-15 with micronutrients and shall be water soluble (The figures in the analysis represent the percent of nitrogen, phosphoric acid and potash nutrients, respectively). Fifty percent or greater of the Nitrogen required shall be in the form of Nitrate Nitrogen ($N0_3$). The remaining Nitrogen required may be in the form urea Nitrogen ($C0(NH_2)_2$).

In the event it is necessary to substitute a fertilizer of a different analysis, it shall be a pelleted or granulated fertilizer with a lower concentration, but the total amount of nutrients furnished and applied per acre shall equal or exceed that specified for each nutrient.

The fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected.

D. Tactifier and Binder. Natural vegetable gum containing gelling and hardening agents that when mixed with water and properly cured, shall form an insoluble network.

E. Water. Shall be furnished by the contractor and shall be clean and free of substances harmful to the growth of vegetation.

F. Herbicide. Herbicide used shall be an easy to apply, effective in a short term, chemical agent to inhibit or destroy weed growth, while being harmless to seed and grass being implanted.

G. Topsoil. Topsoil shall conform to the provisions of Item 515, "Topsoil."

520.3. EQUIPMENT: Provide the machinery, tools and equipment necessary for proper prosecution of the work. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.

520.4. CONSTRUCTION:

A. General. Security of stored hydromulch materials will be the sole responsibility of the Contractor at no additional expense to the City.

It is the contractor's responsibility to verify the location of all utility lines, electric cables, sprinkling systems and conduits so that the proper precautions must be taken not to disturb or damage any subsurface improvements. Should obstructions be found, the Contractor will promptly notify the City Inspector. Any damage caused by the contractor shall be repaired by himself at no cost to the City. Any such repairs shall be subject to approval by the Inspector.

B. Preparation of Subsoil. Inspect subsoil for the presence of objectionable materials, such as rocks (2 inches in diameter and larger), concrete waste, building debris, weeds, grass or other

material that would be detrimental to the growth of grasses. Protect existing underground improvements from damage.

Cultivate to a depth of 3 inches in areas to receive hydromulch. If compaction is due to equipment, traffic or storage, cultivate to a depth of 6 inches, and apply herbicide as directed by manufacturer.

Remove any foreign or objectionable materials collected during cultivation.

Grade placement area to eliminate rough spots and low areas where ponding may occur. Assure positive drainage away from all buildings. Maintain smooth, uniform grades.

Hydromuch area and weed control shall consist of killing all weeds and maintaining a weed-free condition until completion of the project by applying herbicide as directed by the manufacturer.

C. Seeded Lawns. The following construction sequences and procedures shall be observed:

1. The contractor shall notify the Inspector not less than 48 hours in advance of any seeding operation and shall not begin the work until areas prepared or designated for seeding have been approved.

2. Before placement of hydromulch, all areas shall be cultivated to a depth of 3 inches unless otherwise specified or ordered by the Engineer. Cultivation of the soil may be done by disc, spring tooth harrow, roto-tiler, or similar equipment. This operation shall be done at right angles to the natural flow of water on the slopes.

3. The area shall then be rolled in two directions; the second shall be done at right angles to the first rolling.

4. Rake the area to make it smooth and level. Add soil where necessary or as directed by the Inspector.

5. The finished grade shall be 1 inch below all curbs, sidewalks, and/or other appurtenances.

6. Apply the fertilizer at the rate and mixture specified. The fertilizer shall be applied by an approved hand or mechanical method.

7. Roll the area in one direction.

8. Slurry to be sprayed evenly in two intersecting directions with a hydraulic seeder.

9. Erect a barrier of stakes and strings, and post warning signs where necessary, or as directed by the Inspector.

10. Apply water as required to keep the mulch damp at all times throughout germination and initial growth period as determined by the Inspector.

11. Upon completion, all excess material shall be removed and disposed of off the project site at contractor's expense.

D. Slurry. The slurry will be mixed and spread uniformly over the area at the following rate for both residential and commercial areas:

- 70/30 Wood/Cellulose Blend Fiber Mulch 2,000 lb/acre
- Fertilizer 400 lb/acre
- Bermuda 1.5 lb/1,000 sq ft
- Annual Ryegrass (Oct. through March 15) 20 lbs per 1,000 sq ft
- Water and binder shall be added according to manufacturer's recommendations.

E. **Guarantee and Lawn Established Period.** The guarantee and lawn established period shall begin immediately after the completion of the planting and shall start with the Provisional Acceptance and end with the Final Acceptance.

1. **Provisional Acceptance.** Upon completion of hydromulching and written request of Contractor, the Inspector will inspect all the work for Provisional Acceptance.

2. **Guarantee Period.** The guarantee period shall begin upon completion of the provisional acceptance. All plant materials shall be guaranteed by the Contractor for a period of thirty days (30) from the date of provisional acceptance, to be in good, healthy, and nourished condition. The exceptions are damages resulting from neglect by the property owner, abuse or damage by others, or unusual phenomena or incidents which are beyond the Contractor's control.

   During the lawn establishment period, it shall be the contractor's responsibility to ensure the continuing healthy growth. This care shall include labor, water and material necessary to keep the project in a presentable condition, including but not limit to removal of litter, mowing, trimming, removal of grass clippings, edging, fertilization, insecticide and fungicide applications, weed control, and repair and reseeding any and all damaged areas.

   Water application shall be accomplished each week from March through October. An even application of one inch minimum of water shall be required over all lawn areas weekly. The rate and frequency of water application may be changed, as directed by the Inspector, depending on weather, and soil conditions.

3. **Replacement.** The Contractor shall replace, without cost to the City, and as soon as weather conditions permit, all dead grassed areas not in a vigorous, thriving condition, as determined by the Inspector during and at the end of the guarantee period. Replacements shall be subject to all requirements stated in this specification. The Contractor shall make all necessary repairs to grades, grassed areas, and terrace paving required because of grass replacement at no cost to the City.

4. **Final Inspection and Acceptance.** At the end of the guarantee period and upon written request of the contractor, the Inspector will inspect all guaranteed work for final acceptance. The written request shall be submitted to the City ten (10) days prior to the anticipated date of inspection.

   Acceptance of hydromulching lawn as herein specified shall be based on a uniform stand of grass and a uniform grade at the time of final inspection. Area of two square feet or more that are bare or have a poor stand of grass and area not having a uniform grade for any cause before final inspection shall be regraded, rehydromulched and reseeded as specified at the Contractor's expense.

Upon completion by the Contractor of all repairs or renewals which may appear at that time to be necessary in the judgment of the City or its authorized representative, the final acceptance of the hydromulching will be issued.

520.5. MEASUREMENT: Measurement of acceptable "Hydromulching," complete in place, shall be made by the square yard and only for those areas designated on the plans, or for other areas directed by the Inspector. Fertilizers, wood cellulose fibers, seeds, herbicide and water will not be measured for payment.

520.6. PAYMENT: "Hydromulching," measured as provided above, will be paid for at the contract unit price bid per square yard, which price shall be full compensation for furnishing, hauling and placing all materials, for all fertilizer and water required and for all labor, tools, equipment and incidentals necessary to complete the work.

520.7. BID ITEM:

Item 520.1 - Hydromulching (Residential or Commercial) - per square yard

Permanent Stormwater Section
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

REGULATED ENTITY NAME: Natural Bridge Caverns

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

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

2. N/A These practices and measures have been designed, and will be constructed, operated, and maintained to insure that 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site caused by the regulated activity is removed. These quantities have been calculated in accordance with technical guidance prepared or accepted by the executive director.

   ___ The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.
   ___ A technical guidance other than the TCEQ TGM was used to design permanent BMPs and measures for this site. The complete citation for the technical guidance that was used is provided below:

   _____
   _____

3. N/A 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.

4. N/A 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.

   ___ This site will be used for low density single-family residential development and has 20% or less impervious cover.
   ___ This site will be used for low density single-family residential development but has more than 20% impervious cover.
   ___ This site will not be used for low density single-family residential development.

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

X **ATTACHMENT A - 20% or Less Impervious Cover Waiver.** This 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 found at the end of this form.

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

__ This 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 identified as **ATTACHMENT B** at the end of this form.

__ If no surface water, groundwater or stormwater originates upgradient from the site and flows across the site, an explanation is provided as **ATTACHMENT B** at the end of this form.

X If 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, an explanation is provided as **ATTACHMENT B** at the end of this form.

7. **ATTACHMENT C - BMPs for On-site Stormwater.**

__ A description of the BMPs and measures that will be used to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site is identified as **ATTACHMENT C** at the end of this form.

X If 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, an explanation is provided as **ATTACHMENT C** at the end of this form.

8. X **ATTACHMENT D - BMPs for Surface Streams.** A description of the BMPs and measures that prevent pollutants from entering surface streams, sensitive features, or the aquifer is provided at the end of this form. Each feature identified in the Geologic Assessment as "sensitive" has been addressed.

9. X The applicant understands that to the extent practicable, BMPs and measures must maintain flow to naturally occurring sensitive features identified in either the geologic assessment, executive director review, or during excavation, blasting, or construction.

X The permanent sealing of or diversion of flow from a naturally-occurring "sensitive" or "possibly sensitive" feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed for any naturally-occurring "sensitive" or "possibly sensitive" features on this site.

__ **ATTACHMENT E - Request to Seal Features.** A request to seal a naturally-occurring "sensitive" or "possibly sensitive" feature, that includes a justification as to why no reasonable and practicable alternative exists, is found at the end of this form. A request and justification has been provided for each feature.

10. X **ATTACHMENT F - Construction Plans.** Construction plans and design calculations for the proposed permanent BMPs and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information have been signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed permanent BMPs and measures are provided at the end of this form. Design Calculations, TCEQ

Construction Notes, all man-made or naturally occurring geologic features, all proposed structural measures, and appropriate details must be shown on the construction plans.

11. N/A **ATTACHMENT G - Inspection, Maintenance, Repair and Retrofit Plan.** A plan for the inspection, maintenance, repair, and, if necessary, retrofit of the permanent BMPs and measures is provided at the end of this form. The plan has been prepared and certified by the engineer designing the permanent BMPs and measures. The plan has been signed by the owner or responsible party. The plan includes procedures for documenting inspections, maintenance, repairs, and, if necessary, retrofits as well as a discussion of record keeping procedures.

12. ___ The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.

___ Pilot-scale field testing (including water quality monitoring) may be required for BMPs that are not contained in technical guidance recognized by or prepared by the executive director.

N/A **ATTACHMENT H - Pilot-Scale Field Testing Plan.** A plan for pilot-scale field testing is provided at the end of this form.

13. X **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 provided at the end of this form. The measures address increased stream flashing, the creation of stronger flows and in-stream velocities, and other in-stream effects caused by the regulated activity which increase erosion that results in water quality degradation.

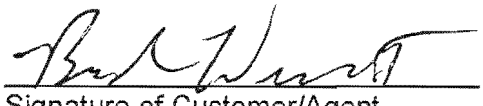
Responsibility for maintenance of permanent BMPs and measures after construction is complete.

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.

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

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:

Brad Wuest
Print Name of Customer/Agent



Signature of Customer/Agent

7-31-12
Date

NATURAL BRIDGE CAVERNS

ATTACHMENT A – 20% OR LESS IMPERVIOUS COVER WAIVER

The tract is 450.078 acres; the proposed improvements add 4.89 acres impervious cover to the existing 7.65 acres impervious cover, giving a total of 12.54 acres. The percentage of proposed impervious cover is: (12.54 acres/450.078 acres) (100) = 2.78% and all improvements on site are less than 20%. As a small business, we hereby make a request to waive the requirements for other permanent BMPs and measures.

NATURAL BRIDGE CAVERNS

ATTACHMENT B - BMP's FOR UPGRADIENT STORMWATER

Permanent BMPs for upgradient stormwater are not required. Upgradient storm water that passes through the proposed improvements all emanates from the owner's property. Therefore, no BMPSs for diversion of this runoff need be employed.

NATURAL BRIDGE CAVERNS

ATTACHMENT C - BMP's FOR ON-SITE STORMWATER

The project site is essentially undeveloped ranch land with less than 8% impervious cover. Vegetative filter strips will prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated storm water runoff. The vegetative filter strips are adjacent and downstream of storm water runoff from existing improvements and adjacent and upstream of existing grassland. The existing native grassland should provide further mitigation to the storm water from the proposed 4.89 acres of improvements (concrete foundations, canvas roofs, ticket booth roof, queuing areas and sidewalks

NATURAL BRIDGE CAVERNS

ATTACHMENT D – BMPs FOR SURFACE STREAMS

The installation of temporary BMPs, the construction of proposed permanent BMPs (vegetative filter strips) and the maintenance of these facilities, as described in detail in this Water Pollution Abatement Plan, are the measures that are proposed to avoid and minimize surface stream contamination off-site. There are no running streams immediately adjacent to the owner's property and only dry creek beds on the site

NATURAL BRIDGE CAVERNS

ATTACHMENT F – CONSTRUCTION PLANS

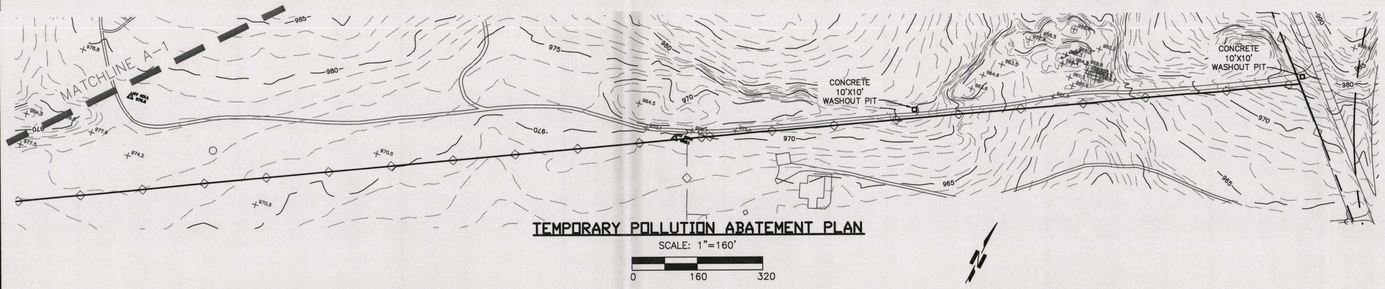
See the following sheets for Temporary Water Pollution Abatement Plan.



TEMPORARY POLLUTION ABATEMENT PLAN

SCALE: 1"=100'

0 100 200



TEMPORARY POLLUTION ABATEMENT PLAN

SCALE: 1"=160'

0 160 320

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
WATER POLLUTION ABATEMENT PLAN
GENERAL CONSTRUCTION NOTES

1. WRITTEN CONSTRUCTION NOTIFICATION MUST BE GIVEN THE APPROPRIATE TCEQ REGIONAL OFFICE NO LATER THAN 48 HOURS PRIOR TO COMMENCEMENT OF THE REGULATED ACTIVITY. INFORMATION MUST INCLUDE THE DATE ON WHICH THE REGULATED ACTIVITY WILL COMMENCE, THE NAME OF THE APPROVED PLAN FOR THE REGULATED ACTIVITY, AND THE NAME OF THE PRIME CONTRACTOR AND THE NAME AND TELEPHONE NUMBER OF THE CONTACT PERSON.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED WATER POLLUTION ABATEMENT PLAN AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITION OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON-SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.

3. IF ANY SENSITIVE FEATURE IS DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPROPRIATE TCEQ REGIONAL OFFICE MUST BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE TCEQ HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY.

4. NO TEMPORARY ABOVEGROUND HYDROCARBON AND HAZARDOUS SUBSTANCE STORAGE TANK SYSTEM IS INSTALLED WITHIN 150 FEET OF A DOMESTIC, INDUSTRIAL, IRRIGATION, OR PUBLIC WATER SUPPLY WELL, OR OTHER SENSITIVE FEATURE.

5. PRIOR TO COMMENCEMENT OF CONSTRUCTION, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY SELECTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS AND GOOD ENGINEERING PRACTICES. CONTROLS SPECIFIED IN THE TEMPORARY STORM WATER SECTION OF THE APPROVED EDWARDS AQUIFER PROTECTION PLAN ARE REQUIRED DURING CONSTRUCTION. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THE CONTROLS MUST REMAIN IN PLACE UNTIL DISTURBED AREAS ARE REVEGETATED AND THE AREAS HAVE BECOME PERMANENTLY STABILIZED.

6. 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).

7. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS NOT LATER THAN WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%. A PERMANENT STAKE MUST BE PROVIDED THAT CAN INDICATE WHEN THE SEDIMENT OCCUPIES 50% OF THE BASIN VOLUME.

8. 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).

9. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE MUST BE STORED ON-SITE WITH PROPER E&S CONTROLS. FOR STORAGE OR DISPOSAL OF SPOILS AT ANOTHER SITE ON THE EDWARDS AQUIFER RECHARGE ZONE, THE OWNER OF THE SITE MUST RECEIVE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN FOR THE PLACEMENT OF FILL MATERIAL OR MASS GRADING PRIOR TO THE PLACEMENT OF SPOILS AT THE OTHER SITE.

10. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARY OR PERMANENTLY CEASE IS PRECLUDED BY WEATHER CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 21 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE. IN AREAS EXPERIENCING DROUGHTS WHERE THE INITIATION OF STABILIZATION MEASURE BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY HAS TEMPORARILY OR PERMANENTLY CEASED IS PRECLUDED BY SEASONAL ARID CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE.

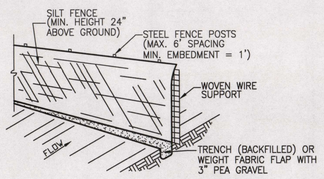
11. THE FOLLOWING RECORDS SHALL BE MAINTAINED AND MADE AVAILABLE TO THE TCEQ UPON REQUEST: THE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR; THE DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND THE DATES WHEN STABILIZATION MEASURES ARE INITIATED.

12. THE HOLDER OF ANY APPROVED EDWARD AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:

A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;
B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;
C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

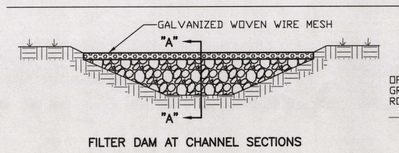
AUSTIN REGIONAL OFFICE 2800 S. IH 35, SUITE 100 AUSTIN, TEXAS 78704-5712 PHONE (512) 339-2929 FAX (512) 339-3795	SAN ANTONIO REGIONAL OFFICE 14250 JUDSON ROAD SAN ANTONIO, TEXAS 78233-4480 PHONE (210) 490-3096 FAX (210) 545-4329

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



STANDARD SILT FENCE
NOT TO SCALE

GENERAL NOTES
1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE, EMBEDDED MIN. 1-FOOT AND SPACED 6 FEET ON CENTER.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF THE FLOW.
3. THE TRENCH SHOULD BE A MINIMUM OF 6 INCHES DEEP AND A MINIMUM OF 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE TO BE LAID IN THE THE GROUND AND BACKFILLED, WHERE FENCE CANNOT BE TRENCHED IN (E.G., OUTCROP), WEIGHT FABRIC FLAP WITH 3 INCHES OF PEA GRAVEL UPHILL SIDE.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS, SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES AND DISPOSED OF IN AN APPROVED SPOIL SITE OR AS IN NO. 7 ABOVE.

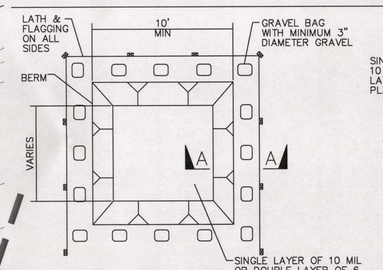


FILTER DAM AT CHANNEL SECTIONS

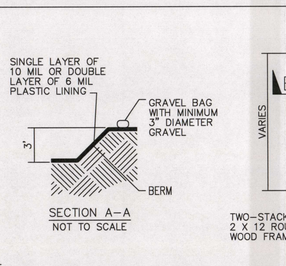
SECTION "A-A"

ROCK FILTER DAM
NOT TO SCALE

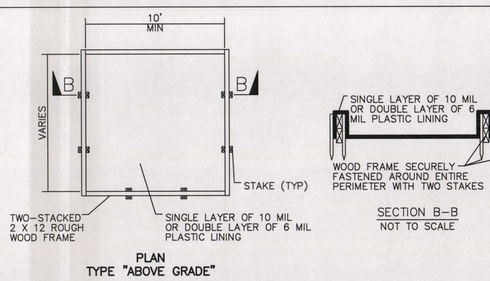
GENERAL NOTES:
1. MATERIALS (AGGREGATE, WIRE MESH, SANDBAGS, ETC.,) SHALL BE AS INDICATED BY THE SPECIFICATION FOR ROCK FILTER DAMS FOR EROSION AND SEDIMENTATION CONTROL. SIDE SLOPES SHOULD BE 2:1 OR FLATTER.
2. FILTER DAMS SHOULD BE EMBEDDED A MINIMUM OF 4" INTO
3. EXISTING GROUND. ROCK FILTER DAM SHALL BE SECURED WITH 20 GUAGE
4. GALVANIZED WOVEN WIRE MESH WITH 1" DIAMETER HEXAGON OPENINGS. THE AGGREGATE SHALL BE PLACED ON THE MESH TO THE HEIGHT AND SLOPE SPECIFIED. THE MESH SHALL BE FOLDED AT THE UPSTREAM SIDE OVER THE AGGREGATE AND TIGHTLY SECURED TO ITSELF ON THE DOWNSTREAM SIDE USING WIRE TIES OR HOG RINGS.



PLAN
TYPE "BELOW GRADE"



SECTION A-A
NOT TO SCALE

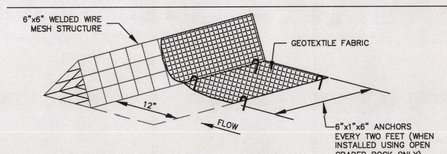


PLAN
TYPE "ABOVE GRADE"

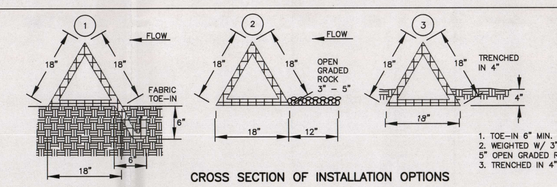
SECTION B-B
NOT TO SCALE

GENERAL NOTES
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. WASHOUT PIT CAPACITY SHALL BE A MINIMUM OF 6 CUBIC FEET PER 10 CUBIC YARDS OF CONCRETE PLACED.
3. CONCRETE WASHOUT SIGNAGE SHALL BE INSTALLED WITHIN 30 FEET OF THE TEMPORARY WASHOUT FACILITY.
4. WASHOUT PIT SHALL BE MAINTAINED BY THE CONTRACTOR DURING CONSTRUCTION TO AVOID RUNOFF, AND EXCESS CONCRETE SHALL BE REMOVED FOR RECYCLING.

CONCRETE WASHOUT PIT
NOT TO SCALE



ISOMETRIC PLAN VIEW



CROSS SECTION OF INSTALLATION OPTIONS

GENERAL NOTES:
1. SILT FENCE MATERIAL SHOULD BE POLYPROPYLENE, POLYETHYLENE OR POLYAMIDE WOVEN OR NONWOVEN FABRIC. THE FABRIC WIDTH SHOULD BE 36 INCHES, WITH A MINIMUM UNIT WEIGHT OF 4.5 OZ/YD, MULLEN BURST STRENGTH EXCEEDING 190 LB/IN², ULTRAVIOLET STABILITY EXCEEDING 70%, AND MINIMUM APPARENT OPENING SIZE OF U.S. SIEVE NO. 30.
2. THE DIKE STRUCTURE SHALL BE 6 GAUGE. 6" X 6" WIRE MESH FOLDED INTO TRIANGULAR FORM BEING 18" ON A SIDE.
3. THE FRAME SHALL BE 6" X 6" .6 GAUGE WIRE MESH, 18" PER SIDE. AND WRAPPED WITH GEOTEXTILE FABRIC THE SAME COMPOSITION AS THAT USED FOR THE SILT FENCE.
4. FILTER FABRIC SHOULD LAP OVER ENDS 6" TO COVER DIKE TO DIKE JUNCTION; EACH JUNCTION SHALL BE FASTENED WITH GALVANIZED SHOAT RINGS.
5. POSITION DIKE PARALLEL TO THE CONTOURS, WITH THE END OF EACH SECTION CLOSELY ABUTTING THE ADJACENT SECTIONS.
6. THE FABRIC SKIRT MAY BE TOED-IN WITH 6" OF COMPACTED MATERIAL, OR 12 INCHES OF THE FABRIC SKIRT SHOULD EXTEND UPHILL AND BE SECURED WITH A MINIMUM OF 3" OF OPEN GRADED ROCK, OR WITH STAPLES OR NAILS. IF THESE TWO OPTIONS ARE NOT FEASIBLE THE DIKE STRUCTURE MAY BE TRENCHED IN 4".
7. TRIANGULAR SEDIMENT FILTER DIKES SHOULD BE INSTALLED ACROSS EXPOSED SLOPES DURING CONSTRUCTION WITH ENDS OF THE DIKE TIED INTO EXISTING GRADES TO PREVENT FAILURE AND SHOULD INTERCEPT NO MORE THAN ONE ACRE OF RUNOFF.
8. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
9. INSPECT AND REALIGN DIKES AS NEEDED TO PREVENT GAPS BETWEEN SECTIONS.
10. ACCUMULATED SILT SHALL BE REMOVED AFTER EACH RAINFALL, AND DISPOSED OF IN A MANNER WHICH WILL NOT CAUSE ADDITIONAL SILTATION.
11. AFTER THE SITE IS COMPLETELY STABILIZED, THE DIKES AND ANY REMAINING SILT SHALL BE REMOVED.SILT SHOULD BE DISPOSED OF IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.

TRIANGULAR FILTER DIKE
NOT TO SCALE

SLAY ENGINEERING CO., INC.
CIVIL - SURVEYING - CONSULTING
123 ALTGELT AVE.
SAN ANTONIO, TEXAS 78201
TELEPHONE (210) 734-4388
TBPE FIRM REGISTRATION NUMBER: F1901

NATURAL BRIDGE CAVERNS
26495 NATURAL BRIDGE CAVERNS ROAD (FM 3009)
WUEST LEGACY PARTNERS,LTD./ WUEST MILLENNIUM PARTNERS, LTD.
SAN ANTONIO, TEXAS

TEMPORARY POLLUTION ABATEMENT PLAN

REVISIONS

NO.	REVISION

DESIGNED BY:	DRAWN BY:
A.B.W.	S.M.R.
CHECKED BY:	DATE:
M.M.S.	07/30/2012

JOB NO. 10-071

SHEET NO. 1 OF 1

NATURAL BRIDGE CAVERNS

ATTACHMENT I - MEASURES FOR MINIMIZING SURFACE STREAM CONTAMINATION

The installation of temporary BMPs, the construction of proposed permanent BMPs (vegetative filter strips) and the maintenance of these facilities, as described in detail in this Water Pollution Abatement Plan, are the measures that are proposed to avoid and minimize surface stream contamination off-site. There are no running streams immediately adjacent to the owner's property, only dry beds on the site.

TSS CALCULATIONS

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Natural Bridge Caverns
Date Prepared: 7/30/2012

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

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

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

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

County =	Comal	
Total project area included in plan * =	7.71	acres
Predevelopment impervious area within the limits of the plan * =	12.54	acres
Total post-development impervious area within the limits of the plan* =	4.89	acres
Total post-development impervious cover fraction * =	0.63	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	-6867	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 5

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

Drainage Basin/Outfall Area No. = 1

Total drainage basin/outfall area =	15.17	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious fraction within drainage basin/outfall area =	0.00	
$L_{M\ THIS\ BASIN}$ =	0	lbs.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

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Date Prepared: 7/30/2012

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
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P = Average annual precipitation, inches

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

County =	Comal	
Total project area included in plan * =	7.71	acres
Predevelopment impervious area within the limits of the plan * =	12.54	acres
Total post-development impervious area within the limits of the plan* =	4.89	acres
Total post-development impervious cover fraction * =	0.63	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	-6867	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 5

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

Drainage Basin/Outfall Area No. = 2

Total drainage basin/outfall area =	53.35	acres
Predevelopment impervious area within drainage basin/outfall area =	1.88	acres
Post-development impervious area within drainage basin/outfall area =	1.88	acres
Post-development impervious fraction within drainage basin/outfall area =	0.04	
$L_{M\ THIS\ BASIN}$ =	0	lbs.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Natural Bridge Caverns
Date Prepared: 7/30/2012

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
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where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

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

County =	**Comal**	
Total project area included in plan * =	**7.71**	acres
Predevelopment impervious area within the limits of the plan * =	**12.54**	acres
Total post-development impervious area within the limits of the plan* =	**4.89**	acres
Total post-development impervious cover fraction * =	**0.63**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**-6867**	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 5

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

Drainage Basin/Outfall Area No. = 3

Total drainage basin/outfall area =	**33.25**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.00**	
$L_{M\ THIS\ BASIN}$ =	**0**	lbs.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Natural Bridge Caverns
Date Prepared: 7/30/2012

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
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where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

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

County =	Comal	
Total project area included in plan * =	7.71	acres
Predevelopment impervious area within the limits of the plan * =	12.54	acres
Total post-development impervious area within the limits of the plan* =	4.89	acres
Total post-development impervious cover fraction * =	0.63	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	-6867	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 5

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

Drainage Basin/Outfall Area No. = 4

Total drainage basin/outfall area =	342.10	acres
Predevelopment impervious area within drainage basin/outfall area =	5.82	acres
Post-development impervious area within drainage basin/outfall area =	10.71	acres
Post-development impervious fraction within drainage basin/outfall area =	0.03	
$L_{M\ THIS\ BASIN}$ =	4389	lbs.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Natural Bridge Caverns
Date Prepared: 7/30/2012

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

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

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

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

County =	Comal	
Total project area included in plan * =	7.71	acres
Predevelopment impervious area within the limits of the plan * =	12.54	acres
Total post-development impervious area within the limits of the plan* =	4.89	acres
Total post-development impervious cover fraction * =	0.63	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	-6867	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 5

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

Drainage Basin/Outfall Area No. = 5

Total drainage basin/outfall area =	7.96	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious fraction within drainage basin/outfall area =	0.00	
$L_{M\ THIS\ BASIN}$ =	0	lbs.

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Form

NAME OF PROPOSED REGULATED ENTITY: Natural Bridge Caverns
REGULATED ENTITY LOCATION: 26495 Natural Bridge Caverns Rd., also called FM 3009
NAME OF CUSTOMER: Wuest Legacy Partners, Ltd./Wuest Millennium Partners, Ltd.

CONTACT PERSON: Brad Wuest (Please Print) PHONE: 210-651-6101

Customer Reference Number (if issued): CN_____ (nine digits)

Regulated Entity Reference Number (if issued): RN 106385081 (nine digits)

Austin Regional Office (3373) ☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362) ☐ Bexar ☒ Comal ☐ Medina ☐ Kinney ☐ Uvalde

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

☐ **Austin Regional Office**

☐ **Mailed to TCEQ**:
TCEQ – Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☒ **San Antonio Regional Office**

☐ **Overnight Delivery to TCEQ**:
TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
512/239-0347

Site Location (Check All That Apply): ☒ Recharge Zone ☐ Contributing Zone ☐ Transition Zone

Type of Plan	Size		Fee Due
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling		Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks		Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	450.078	Acres	$ 10,000
Sewage Collection System		L.F.	$
Lift Stations without sewer lines		Acres	$
Underground or Aboveground Storage Tank Facility		Tanks	$
Piping System(s)(only)		Each	$
Exception		Each	$
Extension of Time		Each	$

Signature

7-31-12
Date

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

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors

in their information corrected. To review such information, contact us at 512/239-3282.

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Schedule
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 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $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

Extension of Time Requests

PROJECT	FEE
Extension of Time Request	$150

APPLICATION FEE CHECK

STORMWATER CALCULATIONS

NATURAL BRIDGE CAVERNS

STORMWATER RUNOFF CALCULATIONS

Existing Conditions:

Natural Bridge Caverns consists of three tracts of land for a total of 450.078 acres and was divided up into five (5) drainage areas based upon the topography of the site. The total drainage area of 451.83 acres, includes an additional 1.75 acres from the shared entrance. Drainage area #1 is 15.17 acres of undeveloped ranch land along the east property line that sheet flows to the east. Drainage area #2 is 53.35 acres consisting of undeveloped ranch land and entry road that drains towards the southeast towards FM 3009 by way of a dry creek. Drainage area #3 is 33.25 acres consisting of undeveloped ranch land, a few structures and drains towards FM 3009 by way of a dry creek. Drainage area #4 is 342.10 acres consisting of undeveloped ranch land and the developed area of Natural Bridge Caverns; and is in the upper watershed of Bear Creek. Drainage area #5 is 7.96 acres of undeveloped ranch land along the south property line that sheet flows south.

Proposed Conditions:

The same five (5) watershed areas apply for the proposed conditions. The development is not altering any of the drainage boundaries or making improvements except to Watershed #4. No new impervious cover is being added to watersheds #1, 2, 3 and 5. Watershed # 4 impervious area will increase by 4.89 acres.

Total Drainage Area = 451.83 acres

Existing Conditions:

Existing Watershed #1 = 15.17 acres

Impervious cover = 0.0 acres

Pervious cover = 15.17 acres

Calculate Time of Concentration,

Tc: Long Flow Path = 400', Slope 0.05 ft/ft, C = 0.50 ranchland over 1% and rocky

Velocity, $v = 16.1345\ (s)^{1/2} = 16.1345 * (.05)^{1/2} = 3.61$ ft/sec

Initial Tc = 20 minutes

Final Tc = L/V = [400'/(3.61 ft/sec)] / (60 sec/min) = 2 min.

Total Tc = 20 + 2 = 22 minutes

Using TxDOT criteria, Intensity, I

- C = 0.5
- i2 = 3.70; Q2 = 28.06 CFS
- i5 = 4.77; Q5 = 36.18 CFS
- i10 = 5.50; Q10 = 41.75 CFS
- i25 = 6.33; Q25 = 48.02 CFS
- i50 = 6.92; Q50 = 52.51 CFS
- i100 = 7.89; Q100 = 59.86 CFS

Existing Watershed #2 = 53.35 acres

Impervious cover = 1.88 acres

Pervious cover = 51.47acres

Calculate Time of Concentration,

Tc: Long Flow Path = 2,200', Slope 0.048 ft/ft, C = 0.50 ranchland over 1% and rocky

Velocity, $v = 16.1345 (s)^{1/2} = 16.1345 * (.048)^{1/2} = 3.53$ ft/sec

Initial Tc = 20 minutes

Final Tc = L/V = [2,200'/(3.53 ft/sec)] / (60 sec/min) = 10.4 min.

Total Tc = 20 + 10.4 = 32.4 minutes

Using TxDOT criteria, Intensity, I

Weighted C = [(1.88/53.35)*0.95] + [(51.47/53.35)*0.5] = 0.516

- C = 0.516
- i2 = 2.92; Q2 = 80.69 CFS
- i5 = 3.80; Q5 = 104.48 CFS
- i10 = 4.39; Q10 = 120.77 CFS
- i25 = 5.06; Q25 = 139.29 CFS
- i50 = 5.55; Q50 = 152.90 CFS
- i100 = 6.31; Q100 = 173.82 CFS

Existing Watershed #3 = 33.25 acres

Impervious cover = 0.05 acres

Pervious cover = 33.20 acres

Calculate Time of Concentration,

Tc: Long Flow Path = 1,700', Slope 0.0587 ft/ft, C = 0.50 ranchland over 1% and rocky

Velocity, $v = 16.1345 (s)^{1/2} = 16.1345 * (.0587)^{1/2} = 3.91$ ft/sec

Initial Tc = 20 minutes

Final Tc = L/V = [1,700'/(3.91 ft/sec)] / (60 sec/min) = 7.25 min.

Total Tc = 20 + 7.25 = 27.25 minutes

Using TxDOT criteria, Intensity, I

Weighted C = [(0.05/33.25)*0.95] + [(3.20/33.25)*0.5] = 0.50

- C = 0.50
- i2 = 3.26; Q2 = 54.20 CFS
- i5 = 4.21; Q5 = 70.07 CFS
- i10 = 4.87; Q10 = 80.93 CFS
- i25 = 5.61; Q25 = 93.23 CFS
- i50 =6.14; Q50 = 102.16 CFS
- i100 = 6.99; Q100 = 116.28 CFS

Existing Watershed #4 = 342.10 acres

Impervious cover = 5.82 acres

Pervious cover = 336.28 acres

Calculate Time of Concentration,

Tc: Flow Path Reach 1(1,400') + Reach 2 (4,310')

Reach 1 = 1,400', Slope 0.05 ft/ft, C = 0.50 ranchland over 1% and rocky

Velocity, $v = 16.1345 (s)^{1/2} = 16.1345 * (.05)^{1/2} = 3.6$ ft/sec.

Tc1 = L/V = [1,400'/(3.6 ft/sec)] / (60 sec/min) = 6.5 min

Reach 2 = 4,310', Slope 0.018 ft/ft, C = 0.50 ranchland over 1% and rocky

Velocity, $v = 16.1345 (s)^{1/2} = 16.1345 * (.018)^{1/2} = 2.16$ ft/sec.

Tc2 = = L/V = [4,310'/(2.16 ft/sec)] / (60 sec/min) = 33.3 min

Initial Tc = 20 minutes

Total Tc = 20 + 6.5 + 33.3 = 59.8 minutes

Using TxDOT criteria, Intensity, I

Weighted C = [(5.82/342.10)*0.95] + [(336.28/342.10)*0.5] = 0.5085

- C = 0.5085
- i2 = 1.94; Q2 = 337.48 CFS
- i5 = 2.54; Q5 = 442.70 CFS
- i10 = 2.95; Q10 = 513.30 CFS
- i25 = 3.42; Q25 = 594.72CFS
- i50 = 3.78; Q50 = 657.19 CFS
- i100 = 4.28; Q100 = 744.09 CFS

Existing Watershed #5 = 7.96 acres

Impervious cover = 0.0 acres

Pervious cover = 7.96 acres

Calculate Time of Concentration,

Tc: Long Flow Path = 1,100', Slope 0.060 ft/ft, C = 0.50 ranchland over 1% and rocky

Velocity, $v = 16.1345 (s)^{1/2} = 16.1345 * (.06)^{1/2} = 3.95$ ft/sec

Initial Tc = 20 minutes

Final Tc = L/V = [1,100'/(3.95 ft/sec)] / (60 sec/min) = 4.64 min.

Total Tc = 20 + 4.64 = 24.64 minutes

Using TxDOT criteria, Intensity, I

- C = 0.50
- i2 = 3.46; Q2 = 13.77 CFS
- i5 = 4.47; Q5 = 18.15 CFS
- i10 = 5.16; Q10 = 20.96 CFS
- i25 = 5.94; Q25 = 24.12 CFS
- i50 = 6.50; Q50 = 26.41CFS
- i100 = 7.41; Q100 = 30.08 CFS

Proposed Conditions:

After construction, the runoff coefficient and stormwater runoff is estimated to be:

Proposed Watershed #4 = 342.10 acres

Impervious cover = 10.71 acres

Pervious cover = 331.15 acres

Calculated Time of Concentration,

Total Tc = 20 + 6.5 + 33.3 = 59.8 minutes

Using TxDOT criteria, Intensity, I

Weighted C = [(10.71/342.10)*0.95] + [(331.39)/342.10)*0.5] = 0.5157

- C = 0.5157
- i2 = 1.94; Q2 = 342.25 CFS
- i5 = 2.54; Q5 = 448.97 CFS
- i10 = 2.95; Q10 = 520.57 CFS
- i25 = 3.42; Q25 = 603.14 CFS
- i50 = 3.78; Q50 = 666.49 CFS
- i100 = 4.28; Q100 = 754.62 CFS

Conclusion: The 4.89 acres of additional impervious area in the 342.10 Drainage Area 4 is fairly insignificant; an increase of 10.53 cfs for the 100-year event, or 1.40 %.

Rainfall Intensity-Duration-Frequency Coefficients for Texas Counties

1. Select your county. 2. Enter the time of concentration

County	Coefficient	2-year	5-year	10-year	25-year	50-year	100-year
Comal	e (in)	0.796	0.781	0.775	0.766	0.753	0.758
Childress 46 37	b	56	69	78	87	91	105
Clay	d (mins)	8.4	8.6	8.6	8.6	8.6	8.4
Cochran	Intensity (in/hr)*	1.94	2.54	2.95	3.42	3.78	4.28
Coke							
Coleman							
Collin							
Collingsworth							
Colorado							
Comal							

Coefficient	2-year	5-year	10-year	25-year	50-year	100-year
e (mm)	0.796	0.781	0.775	0.766	0.753	0.758
b	1422	1753	1981	2210	2311	2667
d (mins)	8.4	8.6	8.6	8.6	8.6	8.4
Intensity (mm/hr)*	49.35	64.64	74.95	86.84	95.96	108.65

* for time of Concentration = **59.8** mins

c = 0.5157
A = 342.1

Q_5 = 448.97
Q_{10} = 520.57
Q_{25} = 603.14
Q_{50} = 666.49
Q_{100} = 754.62

Rainfall Intensity-Duration-Frequency Coefficients for Texas Counties

1. Select your county. 2. Enter the time of concentration

County	Coefficient	2-year	5-year	10-year	25-year	50-year	100-year
Comal	e (in)	0.796	0.781	0.775	0.766	0.753	0.758
Childress 46 37	b	56	69	78	87	91	105
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Cochran	Intensity (in/hr)*	1.94	2.54	2.95	3.42	3.78	4.28
Coke							
Coleman	Coefficient	2-year	5-year	10-year	25-year	50-year	100-year
Collin	e (mm)	0.796	0.781	0.775	0.766	0.753	0.758
Collingsworth	b	1422	1753	1981	2210	2311	2667
Colorado	d (mins)	8.4	8.6	8.6	8.6	8.6	8.4
Comal	Intensity (mm/hr)*	49.35	64.64	74.95	86.84	95.96	108.65

* for time of Concentration = **59.8** mins

c = 0.5085
A = 342.1

Q_5 = 442.70
Q_{10} = 513.30
Q_{25} = 594.72
Q_{50} = 657.19
Q_{100} = 744.09

Authorization of Managers of Wuest Capital Management, LLC to Sign Documents on Behalf of Wuest Millennium Partners, Ltd.

Authorization of Managers of Wuest Capital Management, LLC.
To Sign Documents on Behalf of Wuest Millennium Partners, Ltd.

IT IS HEREBY CONFIRMED THAT:

1. The three managers of Wuest Capital Management, LLC, General Partner of Wuest Millennium Partners, Ltd, are Joye E. Wuest, Brad W. Wuest and Travis R. Wuest.
2. Any or all of the three managers are authorized to sign documents on behalf of Wuest Millennium Partners, Ltd.
3. This authority has been effective since May 23, 2005, and remains in effect until otherwise ordered by the Managers of Wuest Capital Management, LLC, General Partner of Wuest Millennium Partners, Ltd.

Wuest Capital Management, LLC

By: Joye E. Wuest Date: 3/21/2012
Joye E. Wuest, Manager

By: Brad W. Wuest Date: 3-21-2012
Brad W. Wuest, Manager

By: Travis R. Wuest Date: 3/21/2012
Travis R. Wuest, Manager

FILED
In the Office of the
Secretary of State of Texas
MAY 23 2005
Corporations Section

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF LIMITED PARTNERSHIP OF WUEST MILLENNIUM PARTNERS, LTD.

This Certificate of Amendment is filed by the general partner of Wuest Millennium Partners, Ltd. (the "Partnership") to amend the original Certificate of Limited Partnership of Wuest Millennium Partners, Ltd. filed on June 25, 1999 (the "Original Certificate").

1. The general partner of the Partnership named in the Original Certificate was Wuest Capital Management Trust.

2. The Original Certificate is hereby amended as follows:

   Wuest Capital Management Trust is no longer the general partner of the Partnership. Wuest Capital Management Trust has been replaced as such by Wuest Capital Management, L.L.C., whose address is 26495 Natural Bridge Caverns Rd., Natural Bridge Caverns, Texas 78266.

EXECUTED this 18th day of May, 2005, to be effective when accepted for filing by the Secretary of State of Texas.

WUEST CAPITAL MANAGEMENT, L.L.C.

By: Joye E. Wuest, Manager
Joye E. Wuest, Manager

By: Brad Wuest
Brad W. Wuest, Manager

By: Travis Wuest
Travis R. Wuest, Manager

AMENDED AND RESTATED

LIMITED PARTNERSHIP AGREEMENT

OF

WUEST MILLENNIUM PARTNERS, LTD.

Effective Date: May 23, 2005

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operate, lease, mortgage, pledge, sell, or otherwise dispose of farming and ranching properties, services, and products; and to form corporations, partnerships, and other business enterprises as may be desirable in making any such investments, and to do any and all things necessary or incident to such ventures; and

(o) to engage generally in the oil, gas, and mineral business and any related service or equipment business, including the transportation of oil, gas, and minerals by truck, train, pipeline, ship, barge, or otherwise; to acquire, hold, develop, and operate properties and services in the field of oil, gas, and minerals and the transportation of oil, gas, and minerals, either as operator, managing agent, principal, agent, partner, stockholder, associate, joint venturer, participant, or otherwise; to invest funds and to raise funds to be invested in such ventures; to purchase, perform services, acquire, own, develop, operate, lease, mortgage, pledge, sell, or otherwise dispose of oil, gas, and mineral properties and related transportation properties, services, and products; and to form corporations, partnerships, and other business enterprises as may be desirable in making any such investments, and to do any and all things necessary or incident to such ventures.

ARTICLE III

Management

3.01 Powers of Management. The Powers of Management include all powers to take any action or no action in managing the Partnership's business and affairs as may be necessary or appropriate to achieve the Partnership's purposes, including the power:

(a) to purchase or otherwise acquire, construct, deal in, sell, lease, or otherwise dispose of full or fractional interests in real property, depreciable property, or personal property of any kind, including buildings, machinery, equipment, or otherwise; to sell, assign, transfer, convey, lease, loan, exchange, or otherwise dispose of all or any part of the Partnership Assets;

(b) to invest or otherwise participate in other partnerships, corporations or other entities;

(c) to provide or contract for services of any kind; to make, enter into, deliver and perform contracts, agreements, and other undertakings; to contract for the services of accountants, lawyers, investment managers, appraisers, contractors, or other service providers and to delegate powers to any such person, whether ministerial or discretionary; to retain or employ employees; to appoint any individual as an officer of the Partnership; and to delegate to any such officers or employees any of the Powers of Management;

(d) to lend money with or without security to any person, including any Partner or any Partner's Affiliate, on any terms determined to be appropriate;

(e) without limitation as to amount or terms, to borrow and raise moneys, to issue, accept, endorse, and execute promissory notes, drafts, bills of exchange, warrants, bonds, debentures, and other negotiable or nonnegotiable instruments and evidences of indebtedness, and to secure the payment of any such indebtedness and any interest in any such indebtedness by mortgage, pledge, transfer, or assignment in trust of all or any part of the Partnership Assets, whether owned at the time of any such transactions or acquired thereafter, and to sell, pledge, or otherwise dispose of any such obligations of the Partnership;

(f) to guarantee any financial transaction of any kind with or without charging a fee therefor;

(g) to establish trusts for the benefit of the Partnership and to assign and convey all or any part of the Partnership Assets into such trusts on any terms deemed appropriate by the Partnership Management;

(h) to have and maintain one or more offices and to rent or acquire office space, engage personnel, purchase equipment and supplies, and do anything else that may be appropriate in connection with the maintenance of offices;

(i) to buy or hold insurance of any kind;

(j) to pay any expenses related to any of the Partnership's businesses or affairs;

(k) to compromise claims against the Partnership;

(l) to establish bank accounts and other similar accounts for the Partnership; to make or delegate the authority to make withdrawals from such accounts by check or electronic transfer in the name of the Partnership; and

(m) to acquire real and personal property, arrange financing, enter into contracts and complete any other arrangements on behalf of the Partnership, either in the name of the Partnership, in the name of any General Partner having the authority to exercise the Powers of Management or in the name of a nominee, without having to disclose the existence of the Partnership.

3.02 Authority to Exercise Powers of Management. Except with respect to a Partner's approval rights pertaining to Major Decisions as provided in Section 3.10, the Powers of Management shall be exercised only by those General Partners granted the authority to exercise the Powers of Management by this Section, which General Partners shall comprise the Partnership Management. Any exercise of the Powers of Management in accordance with the provisions of this Section shall be binding on the Partnership.

(a) Managing Partner. Whenever there is a Managing Partner, the Powers of Management shall be exercised only by the Managing Partner. Whenever there is more than one General Partner serving jointly as Managing Partner, any action of the Managing Partner shall require unanimous consent of

the General Partners then serving jointly as Managing Partner, if two General Partners are then serving as such, or majority consent of the General Partners then serving jointly as Managing Partner, if more than two General Partners are then serving as such (such majority to be determined by reference to the number of General Partners then serving jointly as Managing Partner, without regard to their Percentage Interests), unless expressly provided otherwise in a written resolution executed by each General Partner then serving as a Managing Partner.

(b) No Managing Partner. Whenever there is no Managing Partner, the Powers of Management shall be exercised only by majority consent of the General Partners on the basis of their Percentage Interests. In that instance, the General Partners shall receive fair and reasonable compensation for any services performed on behalf of the Partnership and shall be entitled to receive reimbursement for any expenses incurred in the performance of the General Partners' duties under this Agreement.

(c) Exception for Life Insurance. Any decision on behalf of the Partnership to acquire a life insurance policy that insures the life of any Partner shall be made on behalf of the Partnership only by majority consent of the General Partners, excluding the Partner to be insured, on the basis of their Percentage Interests. At any time during which the Partnership owns any life insurance policy insuring the life of any Partner or otherwise possesses any of the incidents of ownership with respect to any such policy, as the term "incidents of ownership" is defined for purposes of Section 2042 of the Code, the insured Partner shall have no right or power to exercise any Powers of Management with respect to any incidents of ownership of the policy, including the right to borrow from the insurance company or any other person using the policy as collateral, to change or prevent any change in the beneficiary designation under the policy, to surrender the policy or any portion of the policy for its cash surrender value, and to cancel or terminate the policy; instead, the Powers of Management with respect to the policy shall be exercised only by majority consent of the General Partners, excluding the insured Partner, on the basis of their Percentage Interests.

(d) No Authority Given to Limited Partners. Other than with respect to a Limited Partner's approval rights pertaining to Major Decisions as provided in Section 3.10, no Limited Partner shall have any authority to exercise any Powers of Management.

3.03 Managing Partner. The Managing Partner shall serve only as provided in this Section.

(a) Appointment. Initially, there shall be no Managing Partner. However, at any time there is no General Partner serving as Managing Partner, then by majority consent of the General Partners on the basis of their Percentage Interests, the General Partners may appoint one or more of the General Partners to serve as Managing Partner.

(b) Resignation. Any General Partner may resign from that General Partner's position as Managing Partner at any time with or without cause by providing written notice to all of the other Partners.

(c) Removal. Any General Partner may be removed from that General Partner's position as Managing Partner by majority consent of the General Partners on the basis of their Percentage Interests.

(d) Compensation and Reimbursement. Any Managing Partner shall receive fair and reasonable compensation for any services performed on behalf of the Partnership and shall be entitled to receive reimbursement for any expenses incurred in the performance of the Managing Partner's duties under this Agreement.

3.04 Reliance by Third Parties on General Partners. The Partnership shall be liable for any transaction with any third party who relies on the authority of any General Partner within the Partnership Management if that General Partner communicates to the third party that the actions taken by the General Partner are taken on behalf of the Partnership, and the third party shall not be deemed to have any duty to determine whether the General Partner has the authority to take the action even if it appears to be prohibited by this Agreement; provided that whenever there is a Managing Partner, any action taken by any person other than the Managing Partner that has not been delegated by the Managing Partner to the person, even if the action is stated to be taken on behalf of the Partnership, shall not be binding on the Partnership. This Section shall not affect the liability of any General Partner to the Partnership or the other Partners for any conduct that violates other provisions of this Agreement.

3.05 Delegation by General Partners. Any General Partner may delegate any obligation or power under this Agreement to any employee of the Partnership and may utilize a power of attorney to delegate any obligation or power under this Agreement to an agent, attorney, or attorney-in-fact. To the extent provided by a General Partner in a power of attorney, the General Partner's agent, attorney, or attorney-in-fact shall have complete authority to exercise every power granted to the General Partner by this Agreement and to fulfill every obligation that is required of the General Partner under this Agreement.

3.06 Time and Effort Required of General Partners. The General Partners shall devote an amount of time and effort to the Partnership that is consistent with the duty of care imposed by Section 3.07(d); provided that nothing in this Agreement shall be deemed to restrict the freedom of any General Partner to conduct any business activity separate and apart from the Partnership other than the duty of loyalty imposed by Section 3.07(c).

3.07 Duties of General Partners; Limitations.

(a) Funds Available. Except as provided in Section 10.08(b) with respect to the restoration of Capital Account deficits, any obligation of a General Partner under this Agreement or by operation of law shall be performable only to the extent that the Partnership has funds available therefor, and no General Partner shall be liable personally with respect to any such obligation.

(b) No Guarantees. The General Partners do not guarantee the return of any Partner's capital contributions nor do they guarantee any allocations of Profits or Losses nor any distributions of Distributable Cash to any Partner or Assignee.

(c) Duty of Loyalty. In exercising the powers granted by this Agreement and in performing the duties required by this Agreement, each General Partner has a duty (i) to account to the Partnership and to hold for the Partnership any property, profit or benefit derived by the General Partner in conducting and winding up the Partnership's business and affairs or from the General Partner's use of any of the Partnership Assets, (ii) to refrain from dealing with the Partnership on behalf of a party having an interest adverse to the Partnership, and (iii) to refrain from competing with the Partnership or dealing with the Partnership in a manner adverse to the Partnership. Consistent with this duty, any General Partner or any General Partner's Affiliate may own, operate, or invest in any property or business venture that is not owned or operated by the Partnership without providing notice to the Partnership, the other Partners, or any Assignees and without allowing the participation of the Partnership, the other Partners, or any Assignees, such that neither the Partnership nor any Partner or Assignee shall have any rights with respect to any such properties or business ventures nor any claims with respect to their effect on the Partnership. Also consistent with this duty, any General Partner or any General Partner's Affiliate may transact business of any kind with the Partnership and any of the Partners or Assignees. This subsection is intended to impose on the General Partners the duty of loyalty imposed by Section 4.04 of the Texas Revised Partnership Act without modification.

(d) Duty of Care; Business Judgment Rule. In exercising the powers granted by this Agreement and in performing the duties required by this Agreement, each General Partner has a duty to act in good faith with the reasonable belief that the General Partner's actions are in the Partnership's best interests; provided that an error in judgment by itself shall not constitute a violation of this duty. Consistent with this duty, each General Partner may act without liability to the Partnership, the other Partners or any Assignee in reliance upon any written instrument that is reasonably believed by the General Partner to be genuine and to have been signed or presented by the proper parties. Also consistent with this duty, each General Partner may act or refrain from acting without liability to the Partnership, the other Partners or any Assignee in reliance upon any opinion of any consultant or adviser with respect to matters that the General Partner reasonably believes to be within the consultant's or adviser's professional competence. This subsection is intended to impose on the General Partners the duty of care imposed by Section 4.04 of the Texas Revised Partnership Act without modification.

Authorization of Managers of Wuest Capital Management, LLC to Sign Documents on Behalf of Wuest Legacy Partners, Ltd.

Authorization of Managers of Wuest Capital Management, LLC.
To Sign Documents on Behalf of Wuest Legacy Partners, Ltd.

IT IS HEREBY CONFIRMED THAT:

1. The three managers of Wuest Capital Management, LLC, General Partner of Wuest Legacy Partners, Ltd, are Joye E. Wuest, Brad W. Wuest and Travis R. Wuest.
2. Any or all of the three managers are authorized to sign documents on behalf of Wuest Legacy Partners, Ltd.
3. This authority has been effective since May 18, 2005, and remains in effect until otherwise ordered by the Managers of Wuest Capital Management, LLC, General Partner of Wuest Legacy Partners, Ltd.

Wuest Capital Management, LLC

By: Joye E. Wuest Date: 3/21/2012
Joye E. Wuest, Manager

By: Brad Wuest Date: 3-21-2012
Brad W. Wuest, Manager

By: Date: 3/21/2012
Travis R. Wuest, Manager

ARTICLES OF ORGANIZATION
OF
WUEST CAPITAL MANAGEMENT, L.L.C.

I, the undersigned, a natural person of the age of eighteen years or more, acting as organizer of a limited liability company under the Texas Limited Liability Company Act (the "Act"), do hereby adopt the following Articles of Organization therefor:

ARTICLE I

The name of the limited liability company is Wuest Capital Management, L.L.C. (the "Company").

ARTICLE II

The Company shall continue in existence until the earlier to occur of December 31, 2052, or the dissolution or termination of the Company in accordance with its regulations as adopted and amended from time to time in accordance with the Act.

ARTICLE III

The purpose of the Company includes the transaction of any or all lawful business for which limited liability companies may be organized under the Act, except that it shall not engage in the business of banking or insurance.

ARTICLE IV

The address of the Company's initial registered office is 26495 Natural Bridge Caverns Rd., Natural Bridge Caverns, Texas 78266, and the name of the Company's initial registered agent at such address is Brad W. Wuest.

ARTICLE V

The Company initially shall have three managers. The names of the managers are Joye E. Wuest, Brad W. Wuest, and Travis R. Wuest, and their mailing and street address is 26495 Natural Bridge Caverns Rd., Natural Bridge Caverns, Texas 78266.

ARTICLE VI

The name and address of the organizer is Brad W. Wuest, 26495 Natural Bridge Caverns Rd., Natural Bridge Caverns, Texas 78266.

EXECUTED this 18th day of May, 2005.

Brad W. Wuest, Organizer

REGULATIONS

OF

WUEST CAPITAL MANAGEMENT, L.L.C.

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ARTICLE VII

RIGHTS AND DUTIES OF MANAGERS

7.1 *Management.* The powers of the Company shall be exercised by or under the authority of, and the business and affairs of the Company shall be managed under, its Managers. In addition to the powers and authorities expressly conferred by these Regulations upon the Managers, the Managers may exercise all such powers of the Company and do all such lawful acts and things as are not directed or required to be exercised or done by the Members by the Act or these Regulations.

7.2 *Number and Qualifications.* The number of Managers of the Company initially shall be three. Managers need not be residents of the State of Texas or Members of the Company. The Managers, in their discretion, may elect a chairman of the Managers who shall preside at meetings of the Managers.

7.3 *Powers of the Managers.* Without limiting the generality of Section 7.1, but subject to the limitations of Section 6.11, the Managers shall have power and authority, acting in concert in accordance with these Regulations, to cause the Company to take any of the following actions:

(a) To acquire property in the name of the Company from any Person;

(b) To incur debt or liabilities on behalf of the Company;

(c) To purchase liability and other insurance to protect the Company's property and business;

(d) To hold and own any Company real and/or personal properties, foreign or domestic, in the name of the Company;

(e) To invest any Company funds temporarily (by way of example but not limitation) in time deposits, short-term governmental obligations, commercial paper, or other investments;

(f) To sell or otherwise dispose of the assets of the Company;

(g) To execute on behalf of the Company instruments and documents, including, without limitation, checks, drafts, notes, and other negotiable instruments, mortgages, or deeds of trust, security agreements, financing statements, documents providing for the acquisition, mortgage, or disposition of the Company's property, assignments, bills of sale, leases, partnership agreements, and other instruments or documents necessary to the business of the Company;

(h) To employ accountants, legal counsel, managing agents, or other experts to perform services for the Company and to compensate them from Company funds;

(i) To enter into any and all other agreements on behalf of the Company, with any other Person for any purpose, in such forms as the Managers may approve;

(j) To form or invest in any Entity, to conduct the business of the Company, or for any other purpose; and

(k) To do and perform all other acts as may be necessary or appropriate to the conduct of the Company's business.

Unless authorized to do so by these Regulations or by the Managers of the Company, no Member, agent, or employee of the Company shall have any power or authority to bind the Company in any way, to pledge its credit, or to render it liable pecuniarily for any purpose. No debt may be contracted or liability incurred by or on behalf of the Company except upon the approval of the Managers as provided in these Regulations.

7.4 *Initial Managers.* The initial Managers shall be Joye E. Wuest, Brad W. Wuest, and Travis R. Wuest.

7.5 *Election.* At any special meeting of the Members, the Members may elect the Managers to hold office until the next succeeding special meeting. Unless removed in accordance with these Regulations, each Manager shall hold office for the term for which he is elected and until his successor shall be elected and qualified.

7.6 *Vacancy; Removal.* Any vacancy occurring by reason of death, resignation, or removal of a Manager may be filled at a special meeting called for such purpose. A Manager elected to fill such vacancy shall be elected for the unexpired term of the predecessor in office. A Manager may be removed at any time, with or without cause, by a majority vote of the Members on the basis of their Capital Percentages.

7.7 *Place of Meetings.* All meetings of the Managers of the Company or committees thereof may be held either within or without the State of Texas. Any Manager may participate in a meeting by means of conference telephone or similar equipment, and participation by such means shall constitute presence in person at the meeting.

7.8 *Meetings of Managers.* A meeting of Managers shall be held, without further notice, immediately following any special meeting of Members, and at the same place, or at such other time and place as shall be fixed with the consent in writing of all of the Managers.

7.9 *Regular Meetings of Managers.* Regular meetings of the Managers may be held without notice at such time and place, either within or without the State of Texas, as shall from time to time be determined by the Managers.

7.10 *Special Meetings of Managers.* Special meetings of the Managers may be called by any Manager on two days' notice to each Manager, either personally or by mail, telephone, telegram, or electronic mail transmission.

Corporations Section
P.O.Box 13697
Austin, Texas 78711-3697

Roger Williams
Secretary of State

Office of the Secretary of State

CERTIFICATE OF FILING
OF

WUEST LEGACY PARTNERS, LTD.
14355410

The undersigned, as Secretary of State of Texas, hereby certifies that an amendment to the certificate of limited partnership or the application for registration as a foreign limited partnership for the above named limited partnership has been received in this office and filed as provided by law on the date shown below.

Accordingly, the undersigned, as Secretary of State hereby issues this Certificate evidencing the filing in this office.

Dated: 05/23/2005
Effective: 05/23/2005

Roger Williams
Secretary of State

Phone: (512) 463-5555
Prepared by: Michelle Morin

Come visit us on the internet at http://www.sos.state.tx.us/
Fax: (512) 463-5709

TTY: 7-1-1
Document: 91231650002

FILED
In the Office of the
Secretary of State of Texas
MAY 23 2005
Corporations Section

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF LIMITED PARTNERSHIP OF WUEST LEGACY PARTNERS, LTD.

This Certificate of Amendment is filed by the general partner of Wuest Legacy Partners, Ltd. (the "Partnership") to amend the original Certificate of Limited Partnership of Wuest Legacy Partners, Ltd. filed on December 19, 2000 (the "Original Certificate").

1. The general partner of the Partnership named in the Original Certificate was Wuest Capital Management Trust.

2. The Original Certificate is hereby amended as follows:

   Wuest Capital Management Trust is no longer the general partner of the Partnership. Wuest Capital Management Trust has been replaced as such by Wuest Capital Management, L.L.C., whose address is 26495 Natural Bridge Caverns Rd., Natural Bridge Caverns, Texas 78266.

EXECUTED this 18th day of May, 2005, to be effective when accepted for filing by the Secretary of State of Texas.

WUEST CAPITAL MANAGEMENT, L.L.C.

By: Joye E. Wuest, Manager
Joye E. Wuest, Manager

By: Brad Wuest
Brad W. Wuest, Manager

By: Travis Wuest
Travis R. Wuest, Manager

AMENDED AND RESTATED

LIMITED PARTNERSHIP AGREEMENT

OF

WUEST LEGACY PARTNERS, LTD.

Effective Date: May 23, 2005

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agent, principal, agent, partner, stockholder, associate, joint venturer, participant, or otherwise; to invest funds and to raise funds to be invested in such ventures; to purchase, perform services, acquire, own, develop, operate, lease, mortgage, pledge, sell, or otherwise dispose of oil, gas, and mineral properties and related transportation properties; services, and products; and to form corporations, partnerships, and other business enterprises as may be desirable in making any such investments, and to do any and all things necessary or incident to such ventures.

ARTICLE III

Management

3.01 Powers of Management. The Powers of Management include all powers to take any action or no action in managing the Partnership's business and affairs as may be necessary or appropriate to achieve the Partnership's purposes, including the power:

(a) to purchase or otherwise acquire, construct, deal in, sell, lease, or otherwise dispose of full or fractional interests in real property, depreciable property, or personal property of any kind, including buildings, machinery, equipment, or otherwise; to sell, assign, transfer, convey, lease, loan, exchange, or otherwise dispose of all or any part of the Partnership Assets;

(b) to invest or otherwise participate in other partnerships, corporations or other entities;

(c) to provide or contract for services of any kind; to make, enter into, deliver and perform contracts, agreements, and other undertakings; to contract for the services of accountants, lawyers, investment managers, appraisers, contractors, or other service providers and to delegate powers to any such person, whether ministerial or discretionary; to retain or employ employees; to appoint any individual as an officer of the Partnership; and to delegate to any such officers or employees any of the Powers of Management;

(d) to lend money with or without security to any person, including any Partner or any Partner's Affiliate, on any terms determined to be appropriate;

(e) without limitation as to amount or terms, to borrow and raise moneys, to issue, accept, endorse, and execute promissory notes, drafts, bills of exchange, warrants, bonds, debentures, and other negotiable or nonnegotiable instruments and evidences of indebtedness, and to secure the payment of any such indebtedness and any interest in any such indebtedness by mortgage, pledge, transfer, or assignment in trust of all or any part of the Partnership Assets, whether owned at the time of any such transactions or acquired thereafter, and to sell, pledge, or otherwise dispose of any such obligations of the Partnership;

(f) to guarantee any financial transaction of any kind with or without charging a fee therefor;

(g) to establish trusts for the benefit of the Partnership and to assign and convey all or any part of the Partnership Assets into such trusts on any terms deemed appropriate by the Partnership Management;

(h) to have and maintain one or more offices and to rent or acquire office space, engage personnel, purchase equipment and supplies, and do anything else that may be appropriate in connection with the maintenance of offices;

(i) to buy or hold insurance of any kind;

(j) to pay any expenses related to any of the Partnership's businesses or affairs;

(k) to compromise claims against the Partnership;

(l) to establish bank accounts and other similar accounts for the Partnership; to make or delegate the authority to make withdrawals from such accounts by check or electronic transfer in the name of the Partnership; and

(m) to acquire real and personal property, arrange financing, enter into contracts and complete any other arrangements on behalf of the Partnership, either in the name of the Partnership, in the name of any General Partner having the authority to exercise the Powers of Management or in the name of a nominee, without having to disclose the existence of the Partnership.

3.02 Authority to Exercise Powers of Management. Except with respect to a Partner's approval rights pertaining to Major Decisions as provided in Section 3.10, the Powers of Management shall be exercised only by those General Partners granted the authority to exercise the Powers of Management by this Section, which General Partners shall comprise the Partnership Management. Any exercise of the Powers of Management in accordance with the provisions of this Section shall be binding on the Partnership.

(a) Managing Partner. Whenever there is a Managing Partner, the Powers of Management shall be exercised only by the Managing Partner. Whenever there is more than one General Partner serving jointly as Managing Partner, any action of the Managing Partner shall require unanimous consent of the General Partners then serving jointly as Managing Partner, if two General Partners are then serving as such, or majority consent of the General Partners then serving jointly as Managing Partner, if more than two General Partners are then serving as such (such majority to be determined by reference to the number of General Partners then serving jointly as Managing Partner, without regard to their Percentage Interests), unless expressly provided otherwise in a written resolution executed by each General Partner then serving as a Managing Partner.

(b) No Managing Partner. Whenever there is no Managing Partner, the Powers of Management shall be exercised only by majority consent of the General Partners on the basis of their Percentage Interests. In that instance, the General Partners shall receive fair and reasonable compensation for any services

performed on behalf of the Partnership and shall be entitled to receive reimbursement for any expenses incurred in the performance of the General Partners' duties under this Agreement.

(c) Exception for Life Insurance. Any decision on behalf of the Partnership to acquire a life insurance policy that insures the life of any Partner shall be made on behalf of the Partnership only by majority consent of the General Partners, excluding the Partner to be insured, on the basis of their Percentage Interests. At any time during which the Partnership owns any life insurance policy insuring the life of any Partner or otherwise possesses any of the incidents of ownership with respect to any such policy, as the term "incidents of ownership" is defined for purposes of Section 2042 of the Code, the insured Partner shall have no right or power to exercise any Powers of Management with respect to any incidents of ownership of the policy, including the right to borrow from the insurance company or any other person using the policy as collateral, to change or prevent any change in the beneficiary designation under the policy, to surrender the policy or any portion of the policy for its cash surrender value, and to cancel or terminate the policy; instead, the Powers of Management with respect to the policy shall be exercised only by majority consent of the General Partners, excluding the insured Partner, on the basis of their Percentage Interests.

(d) No Authority Given to Limited Partners. Other than with respect to a Limited Partner's approval rights pertaining to Major Decisions as provided in Section 3.10, no Limited Partner shall have any authority to exercise any Powers of Management.

3.03 Managing Partner. The Managing Partner shall serve only as provided in this Section.

(a) Appointment. Initially, there shall be no Managing Partner. However, at any time there is no General Partner serving as Managing Partner, then by majority consent of the General Partners on the basis of their Percentage Interests, the General Partners may appoint one or more of the General Partners to serve as Managing Partner.

(b) Resignation. Any General Partner may resign from that General Partner's position as Managing Partner at any time with or without cause by providing written notice to all of the other Partners.

(c) Removal. Any General Partner may be removed from that General Partner's position as Managing Partner by majority consent of the General Partners on the basis of their Percentage Interests.

(d) Compensation and Reimbursement. Any Managing Partner shall receive fair and reasonable compensation for any services performed on behalf of the Partnership and shall be entitled to receive reimbursement for any expenses

incurred in the performance of the Managing Partner's duties under this Agreement.

3.04 Reliance by Third Parties on General Partners. The Partnership shall be liable for any transaction with any third party who relies on the authority of any General Partner within the Partnership Management if that General Partner communicates to the third party that the actions taken by the General Partner are taken on behalf of the Partnership, and the third party shall not be deemed to have any duty to determine whether the General Partner has the authority to take the action even if it appears to be prohibited by this Agreement; provided that whenever there is a Managing Partner, any action taken by any person other than the Managing Partner that has not been delegated by the Managing Partner to the person, even if the action is stated to be taken on behalf of the Partnership, shall not be binding on the Partnership. This Section shall not affect the liability of any General Partner to the Partnership or the other Partners for any conduct that violates other provisions of this Agreement.

3.05 Delegation by General Partners. Any General Partner may delegate any obligation or power under this Agreement to any employee of the Partnership and may utilize a power of attorney to delegate any obligation or power under this Agreement to an agent, attorney, or attorney-in-fact. To the extent provided by a General Partner in a power of attorney, the General Partner's agent, attorney, or attorney-in-fact shall have complete authority to exercise every power granted to the General Partner by this Agreement and to fulfill every obligation that is required of the General Partner under this Agreement.

3.06 Time and Effort Required of General Partners. The General Partners shall devote an amount of time and effort to the Partnership that is consistent with the duty of care imposed by Section 3.07(d); provided that nothing in this Agreement shall be deemed to restrict the freedom of any General Partner to conduct any business activity separate and apart from the Partnership other than the duty of loyalty imposed by Section 3.07(c).

3.07 Duties of General Partners; Limitations.

(a) Funds Available. Except as provided in Section 10.08(b) with respect to the restoration of Capital Account deficits, any obligation of a General Partner under this Agreement or by operation of law shall be performable only to the extent that the Partnership has funds available therefor, and no General Partner shall be liable personally with respect to any such obligation.

(b) No Guarantees. The General Partners do not guarantee the return of any Partner's capital contributions nor do they guarantee any allocations of Profits or Losses nor any distributions of Distributable Cash to any Partner or Assignee.

(c) Duty of Loyalty. In exercising the powers granted by this Agreement and in performing the duties required by this Agreement, each General Partner has a duty (i) to account to the Partnership and to hold for the Partnership any property, profit or benefit derived by the General Partner in conducting and winding up the Partnership's business and affairs or from the General Partner's

use of any of the Partnership Assets, (ii) to refrain from dealing with the Partnership on behalf of a party having an interest adverse to the Partnership, and (iii) to refrain from competing with the Partnership or dealing with the Partnership in a manner adverse to the Partnership. Consistent with this duty, any General Partner or any General Partner's Affiliate may own, operate, or invest in any property or business venture that is not owned or operated by the Partnership without providing notice to the Partnership, the other Partners, or any Assignees and without allowing the participation of the Partnership, the other Partners, or any Assignees, such that neither the Partnership nor any Partner or Assignee shall have any rights with respect to any such properties or business ventures nor any claims with respect to their effect on the Partnership. Also consistent with this duty, any General Partner or any General Partner's Affiliate may transact business of any kind with the Partnership and any of the Partners or Assignees. This subsection is intended to impose on the General Partners the duty of loyalty imposed by Section 4.04 of the Texas Revised Partnership Act without modification.

(d) Duty of Care; Business Judgment Rule. In exercising the powers granted by this Agreement and in performing the duties required by this Agreement, each General Partner has a duty to act in good faith with the reasonable belief that the General Partner's actions are in the Partnership's best interests; provided that an error in judgment by itself shall not constitute a violation of this duty. Consistent with this duty, each General Partner may act without liability to the Partnership, the other Partners or any Assignee in reliance upon any written instrument that is reasonably believed by the General Partner to be genuine and to have been signed or presented by the proper parties. Also consistent with this duty, each General Partner may act or refrain from acting without liability to the Partnership, the other Partners or any Assignee in reliance upon any opinion of any consultant or adviser with respect to matters that the General Partner reasonably believes to be within the consultant's or adviser's professional competence. This subsection is intended to impose on the General Partners the duty of care imposed by Section 4.04 of the Texas Revised Partnership Act without modification.

3.08 Indemnification of General Partners.

(a) Mandatory Indemnification; Standards. To the fullest extent permitted by law, the Partnership shall indemnify any Partner or former Partner who or that was, is currently, or is threatened to be made a named defendant or respondent in any legal proceeding because the person is or was a General Partner if it is determined as provided in Section 11.06 of the Act that the Partner or former Partner acted in good faith, acted in the Partnership's best interests when acting in the official capacity of a General Partner, and in all other cases acted in a manner that at least was not opposed to the Partnership's best interests, such that the indemnification permitted by Section 11.02 of the Act shall be mandatory.

(b) Scope of Indemnification. Pursuant to the indemnity described above in this Section, the Partnership shall reimburse any qualifying Partner or former Partner for any payments made with respect to judgments, penalties, including excise and similar taxes, fines, settlements and reasonable expenses, including attorneys' fees, related to the proceeding. The indemnification rights granted by this Section are in addition to any rights against third parties.

(c) Advance Payment of Expenses. To the fullest extent permitted by law, the Partnership shall pay or reimburse, in advance or during the course of any proceeding, reasonable expenses incurred by any Partner or former Partner who or that was, is currently, or is threatened to be made a named defendant or respondent in any legal proceeding because the person is or was a General Partner without the determination specified in Section 11.06 of the Act and referenced above in this Section and without the authorization or determination specified in Section 11.07 of the Act if the Partnership first receives a written affirmation by the person of the person's good faith belief that the person has met the standard of conduct necessary for indemnification under this Section and also receives a written undertaking by or on behalf of the person to repay the amount paid or reimbursed if it ultimately is determined that indemnification against expenses incurred in connection with that proceeding is prohibited by Section 11.05 of the Act.

3.09 Limited Partners.

(a) No Control Over Management. Other than with respect to a Limited Partner's approval rights pertaining to Major Decisions as provided in Section 3.10, no Limited Partner shall have any authority to exercise the Powers of Management or to participate in the control of the Partnership's business or affairs. The Partnership shall not be bound by any act of a Limited Partner.

(b) Limited Liability. The Limited Partners shall not be personally liable for any debts or obligations of the Partnership.

(c) No Return of Contributions. The Limited Partners shall have no right to withdraw from the Partnership and shall have no right to a return of any contributions to the Partnership made by them except to the extent that distributions made to them in the normal course of business as provided in Article VII and upon liquidation of the Partnership as provided in Section 10.05 may be considered as such by law.

(d) Access to Certain Information. Upon written request by a Limited Partner, but only at the expense of the Limited Partner and only at reasonable times and for a purpose related to the Limited Partner's Limited Partnership Interest, a Limited Partner may require the Partnership to provide: (i) true and full information regarding the status of the business and financial condition of the Partnership; (ii) a copy of the Partnership's federal, state and local income tax returns promptly after they become available; (iii) a current list of the full name

and last known business, residence or mailing address of each Partner; (iv) a copy of this Agreement and the Certificate of Limited Partnership, together with executed copies of any powers of attorney pursuant to which this Agreement and the Certificate of Limited Partnership may have been executed; (v) any other information regarding the Partnership's business and affairs as is just and reasonable; and (vi) subject to contractual limitations regarding confidentiality and access to information contained in agreements between the Partnership and third parties covering all or any part of the Partnership Assets or properties owned by other entities in which the Partnership owns a direct or indirect interest, and at the Limited Partner's own risk, access to any such Partnership Assets and properties and the opportunity to observe all operations related to any such Partnership Assets and properties.

(e) Competition. Except as specifically prohibited in Section 3.07(c), any Limited Partner may own, operate or invest in any property or business venture that is not owned or operated by the Partnership without providing notice to the Partnership or the other Partners and without allowing the participation of the Partnership or the other Partners, such that neither the Partnership nor any Partner shall have any rights with respect to any such properties or business ventures nor any claims with respect to their effect on the Partnership.

(f) Transactions with Partnership. Any Limited Partner or any Limited Partner's Affiliate may transact business of any kind with the Partnership and any of the Partners.

3.10 Approval Rights Related to Certain Major Decisions.

(a) Unanimous Approval of Partners Required. Subject to the procedures described below in this Section, the following Major Decisions shall not be made on behalf of the Partnership by any General Partner without the prior written consent of all of the Partners:

(i) filing a petition for relief in bankruptcy under any federal bankruptcy law or any other jurisdiction's debtor relief law;

(ii) making any decision or taking any action that would make it impossible to carry on the Partnership's business and affairs; or

(iii) violating this Agreement in any manner.

(b) Procedures Regarding Major Decisions. Prior to making any Major Decision, a General Partner shall provide all of the other Partners with a written notice describing the Major Decision and providing any other information which may be reasonably necessary for them to evaluate the Major Decision; provided that the Partnership shall bear any expenses related to providing the notice and information. If any Partner fails to approve or disapprove the Major Decision within ten days after receipt of the notice and information required

Agent Authorization Form for
Slay Engineering Company, Inc.
on Behalf of Wuest Legacy Partners, Ltd.
and on Behalf of Wuest Millennium Partners, Ltd.

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

I Brad Wuest _____,
Print Name

Manager _____,
Title - Owner/President/Other

of Wuest Millennium Partners, Ltd. By Wuest Capital Management, LLC Its General Partner,
Corporation/Partnership/Entity Name

have authorized Michael M. Slay P.E.
Print Name of Agent/Engineer

of Slay Engineering Company, Inc.
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 applicants 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.

Applicant's Signature

7-31-12
Date

THE STATE OF TEXAS §

County of BEXAR §

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

GIVEN under my hand and seal of office on this 31 day of JULY, 2012.

MYRA A. RODRIGUEZ
Notary Public, State of Texas
My Commission Expires
AUGUST 22, 2012

NOTARY PUBLIC

MYRA A. RODRIGUEZ
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: AUGUST 22, 2012

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

I Brad Wuest ,
Print Name

Manager ,
Title - Owner/President/Other

of Wuest Legacy Partners, Ltd. By Wuest Capital Management, LLC Its General Partner,
Corporation/Partnership/Entity Name

have authorized Michael M. Slay P.E.
Print Name of Agent/Engineer

of Slay Engineering Company, Inc.
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 applicants who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

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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.

Brad Wuest
Applicant's Signature

7-31-12
Date

THE STATE OF TEXAS §

County of BEXAR §

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

GIVEN under my hand and seal of office on this 31 day of JULY, 2012.

MYRA A. RODRIGUEZ
Notary Public, State of Texas
My Commission Expires
AUGUST 22, 2012

Myra A. Rodriguez
NOTARY PUBLIC

MYRA A. RODRIGUEZ
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: AUGUST 22, 2012

TCEQ Use Only

TCEQ Core Data Form

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

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

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

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Attachments **Describe Any Attachments:** *(ex. Title V Application, Waste Transporter Application, etc.)*

☒ Yes ☐ No — WPAP Modification

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN 602569725		RN 106385081

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy): 7/31/2012

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

☒ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other: _____

7. General Customer Information

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☐ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:			
☐ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A	
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☒ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)*	*If new Customer, enter previous Customer below*	*End Date:*
Wuest Legacy Partners Ltd.		

10. Mailing Address: 26495 Natural Bridge Caverns Road

City	State	ZIP	ZIP + 4
San Antonio	TX	78266	2671

11. Country Mailing Information *(if outside USA)*	12. E-Mail Address *(if applicable)*

13. Telephone Number	14. Extension or Code	15. Fax Number *(if applicable)*
(210) 651-6101		(210) 651-6144

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(if applicable)*	19. TX SOS Filing Number *(if applicable)*
741464802	32036108226		14355410

20. Number of Employees

☒ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated?

☒ Yes ☐ No

SECTION III: Regulated Entity Information

22. 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 Information ☐ No Change** *(See below)*

If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

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

Natural Bridge Caverns

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*	26495 Natural Bridge Caverns Road						
	City: San Antonio	State: TX	ZIP: 78266	ZIP + 4: 2671			
25. Mailing Address:	26495 Natural Bridge Caverns Road						
	City: San Antonio	State: TX	ZIP: 78266	ZIP + 4: 2671			
26. E-Mail Address:							
27. Telephone Number	28. Extension or Code	29. Fax Number *(if applicable)*					
(210) 651-6101		(210) 651-6144					
30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)				
7999	NA	712190	NA				
34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*							
Family Park							

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	26495 Natural Bridge Caverns Road, also called FM 3009; On the west side of FM 3009 approximately 7.3 miles north of IH-35						
36. Nearest City		County		State		Nearest ZIP Code	
Garden Ridge		Comal		TX		78266	
37. Latitude (N) In Decimal:	29.692021N			38. Longitude (W) In Decimal:	98.342691W		
Degrees	Minutes	Seconds		Degrees	Minutes	Seconds	
29	41	31.27N		-98	20	33.69W	

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☒ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
		2142.00		
☐ New Source Review – Air	☒ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Slay Engineering Company Inc.	41. Title:	Agent
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(210) 734-4388	102	(210) 734-6401	mslay@slayengineering.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 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Slay Engineering Company Inc.	Job Title:	Agent
Name *(In Print)*:	Michael M. Slay, P.E., R.P.L.S.	Phone:	(210) 734-4388
Signature:		Date:	

TCEQ Core Data Form

TCEQ Use Only

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

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

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

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Attachments — Describe Any Attachments: *(ex. Title V Application, Waste Transporter Application, etc.)*

☒ Yes ☐ No — WPAP Modification

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN 604074393		RN 106385081

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy): 7/31/2012

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

☒ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other: _____

7. General Customer Information

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☐ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:			
☐ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A	
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☒ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)* — *If new Customer, enter previous Customer below* — *End Date:*

Wuest Millennium Partners, Ltd.

10. Mailing Address: 26495 Natural Bridge Caverns Road

City	State	ZIP	ZIP + 4
San Antonio	TX	78266	2671

11. Country Mailing Information *(if outside USA)*	12. E-Mail Address *(if applicable)*

13. Telephone Number	14. Extension or Code	15. Fax Number *(if applicable)*
(210) 651-6101		(210) 651-6144

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(if applicable)*	19. TX SOS Filing Number *(if applicable)*
742925201	32036213695		

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

21. Independently Owned and Operated? ☒ Yes ☐ No

SECTION III: Regulated Entity Information

22. 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 Information ☐ No Change** *(See below)*

**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

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

Natural Bridge Caverns

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*	26495 Natural Bridge Caverns Road							
	City	San Antonio	State	TX	ZIP	78266	ZIP + 4	2671
25. Mailing Address:	26495 Natural Bridge Caverns Road							
	City	San Antonio	State	TX	ZIP	78266	ZIP + 4	7671

26. E-Mail Address:		
27. Telephone Number	28. Extension or Code	29. Fax Number *(if applicable)*
(210) 651-6101		(210) 651-6144

30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)
7999			

34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*

Family Park

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	26495 Natural Bridge Caverns Road, also called FM 3009; On the west side of FM 3009 approximately 7.3 miles north of IH-35

36. Nearest City	County	State	Nearest ZIP Code
Garden Ridge	Comal	TX	78266

37. Latitude (N) In Decimal:	29.692021N		38. Longitude (W) In Decimal:	98.342691	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	41	31.27N	-98	20	33.69

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☒ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
		2142.00		
☐ New Source Review – Air	☒ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Slay Engineering Company Inc.	41. Title:	Agent

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(210) 734-4388	102	(210) 734-6401	mslay@slayengineering.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 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Slay Engineering Company Inc.	Job Title:	Agent		
Name *(In Print)* :	Michael M. Slay, P.E., R.P.L.S.			Phone:	(210) 734-4388
Signature:				Date:	

NOTICE OF INTENT (NOI)
WUEST LEGACY PARTNERS, LTD.

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)

TCEQ Office Use Only
Permit No.:
RN:
CN:

Sign up now for on line NOI at http://www.tceq.state.tx.us/permitting/steers/steers.html Get Instant Approval

Did you know you can pay on line? Go to https://www6.tceq.state.tx.us/epay/
Select Fee Type: GENERAL PERMIT CONSTRUCTION STORM WATER DISCHARGE NOI APPLICATION

Application Fee: You must pay the $100 Application Fee to TCEQ for the application to be considered complete.
How did you pay this fee?

Mailed: ☑	Check/Money Order No.:	Name Printed on Check:
EPAY: ☐	Voucher No.:	Is the Payment Voucher copy attached? ☐ Yes

IMPORTANT:
- Use the attached **INSTRUCTIONS** when completing this form.
- After completing this form, use the attached **CUSTOMER CHECKLIST** to make certain all items are complete and accurate.
- Missing, illegible, or inaccurate items may delay final acknowledgment or coverage under the general permit.

A. OPERATOR (applicant)

1. If the applicant is currently a customer with TCEQ, what is the Customer Number (CN) issued to this entity? **CN** 602569725

2. What is the full Legal Name of the applicant?
Wuest Legacy Partners, Ltd.
(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.)

3. What is the applicant's mailing address as recognized by the **US Postal Service**?

Address: 26495 Natural Bridge Caverns Road	Suite No./Bldg. No./Mail Code:	
City: San Antonio	State: Texas	ZIP Code: 78266
Country Mailing Information (if outside USA).	Country Code:	Postal Code: 2671

4. Phone No.: (210) 651-6101	Extension:
5. Fax No.: (210) 651-6144	E-mail Address:

6. Indicate the type of Customer:

☐ Individual	☐ Sole Proprietorship-D.B.A.	☑ Limited Partnership
☐ Corporation	☐ Federal Government	☐ General Partnership
☐ State Government	☐ County Government	☐ City Government
☐ Other: N/A		

7. Independent Operator: ☑ Yes ☐ No (If governmental entity, subsidiary, or part of a larger corporation, check "No".)

8. Number of Employees: ☑ 0-20; ☐ 21-100; ☐ 101-250; ☐ 251-500; or ☐ 501 or higher

9. Customer Business Tax and Filing Numbers *(This item is not applicable to Individuals, Government, GP or Sole Proprietor.)*
REQUIRED for Corporations and Limited Partnerships

State Franchise Tax ID Number: 32036108226	Federal Tax ID: 741464802
TX SOS Charter (filing) Number:	DUNS Number (if known):

B. BILLING ADDRESS

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

Is the billing address same as the Operator Address? ☑ Yes, go to **Section C.** ☐ No, fill out **Section B**

1. Billing Mailing Address: 26495 Natural Bridge Caverns Road	Suite No./Bldg. No./Mail Code:	
City: San Antonio	State: TX	ZIP Code: 78266
2. Country Mailing Information (if outside USA).	Territory: Country Code:	Postal Code: 2671
3. Billing Contact (Attn or C/O): Brad Wuest		
4. Phone No.: (210) 6516101	Extension:	
5. Fax No.: (210) 6516144	E-mail Address:	

C. APPLICATION CONTACT

If TCEQ needs additional information regarding this application, who should be contacted?

1. Name: Michael M. Slay, P.E., R.P.L.S. | Title: Professional Engineer | Company: Slay Engineering Company, Inc.
2. Phone No.: (210) 734-4388 | Extension: 102
3. Fax No.: 210 734-6401 | E-mail Address: mslay@slayengineering.com

D. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

1. TCEQ Issued RE Reference Number (RN) (if available):
2. Name of Project or Site (the name as known by the community where this facility/project is located):

Natural Bridge Caverns

(example: phase and name of subdivision or name of project that's unique to the site)

3. Physical Address of Project or Site: (enter in spaces below)

Street Number: 26495 | Street Name: Natural Bridge Caverns Road

City: San Antonio | ZIP Code: 78266 | County (Counties if >1): Comal

4. If no physical address (Street Number & Street Name), provide a written location access description to the site:
(Ex.: phase 1 of Woodland subdivision located 2 miles west from intersection of Hwy 290 & IH35 accessible on Hwy 290 South)

5. Latitude: 29.692021 N | Longitude: -98.342691 W

6. What is the primary business of this entity? In your own words, briefly describe the primary business of the Regulated Entity:
(Do not repeat the SIC and NAICS code) Family tourist attraction

7. What is the mailing address and contact information for the regulated entity?

Is the RE mailing address the same as the Operator? [✓] Yes, address is the same as Operator [ ] No, provide the address

Street Number: 26495 | Street Name: Natural Bridge Caverns Road

City: San Antonio | State: TX | ZIP Code: 78266

E. GENERAL CHARACTERISTICS

1. I certify that the project/site is **not** located on Indian Country Lands? [✓] Yes [ ] No
If No, you must obtain authorization through EPA, Region VI.
2. Is this NOI being submitted due to a change in Operator? [ ] Yes [✓] No
3. What is the Standard Industrial Classification (SIC) code (see instructions for common codes):

Primary: Secondary: N/A

4. What is the total number of acres disturbed? 4.89

Is the project site part of a larger common plan of development or sale? [✓] Yes [ ] No

If **Yes**, the total number of acres disturbed can be less than 5 acres.

If **No**, the total number of acres disturbed must be 5 or more. If the total number of acres disturbed is less than 5 then the project site does not qualify for coverage through this Notice of Intent. Coverage will be denied. See the requirements in the general permit for small construction sites.

5. Discharge Information

a. What is the name of the first water body to receive the storm water runoff or potential runoff from the site? Bear Creek to Comal River

b. What is the segment number(s) of the classified water body(s) that the discharge or potential discharge will eventually reach? 1811

c. Is the discharge into an MS4? [ ] Yes [✓] No

If **Yes**, what is the name of the MS4 Operator? N/A

Note: The general permit requires you to send a copy of the NOI to the MS4 Operator.

6. Is the discharge or potential discharge within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer? [✓] Yes [ ] No

If the answer is Yes, please note that a copy of the agency approved Plan required by the Edwards Aquifer Rule (30 TAC Chapter 213) must be included in the Storm Water Pollution Prevention Plan.

F. CERTIFICATION

Check "Yes" to the certifications below. **Failure to indicate "Yes" to ALL items** may result in denial of coverage under the general permit.

I certify that I have obtained a copy and understand the terms and conditions of the general permit TX150000.	☑ Yes
I certify that the activities at this site qualify for coverage under the general permit TX150000.	☑ Yes
I understand that a Notice of Termination (NOT) must be submitted when this authorization is no longer needed.	☑ Yes
I understand that permits active on September 1st of each year will be assessed an Annual Water Quality Fee.	☑ Yes
I certify that a Storm Water Pollution Prevention Plan (SWP3) has been prepared and implemented as required by the general permit.	☑ Yes

Operator Certification:

I, Brad Wuest (Typed or printed name *(Required)*) Manager (Title *(Required)*)

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

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

Signature: Brad Wuest (Use blue ink) Date: 7-31-12

NOTICE OF INTENT (NOI)
WUEST MILLENNIUM PARTNERS, LTD.

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)

TCEQ Office Use Only
Permit No.:
RN:
CN:

Sign up now for on line NOI at http://www.tceq.state.tx.us/permitting/steers/steers.html Get Instant Approval

Did you know you can pay on line? Go to https://www6.tceq.state.tx.us/epay/
Select Fee Type: GENERAL PERMIT CONSTRUCTION STORM WATER DISCHARGE NOI APPLICATION

Application Fee: You must pay the $100 Application Fee to TCEQ for the application to be considered complete.
How did you pay this fee?

Mailed: ☑	Check/Money Order No.:	Name Printed on Check:
EPAY: ☐	Voucher No.:	Is the Payment Voucher copy attached? ☐ Yes

IMPORTANT:
- Use the attached **INSTRUCTIONS** when completing this form.
- After completing this form, use the attached **CUSTOMER CHECKLIST** to make certain all items are complete and accurate.
- Missing, illegible, or inaccurate items may delay final acknowledgment or coverage under the general permit.

A. OPERATOR (applicant)

1. If the applicant is currently a customer with TCEQ, what is the Customer Number (CN) issued to this entity? **CN** N/A

2. What is the full Legal Name of the applicant?
Wuest Millennium Partners, Ltd.
(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.)

3. What is the applicant's mailing address as recognized by the **US Postal Service**?

Address: 26495 Natural Bridge Caverns Road	Suite No./Bldg. No./Mail Code:	
City: San Antonio	State: Texas	ZIP Code: 78266
Country Mailing Information (if outside USA).	Country Code:	Postal Code: 2671

4. Phone No.: (210) 651-6101	Extension:
5. Fax No.: (210) 651-6144	E-mail Address:

6. Indicate the type of Customer:

☐ Individual	☐ Sole Proprietorship-D.B.A.	☑ Limited Partnership
☐ Corporation	☐ Federal Government	☐ General Partnership
☐ State Government	☐ County Government	☐ City Government
☐ Other: N/A		

7. Independent Operator: ☑ Yes ☐ No (If governmental entity, subsidiary, or part of a larger corporation, check "No".)

8. Number of Employees: ☑ 0-20; ☐ 21-100; ☐ 101-250; ☐ 251-500; or ☐ 501 or higher

9. Customer Business Tax and Filing Numbers *(This item is not applicable to Individuals, Government, GP or Sole Proprietor.)*
REQUIRED for Corporations and Limited Partnerships

State Franchise Tax ID Number: 32036213695	Federal Tax ID: 742925201
TX SOS Charter (filing) Number:	DUNS Number (if known):

B. BILLING ADDRESS

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

Is the billing address same as the Operator Address? ☑ Yes, go to **Section C.** ☐ No, fill out **Section B**

1. Billing Mailing Address: 26495 Natural Bridge Caverns Road	Suite No./Bldg. No./Mail Code:	
City: San Antonio	State: TX	ZIP Code: 78266
2. Country Mailing Information (if outside USA). Territory:	Country Code:	Postal Code: 2671
3. Billing Contact (Attn or C/O): Brad Wuest		
4. Phone No.: (210) 6516101	Extension: N/A	
5. Fax No.: (210) 6516144	E-mail Address: N/A	

C. APPLICATION CONTACT

If TCEQ needs additional information regarding this application, who should be contacted?

1. Name: Michael M. Slay, P.E., R.P.L.S.	Title: Professional Engineer	Company: Slay Engineering Company, Inc.
2. Phone No.: (210) 734-4388	Extension: 102	
3. Fax No.: 210 734-6401	E-mail Address: mslay@slayengineering.com	

D. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

1. TCEQ Issued RE Reference Number (RN) (if available):

2. Name of Project or Site (the name as known by the community where this facility/project is located):

Natural Bridge Caverns

(example: phase and name of subdivision or name of project that's unique to the site)

3. Physical Address of Project or Site: (enter in spaces below)

Street Number: 26495	Street Name: Natural Bridge Caverns Road	
City: San Antonio	ZIP Code: 78266	County (Counties if >1): Comal

4. If no physical address (Street Number & Street Name), provide a written location access description to the site:
(Ex.: phase 1 of Woodland subdivision located 2 miles west from intersection of Hwy 290 & IH35 accessible on Hwy 290 South)

5. Latitude: 29.692021 N	Longitude: -98.342691 W

6. What is the primary business of this entity? In your own words, briefly describe the primary business of the Regulated Entity:
(Do not repeat the SIC and NAICS code) Family tourist attraction

7. What is the mailing address and contact information for the regulated entity?

Is the RE mailing address the same as the Operator? ☑ Yes, address is the same as Operator ☐ No, provide the address

Street Number: 26495	Street Name: Natural Bridge Caverns Road	
City: San Antonio	State: TX	ZIP Code: 78266

E. GENERAL CHARACTERISTICS

1. I certify that the project/site is **not** located on Indian Country Lands? ☑ Yes ☐ No
If No, you must obtain authorization through EPA, Region VI.

2. Is this NOI being submitted due to a change in Operator? ☐ Yes ☑ No

3. What is the Standard Industrial Classification (SIC) code (see instructions for common codes):

Primary: Secondary: N/A

4. What is the total number of acres disturbed? 4.89

Is the project site part of a larger common plan of development or sale? ☑ Yes ☐ No

If **Yes**, the total number of acres disturbed can be less than 5 acres.

If **No**, the total number of acres disturbed must be 5 or more. If the total number of acres disturbed is less than 5 then the project site does not qualify for coverage through this Notice of Intent. Coverage will be denied. See the requirements in the general permit for small construction sites.

5. Discharge Information

a. What is the name of the first water body to receive the storm water runoff or potential runoff from the site? Bear Creek to Comal River

b. What is the segment number(s) of the classified water body(s) that the discharge or potential discharge will eventually reach? 1811

c. Is the discharge into an MS4? ☐ Yes ☑ No

If **Yes**, what is the name of the MS4 Operator? N/A

Note: The general permit requires you to send a copy of the NOI to the MS4 Operator.

6. Is the discharge or potential discharge within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer? ☑ Yes ☐ No

If the answer is Yes, please note that a copy of the agency approved Plan required by the Edwards Aquifer Rule (30 TAC Chapter 213) must be included in the Storm Water Pollution Prevention Plan.

F. CERTIFICATION

Check "Yes" to the certifications below. **Failure to indicate "Yes" to ALL items** may result in denial of coverage under the general permit.

I certify that I have obtained a copy and understand the terms and conditions of the general permit TX150000.	☑ Yes
I certify that the activities at this site qualify for coverage under the general permit TX150000.	☑ Yes
I understand that a Notice of Termination (NOT) must be submitted when this authorization is no longer needed.	☑ Yes
I understand that permits active on September 1st of each year will be assessed an Annual Water Quality Fee.	☑ Yes
I certify that a Storm Water Pollution Prevention Plan (SWP3) has been prepared and implemented as required by the general permit.	☑ Yes

Operator Certification:

I, Brad Wuest (Typed or printed name *(Required)*) Manager (Title *(Required)*)

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

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

Signature: Brad Wuest (Use blue ink) Date: 7-31-12

ZARA
ENVIRONMENTAL LLC
1707 West FM 1626
Manchaca, Texas 78652
www.zaraenvironmental.com

RECEIVED
AUG 10 2012
COUNTY ENGINEER

GEOLOGIC ASSESSMENT FOR NATURAL BRIDGE CAVERNS COMAL COUNTY, TEXAS



Caption: View looking at the natural entrance sinkhole to Natural Bridge Caverns. The resistant bed of limestone making the "bridge" for which the cave system was named is formed in the Dolomitic member of the Kainer Formation.

TCEQ-R13
AUG 07 2012
SAN ANTONIO

Prepared for:
Wuest Legacy Partners, Ltd.
Natural Bridge Caverns, TX 78266

&

Wuest Millennium Partners, Ltd.
Natural Bridge Caverns, TX 78266

28 March 2012

ZARA
ENVIRONMENTAL LLC
1707 West FM 1626
Manchaca, Texas 78652
www.zaraenvironmental.com

GEOLOGIC ASSESSMENT FOR NATURAL BRIDGE CAVERNS COMAL COUNTY, TEXAS

Prepared for:
Wuest Legacy Partners, Ltd.
Natural Bridge Caverns, TX 78266

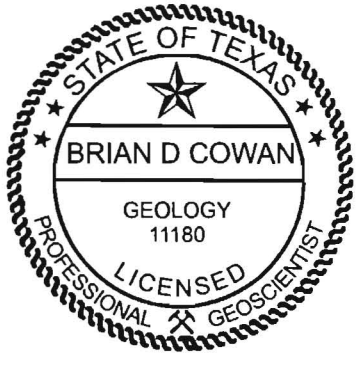
&

Wuest Millennium Partners, Ltd.
Natural Bridge Caverns, TX 78266

28 March 2012

In accordance with the Texas Board of Professional Geologists rules at 22 Texas Administrative Code, Part 39, Chapter 851, Subchapter C, §851.156, this report is signed and sealed on the title page to assure the user that the work has been preformed by or directly supervised by the following professional geologist who takes full responsibility for this work.

The computer generated seal appearing on this document was authorized by Brian D Cowan, P.G. 11180, on 28 March 2012.



28 March 2012
Brian D Cowan, Texas Professional Geologist No. 11180

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

REGULATED ENTITY NAME: Natural Bridge Caverns

TYPE OF PROJECT: X WPAP __ AST __ SCS __ UST

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

PROJECT INFORMATION

1. X Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE.**

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

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Comfort rock outcrop	A	1.75
Tolerant rock outcrop	A	1.75
Rumple-Comfort association	B	1.75

* 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.

3. X A **STRATIGRAPHIC COLUMN** is attached at the end of this form that shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column.

4. X A **NARRATIVE DESCRIPTION OF SITE SPECIFIC GEOLOGY** is attached at the end of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.

5. X Appropriate **SITE GEOLOGIC MAP(S)** are attached:

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

Applicant's Site Plan Scale 1" = 200'
Site Geologic Map Scale 1" = 200'
Site Soils Map Scale (if more than 1 soil type) 1" = 200'

6. Method of collecting positional data:

X Global Positioning System (GPS) technology.
__ Other method(s).

7. X The project site is shown and labeled on the Site Geologic Map.

8. X Surface geologic units are shown and labeled on the Site Geologic Map.

9. X Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
__ Geologic or manmade features were not discovered on the project site during the field investigation.

10. X The Recharge Zone boundary is shown and labeled, if appropriate.

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

__ There are 9 (#) 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.
X The wells are in use and comply with 16 TAC Chapter 76.
__ There are no wells or test holes of any kind known to exist on the project site.

ADMINISTRATIVE INFORMATION

12. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

Date(s) Geologic Assessment was performed: April 24 - June 3, 2011
Date(s)

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

Brian D Cowan
Print Name of Geologist

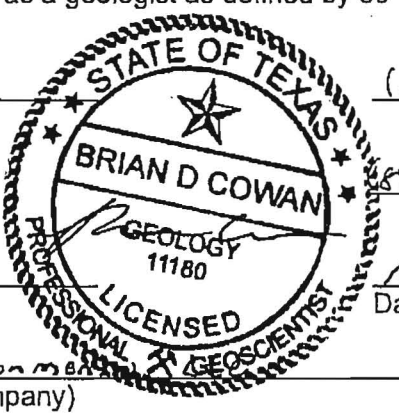
(512) 632-8409
Telephone

(866) 908-9137
Fax

Signature of Geologist

March 28, 2011
Date

Representing: Zara Environmental
(Name of Company)



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

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

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: *Natural Bridge Caverns Enhanced Geologic Assessment*

LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DIP	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	≥40	<1.6	≥1.6	
NBS-01	29.68790	-98.34064	MB	30	Kainer	0.5	0.5	1000	n/a	-	n/a	n/a	n/a	10	40		x		x	drainage
NBS-02	29.68910	-98.33780	CD	5	Kainer	330	125	7	n/a	-	n/a	n/a	C	15	20	x			x	hillside
NBS-03	29.68928	-98.33741	SC	20	Kainer	1	0.8	10	n/a	-	n/a	n/a	N	40	60		x		x	floodplain
NBS-04	29.69049	-98.33436	SH	20	Kainer	12	6	4.5	n/a	-	n/a	n/a	C,N	15	35	x		x		streambed
NBS-05	29.69058	-98.33331	CD	5	Kainer	80	40	10	n/a	-	n/a	n/a	C	15	20	x			x	drainage
NBS-06	29.68874	-98.34006	CD	5	Kainer	6	3	1.5	n/a	-	n/a	n/a	V,O	5	10	x		x		hilltop
NBS-07	29.68780	-98.34193	CD	5	Kainer	330	95	15	n/a	-	n/a	n/a	C,N	15	20	x			x	drainage
NBS-08	29.68758	-98.34467	SH	20	Kainer	2	2	2.5	n/a	-	n/a	n/a	C,O	20	40		x	x		hillside
NBS-09	29.68878	-98.34231	FZ	30	Person	50	12	0.4	48	10	2	n/a	N	25	55		x		x	drainage
NBS-10	29.68923	-98.34145	MB	30	Person	0.5	0	100	n/a	-	n/a	n/a	n/a	10	40		x	x		hillside
NBS-11	29.68923	-98.34066	SH, Z	30	Person	9	7.5	3	n/a	-	0.1	n/a	C,F	10	40		x			hillside
NBS-12	29.68936	-98.34038	SH	20	Person	9	4.5	1.5	n/a	-	n/a	n/a	F,V	15	35	x		x		hillside
NBS-13	29.68973	-98.33914	MB	30	Kainer	0.2	0.2	450	n/a	-	n/a	n/a	n/a	5	35	x		x		hillside
NBS-14	29.69075	-98.33758	SH	20	Kainer	12	9	1	n/a	-	n/a	n/a	F,V	10	30	x		x		hillside
NBS-15	29.69121	-98.33742	SH	20	Kainer	3	1	1.5	50	10	n/a	n/a	C,O,V	20	40		x	x		hillside

* DATUM: WGS 84

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

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

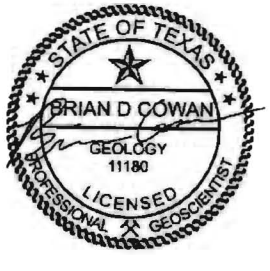
12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

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

Date March 28, 2012

Sheet 1 of 5

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



GEOLOGIC ASSESSMENT TABLE — PROJECT NAME: *Natural Bridge Caverns Enhanced Geologic Assessment*

LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	≥40	<1.6	≥1.6	
NBS-16	29.68982	-98.34183	SH	20	Kainer	3	1.5	2.4	110	-	n/a	n/a	O,C	20	40		x	x		hillside
NBS-17	29.68873	-98.34348	SH	20	Kainer	6	4.5	1	n/a	-	n/a	n/a	O,V	10	30	x		x		hillside
NBS-18	29.69258	-98.33585	SH	20	Kainer	15	9	10	90	-	n/a	n/a	N,C	30	50		x	x		hillside
NBS-19	29.69290	-98.33507	SH	20	Kainer	12	9	2.1	n/a	-	n/a	n/a	C	30	50		x		x	hillside
NBS-20	29.69251	-98.33712	SH	20	Kainer	2.7	2.7	3	n/a	-	n/a	0.3	C,V,O	25	45		x	x		hillside
NBS-21	29.69167	-98.33873	SH	20	Kainer	2.4	1.2	3	n/a	-	n/a	n/a	N	30	50		x	x		hillside
NBS-22	29.69143	-98.33881	SH	20	Kainer	7.5	2.7	1.2	n/a	-	n/a	n/a	C,F,V	15	35	x		x		hillside
NBS-23	29.68991	-98.34106	SH	20	Kainer	6	6	3	n/a	-	n/a	n/a	F,C	15	35	x		x		hillside
NBS-24	29.68999	-98.34249	MB	30	Kainer	0.5	0.5		n/a	-	n/a	n/a	N	10	40		x	x		hillside
NBS-25	29.68966	-98.34494	SH	20	Kainer	7.2	4.8	2.4	n/a	-	n/a	n/a	O,C	15	35	x		x		hillside
NBS-26	29.68971	-98.34475	SH	20	Kainer	3.3	2.4	2.1	n/a	-	n/a	n/a	O,N	10	30	x		x		hillside
NBS-27	29.69201	-98.34073	SH	20	Kainer	3	1.8	1.5	n/a	-	n/a	n/a	O,N	15	35	x		x		hillside
NBS-28	29.69123	-98.34143	SF	20	Kainer	4.5	2.4	1.5	n/a	-	n/a	n/a	O,N,C	15	35	x		x		hilltop
NBS-29	29.69102	-98.34255	MB	30	Kainer	0.5	0.5	0	n/a	-	n/a	n/a	N	10	40		x	x		hillside
NBS-30	29.69128	-98.34183	MB	30	Kainer	2	2	315	n/a	-	n/a	n/a	N	20	50		x	x		hillside

* DATUM: WGS 84

2A	TYPE	2B POINTS
C	Cave	30
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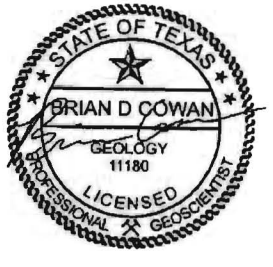
Date March 28, 2012

Sheet 2 of 5

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



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						X	Y	Z		10						<40	>40	<1.6	>1.6	
NBS-31	29.69154	-98.34237	MB	30	Kanier	0.5	0.5	100+	n/a	-	n/a	n/a	N	20	40		x	x		hillside
NBS-32	29.69323	-98.34046	SH	20	Kanier	6	6	2.3	n/a	-	n/a	0.5	N,O	35	55		x		x	hillside
NBS-33	29.69348	-98.33855	SH	20	Kanier	2.4	3.6	1	n/a	-	n/a	n/a	C,O	10	30	x		x		hilltop
NBS-34	29.69503	-98.33706	C	30	Kanier	7.9	9.2	15	55	10	n/a	2	N	35	75		x	x		hilltop
NBS-35	29.69525	-98.34324	MB	30	Kanier	4	4	100	n/a	-	n/a	3	N	10	40		x	x		hillside
NBS-36	29.69634	-98.34092	CD	5	Kanier	7.5	18	4.5	n/a	-	n/a	n/a	C,F	10	15	x		x		hillside
NBS-37	29.68987	-98.34623	SC	20	Kanier	7.5	3	1	n/a	-	n/a	0.3	O,F	20	40		x	x		hillside
NBS-38	29.69291	-98.34405	SF	20	Kanier	6	3	1.8	75	10	n/a	0.2	C	20	50		x		x	streambed
NBS-39	29.69700	-98.34467	SH	20	Kanier	4.3	7	7	n/a	-	n/a	0.4	N,O	25	45		x	x		hillside
NBS-40	29.69818	-98.34296	SF	20	Kanier	4	1.5	5.4	135	no	n/a	0.3	N,O	20	40		x	x		hillside
NBS-41	29.69806	-98.34213	SH	20	Kanier	6.6	5.7	6	n/a	-	n/a	0.5	O,F	20	40		x	x		hillside
NBS-42	29.69791	-98.34203	SH	20	Kanier	4.5	4.5	1.8	n/a	-	n/a	n/a	O,F	15	35	x		x		hillside
NBS_43	29.69901	-98.34202	MB	30	Kanier	0.5	0.5	330	n/a	-	n/a	n/a	N	10	40		x	x		hillside
NBS-44	29.7001	-98.3429	CD	5	Kanier	75	90	4.5	n/a	-	n/a	n/a	C,F	15	20	x		x		hilltop
NBS-45	29.79997	-98.34713	SF	20	Kanier	0.2	0.4	1	10	no	n/a	0.2	n	15	35	x		x		hillside

* DATUM: WGS 84

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

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

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

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Date March 28, 2012

Sheet 3 of 5

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



GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: *Natural Bridge Caverns Enhanced Geologic Assessment*

LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
NBS-46	29.70194	-98.34351	SH	20	Kanier	75	90	0.5	n/a	-	n/a	n/a	O,F	20	40		x	x		hilltop
NBS-47	29.70191	-98.34332	CD	5	Kanier	75	45	1	n/a	-	n/a	n/a	O,F	15	20	x		x		hilltop
NBS-48	29.70301	-98.34487	MB	30	Kanier	0.5	0.5	1100	n/a	-	n/a	n/a	N	10	40		x	x		hillside
NBS-49	29.69425	-98.34352	SH	20	Kanier	41	12	1.2	n/a	-	n/a	n/a	C,F	10	30	x			x	hillside
NBS-50	29.69447	-98.34350	SH	20	Kanier	18	21	1	n/a	-	n/a	n/a	C,F	10	30	x		x		hillside
NBS-51	29.69465	-98.34436	C	30	Kanier	10	6	8	n/a	-	n/a	8	N	20	50		x	x		hillside
NBS-52	29.69201	-98.34279	C	30	Kanier	180	60	15	n/a	-	n/a	20	N	45	75		x	x		hillside
NBS-53	29.69340	-98.34185	MB	30	Kanier	0.5	0.5	1000	n/a	-	n/a	n/a	N	10	40		x	x		hillside
NBS-54	29.69369	-98.34369	MB	30	Kanier	0.5	0.5	130	n/a	-	n/a	n/a	N	20	50		x	x		hillside
NBS-55	29.69251	-98.34311	MB	30	Kanier	0.5	0.5	130	n/a	-	n/a	n/a	N	20	50		x	x		hillside
NBS-56	29.69601	-98.34846	C	30	Kanier	11	4.4	11	n/a	-	0.3	n/a	N	20	50		x	x		hillside
NBS-57	29.69653	-98.34719	SF	20	Kanier	4.5	3.6	2.1	60	10	n/a	n/a	O,F	15	45		x	x		hillside
NBS-58	29.69712	-98.34817	SH	20	Kanier	9.6	1.1	20	30	no	n/a	1.1	N	30	50		x	x		hillside
NBS-59	29.69536	-98.35096	SH	20	Kanier	6.5	5	0.5	n/a	-	n/a	n/a	O,F	20	40		x		x	hillside
NBS-60	29.69726	-98.34928	SH	20	Kanier	4.4	4.5	1	n/a	-	n/a	n/a	O,F	10	30	x		x		hillside

* DATUM: WGS 84

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

8A INFILLING	
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O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials

12 TOPOGRAPHY

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Date March 28, 2012

Sheet 4 of 5

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



GEOLOGIC ASSESSMENT TABLE — PROJECT NAME: *Natural Bridge Caverns Enhanced Geologic Assessment*

LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	≥40	<1.6	≥1.6	
NBS-61	29.69810	-98.34957	CD	5	Kanier	45	17	3.8	n/a	-	n/a	n/a	O,F	5	10	x			x	hillside
NBS-62	29.69602	-98.35184	MB	30	Kanier	0.5	0.5	1,140	n/a	-	n/a	n/a	n	15	45		x	x		hillside
NBS-63	29.691646	-98.342130	MB	30	Kanier	2	2	120	n/a	-	n/a	2	n	20	50		x	x		hillside
NBS-64	29.687877	-98.342057	F	20	Kanier	300	3	1	60	10	n/a	n/a	n	20	40		x		x	Hillside
NBS-65	29.689363	-98.34142	F	20	Kanier/ Person	As regionally mapped			60	10	n/a	n/a	n	20	40		x		x	hillside
NBS-66	29.69202	-98.34183	C	30	Kainer	8	8	8	n/a	-	n/a	8	N	40	70		X		X	drainage

* DATUM: WGS 84

2A	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
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Date March 28, 2012

Sheet 5 of 5

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



Introduction

A karst feature survey and geologic assessment (GA) was conducted within the 450 acre property above Natural Bridge Caverns, a popular show cave located within the Edwards Aquifer Recharge Zone in Comal County, Texas. A detailed walking survey of the entire area was conducted over six days, documenting 66 surface features between April 27 and May 10, 2011. Additionally, most passages of the cave (both tour and wild passages) were observed to conduct a general analysis and characterization of water flow into and through Natural Bridge Caverns on May 25 and June 1. This cave has been surveyed to a total length of 3,535 meters and has a maximum depth of 75 meters below the natural entrance.

Methods

Karst survey methods followed protocols outlined in Texas Commission for Environmental Quality (TCEQ) Instructions to Geologists for Geologic Assessments (TCEQ, 2004) and USFWS Section 10(a)(1)(A) Scientific Permit Requirements for Conducting Presence/Absence Surveys for endangered karst invertebrate species (USFWS 2006).

Reconnaissance excavation and walking ground survey, as defined by Veni and Reddell (2002), Barrett (1999) and TCEQ (2004), was conducted at all potential karst features. Positions of all features were documented using Global Positioning System (GPS) technology and checked with field maps based on digital ortho-imagery. All features identified were inspected by a licensed professional geologist and evaluated for potential impact to Edwards Aquifer recharge. This is completed by ranking the recharge sensitivity of each feature using the point scheme defined by TCEQ (2004). Field work for the karst survey was supervised by Texas licensed professional geologist Marcus Gary. Additional individuals involved with field work for this GA are listed in the personnel section of this report.

The underground cave passages of Natural Bridge Caverns were also assessed for this study. This was conducted by two days of cave visits led by Natural Bridge Caverns staff geologist Brian Vauter. The South Cavern and developed tour passages of the North Cavern were assessed on May 25 and the remaining passages in the northern-most portions of the cave were assessed on June 1. Major hydrologic, speleogenetic, geologic, and geomorphic features were noted in these assessments to evaluate the water flux into and through the cave. Features such as faults, fractures, breakdown talus cones, sediment, lithology, speleothem growth, conduit patterns, water pools, and streams were observed to characterize distinct sections of the cave. Brief descriptions of these sections are given in the results portion of this report.

Well data were also compiled for this report and included in the analysis. These data were provided by Natural Bridge Caverns staff and reflect drilling of test wells, cave access shafts, and water wells on the property.

Background

Soils

Soil descriptions were compiled from the Web Soil Survey of the U. S. Department of Agriculture (USDA) (USDA, 2011), and site observations. Twelve different soil types are identified in the project area by the USDA dataset, but only three of these are present in the area surveyed for this geologic assessment. These three soils are listed above and details of all the soil types are presented in Appendix A. The spatial distribution is shown in attached Map Plate 1 (Soils of the Project Area).

Comfort-Rock outcrop complex (CrD) This is slope/footslope forming soil that is characterized by cobbles, stones and boulders, and is capable of transmitting up to 0.20in/hr. of precipitation by the its limiting layer to subsurface. This soil group comprises 69%of the project area.

Eckrant-Rock outcrop complex (ErG) This soil is characterized by slopes of mainly (70%) Eckrant and similar soils, forming ridges, backslopes and footslopes. Rock crops out over 20% of this soil group. The infiltration rate for this soil ranges between 0.06 and 0.57 in/hr. This soil group comprises 27%of the project area.

Rumple-Comfort association (RUD) This soil group is a well drained, moderately thick (20-40in.) soil that forms mainly plains and is has a low calcium carbonate content. This soil comprises 4%of the project area
Bedrock Geology in the study area

Regional Geology
Natural Bridge Caverns is located in the southeastern portion of the Edwards Plateau Physiographic Province of central Texas, along the Balcones Fault Zone (BFZ) and within the Hill Country. The BFZ also forms the Balcones Escarpment, which is a highly eroded region bordering the Edwards Plateau on its southern and western boundaries. The study area is typified by higher elevations to the north and west, generally sloping in a southeastern direction. Canyons and drainage basins were formed by surface flow of the San Antonio and Guadalupe Rivers Basin, including Cibolo Creek.

The geologic formations occurring within and surrounding the project area are comprised mostly of Cretaceous age-rocks with some overlaying Quaternary alluvium along surface drainages (Figure 1). The soils that have formed on top of these limestones are relatively thin and offer very minimal filtering capability. The limestone bedrock developed from the accumulation of thick sequences of marine sediments deposited in a lagoon environment on the San Marcos Platform protected by a barrier reef during the Cretaceous about 100 million years ago. In central Texas, the Cretaceous strata slightly dip to the southeast at about 10 to 15 feet per mile toward the Gulf of Mexico.

Major tectonic uplifting of the Edwards Plateau occurred along the BFZ during Miocene times about 15 million years ago, which resulted in accelerated erosion of the hill-country topography seen today. The boundary between the Edwards Plateau and Gulf Coastal Plain occurs along the trace of the BFZ. The BFZ is comprised mostly of northeast-southwest normal faults with displacement toward the southeast. The accumulative displacements for some of these fault sets can be greater than 1,000 feet. The Miocene faulting permitted meteoric water to percolate into the limestone allowing for extensive karstic diagenesis that resulted in interconnected, sometimes cavernous porosity of the prolific Edwards Aquifer.

Stratigraphy
The geological formations that comprise the Edwards Aquifer are from top to bottom the Georgetown, Person and Kainer. Maclay and Small (1976) divided the aquifer into eight hydrogeologic units (Units I through VIII), which are based on aquifer and lithologic properties. The Georgetown Limestone (Unit I) can be up to about 20 feet thick in Bexar County and unconformably overlies the Person Formation. The Georgetown can be identified by the presence of the index fossil brachiopod *Waconella wacoensis*. The Georgetown is a shaley, relatively impervious yellow limestone that is not known to yield water and sometimes can be considered part of the upper confining unit to the Edwards Aquifer. A stratigraphic column showing the regional geology is shown in Figure 2.

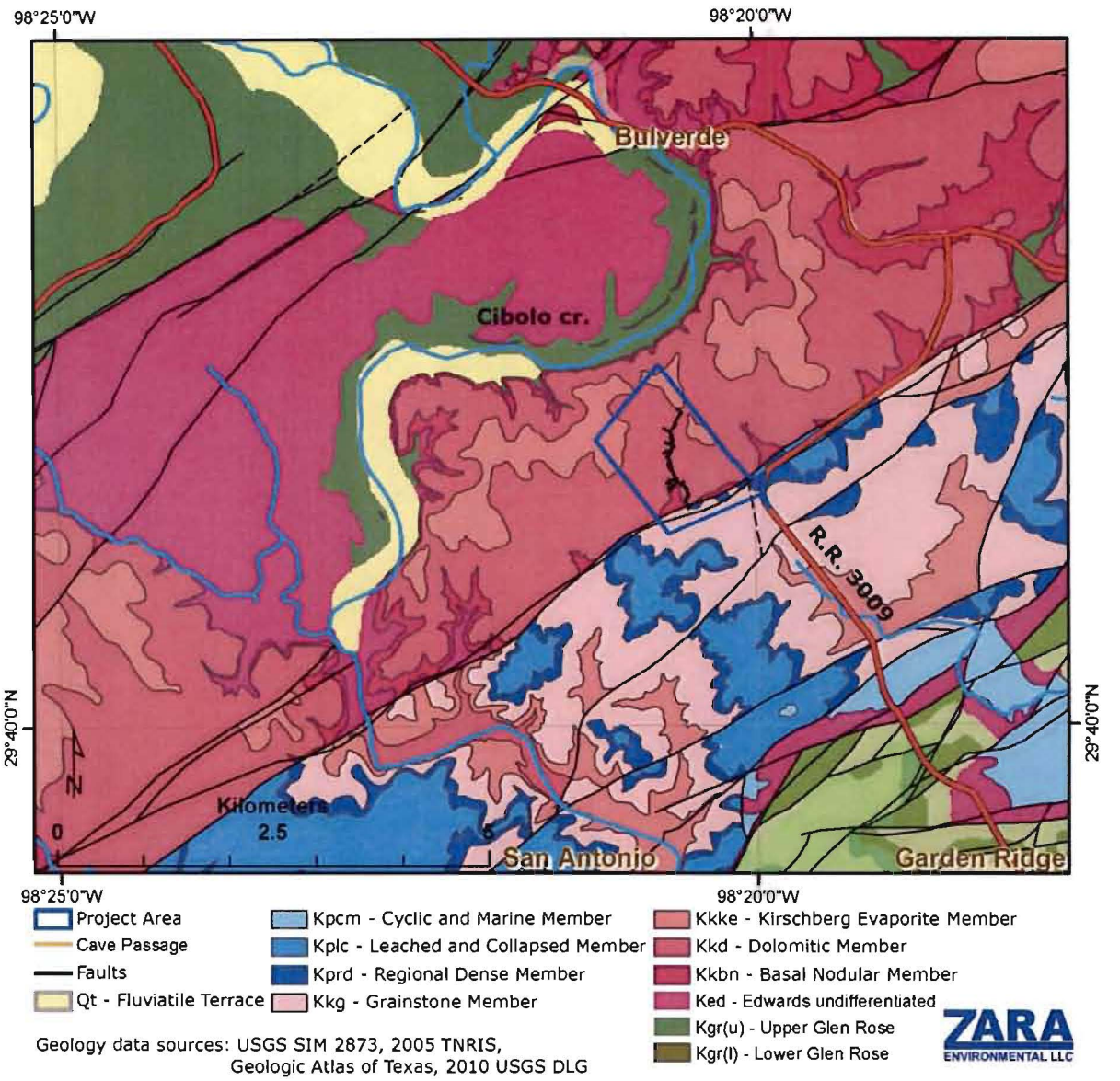

Figure 1. *Geologic map of the area surrounding Natural Bridge Caverns shows the project area bounded in the blue box. Most of the surface of the project area is located in the Dolomitic member of the Kainer Formation, with high points on the west, north, and east boundaries in the Kirshberg Evaporite member. The southern portion of the study area is on the downthrown side of a major normal fault, with outcrops of the Regional Dense member of the Person Formation and the Grainstone member of the Kainer Formation.*

The Person and Kainer Formations comprise the Edwards Group (Rose, 1972). The Person Formation is about 185 feet thick in northern Bexar County. The composition of the Person Formation ranges from crystalline limestone to grainstone to mudstone and is comprised of three informal hydrogeologic units: the Cyclic and Marine members, undivided; the Leached and Collapsed members, undivided; and the Regional Dense member.

The Cyclic and Marine members (Unit II) are composed of mudstone to fossiliferous packstone and are approximately 85 feet thick but can be somewhat variable in thickness because of the erosional unconformity between the Person and Georgetown Formations. The

cyclic member is an alternating tidal flat deposit with small collapsed breccias, and the marine member is a cross-bedded biosparite to biomicrite with chert nodules.

The Leached and Collapsed members (Unit III) are a sequence of interbedded mudstone and grainstone intervals that form one of the more porous and permeable subdivisions of the Edwards Aquifer. The leached member is a dense, bioturbated micrite and the collapsed member is composed of several one- to five-feet thick zones of collapsed stromatilitic limestone (Rose, 1972). Average thickness of the Collapsed and Leached members is approximately 80 feet in northern Bexar County and is characterized by two highly churned, iron stained beds separated by a more massive light colored limestone. Horizontal caverns with relatively large rooms develop in this unit.

The bottom unit of the Person Formation is the Regional Dense Member (RDM) (Unit IV), which throughout the region has a relatively consistent thickness of 20 feet. The RDM is composed of a dense argillaceous mudstone and is easily identified in the outcrop and on a variety of geophysical logs. Most of the fractures that penetrate the RDM do not appear to be solution enlarged. Caves that breach the RDM are not enlarged but are usually vertical shafts with horizontal caverns developed above or below the RDM.

The RDM can function as a confining unit between the upper and lower portions of the Edwards Aquifer between the Kainer and the Person Formation. However, caves, faults, and fractures may greatly reduce the vertical confining ability of the RDM. The RDM is probably not an effective barrier to lateral flow at faults because of the relatively thin 20-foot section. The flow of water tends to circumvent the RDM because of the impermeable nature of this unit.

The Kainer Formation has an approximate total thickness of 285 feet. The lithology of the Kainer Formation ranges from mudstone to *miliolid* grainstone to crystalline limestone. The Kainer is subdivided into four informal members that include the grainstone, Kirschberg Evaporate, Dolomitic and Basal Nodular members.

The Grainstone member (Unit V) is the uppermost unit of the Kainer Formation and is approximately 55-feet thick. Unit V is composed of thick sequences of dense, tightly-cemented, miliolid grainstone. Primary matrix porosity, as measured on geophysical logs, is some of the lowest in the Edwards Aquifer. Secondary fracture porosity accounts form the bulk of effective porosity in this aquifer unit.

The Kirschberg evaporite member (Unit VI) underlies the Grainstone member and is about 60 feet in thickness. This hydrogeologic unit consists of crystalline limestone interbedded with mudstone containing chert lenses. Collapse features are common. The porosity has been described as boxwork (Maclay and Small, 1976) because of the configuration of the voids and the secondary neospar and travertine deposits. The boxwork porosity does not seem to be prevalent throughout the entire thickness or extent of subdivision VI, but occurs sporadically within more massive limestone. Dissolution of evaporite minerals, such as gypsum and anhydrite, and the existence of contorted beds in the Kirschberg evaporite results in extensive secondary porosity, which creates one of the most permeable subdivisions in the Edwards Aquifer.

The Dolomitic member (Unit VII) is a dense, crystalline limestone with interbedded grainstone and burrowed mudstone with some chert beds. The Dolomitic member has a total thickness of about 110 feet and is characterized by massive thick beds. Effective porosity and probable pathways of water in this unit are restricted to solution enlarged bedding planes, joints, fractures and faults.

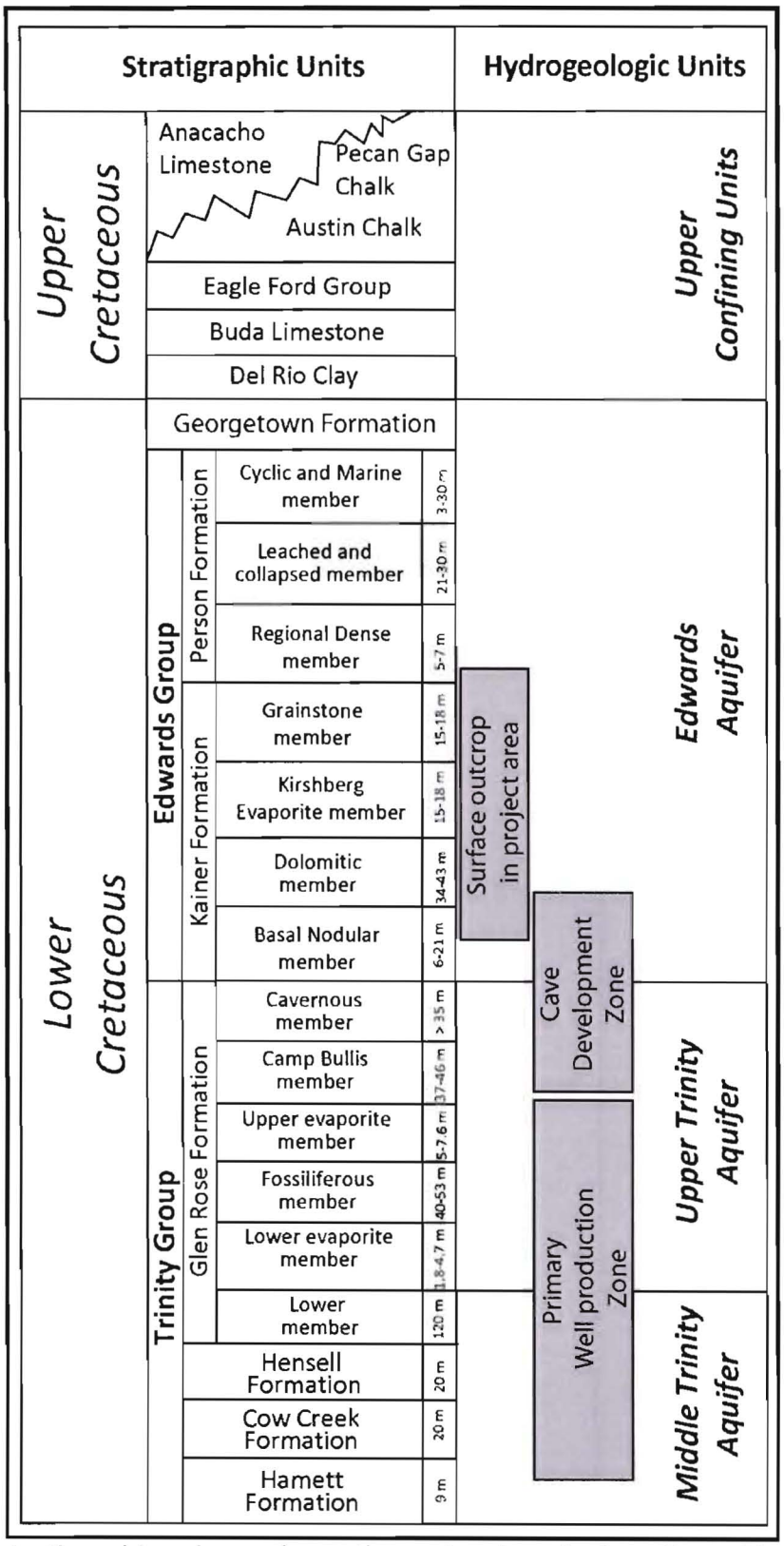

Figure 2. This stratigraphic column shows the regional geologic units and indicates the zones of rocks that outcrop in the Natural Bridge Caverns project area, units the cave is developed in, and units that supply the primary wells on the property.

The basal nodular member (Unit VIII) is the lowermost unit of the Edwards Group and is about 50 to 60 feet of tan, marly, nodular limestone. In the subsurface, the basal nodular member has negligible porosity and permeability (Maclay and Small, 1984), and can function as part of the lower confining unit. However, in outcrop the basal nodular member often displays extensive karstification, which has generated secondary porosity in the form of large lateral caves.

The upper Glen Rose Limestone (upper Trinity) acts as the lower confining unit for the Edwards Aquifer. The interbedded clays in the upper Glen Rose are restrictive to vertical flow and act to confine water in the Edwards Aquifer. A more detailed discussion of the Trinity is given below.

The Trinity Aquifer is an aquifer system that is composed of individual smaller layered aquifers within the geologic formations that comprise the Cretaceous-age Trinity Group. Trinity Group deposits include sands, limestones, shales and clays that were deposited before the Edwards limestone and, where present, are found beneath the Edwards Aquifer. The Trinity Group is divided into the following formations, in order from the shallowest to deepest: Glen Rose and Travis Peak (also known as the Pearsall Formation in Stricklin and others, 1971). The Travis Peak Formation of the lower Cretaceous is subdivided into the following members in order from shallowest to deepest: Bexar Shale or Hensell Sand, Cow Creek Limestone, Hammett Shale, Sligo Limestone and Hosston Sand.

The Glen Rose Formation has been divided informally into two members, lower and upper. The upper member of the Glen Rose Formation is an alternating sequence of limestone and marly clay that, when weathered, creates the distinctive "stair-step" topography found throughout much of the Hill Country. The upper Glen Rose member weathers to a yellowish-brown and develops characteristic yellowish tan soils, in contrast with the Edwards outcrop soils of grayish black.

In northern Bexar County, the upper Glen Rose member is up to 500 feet thick and contains two prominent evaporite beds. Each bed ranges from 20 to 30 feet thick and is composed of yellow marl, dolomite, and white chalky limestone (Reeves, 1967). Irregular bedding may be present from the removal of anhydrite and gypsum by solutioning. Springs and seeps are often located along outcrops of the evaporite beds. The upper Glen Rose member yields small quantities of water to wells and the water is often of poor quality (Reeves, 1967). Because of the presence of gypsum and anhydrite found near the middle and bottom of the upper Glen Rose, the evaporite beds produce water with high sulfate and total dissolved solids content. Permeability and water quality can be better in areas with solution enlarged fractures or faults.

Clark (2003 and 2009) has divided the upper Glen Rose into five hydrogeologic intervals. The cavernous hydrostratigraphic member (interval A) is the youngest, approximately 120' thick, formed by alternating and interfingering mudstone, wackestone and packstone, and is well karstified. It overlies the Camp Bullis hydrostratigraphic member (interval B), which ranges from 120 to 150' thick. The Camp Bullis member is lithologically similar to the cavernous member, but has less karst development and consequently has a lower permeability. The Upper Evaporate hydrostratigraphic member (interval C) is 10 to 20' thick. This thin layer of highly soluble carbonates and evaporites is characterized by breccia porosity, boxwork permeability and collapse structures. Groundwater flows horizontally along this layer and usually discharges in small ephemeral springs where the interval intersects the ground surface. The fossiliferous hydrostratigraphic member (interval D) is 135-180 feet thick. Overall, it has low porosity and permeability, with the exception of a caprinid biostrome near the top of the interval. This biostrome is up to 40 feet thick, is well karstified,

and hosts locally important flow systems, although the ultimate destination of this groundwater is not well known. The biostrome is thickest in the center of Camp Bullis, and thins to the north. The lower evaporate hydrostragraphic member (interval E); is quite similar to the upper evaporate member (interval C), and is 10 to 20 feet thick with mostly dissolved evaporites diverting groundwater horizontally.

The lower member of the Glen Rose Limestone is about 300 to 320 feet of massively bedded dolomitic limestone with occasional rudistid reef mounds. The lower member can be well karstified and highly permeable, with significant recharge features formed when exposed at the surface as can be seen along Cibolo Creek.

The Bexar Shale (of the Travis Peak Formation) is a deeper water transitional formation from the more terrigenous Hensell Sand that can be found further to the north in Central Texas. The Bexar Shale is up to 80 to 90 feet thick in northern Bexar County and generally consists of clays, silts and sands. This unit can produce water from the sandier sections in some locations. Below the Bexar Shale is about 80 feet of Cow Creek limestone. The bottom portion of the Cow Creek transitions to a more clay-rich shaley limestone. The upper third of the Cow Creek is usually cream colored and is more porous and permeable, which forms the base of the production for the middle Trinity Aquifer.

Below the Cow Creek, the Hammett Shale (sometimes referred to as the Pine Island Shale) is about 50 feet of "sticky" blue clay that is relatively impermeable and acts as a confining bed that divides the producing units of the lower and middle Trinity Aquifer. The lower Trinity Aquifer consists of about 100 feet or less thickness of Sligo Limestone and about 100 to 200 feet thickness of the Hosston Sand at the base of the Trinity Group. The Hosston is composed of clays, silts, sands and a basal conglomerate.

Natural Bridge Caverns Geology
The immediate geologic units that outcrop in the Natural Bridge Caverns project area include: the Regional Dense member of the Person Formation, the Grainstone, Kirshberg Evaporitic, Dolomitic, and Basal Nodular members of the Kainier Formation. All of these units are within the Edwards Group limestone which comprise the Edwards Aquifer. Beneath these units lies the Cavernous member of the Glen Rose Formation. Most of the major cave development of Natural Bridge Caverns is in this unit. A major normal fault crosses the project area's southern extent, referred to as the Bat Cave Fault. It is a large, regional fault, mapped to extend from Cibolo Creek across Comal County into Hays County. This fault offsets the Kainer Formation next to the Glen Rose Formation and is directly observed in the southern-most section of the Natural Bridge Caverns cave.

Groundwater
This area is in a semi-arid environment with average annual rainfall of about 30 to 35 inches per year. Evaporation of 75 to 90 inches per year removes much of this water prior to recharging the aquifers. Many of the rainfall events occur as thermal convection thunderstorms that can produce excessive amounts of precipitation in short periods of time. Some of this water makes its way into the aquifers usually through concentrated areas along creeks and rivers in outcrop areas of the recharge zone.

The Edwards Aquifer is one of the most permeable and productive limestone aquifers in the United States. In the San Antonio region, the aquifer supplies drinking water to more than 1.7 million people and provides habitat for several endangered aquatic species. The Trinity Aquifer plays a lesser role in this region but is none the less designated as a major aquifer of Texas and regionally spans most of central Texas. The stratigraphic, lithologic, and hydrologic characteristics of the rocks in Bexar County are summarized in Table 3.6.1.

Both the Edwards and Trinity Aquifers in this area have karst characteristics with heterogeneous flow, storage and transport of the groundwater via underground conduit systems. Flow in karst aquifers occurs over a wide range of permeability, from flow through the rock matrix (least permeable), flow in planar fractures and bedding planes to turbulent flow through integrated conduit systems (most permeable). Surface landforms commonly seen in this terrain are: 1) recharge features such as solution widened fractures, sinkholes and losing streambed sections, 2) transmission features such as active and relict caves, and 3) discharge features such as permanent and ephemeral springs. In general, most storage occurs in the matrix, while most flow occurs in the conduits. Matrix and conduit components may or may not mix effectively. Thus, some components of the aquifer may have very long residence times and be relatively resistant to surface contamination, while other components of the aquifer may have extremely rapid travel times and be very vulnerable to contamination. The vulnerable portions of the aquifer are also the most productive and the ones that eventually feed the major springs and wells.

In addition to the variability of flow velocities, flow directions are also variable. Flow directions are influenced by hydraulic gradients both regional and local, but are also controlled by the location of conduit systems, which are often influenced by older development that occurred in previous flow regimes. Thus, flow paths may not follow local topography or surface watersheds. It is common for flow in karst aquifers to cross between watershed boundaries. The pattern and direction of flow in karst is often stage dependent, as high water levels can utilize different flow paths and travel in unpredictable directions.

Karst aquifers are, by their nature, extremely vulnerable to contamination. Soils in karst areas tend to be thin and patchy. When eroded by damaging practices, they are slow to be replaced. Thus, the filtration of diffuse recharge afforded by soils is at best low, and is only decreased by human activity. Recharge in karst systems commonly occurs as point recharge into specific karst features, bypassing what little filtration a limited soil zone might afford. Furthermore, a karst flow system is formed by convergent flowpaths that combine to form efficient flow networks. Rapid transportation through integrated flow networks leads to lower residence times, minimizing the opportunity for the die-off of pathogens or the degradation of hazardous chemicals. These efficient flow networks can cover large areas, allowing contaminants to travel long distances very quickly, endangering distant water supplies before problems are identified (Ford and Williams, 2007). Finally, monitoring of contaminant plumes is very difficult due to the anisotropic nature of karst flow systems, where traditional placement of up and down gradient monitoring wells are likely to miss the conduits through which the contaminants are flowing.

Edwards Aquifer

The length of the Edwards Aquifer in the San Antonio region extends approximately 180 miles from the groundwater divide near Brackettville in the west to the groundwater divide north of Kyle in the northeast.

The Edwards Aquifer varies in width from 5 to 40 miles from the northern limit of the recharge zone to the southern limit of fresh water. The southern boundary of the aquifer is a gradational zone of increasing salinity from 350 parts per million to over 300,000 parts per million total dissolved solids (TDS).

Two distinctive zones, fresh and saline, can be found in the Edwards Aquifer with a transition area between them. Locally, the point at which TDS reaches 1,000 parts per million is referred to as the "bad-water line" and is the approximate southern extent of potable water. The freshwater zone has gone through extensive changes since deposition whereas the

saline zone has retained more of its original depositional lithology. The high productivity of the Edwards Aquifer freshwater zone is a result of dissolution along fractures associated with Balcones faulting. The voids created by the dissolved rock made pathways for the water to move through the limestone. Effective porosity within the freshwater Edwards Aquifer is primarily the result of dissolution of the original rock matrix along bedding planes, joints, and fractures after deposition.

The Edwards Aquifer, as regulated by the Texas Commission on Environmental Quality (TCEQ), has four zones: the Contributing Zone, the Recharge Zone, the Transition Zone and the Confined Zone. In the Contributing Zone, water flows over less permeable bedrock and is routed onto the Recharge Zone. The Contributing Zone is composed of drainage areas and catchments of surface streams that flow over the Recharge Zone. Much of the Contributing Zone lies over the older Glen Rose Formation. The Recharge Zone is a relatively narrow band of outcrops of heavily faulted and karstified Edwards limestone. In the Recharge Zone, surface water flows underground to contribute to the Edwards Aquifer. Water stored in the Recharge Zone as part of the Edwards Aquifer is unconfined. The flow of water is driven by gravity to discharge at water-table springs, to enter deeper flow systems and discharge at artesian springs, or to contribute to the Confined Zone of the Aquifer. The Transition Zone consists primarily of younger bedrock overlying the Confined Zone. These younger and generally less permeable rocks of the Transition Zone overlie and form the upper confining cap to the Artesian Zone of the Edwards Aquifer. While the surface bedrock in the Transition Zone is generally less permeable and karstified than the rocks of the Edwards Group, it is also extensively fractured and faulted by the BFZ, and hosts some high-permeability pathways into the Artesian Zone.

Water levels of the Edwards Aquifer and associated flows of Comal Springs, San Marcos Springs, and other major and minor natural discharge points are affected by the rate of water entering the aquifer (recharge) and the rate of water exiting the aquifer (discharge). Decreased spring discharge and/or degradation of water quality including anthropogenic contamination can adversely affect the health of eight federally-listed endangered or threatened species that depend on adequate minimum flows at Comal and San Marcos Springs for survival.

Recharge occurs from water entering the recharge zone from streams, natural catchments, recharge structures, localized runoff, upland recharge from precipitation events, and potential cross-formational flow from the Trinity Aqufier. Seasonal rainfall over the region ultimately controls the rate of recharge. Groundwater flow paths in northern Bexar and Comal Counties are hypothesized to flow to the southeast in the Natural Bridge Caverns area, then shift to the northeast once crossing the Bat Cave Fault (Figure 3). Discharge occurs from withdrawal of water from wells and from natural springs and seeps. An unknown smaller quantity is discharged to the saline water zone (Maclay 1995). Discharge is greatly affected by water demand and rate of pumping. If recharge is high, the aquifer can sustain higher levels of pumping, while maintaining higher levels of springflows. However, if there is low seasonal recharge followed by reduced rainfall and by high rates of pumping, then aquifer levels will decline with resulting decreased spring discharge.

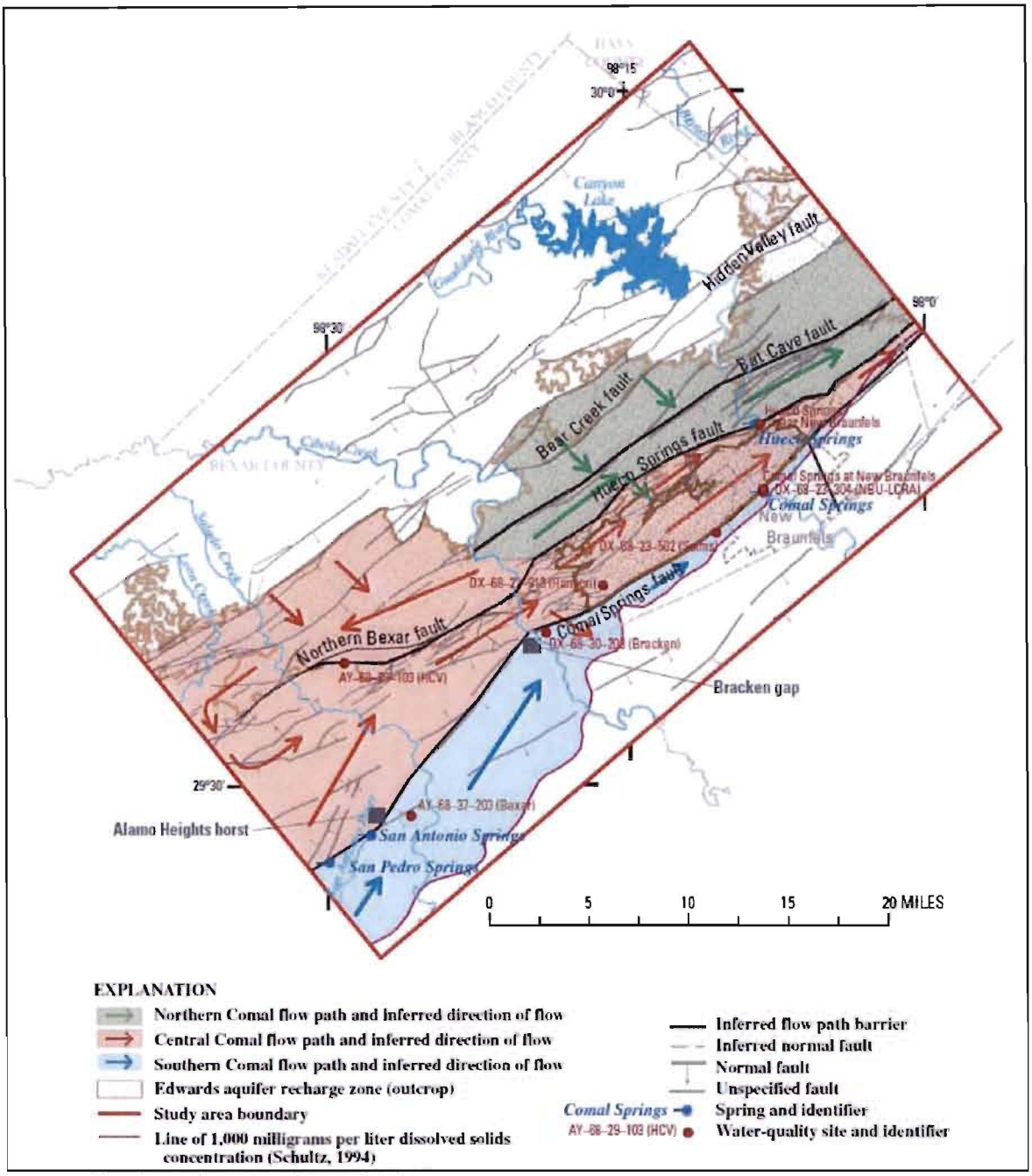

Figure 3. Map showing hypothesized groundwater flow paths of the Edwards Aquifer in northern Bexar and Comal Counties (Otero, 2007)

Estimates of the average annual recharge of the Edwards Aquifer vary according to changes in weather cycles and resulting precipitation over the recharge zone. Maclay (1995) cites an average annual recharge of 635,000 acre-feet. However, Klemt et al. (1979) indicate an average annual recharge of approximately 651,000 acre-feet. Data from the Edwards Aquifer Authority's 2008 Hydrogeologic Data Report (2009) indicate an average annual recharge of 724,300 acre-feet for the period of record 1934-2008, and an even higher annual average of 991,700 acre-feet during the last ten-year period 1999-2008. Lowest annual recharge (44,000 acre-feet) occurred during 1956 at the peak of the drought of record. Highest recharge (2,486,000 acre-feet) occurred in 1992. Streams losing flow as

they cross the Edwards outcrop account for a majority of the recharge to the aquifer (85 %). A much smaller portion is contributed by direct precipitation and localized runoff within the recharge zone (15 %). Rates of infiltration of water carried by the streams across the recharge zone have been estimated by the U.S. Army Corps of Engineers in 1965 to range from 500 to greater than 1,000 cubic feet per second (cfs).

Water discharges from the Edwards Aquifer from wells and from natural springs and seeps occurring near geological faults along the Edwards limestone and Balcones Escarpment. Wells are the principal source of water for agricultural, municipal, and industrial uses in the region. Average annual discharge from wells over the period of record 1934-2008 was 310,300 acre-feet (44.6%), in comparison to 385,000 acre-feet (55.4%) from springflow. During droughts, the proportion of well discharge to spring discharge changes considerably. During 1956 at the height of the drought of record, wells contributed 82% of the discharge in comparison to 18% for springs. During the drought of 2008, wells contributed 51% of the total discharge, while spring discharge comprised 49%.

Well discharge has generally increased over the period of record to a point beginning in 1968 and running through 1989 where annual discharge consistently exceeded the average annual recharge (Maclay 1995). Pumping peaked in 1989 at an estimated level of 542,000 acre-feet. Since 1980, as a result of increased pumping, there has been greater fluctuation of springflow with increased time required for recovery, even during a period that recorded the two highest levels of aquifer recharge (1992 and 1987).

In 1993, the Texas Legislature created the Edwards Aquifer Authority (EAA) by passage of the EAA Act to "manage, conserve, preserve, and protect the southern segment of the aquifer and to increase the recharge of, and prevent pollution of water in, the aquifer." Although the legislation was passed in 1993, litigation delayed agency start up by three years, until 1996. In 2007, the Texas Legislature mandated the EAA to allow regular permitted withdrawals from the southern segment of the Edwards Aquifer of up to 572,000 acre-feet per year subject to mandated reductions in pumping of up to 40 percent during critical drought periods. These mandates may be further modified by aquifer management strategies currently being developed as part of a Habitat Conservation Plan also mandated in 2007 by the Texas Legislature, as part of the Edwards Aquifer Recovery Implementation Program.

The groundwater of the Edwards Aquifer is generally known to be of high quality, typically fresh, but hard with an average dissolved solid concentration of less than 500 mg/l (TWC 1992). However, increased human development throughout the region has created a higher level of pollutants and greater potential for adversely affecting both surface water and groundwater quality. Cooperative efforts between the EAA, USGS, and TWDB have resulted in a systematic program of water quality monitoring. Each year the EAA measures the quality of water in the aquifer by sampling approximately 80 wells, eight surface water sites, and major spring groups across the region. Sample collection sites are typically selected to provide representative samples of the recharge zone, shallow and deep artesian zone, springs, and surface streams that flow across the recharge zone as well as areas with historical detection of anthropogenic compounds. In 2008, well sampling did not indicate widespread contamination in the aquifer (Johnson et al, 2009). However, elevated nitrate detections (>2 mg/L) were present in 20 of the 81 wells sampled. Metals were detected above a regulatory limit in eight of the 81 wells sampled. Detections of the metals strontium and iron are likely due to naturally occurring sources of these two metals. Strontium detections are typically highest in and close to the saline water part of the aquifer. Iron detections are occasionally high in some parts of the aquifer system. Manganese was unusually high in one well and is scheduled for future monitoring.

Trinity Aquifer

The Trinity Aquifer is located below the Edwards Aquifer and within the RSA for Loop 1604 is very limit in extent and use of the aquifer. Groundwater may flow from the Glen Rose Formation to the Edwards Aquifer along the BFZ. Groundwater moving laterally in a down-gradient direction within the Glen Rose can enter the Edwards Aquifer through fault planes. However, most studies have shown that the Trinity contribution to the Edwards is a relatively small percentage of the total water budget during average recharge conditions for the Edwards Aquifer. Based on their hydrologic relationships, the water-bearing rocks of the Trinity Group, collectively referred to as the Trinity Group Aquifer, are organized into three aquifer units: The upper, middle and lower Trinity Aquifer (Ashworth, 1983).

Recharge to the Trinity Aquifer is completely dependent on rainfall that might occur over the outcrop areas. Both the Cow Creek Limestone and the Glen Rose Formation contain caves and karst features (Veni, 1997). Because of fractures, faults and other hydrogeologic factors, the upper, middle and lower Trinity Aquifer units often are in hydraulic communication with one another and collectively should be considered a leaky-aquifer system. Estimated recharge to the Trinity has been made at about four percent of annual rainfall, which would correlate to a little more than one inch of recharge per year to the Trinity Aquifer (Ashworth, 1983).

The upper and middle Trinity Aquifer units are divided because of water-quality differences. This portion of the Glen Rose is characterized with significant secondary porosity and in certain areas can have cavern development. The lower Glen Rose forms the upper portion of the productive middle Trinity Aquifer. The middle Trinity Aquifer is the most productive groundwater producer for the Trinity section in northern Bexar County.

Much of the water in the lower Trinity Aquifer is produced from coarser sediments in and near the bottom of the Hosston. The lower Trinity is extensively used further to the north, but few wells tap the deeper lower Trinity in Bexar County and those few that do, generally have encountered higher total dissolved solids and poorer water quality.

Previous Cave Studies at Natural Bridge Caverns

Several previous studies related to the geology and hydrology of Natural Bridge Caverns have been performed in the past. Kasting (1983) conducted a doctoral study of karst in the region, and included a detailed evaluation of the cave. This evaluation included descriptive details of the morphology and observational water flow characteristics of the cave. A major change in the terminology used by Kasting and that recognized in the current geologic literature is related to lithology. Kasting refers to the upper portions of Natural Bridge Caverns in the Bull Creek member of the Walnut Formation (Edwards Group), while this formation is currently not recognized in Comal County. Instead, the Kainer Formation, including the Basal Nodular and Dolomitic members are now defined in the area (Rose, 1972; Blome et al., 2005). However, Kasting's understanding of karst processes, geomorphology, hydrology, and speleogenesis provide and excellent framework to understand how the cave formed and its current hydrogeologic significance.

In recent years, a research group at The University of Texas at Austin led by Dr. Jay Banner has conducted numerous and on-going projects within Natural Bridge Caverns. These studies are related primarily to cave drip water, speleothem growth, and cave atmosphere conditions. The following list summarizes some of these:

Wong et al., 2011

- Examined effects of precipitation and cave air CO_2 concentration on the composition of cave dripwaters and quantitatively modeled mineral-solution reactions within the bedrock. Discussed the implications of the findings on paleoclomate reconstructions using speleothems.

Cowan, 2010

- Examined temporal variability of cave air CO_2 concentrations in Natural Bridge and other Central Texas Caves. CO_2 fluctuated on a seasonal and diurnal timescale and occur in wild and show caves, suggesting a non-anthropogenic control on CO_2 concentration. Seasonal fluctuations are attributed to density driven cave ventilation and diurnal fluctuations are attributed to cave-surface air exchange caused by the global barometric tide.

Wong and Banner, 2010

- Examined the effects of clearing brush in an 8,000m^2 area above and upslope of the cave. Assessed drip rate, drip water composition, cave air CO_2 and speleothem growth pre and post-clearing. No clear impact on measured drip rates and Sr isotopic data suggests there was no significant impact on recharge to the cave. Significant decrease in cave air CO_2 concentration in the South Cavern (clearing was above South Cavern) that affected drip water chemistry.

Banner et al., 2007

- Examined the link between cave air CO_2 and speleothem growth rates. Cave air CO_2 is seasonally variable with elevated CO_2 concentrations in the warm months. This trend was observed in other Central Texas caves. Elevated air CO_2 concentrations were shown to inhibit speleothem growth. These findings have significant implications on paleoclomate reconstructions using speleothems.

Guilfoyle, 2006

- Examined environmental controls on drip water isotopic and elemental chemistry in NB and another central Texas cave. Chemical evolution of the waters was attributed to variations in calcite precipitation, soil geochemistry, flow paths, and degassing of CO_2 driven by seasonal cave ventilation.

Musgrove and Banner, 2004

- Measured the temporal variability in the geochemistry of cave dripwaters to better understand links between climate and hydrologic processes. Found that drip water chemistry and Sr isotopic composition was strongly influenced by residence time and water rock-interactions with overlying soils and bedrock, which is controlled by recharge. Spatial variation in drip water composition was attributed to heterogeneity of soil and bedrock composition and vadose flow type (diffuse or conduit).

Results

The results for this geologic assessment of Natural Bridge Caverns and the overlying land surface are presented in three parts: **1.)** the in-cave description and evaluation of water flux; and **2.)** the results of the surface walking karst feature survey. The in cave evaluation describes the cave in 13 sections, defining major geomorphic and hydrologic characteristics of each separately. The individual section breakouts are shown in Plate 3 – Geologic Cross-section of Natural Bridge Caverns and described in the following section. **3.)** A summary of manmade features on the property relevant to aquifer recharge sensitivity. **4.)** The surface karst feature survey results are summarized in Appendix A – Feature Descriptions and feature locations shown in Plate 1 – Soils and Plate 2 – Geology. Surface features near the cave footprint are also shown in Plate 3.

In-Cave Assessment

Following two days of in-cave evaluation at Natural Bridge Caverns, 13 different sections were defined. The sections breakouts were identified by Natural Bridge Caverns staff geologist, Brian Vauter. The section extents are shown on Plate 3 – Geologic Cross-section of Natural Bridge Caverns.

1. FAULT ROOM SECTION

The Fault Room Section is the southern-most section of the cave, ending in the zone of the Bat Cave Fault, a major off-setting fault of the Balcones Fault System. This Room has a high ceiling and large breakdown talus cone that has resulted from significant dissolution of limestone along the dip slope of the Bat Cave Fault. The strike of the Bat Cave Fault is measured at 60 degrees and has an apparent dip of 75 degrees to the south. Several associated faults with a strike of 50 degrees and dip of 72 degrees to the north intersect the Bat Cave Fault and are shown in Figure 4. These formed as a result of drag along the Bat Cave Fault plane occurred. Drip water is active in this room even during drought conditions. The University of Texas conducts studies on water dripping in this section. The room is formed in the Cavernous and Camp Bullis members of the Glen Rose Formation north of the Bat Cave Fault, and in the Dolomitic member of the Kainer Formation south of the fault (Plate 3). A ventilation shaft enters the Fault Room Section of the cave in the tunnel north of the fault. This shaft corresponds with surface feature NBS-10 (Appendix A; Plate 3).



Figure 4. Photo of the east wall of the fault room showing several reverse faults related the Bat Cave Fault, although they dip to the north-northwest instead of the south-southeast.

2. BOX CANYON / BALLROOM SECTION

This section of the cave is immediately north of the Fault Room Section and is formed by two canyon passages that formed along preferential orientations of a fracture and a small fault. The Box Canyon extends north-northeast along a major fracture observed in the ceiling with a bearing of 337 degrees. This passage is formed in the Camp Bullis member of the Glen Rose Formation, and the contact with the Cavernous member is observed in the flat ceiling in certain areas. At the point this fracture intersects a series of small normal faults with a strike of 55 degrees (consistent with Bat Cave Fault), the passage changes path, and formed along this orientation (55 degrees). The passage is at a higher level here, and is formed primarily in the Cavernous member. Another fracture is intersected approximately 75 meters north, and the passage again trends in a heading of approximately 335 degrees. This area is referred as the Ballroom and is also formed entirely in the Cavernous member. There is relatively little secondary calcite precipitation in this section of the cave, and speleothems are not as common as other sections. There are active drips present, and The University of Texas has a drip plate here that is collecting precipitated calcite related to climate studies they are performing.

3. CATHEDRAL ROOM SECTION

This section of the cave is characterized by large amounts of breakdown and numerous cave formations. An 2-foot diameter entrance shaft (Entrance Shaft # 5) has been bored to allow for access into the cave directly from the surface. Tourists can be lowered into the Cathedral Room through this shaft, which corresponds with surface feature NBS-30 (Appendix A; Plate 3). Ceiling water drips remain active in this section even during drought conditions, and are observed to form along the primary fracture trend (Figure 5). The Cathedral Room Section is formed entirely in the Cavernous member of the Glen Rose Formation.



Figure 5. Ceiling in the Cathedral Room Section shows fractures with preferential water flow forming a higher density of stalagtite growth.

4. JAREMY ROOM SECTION

The Jaremy Room Section of Natural Bridge Caverns was discovered though an exploratory borehole drilled into the room along the west wall. This shaft is referred to as the Jaremy Room Shaft Entrance and corresponds to surface feature NBS-63 (Appendix A; Plate 3). This is a very large room with a vertical extent of approximately 30 meters. The room is characterized by a large breakdown talus slope covered with a high density of cave formations. The base of the Jaremy Room is in the Cavernous member of the Glen Rose Formation, but most of the volume of the cave void here extends up through the Basal Nodular member of the Kainer Formation to the base of the Dolomitic member of the Kainer Formation. Some ceiling structures referred as "cupalas" are found along parts of the ceiling, and are diagnostic of upward flowing water in phreatic conditions. This may indicated that an earlier period in the cave formation occurred when water levels were much higher, and artesian conditions may have been present in the area. This upward flowing water from the Glen Rose Formation into the overlying Kainer Formation of the Edwards Group may have caused this upward reaching chamber while most of the remainder of the cave exists in the Glen Rose. This process has been referred as hypogene speleogenesis (Klimchouk, 2009), and is hypothesized in other parts of the Edwards Aquifer.

5. ENTRANCE SECTION

This is the only natural entrance to the Natural Bridge Caverns system, and may have evolved similarly to the Jaremy Room. The intersection of voids caused by upward-flowing artesian flow and downward cutting of the surface stream here likely caused the entrance to form. There is evidence that cave passages once existed above the present-day land surface from cave formations observed in the creek northwest of the natural entrance (NBS-38; Figure 6). The Entrance Section is formed in the Dolomitic (Figure 7) and Basal Nodular members of the Kainer Formation and the lower passages are in the top of the Cavernous member of the Glen Rose Formation.



Figure 6. Cave formation (NBS-38) now located on the surface in the creek drainage above the existing cave.



Figure 7. View looking at the natural entrance sinkhole to Natural Bridge Caverns. The resistant bed of limestone making the "bridge" for which the cave system was named is formed in the Dolomitic member of the Kainer Formation.

6. PURGATORY CREEK SECTION

The Purgatory Creek Section of the cave is characterized by a large, deep stream passage formed as water flowing through the cave cut down through the limestone (Figure 8). This stream is typically dry, but the room fills with water up to 20 meters deep during very large rain events several days after surface streams peak (Kasting, 1883). The Purgatory Creek Section is formed entirely in the Cavernous member of the Glen Rose Formation. An access shaft (NBS-55) intersects the cave in this section, and was used when the cave was under development. Other areas of significance in this section include Pluto's Anteroom, the Sherwood Forrest, and Chapel Hall.

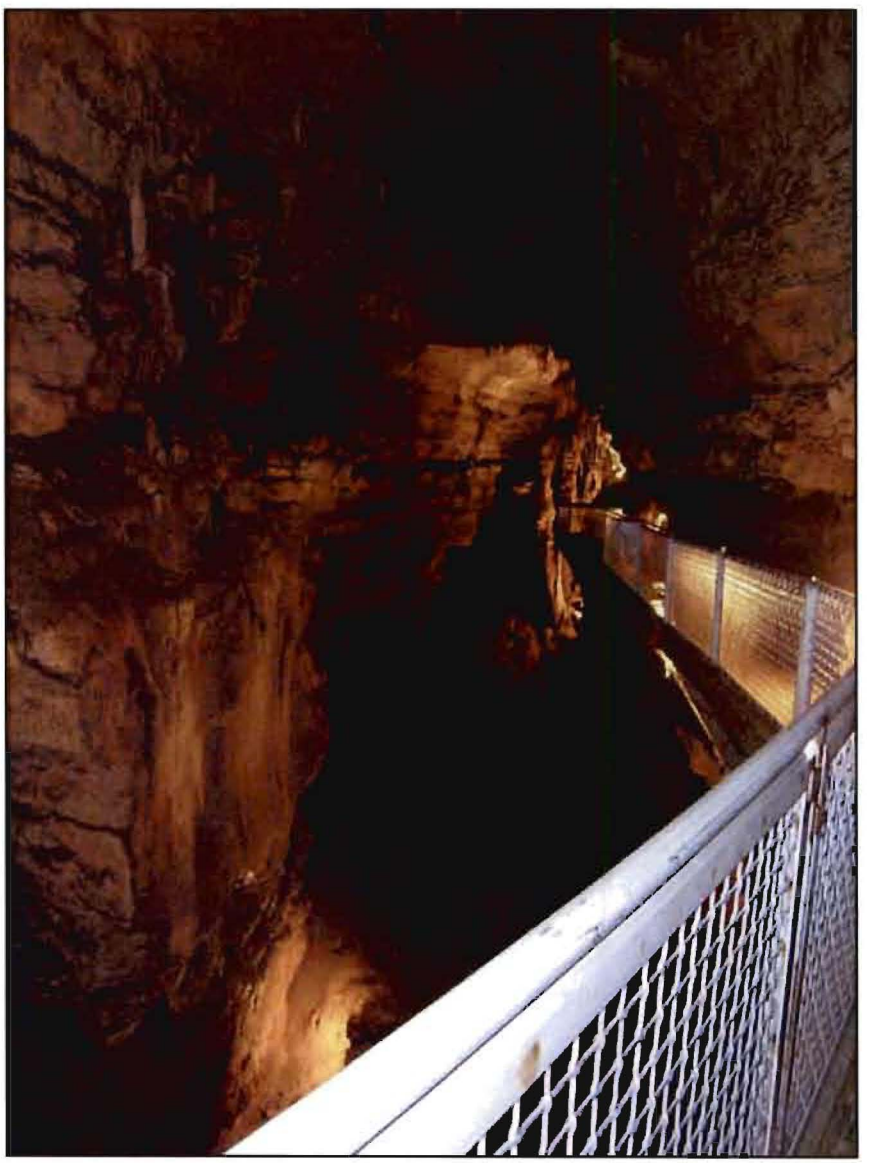

Figure 8. The deep, relatively narrow passage of Purgatory Creek shown from the tourist walkway.

7. CASTLE OF THE WHITE GIANTS SECTION

The Castle of the White Giants Section is characterized by the huge and numerous speleothems in this large room (Figure 9). It is part of the same water flow passage as Purgatory Creek, but lies on a large mass of breakdown formed as the roof collapsed. This is now almost completely covered by secondary calcite (cave formations). An upper level passage (Jan's Long Crawl) has formed to the side of the main room. The room has been observed to fill with water during large flood events (Figure 10). This section is formed entirely in the Cavernous member of the Glen Rose Formation.



Figure 9. Large stalagmites are observed by tourists in the Castle of the White Giants Section of Natural Bridge Caverns.



Figure 10. Floodwater fills the lower portions of the Castle of the White Giants during a large precipitation event.

8. GRENDEL'S CANYON SECTION

Grendel's Canyon is the third section of the middle portion of the cave system formed in the lower part of the Cavernous member of the Glen Rose Formation. These sections include Purgatory Creek, Castle of the White Giants, and Grendel's Canyon. They are all part of a single flow system that may also connect to the lower levels of the northern cavern sections (Limbo Passage and Lake Passage). The three middle sections all have a similar dominant trend of 330 degrees and are formed in the same geologic unit (Cavernous member of the Glen Rose Formation). Grendel's Canyon is not part of the tourist route through the cave, and is filled with large amounts of wet sediment and mud bounded by breakdown on each end (Figure 11). A bypass tunnel was cut through the limestone to allow for continuation of the tourist path to the next section to the north, the Exit Tunnel Section.



Figure 11. View looking south into Grendel's Canyon from the tour pathway.

9. EXIT TUNNEL SECTION

The Exit Tunnel Section of the cave includes the very large room of the Hall of the Mountain King and the Valley of the Fallen Lords. This is primarily one large room formed along a similar trend to that of regional faulting (~ 60 degrees). The rooms are highly decorated with cave formations (Figure 12), many of which have developed on a large breakdown talus pile. A manmade exit tunnel has been excavated from the Hall of the Mountain Kings to the surface for cave tours. This tunnel intersected a natural void 30 meters west of the main cave, indicating that other voids are likely to exist disconnected from the explored cave, possibly in hydrologic communication with the main passages. The Exit Tunnel Section is formed in the Basal Nodular member of the Kainer Formation and the manmade tunnel is bored through the Dolomitic member of the Kainer Formation.



Figure 12. Numerous speleothems are seen from the tour path in the Hall of the Mountain King Room in the Exit Tunnel section of the cave.

10.THE MOORS SECTION

The Moors Section of Natural Bridge Caverns extends north from the Valley of the Fallen Lords room and is off the regular tour cave route. A large walking passage continues for several tens of meters then constricts to a vertically narrow tunnel known as the Birth Canal (Figure 13). This narrow passage is formed along a bedding plane that has been preferentially dissolved and is almost completely covered with precipitated calcite (cave formations). This section is over 150 meters long, and winds along a general trend of 355 degrees. All of the Moors Section is formed within the Basal Nodular member of the Kainer Formation.



Figure 13. View of the vertically narrow passage of the Birth Canal in The Moors Section of the cave.

11.LIMBO PASSAGE SECTION

The Limbo Passage Section of Natural Bridge Caverns is primarily formed directly below The Moors Section. The cave passage connects through the Inferno Room / Dome Pit Section via a passage that extends south from the Inferno Room (discussed in next section). This tunnel is over 150 meters in length and is characterized by the numerous cave pools and rimstone dams present (Figure 14). In areas between the pools, rocks are covered with a calcite coating and large amounts of mud are present. The Limbo Passage Section ends at a rimstone lined pool known as the Octagon Lake (Figure 15). This section is formed entirely in the Cavernous member of the Glen Rose Formation and trends roughly 355 degrees.



Figure 14. One of the many cave pools found in the Limbo Passage Section of the cave.



Figure 15. The Octagon Lake is rimstone lined pool at the southern end of the Limbo Passage Section of the cave.

12.INFERNO ROOM / DOME PIT SECTION

The Inferno Room / Dome Pit Section of the cave is characterized by the two main rooms it is named from and also by the 3-dimensional narrow passages that wind between the rooms. The Inferno Room has developed as large scale collapse has created a very large, almost vertical breakdown talus pile that is over 20 meters high. A small opening in the ceiling of this room connects to The Moors Section. Rocks in this pile are almost completely coated in secondary calcite (Figure 16). Passage leading south from the Inferno Room connects to the Limbo Passage Section. The area north of the Inferno Room is a 140 meter long tunnel leading to the Dome Pit, another large room that has developed upwards through the limestone (Figure 17). Most of the passage in this section is developed in the Cavernous member of the Glen Rose Formation, but the large rooms extend upward into the Basal Nodular member of the Kainer Formation. The passage connecting the two rooms runs along a bearing of 45 degrees.



Figure 16. A calcite flowstone covered breakdown talus cone typical of the Inferno Room / Dome Pit Section of the cave. The three geologists are also covered with the extensive thick mud that is characteristic of the northern sections of Natural Bridge Caverns.

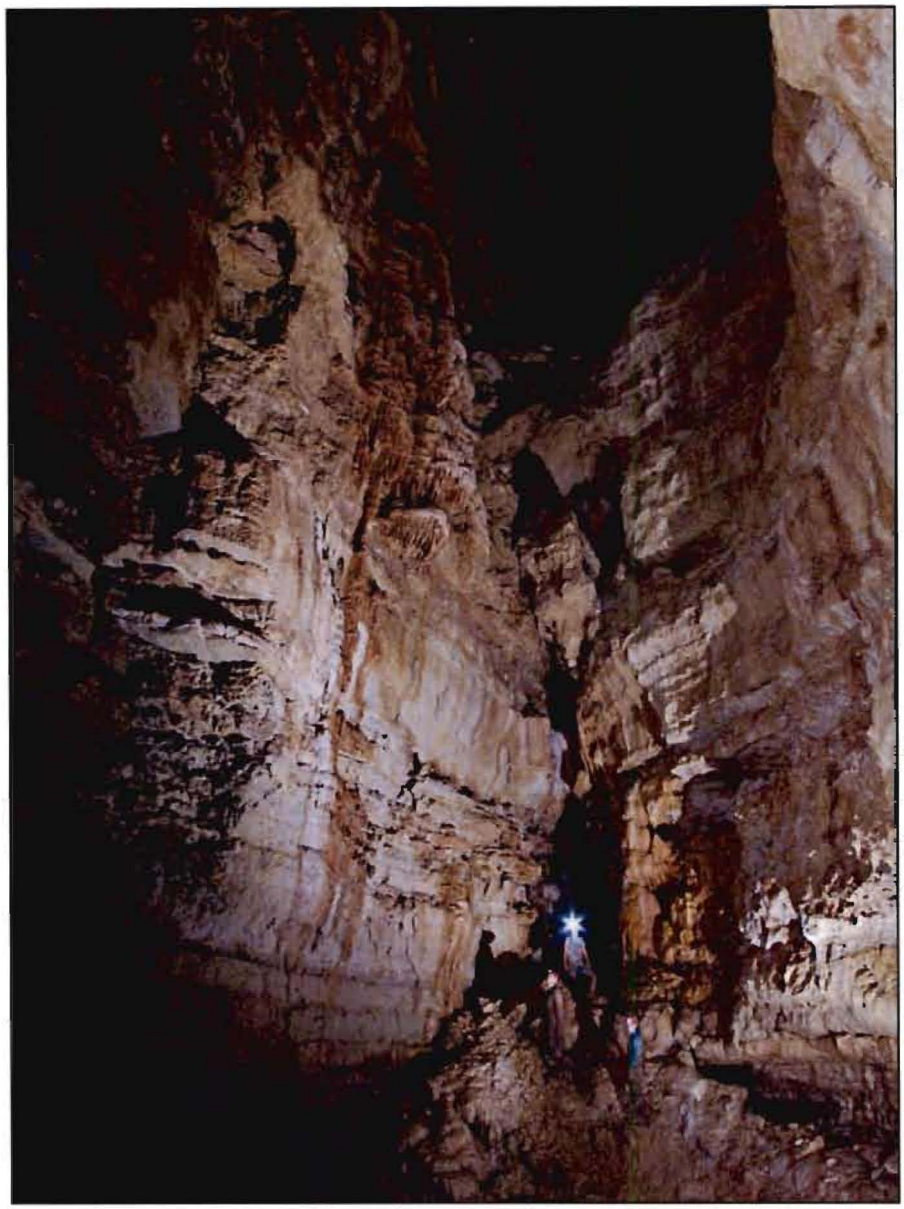

Figure 17. The Dome Pit room has a large vertical extent as indicated by the cave explorers shown for scale (Orion Knox photo).

13.LAKE PASSAGE SECTION

The Lake Passage Section of Natural Bridge Caverns is the northern-most section of the cave, extending 130 meters north of the Dome Pit. This section is very similar to the passage connecting the Inferno Room and Doom Pit, and runs along the same trend (45 degrees). There are several areas of large breakdown, including a large boulder named House Rock. The passage ends near a pool lined with calcite coated rocks (Figure 18), and inflow into the cave comes from an infeeder named the River Styx. This infeeder likely has some degree of connection to water recharging from Cibolo Creek, which is only several hundred meters to the north. The Lake Passage Section is formed entirely within the Cavernous member of the Glen Rose Formation.



Figure 18. The northern-most cave pool near the River Styx in the Lake Passage Section of Natural Bridge Caverns.

Manmade Features

Numerous manmade features in the bedrock exist on the Natural Bridge Caverns property. These include operational water wells, test water wells, exploration boreholes, access shafts, and service shafts into the cave. All observable features were documented during the surface karst feature survey as required by TCEQ standards. A summary of these features are presented in Table 1. Feature names in this table relate to the TCEQ Geologic Assessment tables at the beginning of this document and are related to well and driller's logs in Appendix B.

Table 1. Manmade features in bedrock in the project area

Feature Name	Type	Alias Name	Date drilled	Total Depth	depth to water
NBS-01	Well	Trinity Well No.3	Summer 2009	960 ft.	---
NBS-10	Shaft	Ventilation Shaft	---	165 ft.	---
NBS-13	Well	Campground Well	April 19, 1968	450 ft.	330
NBS-24	Well	Trinity Well No. 1	Summer 2009	1,080 ft.	335
NBS-29	Well	Well #2	November 22, 1963	400 ft.	200 ft.
NBS-30	Well	Hole No. 6	December 15, 1967	315 ft.	---
NBS-31	Boring	Exploration Boring	---	---	---
NBS-35	Shaft	Access Shaft	---	100 ft.	---
NBS-43	Well	Well #4	May 26, 1964	330 ft.	280
NBS-48	Well	Trinity Well No. 4	Summer 2009	1,100 ft.	---
NBS-53	Well	Parking Lot	September 4, 1998	1,000 ft.	325
NBS-54	Shaft	Line Shaft	November 15, 1963	124 ft.	---
NBS-55	Shaft	Access Shaft	---	150 ft.	---
NBS-62	Well	Trinity Well No. 2	Summer 2009	1,140 ft.	---
NBS-63	Boring	Hole No. 4	December 5, 1967	147.5 ft.	---

Surface Karst Feature Survey

Results of the surface karst feature survey are presented in the TCEQ Geologic Assessment tables at the beginning of this document. All features were ranked according to TCEQ standards and reported in both the tables and on Plates 1 and 2 (Soils and Geology maps). Descriptions and photographs of the features are given in Appendix A.

Recommendations

The proposed expansion of Natural Bridge Caverns facilities in northwestern Comal County occurs on a portion of the Edwards Aquifer, crossing over 450 acres of the Edwards Aquifer Recharge Zone (EARZ). The indirect and cumulative effects of this development could impact the cave and aquifer below without proper planning that accounts for the sensitive nature of this karst area. These possible impacts include water supply contamination associated with construction and operation activities such as increased levels of suspended sediment, dissolved metals, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and other toxic materials resulting from increased anthropogenic disturbance and activity (Barrett et al., 1995). Infiltration of any of these contaminants into the groundwater system is enhanced in the particular hydrogeologic setting of northern

Bexar County, which is karstic in nature. Karst aquifers are well documented to rapidly transmit surface water into the subsurface through systems of enhanced permeability channels that include solution-enlarged fractures or joints, faults, solution cavities, solution sinkholes, collapse sinkholes, caves, or combinations of these features. Special consideration is required to protect the karst groundwater resources from urban development, including that related to the proposed facility expansion. Direct impacts to groundwater quality are related to the occurrence, density, and type of karst features that exist within the zone of disturbance of projects in karstic environmentally-sensitive zones such as the EARZ, both in the construction and operation phases of the expansion projects. Dozens of karst features in the area of the proposed expansion project have been identified from this study. The high number of features is reflective of the environmental sensitivity of northwestern Comal County related to potential groundwater contamination possible through discrete karst features.

The karst survey was performed throughout the entire property in the EARZ. As per TCEQ guidelines all features with sensitivity values of 40 points or greater should be evaluated for protection in the water pollution abatement plan (WPAP). Additionally, features known to have direct connection to Natural Bridge Caverns should be considered as sensitive sites. For this reason, particular caution should be taken to prevent water quality degradation from construction and operation of an expanded facility in areas that could directly affect creeks in the project area. In particular, the drainages that pass directly over the caverns have been documented to contain sensitive karst features. These features could transmit rapid recharge to the caverns or aquifer with little to no natural filtration, thus making these downstream segments susceptible to contamination during construction and operation of the expanded facilities.

Recent dye tracing studies have been conducted under the direction of the Edwards Aquifer Authority (EAA) (Johnson et al., 2010) and provide good evidence for flowpaths and time of travel in the aquifer. These studies took place near Panther Springs Creek and U.S. 281 in northern Bexar County and are directly applicable to evaluation of sensitivity of the EARZ in the area near Natural Bridge Caverns. Four phases of tracing using non-toxic fluorescent dyes were performed through injection sites in six caves and at an additional site that is a soil covered inter-stream location with no visible karst features. Water was sampled for the detection of the dyes in 32 public and private wells located in the general vicinity of Panther Springs Creek near Loop 1604 and U.S. 281.

The path that the dyes took from injection point to receptor crossed under the Loop 1604 area just east of the Blanco Road intersection. The potential straight-line flow velocities measured from the testing ranged from a low of 43 feet per day to a high of 17,400 feet per day. The large discrepancies in velocities can be attributed to whether a monitored well is located in the vicinity of karst conduit or flow path that might directly channel the dye to a particular location and dye attenuation times in the vadose zone at injection sites. The hydrologic conditions before, during and after dye injections potentially impact both groundwater velocity and direction of groundwater flow. Several mapped faults are located between injection and the monitored receptor wells. The results from the traces indicate that these faults did not interfere or redirect the flow path between receptor and injection locations. The apparent flow direction was perpendicular to the faults and generally parallel to the surface direction along the creek. Additionally, some of the injections were in caves predominantly in the upper Glen Rose and were detected downstream in wells completed into the Edwards Aquifer. The location of one dye injection was in an inter-stream location and was slowly flushed with water over a two-month period in an area with no observable karst features. The dye was detected in two wells, which demonstrated the potential vulnerability of the recharge zone even in areas that are not known to have mapped caves or

other karst features. This study is significant to the Natural Bridge Caverns property since a major fault (Bat Cave Fault) similar to those in Bexar County exists. Tracer studies such as this in the area may show that groundwater in the Trinity Aquifer is in direct connection with groundwater in the Edwards Aquifer, flowing directly across faults. Faults with major offsets like the Bat Cave Fault were previously thought to act as barriers to groundwater flow (Kasting, 1983), but now are recognized to have karst conduits passing directly through them.

Personnel

Dr. Marcus O. Gary directed the geologic assessment on this project. Marcus is a state of Texas licensed geologist (No. 10386) and hydrogeologist specializing in karst forming processes and the implications that karst geology has on natural resource management. Marcus received an Associate of Science degree in Marine Technology at the College of Oceaneering, a B.S. degree in hydrogeology and environmental geology at the University of Texas at Austin, and completed his doctorate at UT on a volcanogenic karst project in 2009. His research has been internationally recognized for investigating of the world's deepest underwater sinkhole and interpreting the geologic mechanisms that formed the karst system. For eight years he worked in the Texas Water Science Center of the U.S. Geological Survey, performing a multitude of tasks related to water resources. Projects included developing methods to quantify spring flow using acoustic technology, monitoring stage and water chemistry parameters at springs, performing a geochemical investigation of the Barton Springs Segment of the Edwards Aquifer, providing diving support for coring and karst monitoring projects, serving as a dive safety officer for the Central Region, and designing and implementing a variety of continuous monitoring projects at locations across Texas. His work at Zara since 2007 includes geologic assessments, drainage basin delineation, and dye tracing.

N. Cass Meyer assisted with the Geologic Assessment in the field and helped prepare the final report. Cass is working towards his Professional Geoscientist license, and has his Bachelor of Science in Geology from the University of Texas at Austin. Cass has been involved with numerous subsurface and groundwater modeling projects throughout Texas focusing on the Upper and lower Cretaceous, and has recently begun learning caving techniques from Zara personnel.

Peter Sprouse assisted with the karst feature survey for this project. He has been exploring and studying caves since 1970, having led the exploration of Sistema Purificación in Mexico, one of the longest and deepest caves in the world. He began collecting cave fauna for study by taxonomists in 1977, and has nine species named in his honor. He attended the University of Texas at Austin in 1974 as geology major, and since 1991 he has worked professionally in the fields of cave biology, land management, and cartography. He co-founded Zara Environmental LLC in 2003 and currently manages over 90 caves in central Texas, conducting fire ant control and building cave gates. His experience in conducting karst surveys for invertebrate cave fauna habitat is very extensive. He is an NSS Fellow and was presented with the prestigious Lew Bicking Award and is a multiple medal winner in NSS Cartographic Salons. He is a director of the Texas Speleological Survey and serves on the Balcones Canyonlands Preserve Scientific Advisory Committee Karst Subcommittee. He holds US Fish and Wildlife Service Endangered Species Permit number TE014168-0 and Texas Department of Agriculture Pest Control License number 0362274.

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APPENDIX A – FEATURE DESCRIPTIONS

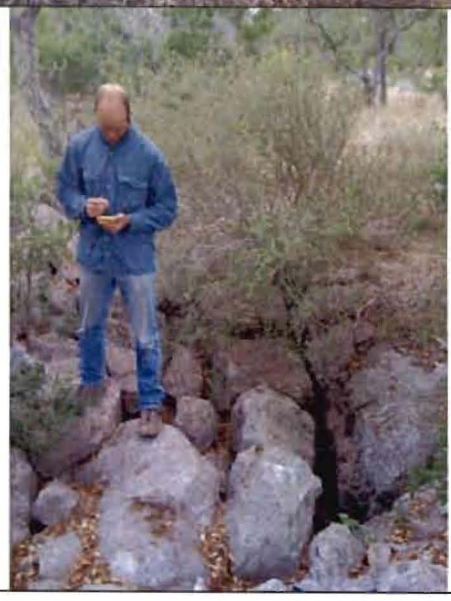
Feature ID	Description	Photo
NBS-01	This well measures 50 cm in diameter and encounters cave passage at approximately 61 m depth. A bit drop of approximately 3-4 m occurred when cave passage was encountered.	
NBS-02	This closed depression measures approximately 100 by 40 m and is 12 m deep. It is located on a hillside, has low potential for recharge, and receives sheetwash from an area of approximately 10,000 m^2.	
NBS-03	This enlarged fracture measures 0.4 by 0.3 m and is 1.5 m deep. It is located in drainage, has a high potential for recharge and a catchment area of approximately 10,000 m^2.	

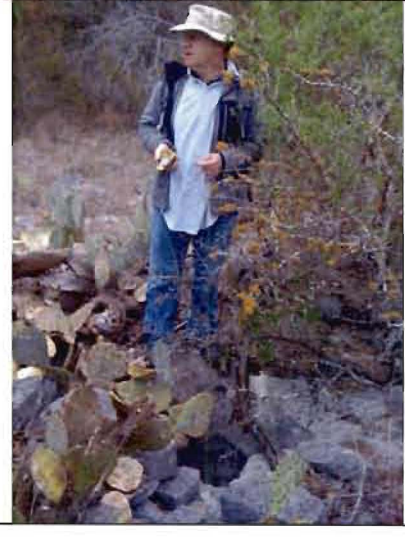
Feature ID	Description	Photo
NBS-04	This closed depression measures 4 by 2 m and is 1.5 m deep. It is located on a hillside, has a low potential for recharge and a catchment area of approximately 5,000 m^2.	
NBS-05	This closed depression measures 80 by 40 m and is 10 m deep. It is located in drainage, has a low potential for recharge and a catchment area of approximately 30,000 m^2.	
NBS-06	This collapse sinkhole measures 2 by 1 m and is 0.5 m deep. It is located on a hilltop, has a low potential for recharge and a catchment area of approximately 10 m^2.	

Feature ID	Description	Photo
NBS-07	This closed depression measures 110 by 30 m and is 15 m deep. It is located in a drainage, has a low potential for recharge and a catchment area of approximately 20,000 m^2.	
NBS-08	This solution sinkhole measures .03 by 0.2 m and is 0.3 m deep. It is located on a hilltop, has a moderate potential for recharge and a catchment area of approximately 100 m^2.	
NBS-09	This fracture zone is between two mapped faults. It measure 20 by 25 m. It is located in a streambed, has moderate potential for recharge, and has a catchment of 10,000 m^2.	

Feature ID	Description	Photo
NBS-10	This access shaft was drilled to help increase surface airflow to the south cave passage, which does not have a natural entrance.	
NBS-11	This is a grouping of six closed depressions within an area of 27 square m. The features are located on a hillside, have moderate potential for recharge and a catchment of 500 m^2. This cluster is near the same mapped fault that defines the southern extent of mapped passage in the south passage.	
NBS-12	This collapse sinkhole measures 3 by 1.5 m and is 0.5 m deep. It is filled with modern soils, fine sediments and vegetation (small cedar trees). It is located on a hillside, has a low potential for recharge and a catchment area of approximately 100 m^2.	

Feature ID	Description	Photo
NBS-13	This well and well house are not used by the Natural Bridge Cavern. It is near a private residence on the property.	
NBS-14	This collapse sinkhole measures 4 by3 m and is 0.3 m deep. It is filled with modern soils, fine sediments, and grassy vegetation. It is located on a hillside, has a moderate potential for recharge and a catchment area of approximately 150 m^2.	
NBS-15	This solutional sinkhole measures 1 by 0.3 m and is 0.5 m deep. It is located on a hillside, has a moderate potential for recharge and a catchment area of approximately 200 m^2.	

Feature ID	Description	Photo
NBS-16	This solutional sinkhole measures 3 by 0.5 m and is 0.8 m deep. It is filled with leaf litter. It is located on a hillside, has a high potential for recharge and a catchment area of approximately 200 m^2.	
NBS-17	This collapse sinkhole measures 2.5 by 1.5 m and is 0.3 m deep. It is filled with modern soils and vegetation. It is located on a hillside, has a low potential for recharge and a catchment area of approximately 200 m^2.	
NBS-18	This solutional sinkhole measures 5 by 3 m and is 2.9 m deep. It is located on a hillside, has a high potential for recharge and a catchment area of approximately 10,000 m^2.	

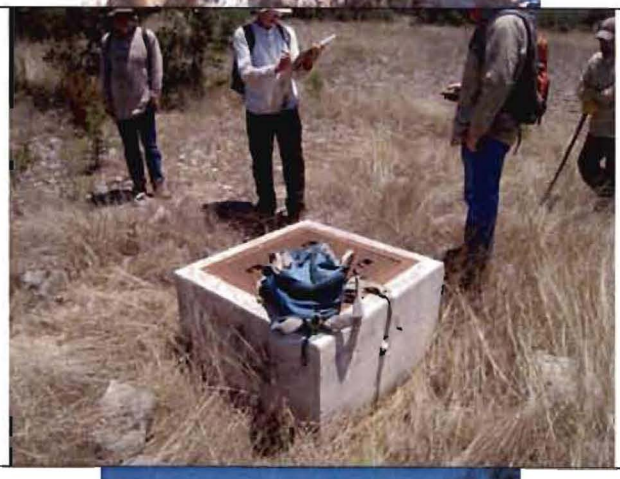
Feature ID	Description	Photo
NBS-19	This collapse sinkhole measures 4 by 3 m and is 0.7 m deep. It is located on a hillside, has a high potential for recharge and a catchment area of approximately 5,000 m^2.	
NBS-20	This collapse sinkhole measures 0.9 m in diameter and 1 m deep. It is filled with modern soils, leaf litter and vegetation (persimmon tree). It is located on a hillside, has a high potential for recharge and a catchment area of approximately 150 m^2.	
NBS-21	This solutional sinkhole measures 0.8 by 0.4 m and is 1 m deep. It is located on a hillside, has a high potential for recharge and a catchment area of approximately 300 m^2.	

Feature ID	Description	Photo
NBS-22	This collapse sinkhole measures 2.5 by 0.9m and is 0.4 m deep. It is filled with coarse and fine sediments and vegetation. It is located on a hillside, has a moderate potential for recharge and a catchment area of approximately 150 m^2.	
NBS-23	This collapse sinkhole has a diameter of 2 m and is 1 m deep. It is filled with modern soils and fine sediments. It is located on a hillside, has a moderate potential for recharge and a catchment area of approximately 1,000 m^2 .	
NBS-24	This water well has a pad 1.5 x 1.5 m. IT was drilled to a T.D. of 1,080 ft. This feature has a low potential for recharge.	

Feature ID	Description	Photo
NBS-25	This collapse sinkhole measures 3.2 by 1.6 m and is 0.8 m deep. It is filled with modern soils and vegetation. It is located on a hillside, has a moderate potential for recharge and a catchment area of approximately 100 m^2.	
NBS-26	This solutional sinkhole measures 1.1 by 0.8 m and is 0.7 m deep. It is located on a hillside, has a moderate potential for recharge and a catchment area of approximately 100 m^2.	
NBS-27	This solutional sinkhole measures 1 by 0.6 m and is 0.5 m deep. It is located on a hillside, has a moderate potential for recharge and a catchment area of approximately 100 m^2.	

Feature ID	Description	Photo
NBS-28	This solutional sinkhole measures 0.8 by 1.5 m and is 0.5 m deep. It is located on a hilltop, has a moderate potential for recharge and a catchment area of approximately 100 m^2.	
NBS-29	This is a well and tank of unknown specifications. The recharge potential of this feature is low.	
NBS-30	This access shaft was drilled into the cathedral room of the south passage. Well sealed off from surface catchment	

Feature ID	Description	Photo
NUBS-31	This is a well of unknown specifications. The recharge potential of this feature is moderate.	
NBS-32	This solutional sinkhole measures approximately 1.5 m in diameter 0.5 m deep with two solution cavities located in the base. One cavity extends downward an unknown distance. This feature is located in a creek bed and has a catchment of 8,100 m^2.	
NBS-33	This solutional sinkhole measures 0.8 by 1.22 m and is 0.5 m deep. It is filled with fine sediments and modern soils that are loose to a depth of 25 cm. It is located on a hilltop, has a moderate potential for recharge and a catchment area of approximately 50 m^2	

Feature ID	Description	Photo
NBS-34	This vadose cave measures 2.7 by 3.05 m and is 5.1 m deep. A fracture bearing 33 degrees guides this feature. The feature is filled with clean washed rocks. It is located on a hilltop, has a moderate potential for recharge and a catchment area of approximately 80 m^2.	
NBS-35	This access shaft is approximately 1.5 by 1.5 meters and extends to an unknown depth. This feature has a low potential for recharge. Extends into Hall of the Mountain Kings room in the NBC.	
NBS-36	This closed depression measures 25 x 6 m and is 1.5 m deep. It has a moderate potential for recharge and a catchment area of approximately 900 m^2.	

Feature ID	Description	Photo
NBS-37	This enlarged bedding plane measures 2.5 by 1 m and continues an unknown distance. It is located on a hillside and has a moderate recharge potential and a catchment of 30 m^2.	
NBS-38	This enlarged fracture measures 7 by 1 m and is 0.6 m deep. It is located on a hilltop and has a bearing of 255 degrees. It has a high potential for recharge and a catchment area of approximately 250,000 m^2.	
NBS-39	This solutional sinkhole measures 1.75 by 2.35 m and is 2.35 m deep. It is located on a hillside and has a high potential for recharge and a catchment area of approximately 500 m^2.	

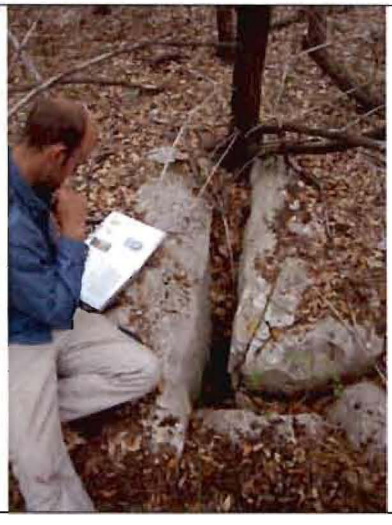
Feature ID	Description	Photo
NBS-40	This enlarged fracture measures 140 by 130 cm and is 70 cm deep. It has a low recharge potential and a catchment area of approximately 100 m^2.	
NBS-41	This enlarged bedding plane measures 0.7 m in diameter and is 2.2 m long. The surface sink measures 1.9m wide. It is located on a hillside, has a moderate recharge potential and a catchment area of approximately 60 m^2.	
NBS-42	This collapse sinkhole measures 1.5 m in diameter and is o.6 m deep. It is filled with modern soils and fine sediments. It is located on a hillside, has a moderate recharge potential and a catchment area of approximately 75 m^2.	

Feature ID	Description	Photo
NBS-43	This is a well of unknown specifications. The recharge potential of this feature is low.	
NBS-44	This closed depression measures 25 by 30 m and is 1.5 m deep. It is filled with gravel. It is located on a hilltop, has a moderate recharge potential and a catchment area of approximately 500 m^2.	
NBS-45	This enlarged fracture has an unknown length, an aperture of 0.25 m and is 1.1 m deep. It has a bearing of 0 degrees. It is located on a hilltop, has a low potential for recharge and a catchment area of approximately 24 m^2.	

Feature ID	Description	Photo
NBS-46	This solution sinkhole measures 30 by 25 m and is 0.5 m deep. It is filled with modern soils, leaf litter and fine sediments. It is located on a hilltop, has a high potential for recharge and a catchment area of approximately 2,500 m^2.	
NBS-47	This solution sinkhole measures 15 by 2.5 m and is 0.5 m deep. It is filled with modern soils, leaf litter and fine sediments. It is located on a hilltop, has a moderate recharge potential and a catchment area of approximately 2,800 m^2.	
NBS-48	This is a well of unknown specifications. The recharge potential of this feature is low.	

Feature ID	Description	Photo
NBS-49	This sinkhole measures 20 by 5 m and is 0.4 m deep. It is located on a hillside, has a moderate recharge potential and a catchment area of approximately 1,250 m^2.	
NBS-50	This sinkhole measures 6 by 7 m and is 0.35 m deep. It is located on a hillside, has a low potential for recharge and a catchment area of approximately 800 m^2.	
NBS-51	This is the exit tunnel to Natural Bridge Caverns, a pheratic cave system. There is little potential for recharge to the caverns at this location.	

Feature ID	Description	Photo
NBS-52	This is an entrance to Natural Bridge Caverns, a phreatically formed cave system. It is located in a collapse sinkhole and the entrance was enlarged to allow commercial tours. It has a high potential for recharge and a catchment area of 2,100 m^2.	
NBS-53	This is a well of unknown specifications. The recharge potential of this feature is low.	
NBS-54	This is an access shaft with a diameter of 0.35 m and a depth of 40 m.	

Feature ID	Description	Photo
NBS-55	This is an access shaft with a diameter of 1 m and a depth of 40 m.	
NBS-56	This solution sinkhole has a surface depression measuring 3.6 by 1.8 m. A vertical shaft that is 0.25 m in diameter leads to a small room that is 3.3 m in diameter and is 3.5 m deep. It is located on a hillside, has a moderate recharge potential and a catchment area of approximately 36 m^2.	
NBS-57	This enlarged fracture measures 30 by 25 m and is 0.5 m deep. It is filled with modern soils, leaf litter and fine sediments. It is located on a hilltop, has a high potential for recharge and a catchment area of approximately 2,500 m^2.	

Feature ID	Description	Photo
NBS-58	This solution sinkhole has a surface depression measuring 2 by 1.1 m. A vertical shaft continues to a depth of at least 3.2 m. It is located on a hillside, has moderate potential for recharge and a catchment area of approximately 30 m^2.	
NBS-59	This solution sinkhole measures 6.5 by 5 m and is 0.5 m deep. It has a moderate recharge potential and a catchment area of approximately 1,200 m^2. This features had noticeable airflow around fissures in the soil.	
NBS-60	This exposed highly epikarstic zone measures 1.8 by 1.5 m and is 0.3 m deep. It has a low potential for recharge and a catchment area of approximately 50 m^2.	

Feature ID	Description	Photo
NBS-61	This feature is a manmade depression, of unknown origin and purpose. It is 15 by 5.7 m and 1.25 m deep. It has a low potential for recharge and a catchment area of approximately 900 m^2.	
NBS-62	This feature is a water exploration well into the Trinity aquifer, boring NBC Trinity well No. 2. This feature has a moderate recharge potential.	
NBS-63	This feature is located 5 feet above the creek bottom between features NBS-30 and NBS-31. It was originally an exploration well, and is now covered with a concrete plate. This well intersected the South Cave and has moderate recharge potential.	

Feature ID	Description	Photo
NBS-64	This is a fault that has surface expression along a man made stock tank in bedrock it is 300 meters long , approximately 3 meters wide and is a meter deep of visible brecciation. The surface catchment is the same as feature NBS-05 at 30,000 m^2	
NBS-65	This feature is Bat Cave Fault, a major fault. It is a normal fault with roughly 100 m of offset between the Bat Cave Fault Block and the Hueco Springs Fault Block. The fault is roughly 64 km long and terminates in Hays County near the Comal River and in Bexar County near Canyon Lake. Natural Bridge Caverns is located in the Bat Cave Fault Block.	
NBS-66	This is the entrance to the South Passage of Natural Bridge Caverns, a prheatically formed cave system. It is 2.3 by 2.3 by 2.3 meters and has a surface catchment of 2,500 m^2.	

APPENDIX B – WELL SUMMARIES AND LOGS

NBS-29

BU house
Pump jacks well

November 22, 1963

Dempster Jacks

Wuest Ranch
Route 1 Box 515
San Antonio, Texas

Natural Bridge Caverns

Re: Well #2

Hit little water at 300 feet - 1½ gallon per minute. Water stand approximately 250 feet from top. 4 ft. 8 5/8 od casing.

0	- 3	Loose rocks
3	- 110	Edwards Limestone
110	- 120	Blue Limestone
120	- 175	Soft Yellow Limestone
175	- 400	Blue Limestone(Glenrose)

E. B. Kutscher
KUTSCHER DRILLING COMPANY
Route 1 Box 151
San Marcos, Texas

NEED well logs
NBS-01
24

NBS-54

Emerald Lake

November 15, 1963

Wuest Ranch
Route 3 Box 515
San Antonio, Texas

Natural Bridge Caverns

Re: Line Shaft

Depth of hole is 124 feet. 15" hole. 7 feet 15 3/4" OD Casing.

0	- 6	Top Soil & Loose Rocks
6	- 70	Hard Yellow Limestone
70	- 75	Soft Yellow Limestone
75	- 115	Layers of Yellow Clay & Limestone
115	- 124	Hard Yellow Limestone

E. B. Kutscher
KUTSCHER DRILLING COMPANY
Route 1 Box 151
San Marcos, Texas

(NBS-30)

Water Well Drilling
Windmills & Electric Pumps
Sales & Service No.

South Cave Supply

Wench hole

Customer's Order No. Date 12- 15 19 67

Sold To Natural Bridge Caverns

Address Route 3

City San Antonio State Texas 78213

Hole No. 6

SOLD BY	CASH	C.O.D.	CHARGE	ON ACCT.	MDSE. RETD.	PAID OUT	

	QUANTITY	DESCRIPTION	PRICE	AMOUNT
1		top of hole is 8" and bottom is 6½"		
2				
3	0 75	Limestone		
4	75 152	Broke Down		
5	152 155	[illegible] Upper cave		
6	155 170	Limestone		
7	170 176	Open to lower Cave		
8	176 270	Limestone (Broken Down)		
9	270 295	Limestone		
10	295 315	Blue Limestone		
11				
12				
13		E. B. Kutscher Drilling Co.		
14		Route 1 Box 151		
15		San Marcos , Texas 78666		
		Phone : 392-5538		

All claims and returned goods MUST be accompanied by this bill

Received by

GrayLine "SNAP-A-WAY" FORM 44-801 3-PARTS

WILSON JONES COMPANY © 1961 PRINTED IN U.S.A.

ORIGINAL

NBS-63

Water Well Drilling
Windmills and Electric Pumps
Sales & Service No._____

Borehole into Jeremy Room

Customer's Order No._____ Date 12-5- 19 67

Sold To Natural Bridge Caverns

Address Route 3

City San Antonio State Texas 78213

Hole No. 4 Jaremy

SOLD BY	CASH	C.O.D.	CHARGE	ON ACCT.	MDSE. RETD.	PAID OUT	
Top of Hole 8", 15", 22", and now it is 22"							

	QUANTITY	DESCRIPTION	PRICE	AMOUNT
1	0 75	Brocken Limestone		
2	75 87	Cave		
3		Hole no. 5		
4		22" hole		
5	0 75	Brocken Limestone		
6	75 88	Cave (that is upper cave)		
7	88 135	Brocken Down		
8	135 147½	Cave.		
9				
10				
11				
12				
13				
14				
15				

E. B. Kutscher Drilling Co.
Route 1 Box 151
San Marcos, Texas 78666
Phone : 392-5538

bfk/ EBK

All claims and returned goods MUST be accompanied by this bill

Received by_____

GrayLine "SNAP-A-WAY" FORM 41-801 3-PARTS

WILSON JONES COMPANY © 1961 PRINTED IN U.S.A.

ORIGINAL

SNAP-A-WAY FORMS

GrayLine GrayLine GrayLine GrayLine GrayLine GrayLine GrayLine

VBS-13

Thads House

No.

Customer's Order No. Date April 19 19 68

Sold To Wueast Natural Bridge Caverns

Address Route X 3 Box 315

City San Antonio, State Texas 78218

SOLD BY	CASH	C.O.D.	CHARGE	ON ACCT.	MDSE. RETD.	PAID OUT

Top of hole is 8" and the bottom is 6¼"

	QUANTITY	DESCRIPTION	PRICE	AMOUNT
1	0 2	Loose rock and top XXXX soil		
2	2 160	Yellow Limestone some Red		
3	160 165	Honey Comb		
4	165 205	Yellow Limestone some Red		
5	205 360	Blue & Gray Limestone		
6				
7	Depth of well 360 feet cased with 21.6 feet 7			
8	O.D. casing. Rig Tested: 18 gal.per.min. with			
9	draw down to 325 feet. Water static at 300feet.			
10				
11				
12		E. B. Kutscher Drilling Co.		
13		Route 1 Box 151		
14		San Marcos, Texas 78666		
15		Phone: 392-5538		

EBK/bfk

ALL claims and returned goods MUST be accompanied by this bill

Received by

GrayLine "SNAP-A-WAY" FORM 44-801 3-PARTS

WILSON JONES COMPANY © 1961 PRINTED IN U.S.A.

ORIGINAL

ry Summer - Deepen Well - Pump Set 8/10/00

375 - 395 light grey limestone

395 - 425 grey limestone

425 - 450 light grey limestone

Pump set

NBS-13

* NBC AT Center + Wood Ranch Foreman Home Aug 2000,

KUTSCHER DRILLING LTD.

BUS: 353-0075 * RES: 353-1554 * 353-0625
3810 HUNTER RD. - SAN MARCOS, TEXAS 78666

Date APRIL 19 1968 19

To NATURAL BRIDGE CAVERNS (WUEST)

Address 26495 NBC Rd.

City San Antonio Texas State 78266-9645

Location: Deepen well

TOP OF HOLE IS 8" AND BORROM IS 6¼"

0	2	LOOSE ROCK AND TOP SOIL
2	160	YELLOW LIMESTONE AND SOME RED
160	165	HONEYCOMB
165	205	YELLOW LIMESTONE (SOME RED)
205	360	BLUE & GRAY LIMESTONE

DEPTH OF WELL IS 360 FEET CASED WITH 21.6 FEET OF 7 O.D. STEEL CASING. RIG TESTED: 18 GAL PER MIN WITH DRAW SOWN TO 325 FEET. WATER STATIC: 300 FEET.

* AUGUST 8,2000 NOW

360	375	CLEAN OUT WELL
375	395	LIGHT GRAY LIMESTONE (HIT WATER AT 390 FEET 6 GAL PER MIN)
395	425	GRAY LIMESTONE
425	450	LIGHT GRAY LIMESTONE

DEPTH OF WELL IS NOW 450 FEET .WATER STATIC: 330 FEET. RIG TESTED: 8 GAL PER MIN. BOTTOM OF HOLE IS 6¼".

NBS-13

58-22-4

KUTSCHER DRILLING LTD.

BUS: 353-0075 * RES: 353-1554 * 353-0625
3810 HUNTER RD. - SAN MARCOS, TEXAS 78666

Date APRIL 19 1968 19

To NATURAL BRIDGE CAVERNS (WUEST)

Address 26495 NBC Rd.

City San Antonio Texas State 78266-9645

Location: Deeper Well

TOP OF HOLE IS 8" AND BORROM IS 6¼"

0	2	LOOSE ROCK AND TOP SOIL
2	160	YELLOW LIMESTONE AND SOME RED
160	165	HONEYCOMB
165	205	YELLOW LIMESTONE (SOME RED)
205	360	BLUE & GRAY LIMESTONE

DEPTH OF WELL IS 360 FEET CASED WITH 21.6 FEET OF 7 O.D. STEEL CASING. RIG TESTED: 18 GAL PER MIN WITH DRAW SOWN TO 325 FEET. WATER STATIC: 300 FEET.

AUGUST 8,2000 NOW

360	375	CLEAN OUT WELL
375	395	LIGHT GRAY LIMESTONE (HIT WATER AT 390 FEET 6 GAL PER MIN)
395	425	GRAY LIMESTONE
425	450	LIGHT GRAY LIMESTONE

DEPTH OF WELL IS NOW 450 FEET .WATER STATIC: 330 FEET. RIG TESTED: 8 GAL PER MIN. BOTTOM OF HOLE IS 6¼".

SEPTEMBER 4,1998

NBS-53

Parking Lot

KUTSCHER DRILLING LTD.
SINCE 1925
3810 HUNTER ROAD,
SAN MARCOS, TEXAS 78666-9392
PHONE :512-353-0075

NATURAL BRIDGE CAVERNS
WELL LOGGED MARCH 9,1978

0	15	HARD WHITE LIMESTONE
15	50	HARD RED LIMESTONE
50	80	DARK YELLOW LIMESTONE
80	100	DARK YELLOW HONEYCOMB
100	160	LIGHT YELLOW LIMESTONE
160	165	BLUE GLINROSE
165	180	YELLOW LIMSTONE
180	200	DARK YELLOW LIMETONE (SOME HONEYCOMB)
200	205	LIGHT YELLOW LIMESTONE
205	800	BLUE GLINROSE
800	885	GRAY LIMESTONE
885	920	DARK BLUE LIMESTONE
920	955	GRAY LIMESTONE
955	970	GRAY -WHITE LIMESTONE
970	1000	BROWN LIMESTONE (WATER)

DEPTH OF WELL IS 1000 FEET CASED WITH 807 FEET 5½ O.D. STEEL CASING AND CEMENTED BY READY-MIX (2 YDS. OF 6 SACK MIX GROUT . WATER STATIC: 325 FEET. RIG TESTED: 15 GPM AT 415 FEET.

Main Well

NBS -43

May 26, 1964

Meyers Sub

Wuest Ranch
Route 3 Box 515
San Antonio, Texas

Natural Bridge Caverns
Re: Well #4

Rig tested 30 gallons per minute. Water level approximately 280 feet. 2 ft.6 in. 7 od casing.

0	- 35	Hard White Limestone
35	- 75	Yellow Limestone - some Honeycomb
75	- 80	Light Yellow Limestone
80	- 135	Dark Yellow Limestone
135	-145	Cave with Red Clay at bottom
145	- 160	Dark Yellow Limestone
160	- 200	Light Yellow Limestone(small opening at 200 ft - 6")
200	- 215	Dark Yellow Limestone
215	- 220	Soft Blue Limestone
220	- 230	Gray Limestone
230	- 256	Light Yellow Limestone
256	- 265	Cave
165	- 292	Dark Yellow Limestone with clay and boulders
292	- 330	Gray & Blue Limestone

E. B. Kutscher
KUTSCHER DRILLING COMPANY
Route 1 Box 151
San Marcos, Texas

Wet Rock Groundwater Services, L.L.C.
Groundwater Specialists
TBPG Firm No: 50038
P.O. Box 163144
Austin, Texas 78716
Ph: 512-773-3226 Fax: 512-879-6809
www.wetrockgs.com

Summary of Well Drilling at Natural Bridge Caverns: Summer 2009

Four wells were completed at Natural Bridge Caverns during the summer of 2009. Below is a summary of the findings at each well.

NBC Trinity Well No. 1

- Total Depth: 1,080 ft
- 5-inch PVC Casing: Surface to 420 ft below ground surface (bgs)
- Open Hole completion: 420 ft to 1,080 ft
- Estimated W.L.(from e-log) ~ 335 ft bgs (4-20-2009)
- Estimated Yield: 50 gpm

NBC Trinity Well No. 2

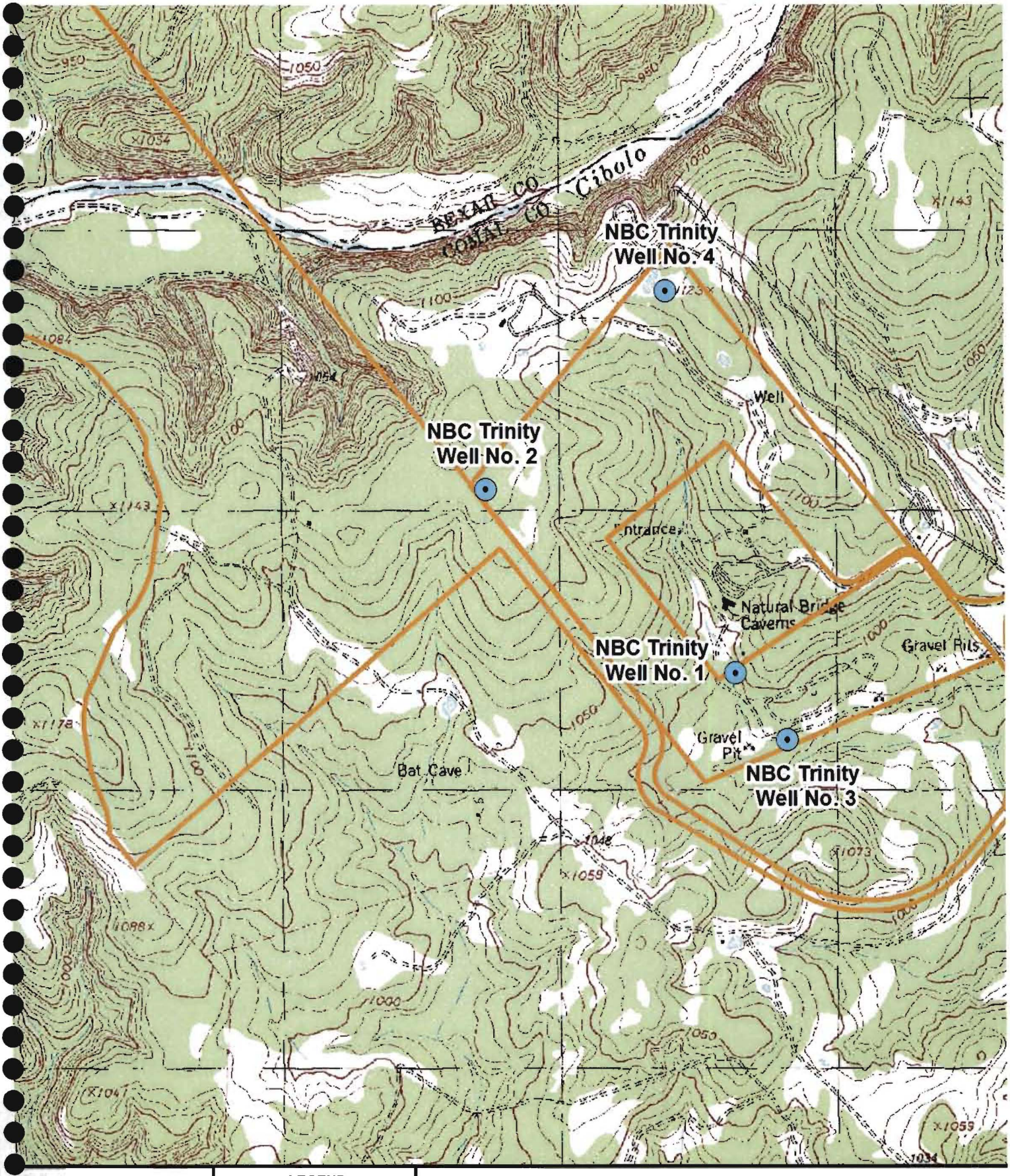
- Total Depth: 1,140 ft
- 5-inch PVC Casing: Surface to 420 ft bgs
- Open Hole completion: 420 ft to 1,140 ft
- Estimated W.L.(from e-log) ~ 367 ft bgs (5-1-2009)
- Estimated Yield: 50 gpm

NBC Trinity Well No. 3

- Total Depth: 960 ft
- 8-inch Steel Casing: Surface to 400 ft bgs (torch slotted: 250 ft to 400 ft)
- Open Hole completion: 400 ft to 960 ft (originally drilled to 1,200 ft)
- Static W.L. = 356.5 ft bgs (8-5-2009)
- Estimated Yield: 250+ gpm

NBC Trinity Well No. 4

- Total Depth: 1,100 ft
- 5-inch PVC Casing: Surface to 460 ft bgs
- Open Hole completion: 420 ft to 1,100 ft
- Estimated W.L.(from e-log) ~ 396 ft bgs (7-15-2009)
- Estimated Yield: 40 gpm



ALE: 1 In = 1,500 ft	LEGEND	NATURAL BRIDGE CAVERNS - TRINITY WELLS
AWN BY: KK DATE: 8/09	Property Boundary	NATURAL BRIDGE CAVERNS, INC.
ECKED BY: KK DATE: 8/09		COMAL COUNTY, TEXAS

WET ROCK GROUNDWATER SERVICES, L.L
GROUNDWATER SPECIALISTS
P.O. BOX 163144 AUSTIN, TEXAS 787
PH: (512) 773-3226 FAX: (512) 879-6809

GEO CAM

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Borehole: WELL NO. 1

Logs: GAMMA, RESISTIVITY, CALIPER, SPR

Project: NATURAL BRIDGE CAVERNS WELL 1 **Date:** 04-20-09

Client: DAVENPORT DRILLING **County:** COMAL

Location: N 29* 41' 24.1" W 98* 20' 33.1" **State:** TX

BOREHOLE DATA

Drilling Contractor: DAVENPORT DRILLING **Driller T.D. (ft) : 1080**

Elevation: 1011' GPS Logger T.D. (ft) : 1047

Depth Ref: G.L. Date Drilled: 04-20-09

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8 1/2"	0	1080	NONE		
2						
3						

Drill Method: AIR ROTARY Weight: **Fluid Level (ft) :** 335

Hole Medium: Mud Type: Time Since Circ:

Viscosity: Rm: at: Deg C

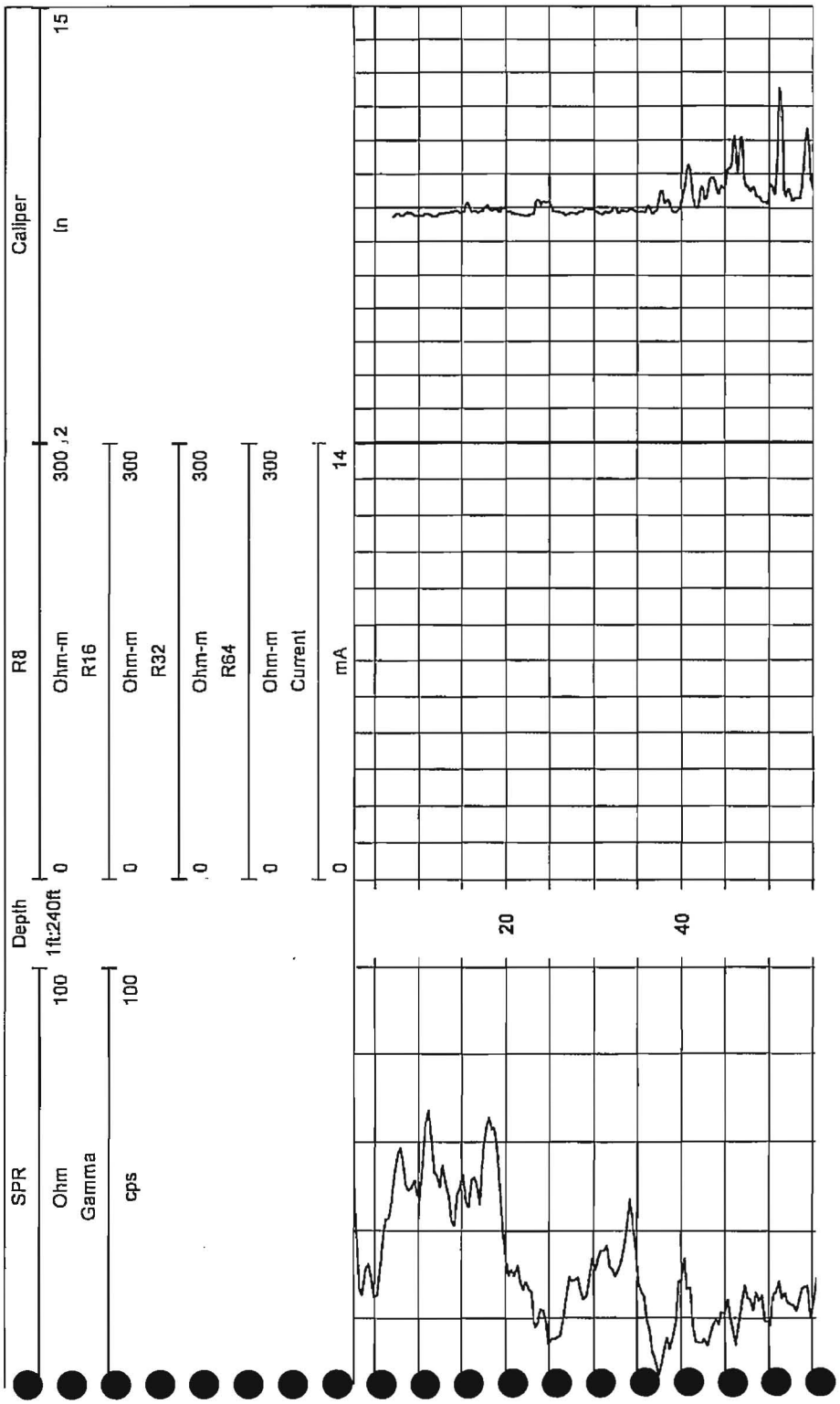
GENERAL DATA

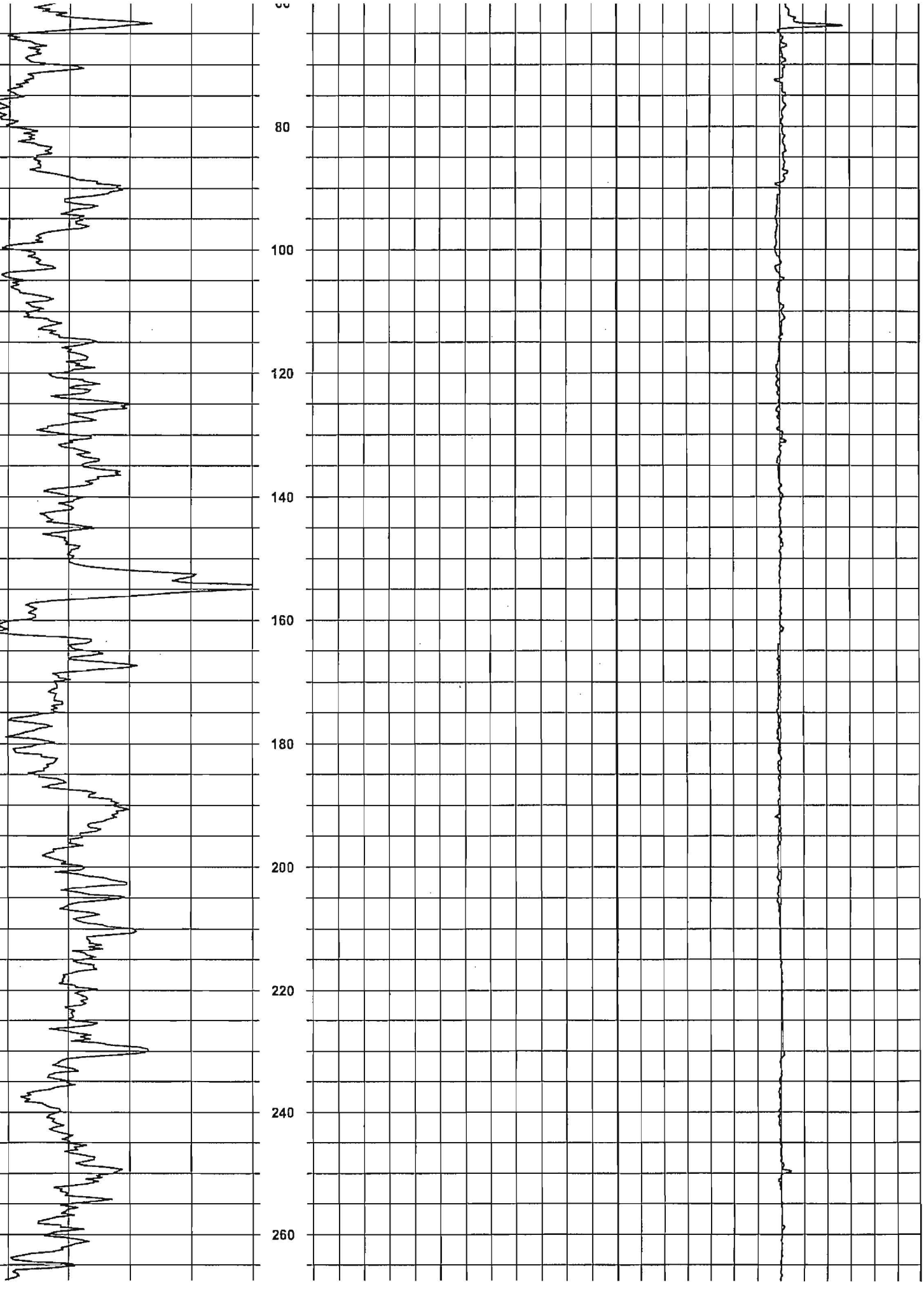
Logged by: Kelly Tuten Unit/Truck: 05

Witness: Mike Miller, Luke Francis

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	24	1044	3	20
RESISTIVITY, SPR	1	24	1045	335	20
CALIPER	1	24	1049	7	20

Comments: EAA PERMIT NO. C103-134

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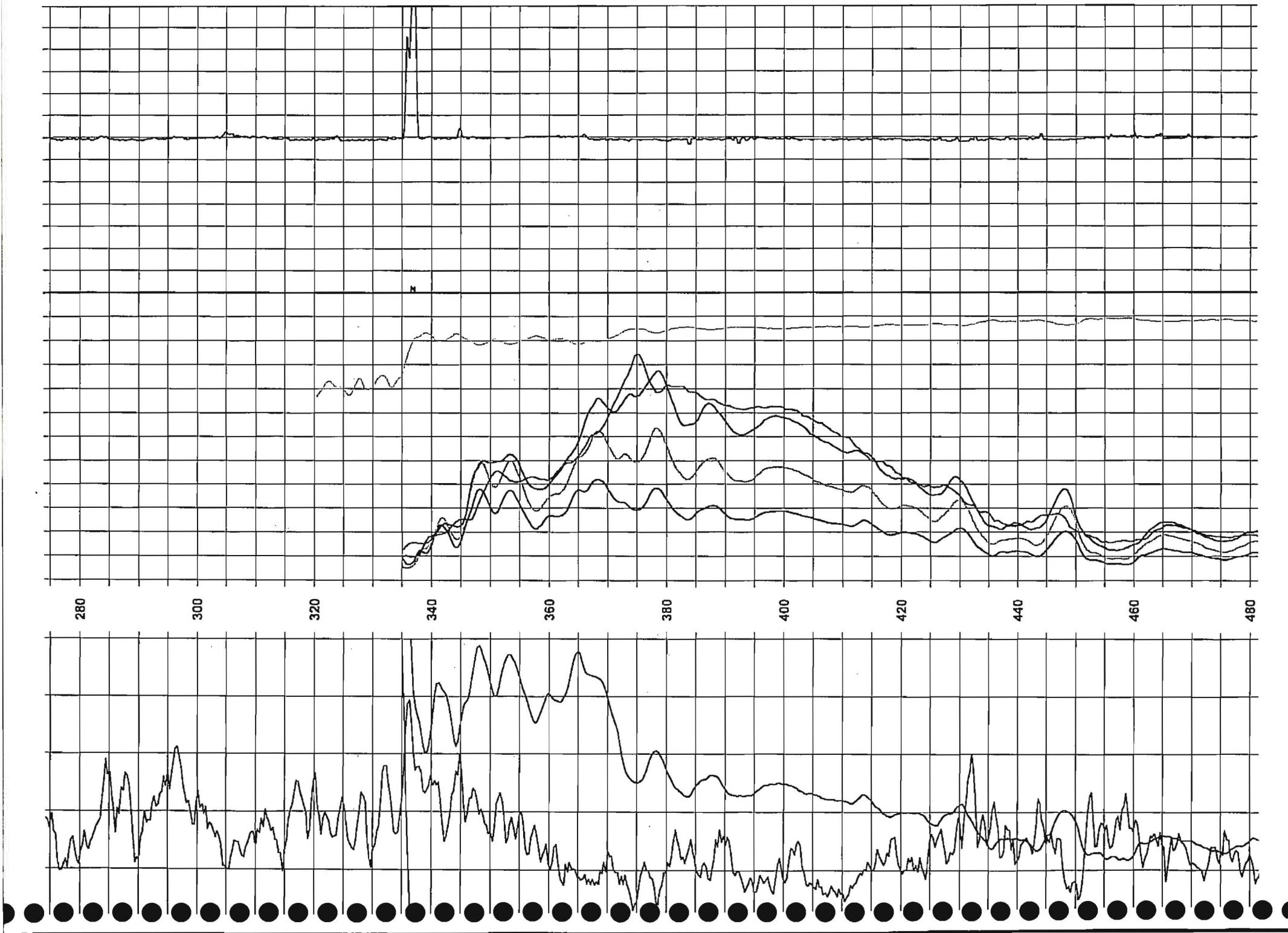
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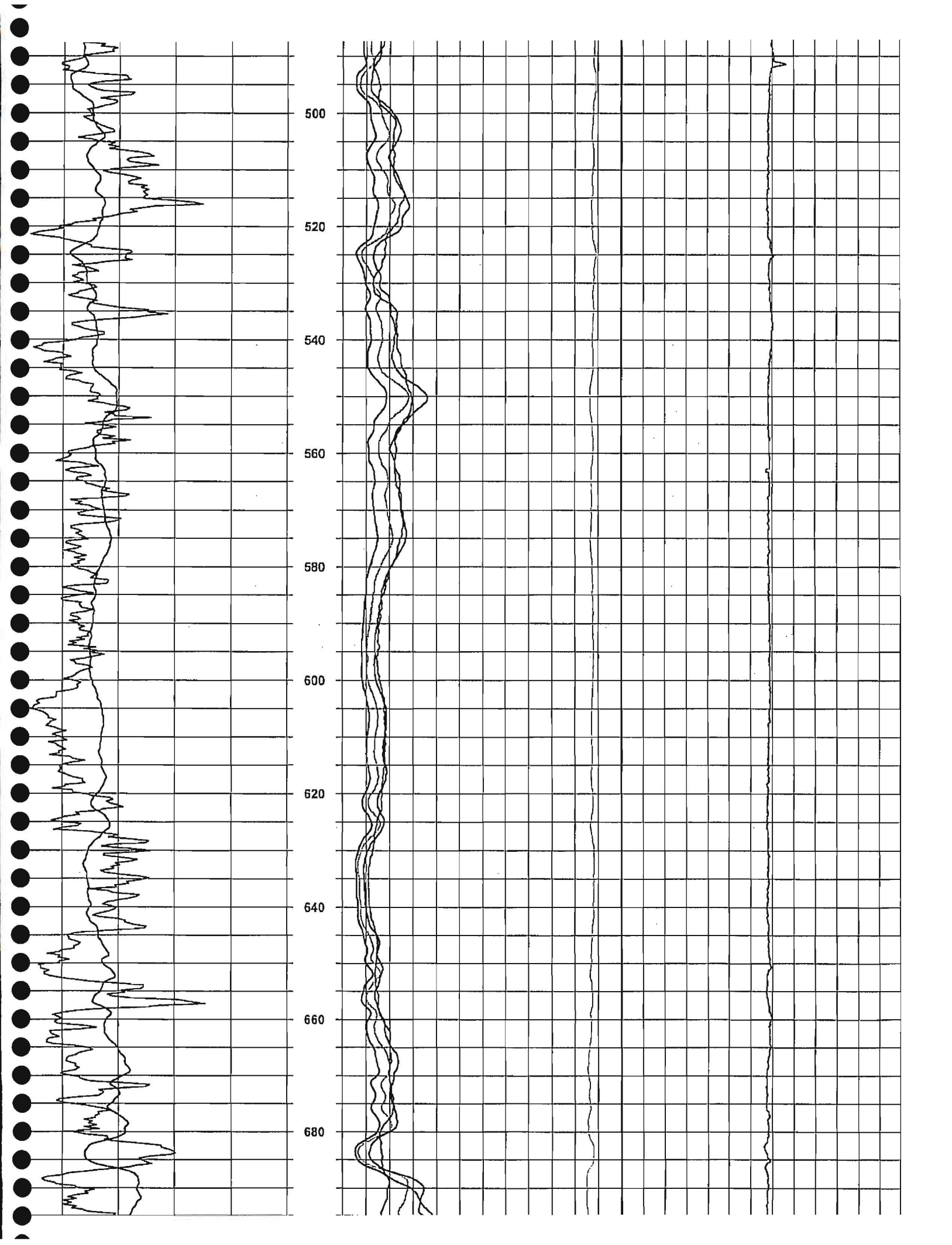
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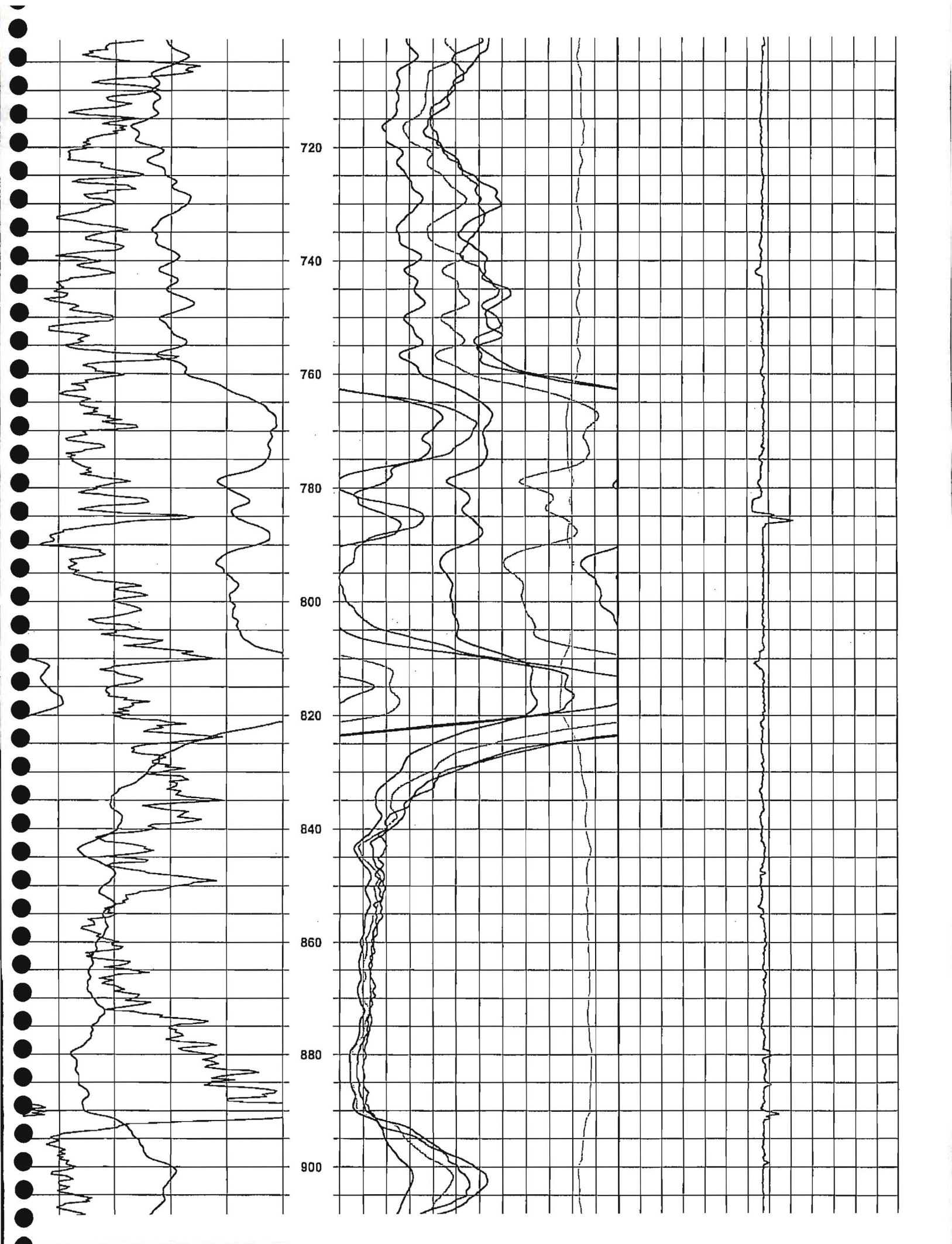
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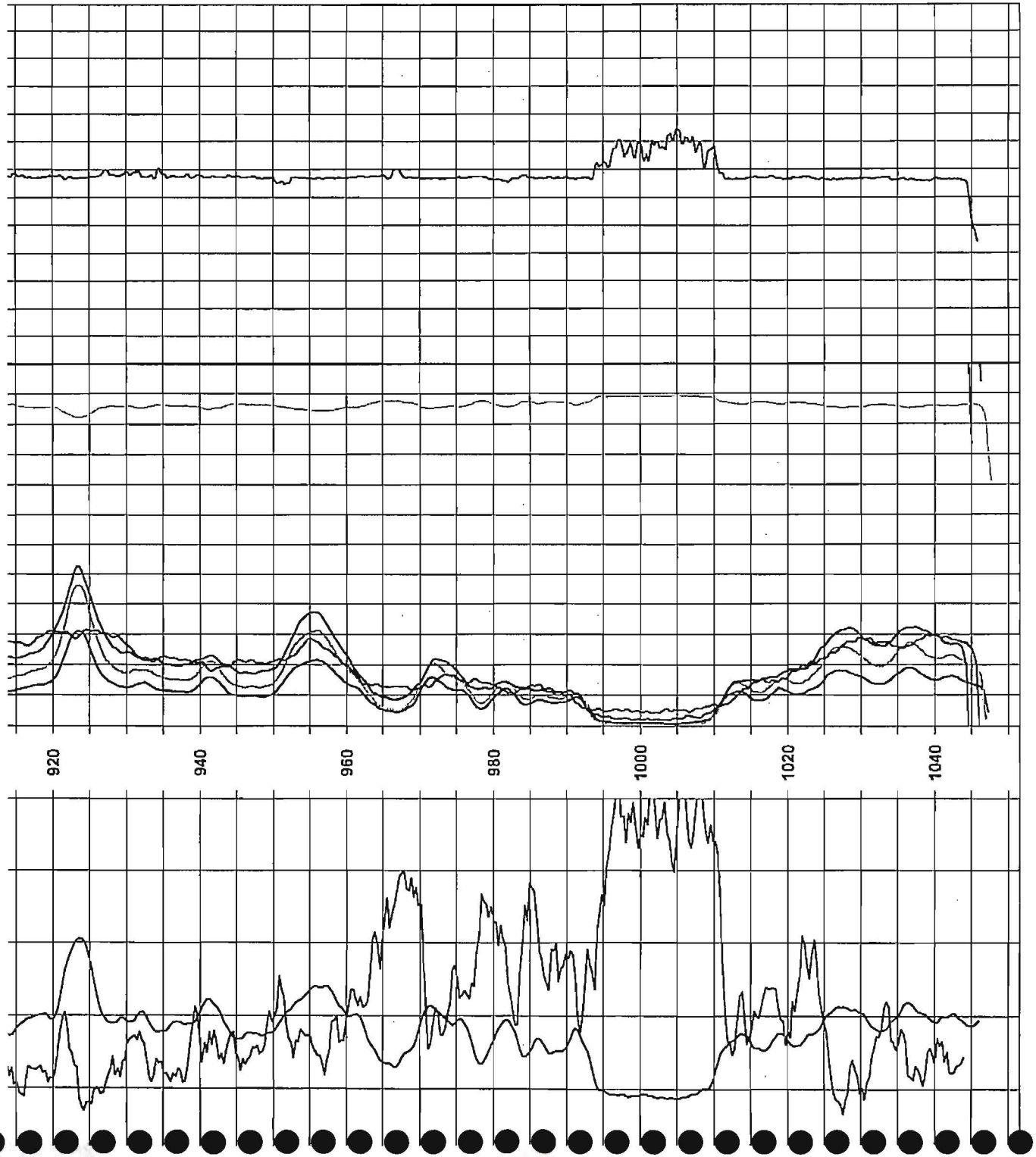
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GEO CAM

Borehole: WELL NO. 2

Logs: GAMMA, RESISTIVITY, SP

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: NATURAL BRIDGE CAVERNS
Date: 04-30-09
Client: DAVENPORT DRILLING & P.S.
County: COMAL
Location: N 29* 41' 45.6" W98* 21' 06.5"
State: TX

BOREHOLE DATA

Drilling Contractor: DAVENPORT
Driller T.D. (ft) : 1060
Elevation: 1159' GPS
Logger T.D. (ft) : 1045
Depth Ref: G.L.
Date Drilled: 04-29-09

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1				NONE		
2						
3						

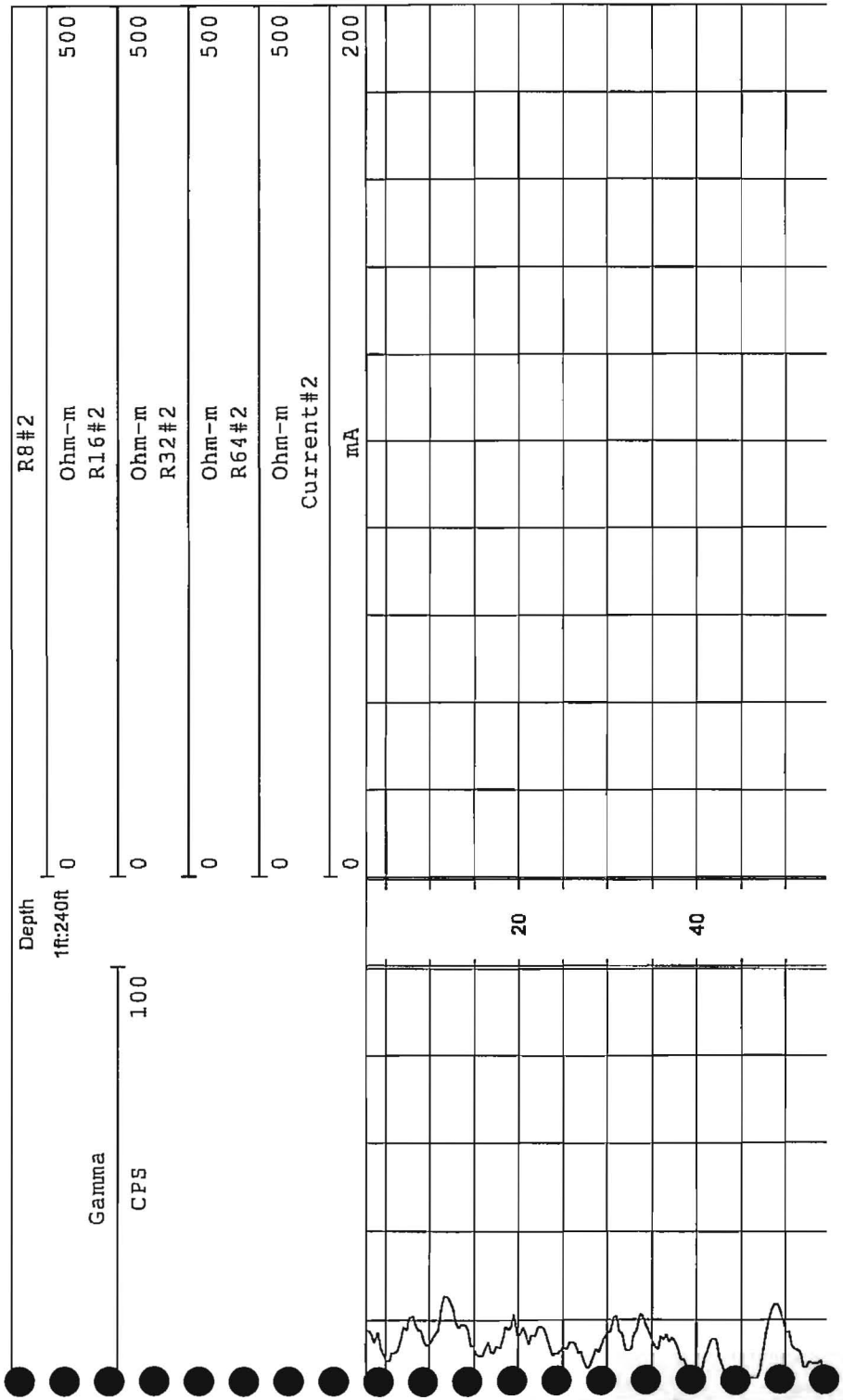
Drill Method: AIR ROTARY
Weight:
Fluid Level (ft) :
Hole Medium:
Mud Type:
Time Since Circ:
Viscosity:
Rm: at: Deg C

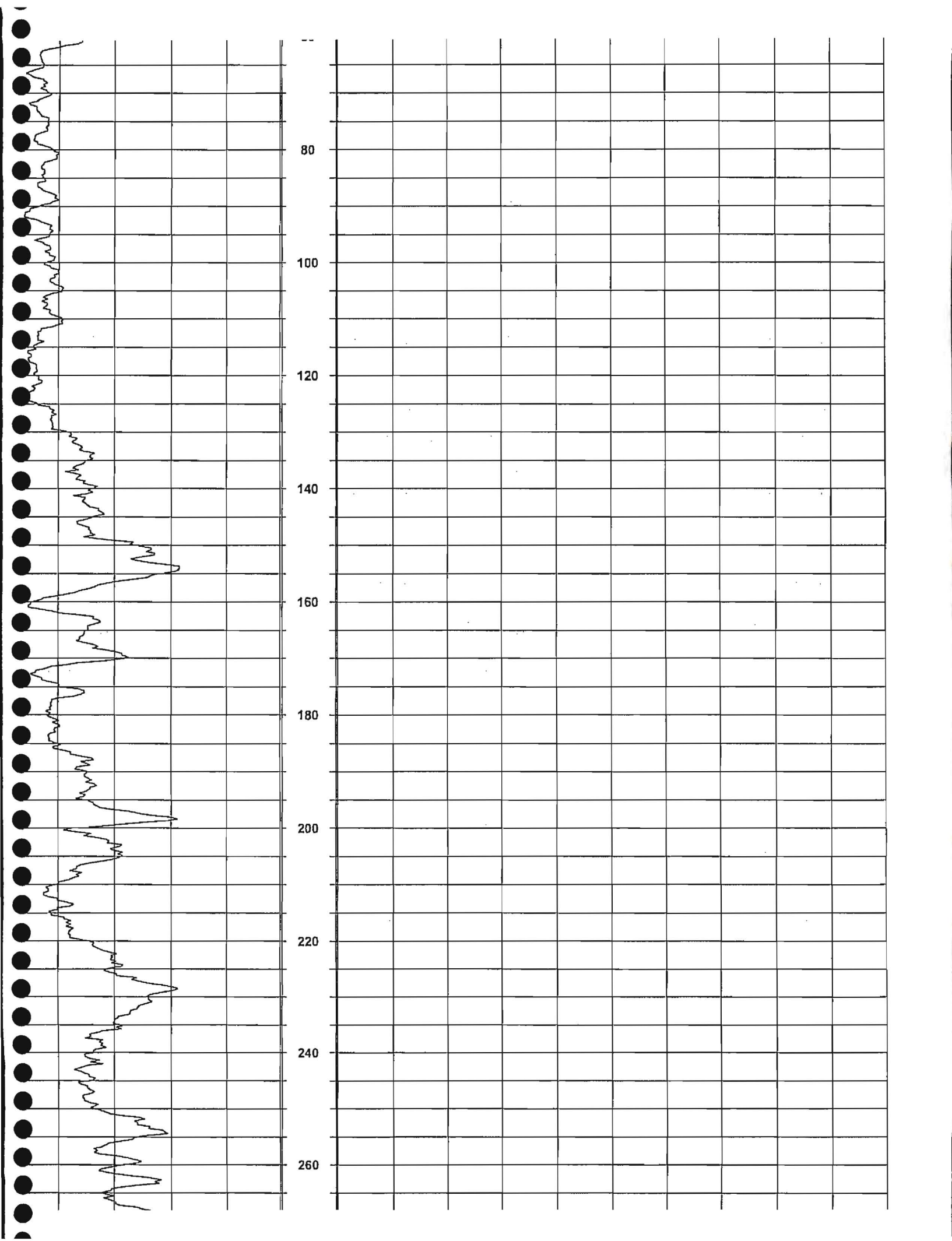
GENERAL DATA

Logged by: Kelly O. Tuten
Unit/Truck: 03
Witness: Michael Miller

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	30			20
RESISTIVITY, SPR	1	30			20

Comments:

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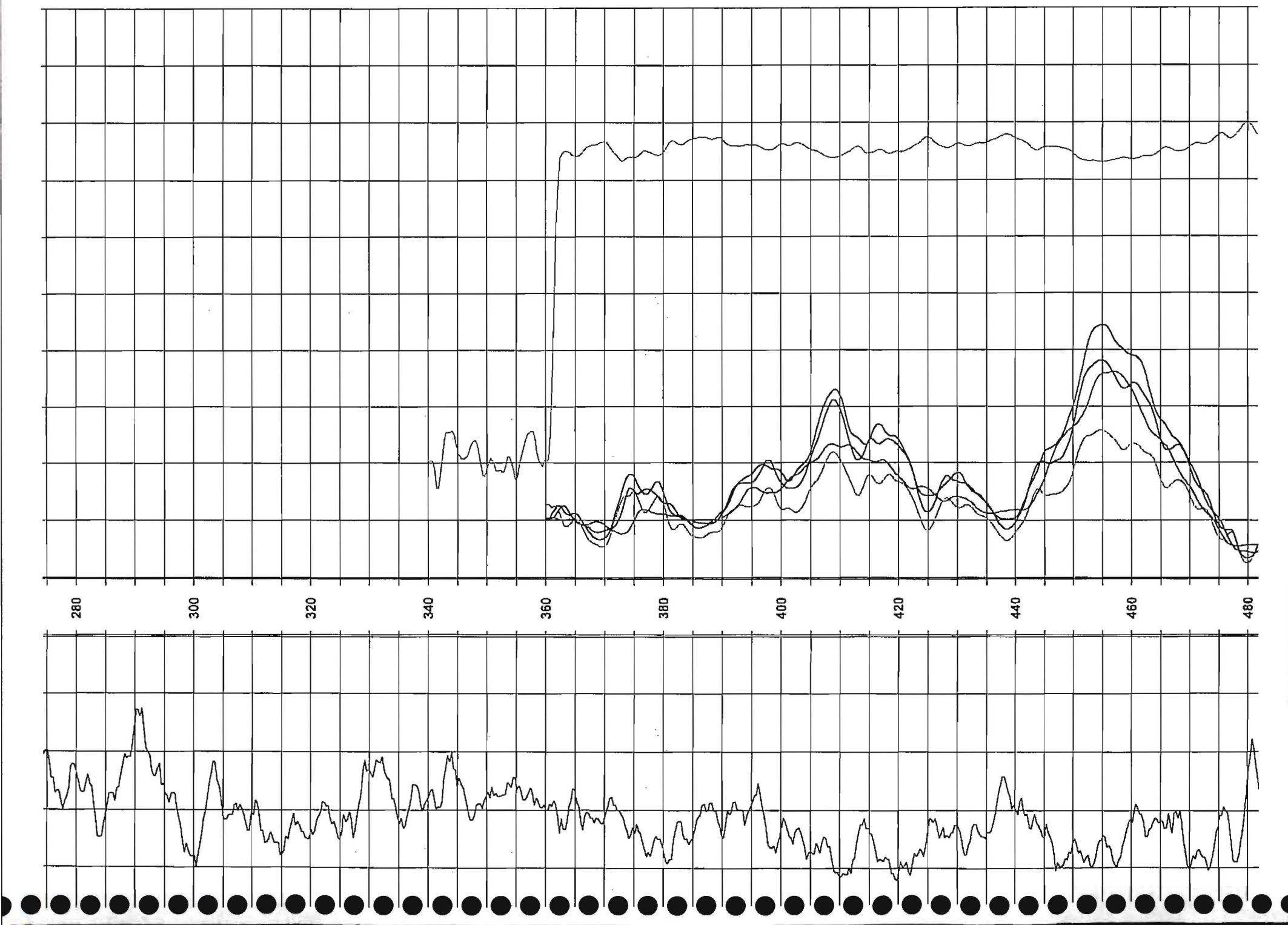
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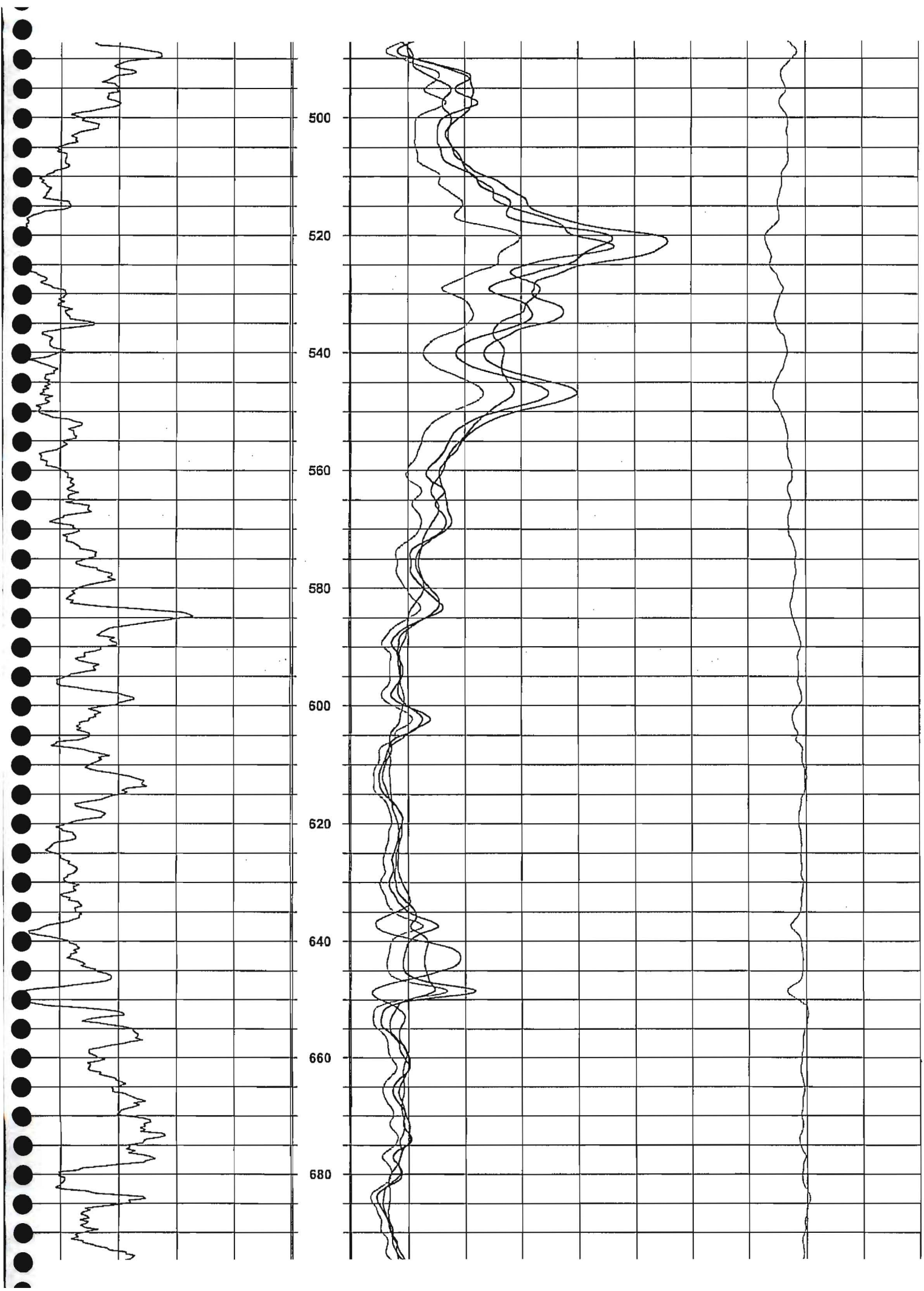
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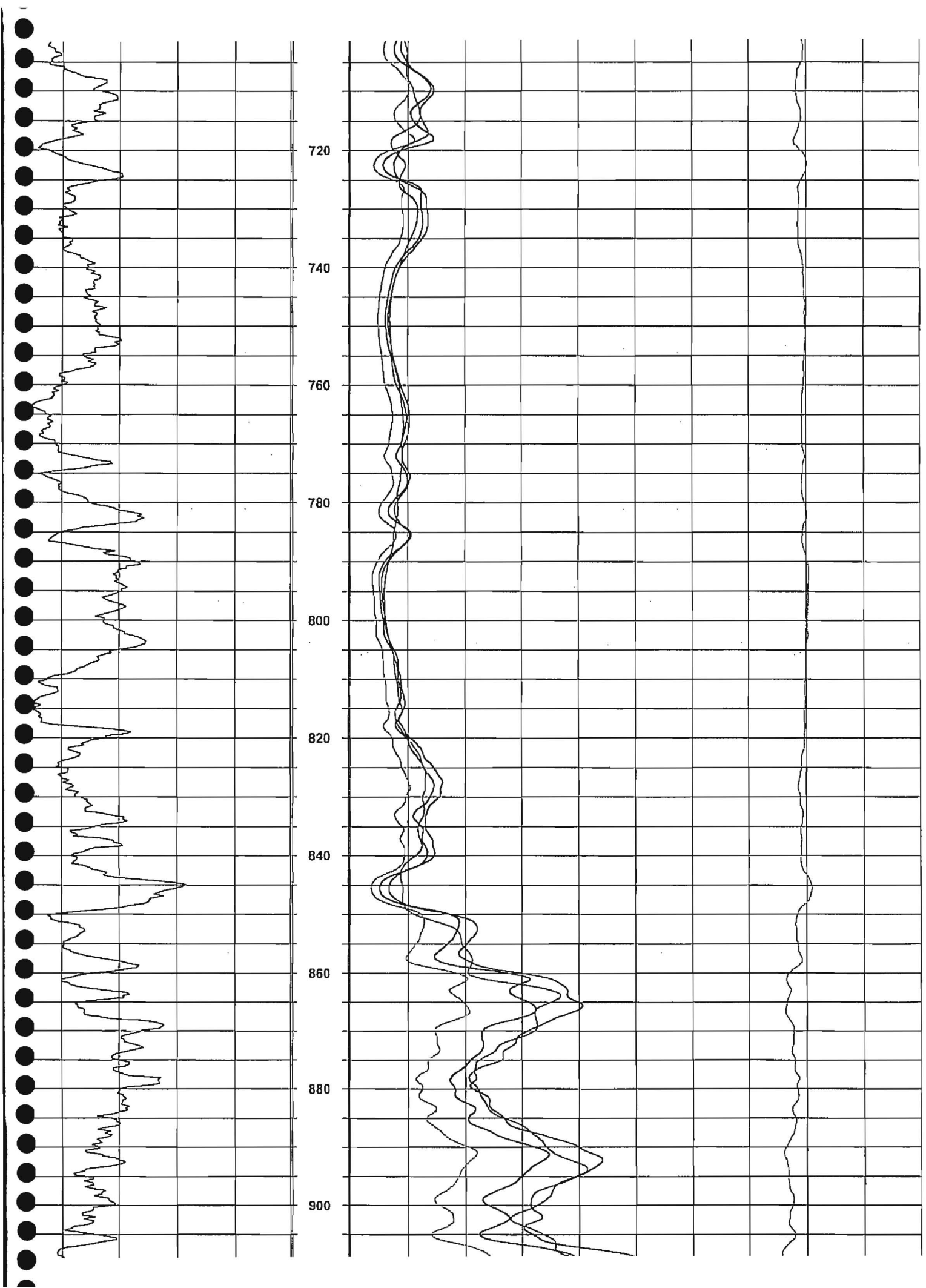
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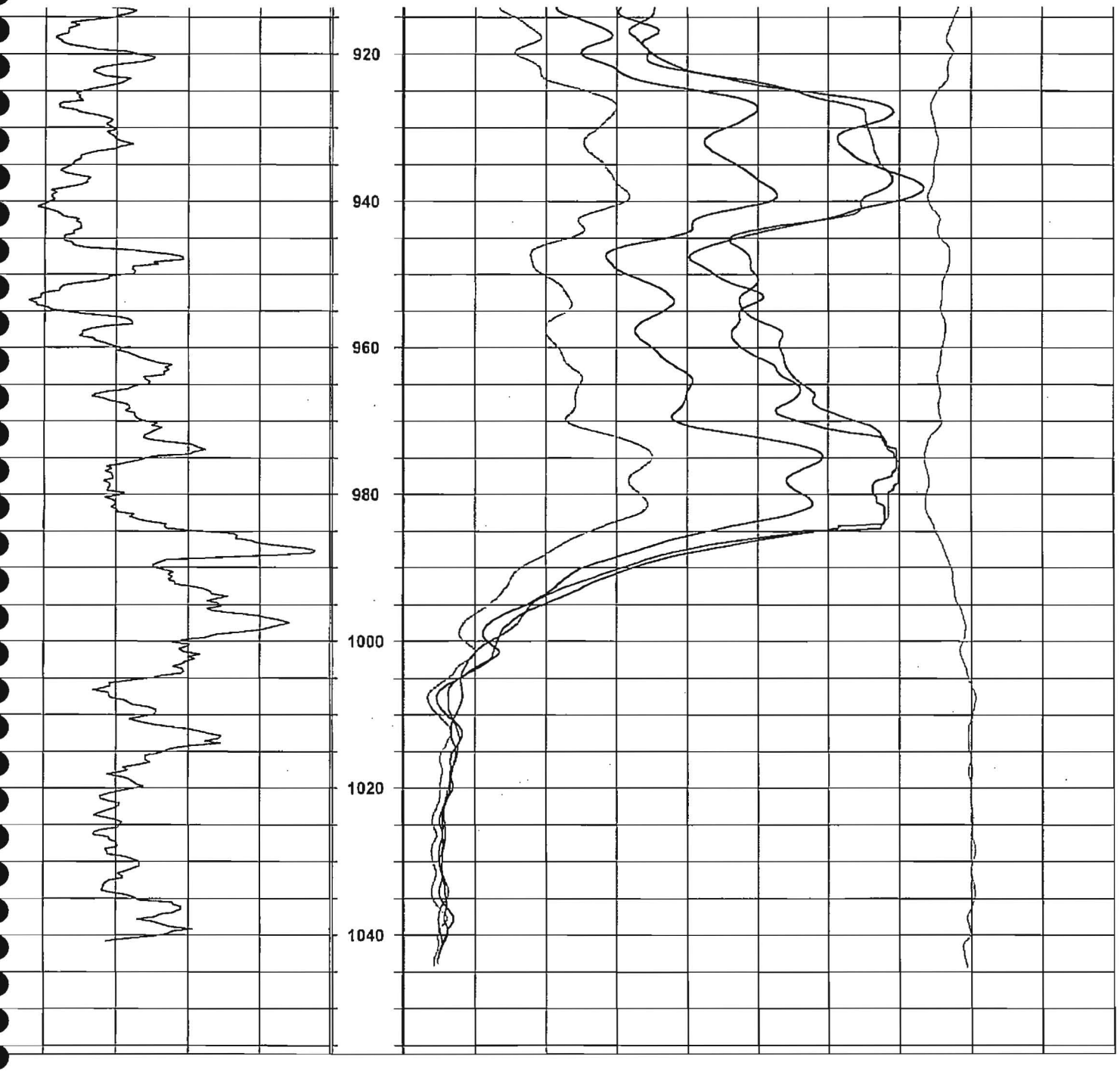
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GEO CAM

Water Well Logging & Video Recording Services

Borehole: NBC No. 3

Logs: Gamma, Caliper, Resistivity, SP, SPR

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: Natural Bridge Caverns
Date: 05-20-09

Client: Davenport Drilling & Pump Service
County: Comal

Location: N 29* 41' 16.4", W098* 20' 26.3"
State: TX

BOREHOLE DATA

Drilling Contractor: Davenport Drilling & P S
Driller T.D. (ft) : 1200

Elevation: 955 GPS
Logger T.D. (ft) : 996.1

Depth Ref: Ground Level
Date Drilled: 05-19-09

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	12	0	389	8" Steel	+1.4	389
2	8-3/4	389	1200	None		
3						

Drill Method: Air Rotary
Weight:
Fluid Level (ft) : 334

Hole Medium:
Mud Type:
Time Since Circ:

Viscosity:
Rm: at: Deg C

GENERAL DATA

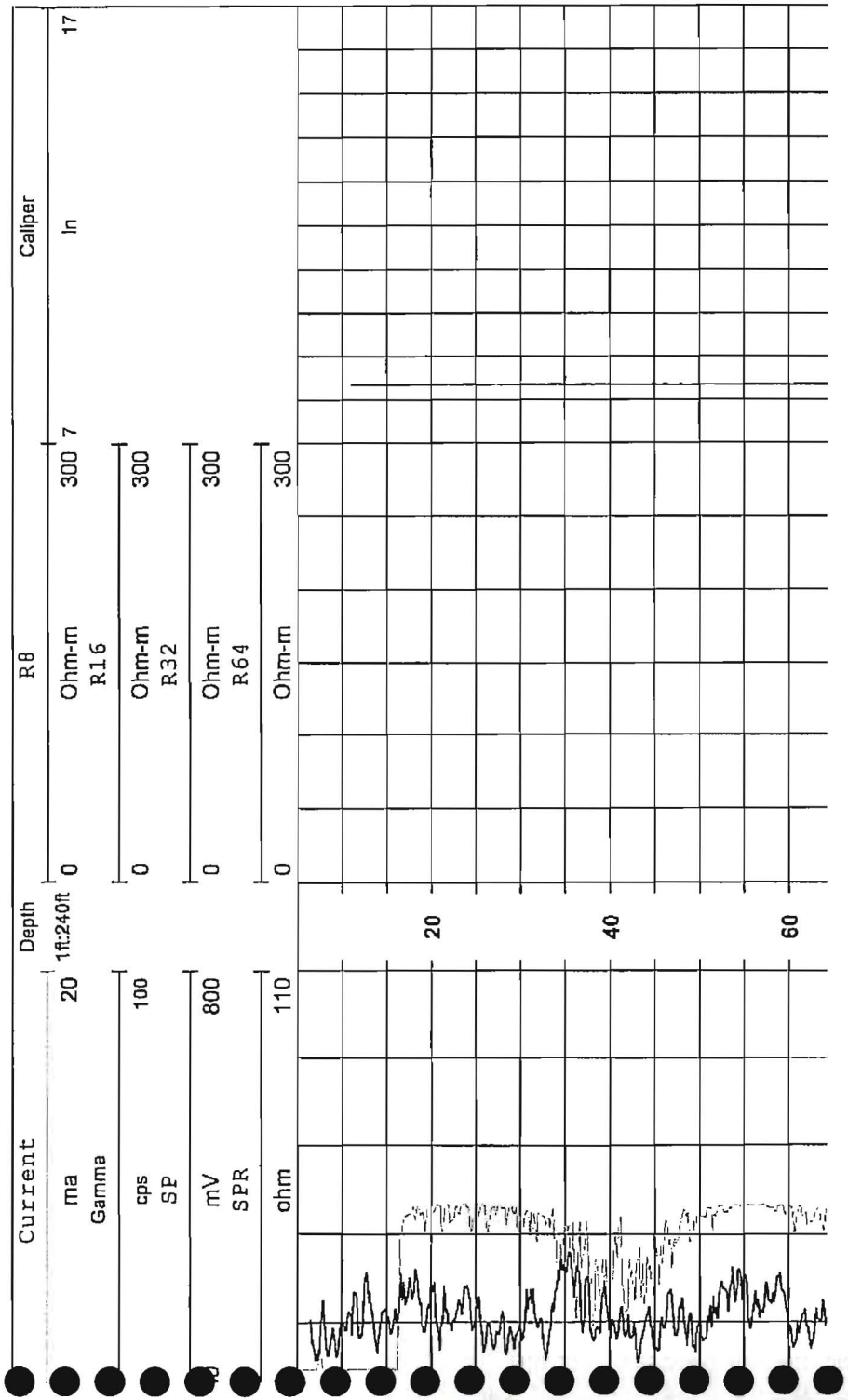
Logged by: Edward G. Miller
Unit/Truck: 03

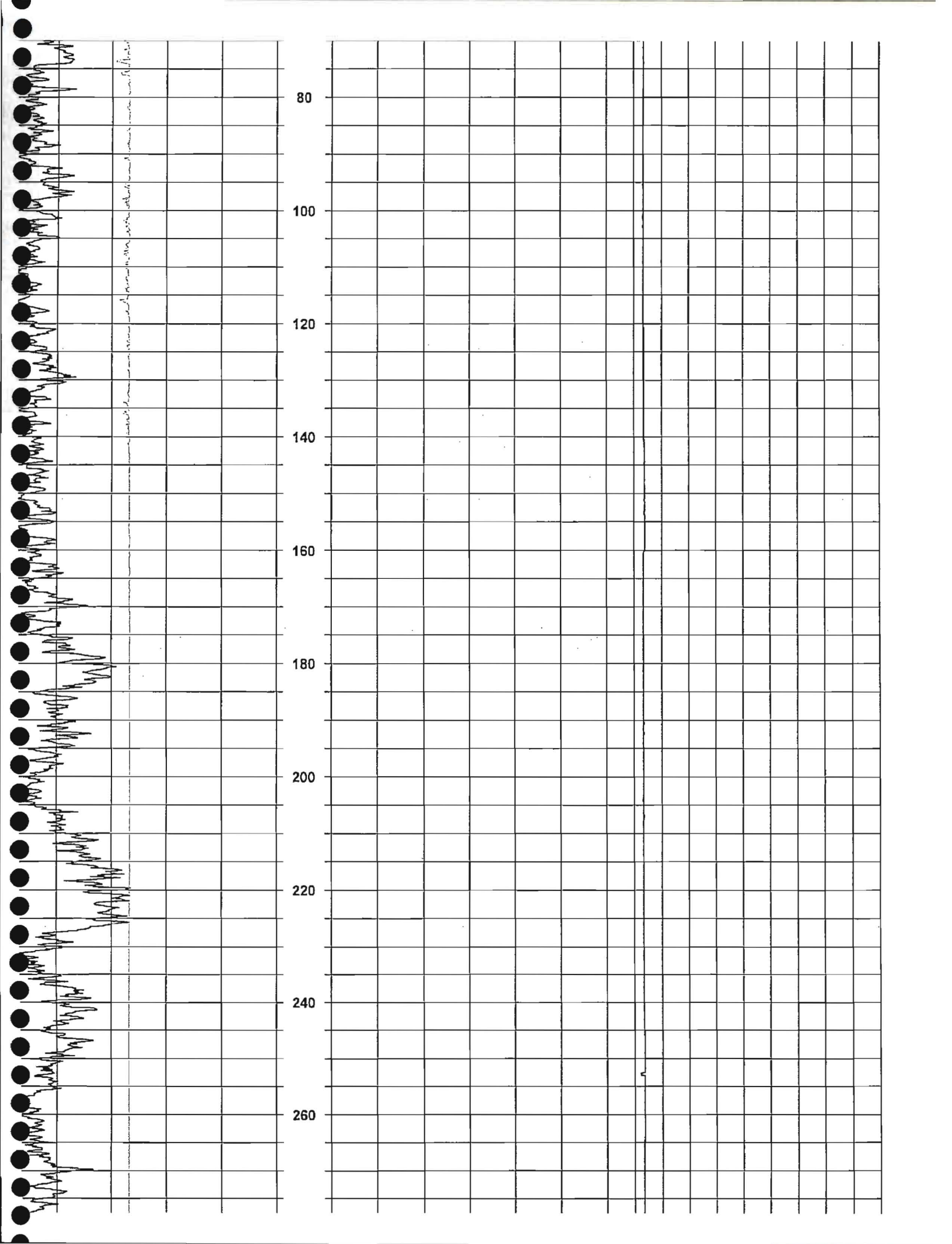
Witness: Jimmy Cook

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
Gamma	1	25	990	6	20
Caliper	1	25	995	11	20
Resistivity, SP, SPR	2	25	990	380	20

EAA Permit No.

Comments:

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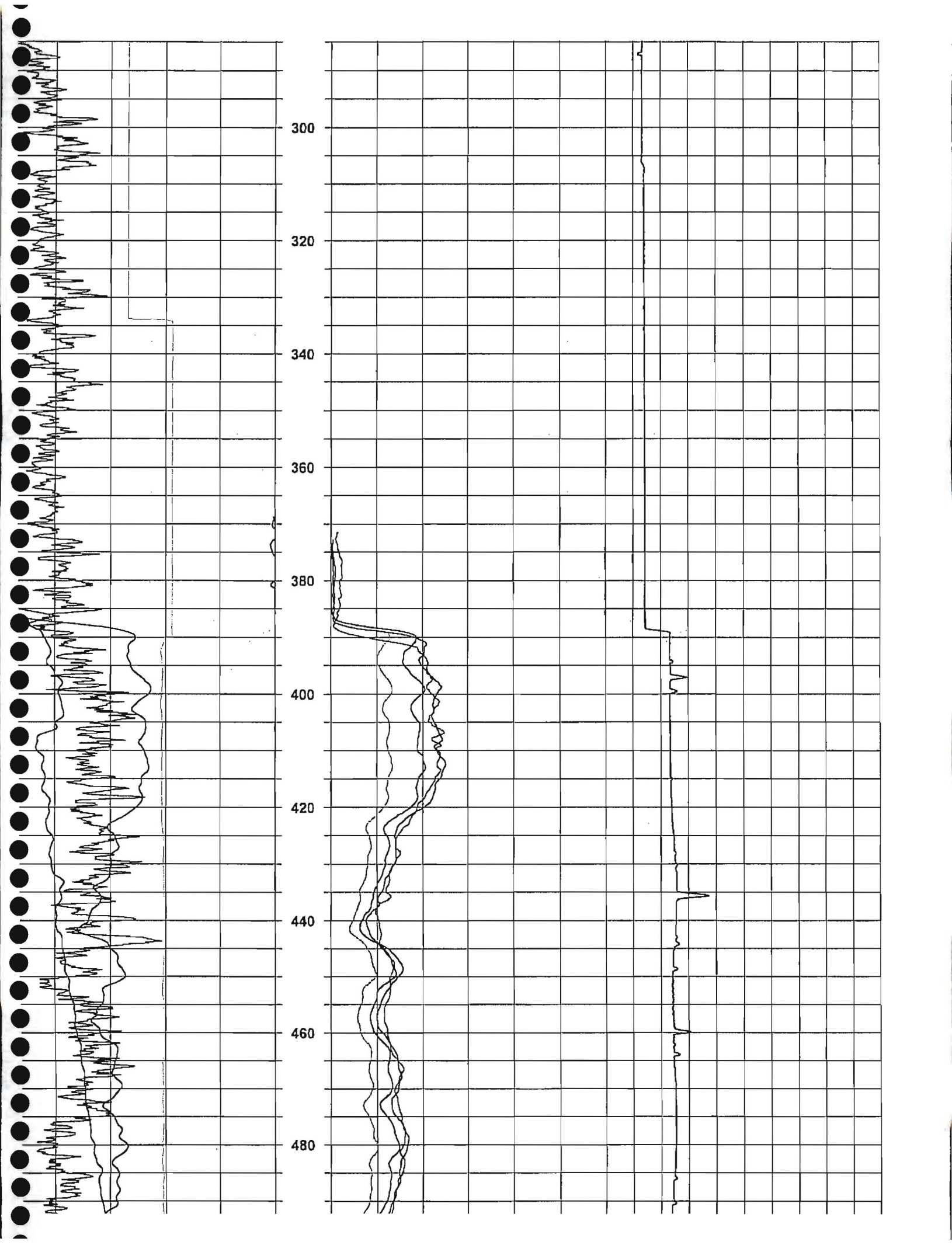
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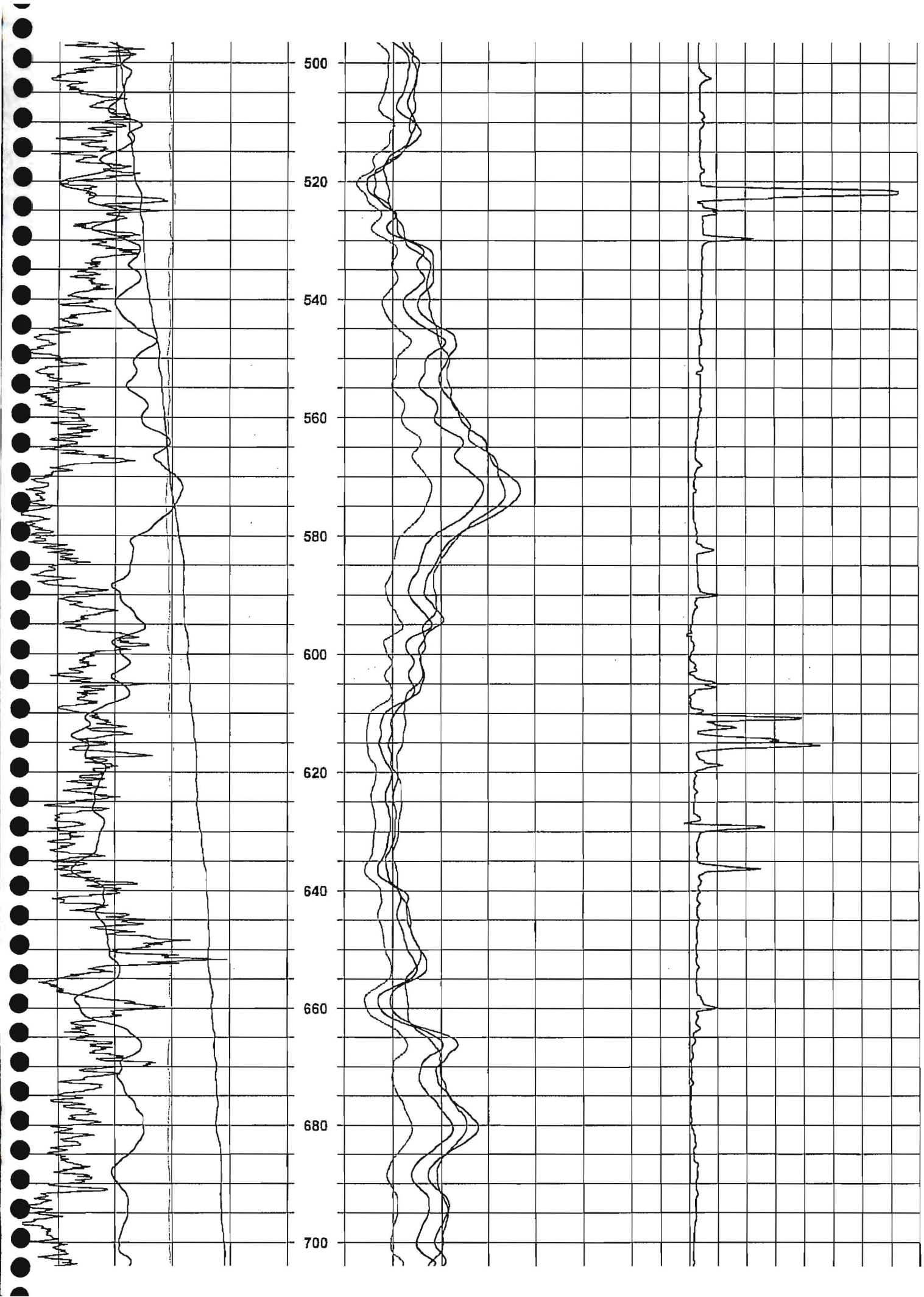
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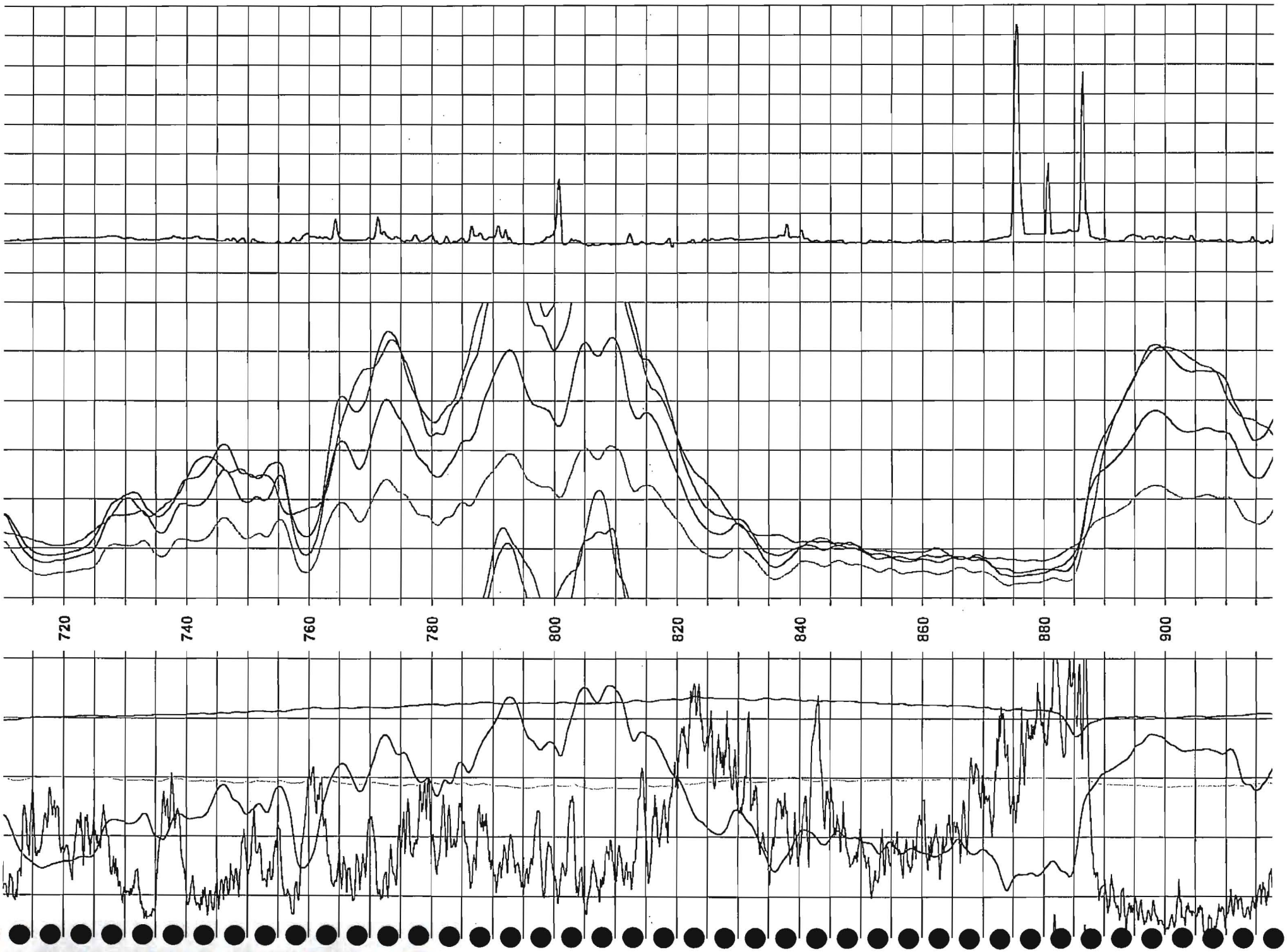
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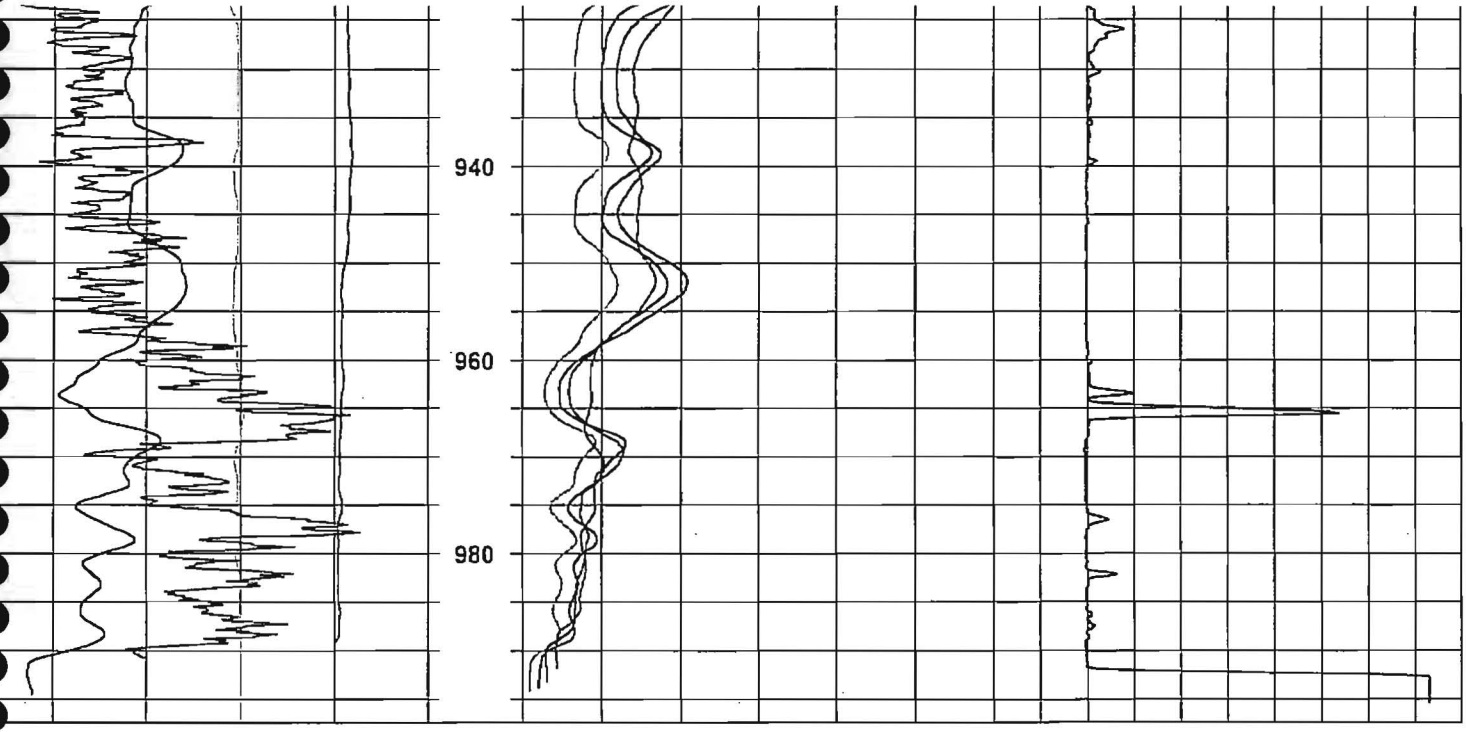
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GEO CAM

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Borehole: WELL NO. 4

Logs: GAMMA, RESISTIVITY, CALIPER, SPR

Project: NATURAL BRIDGE CAVERNS WELL NO. 4 **Date:** 07-15-09

Client: DAVENPORT DRILLING & P.S. County: BEXAR

Location: N 29* 42' 11.0" W 98* 20' 41.3" State: TX

BOREHOLE DATA

Drilling Contractor: DAVENPORT **Driller T.D. (ft) : 1100**

Elevation: 1140' GPS Logger T.D. (ft) : 1078

Depth Ref: G.L. Date Drilled: NA

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8 3/4"	0	1100	NONE		
2						
3						

Drill Method: AIR ROTARY Weight: **Fluid Level (ft) :** 397

Hole Medium: Mud Type: Time Since Circ:

Viscosity: Rm: at: Deg C

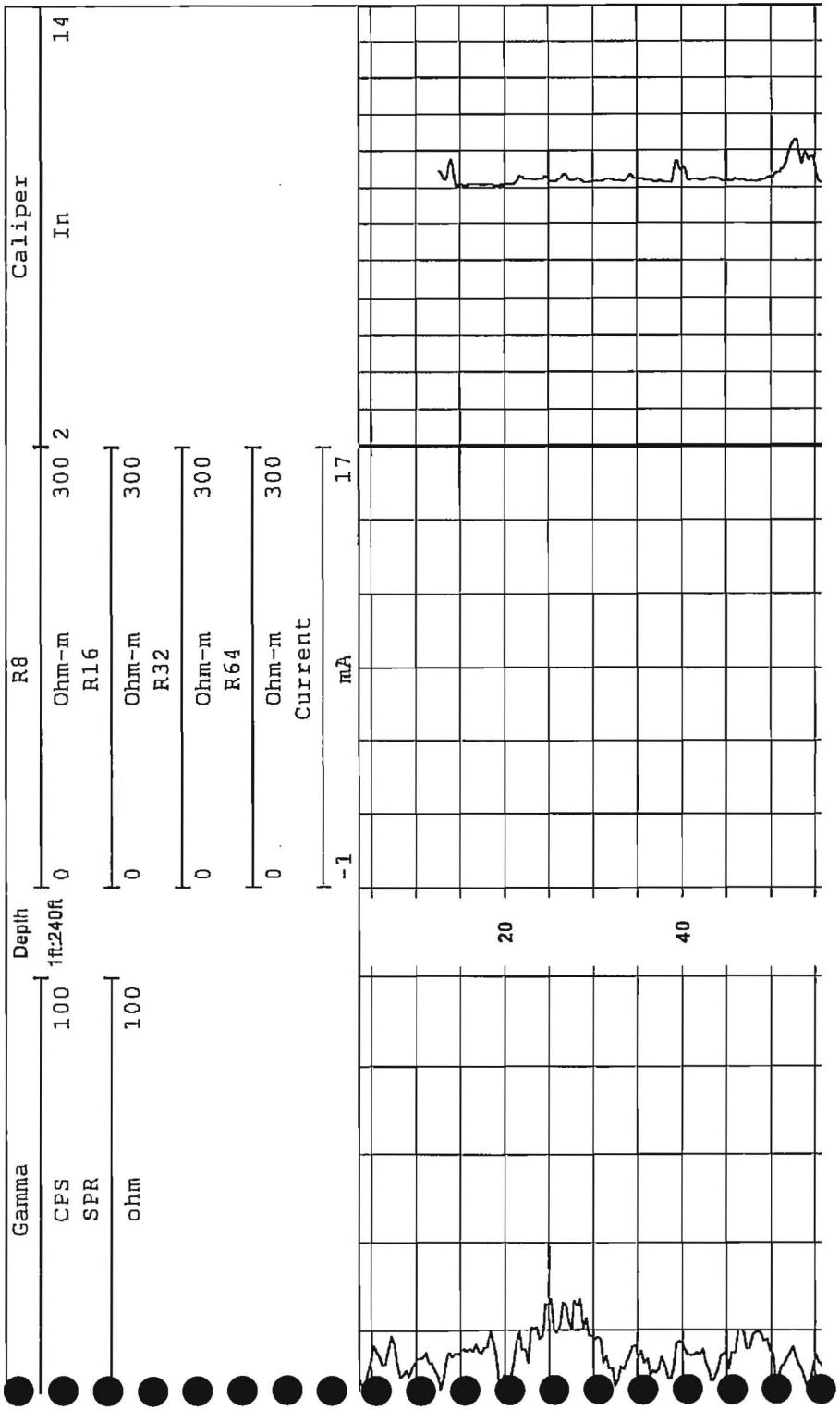
GENERAL DATA

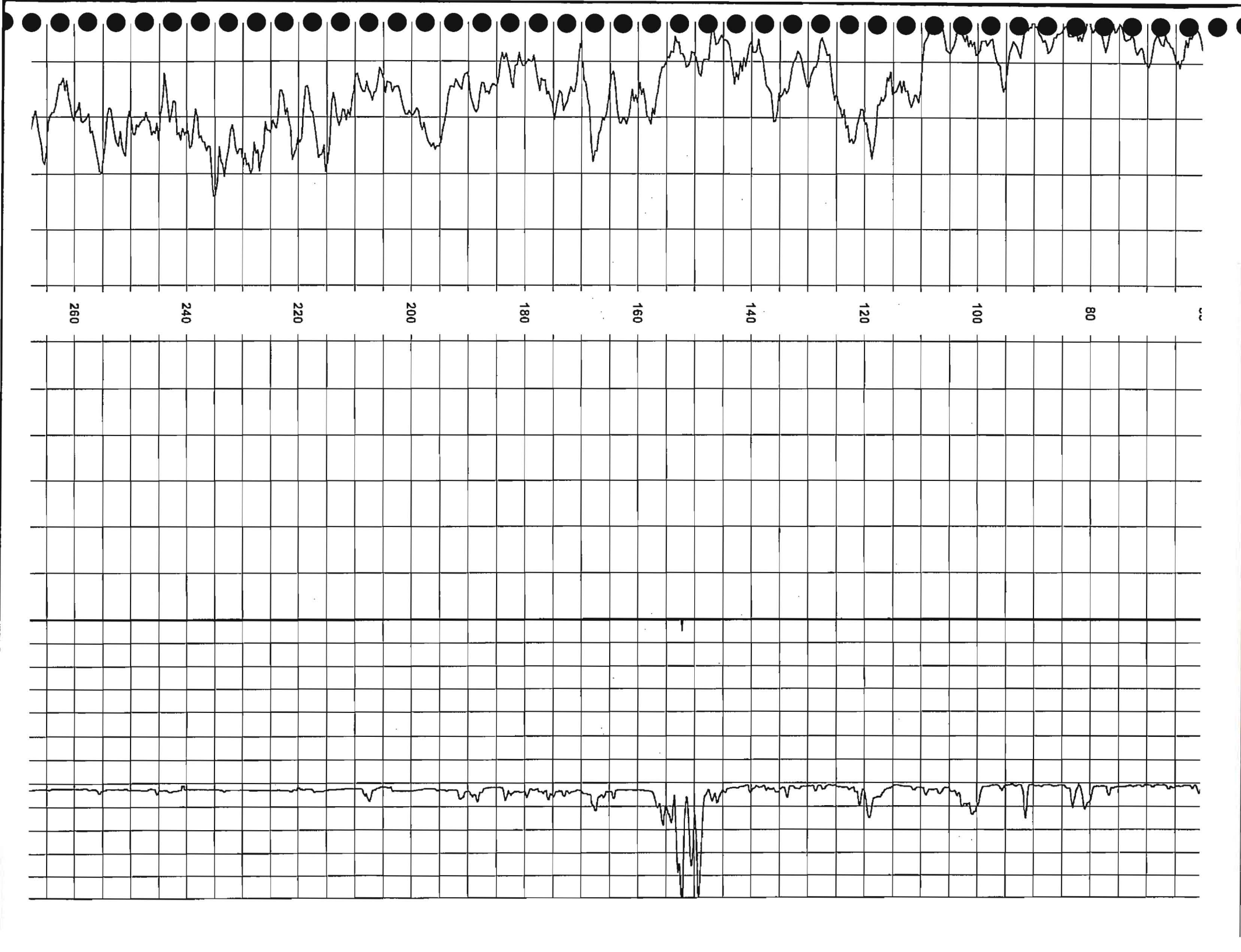
Logged by: Kelly O. Tuten Unit/Truck: 02

Witness:

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	2	23	1073	4	20
RESISTIVITY, SPR	2	23	1075	397	20
CALIPER	1	26	1078	12	20

Comments:

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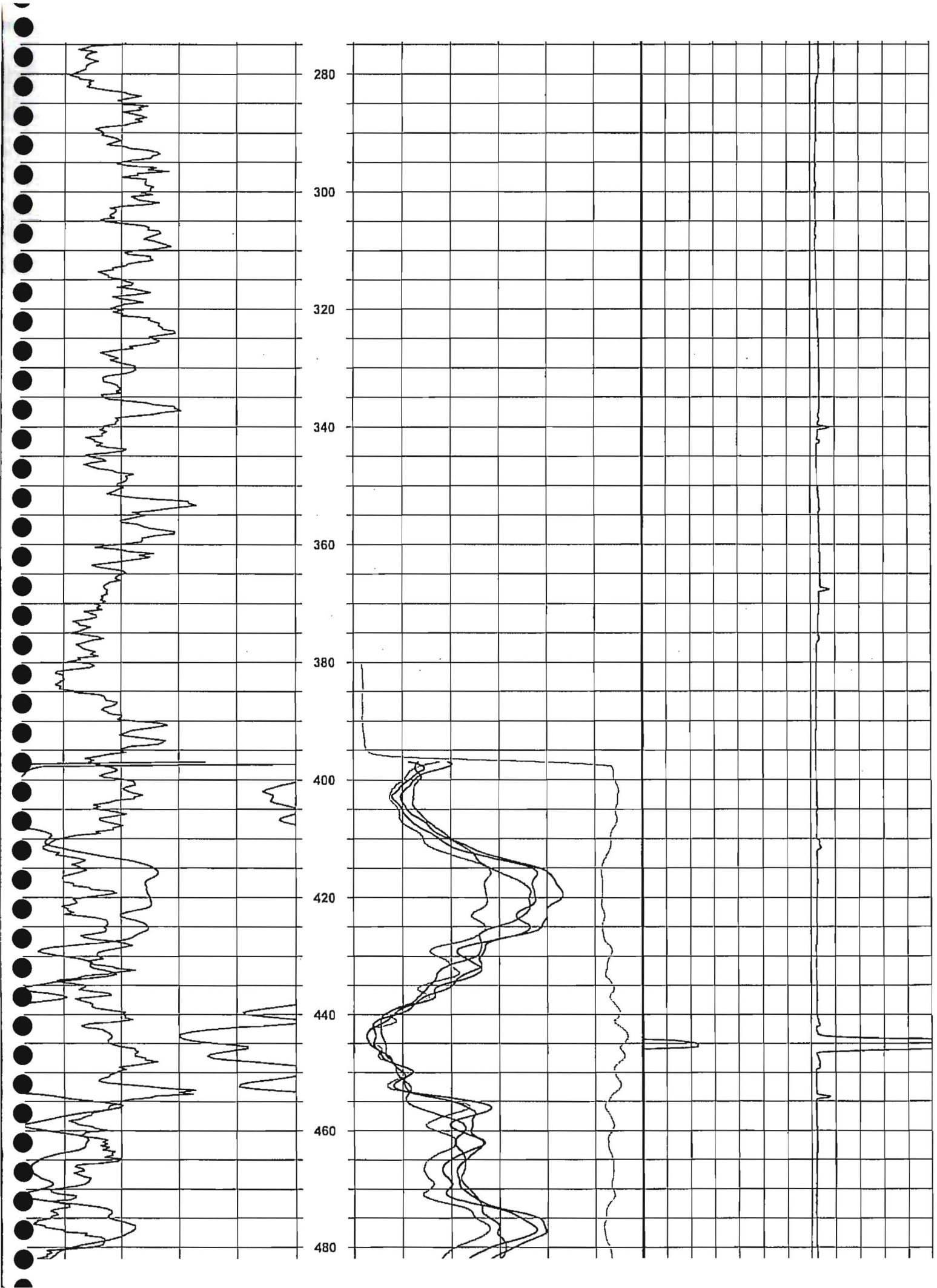
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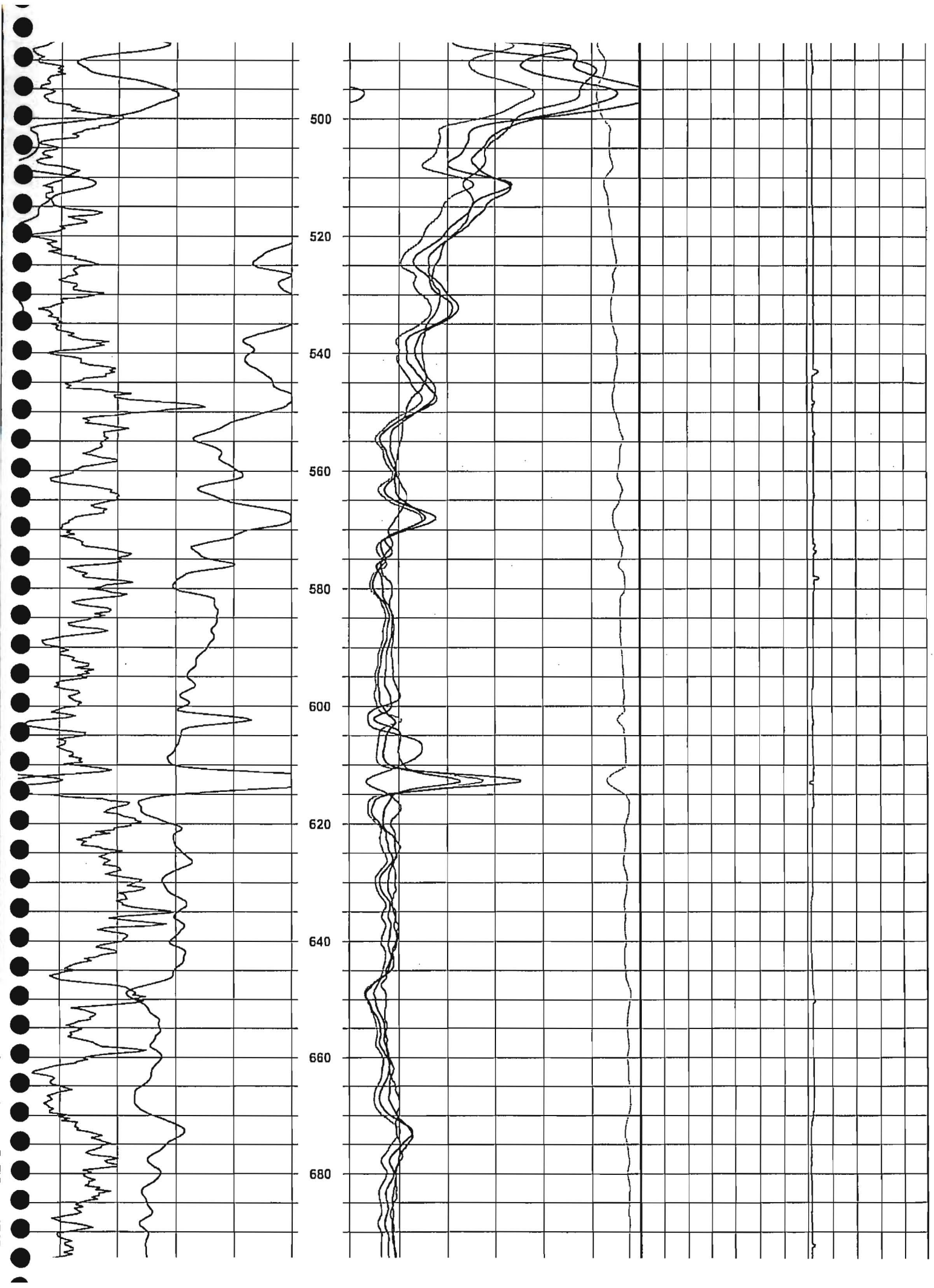
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540
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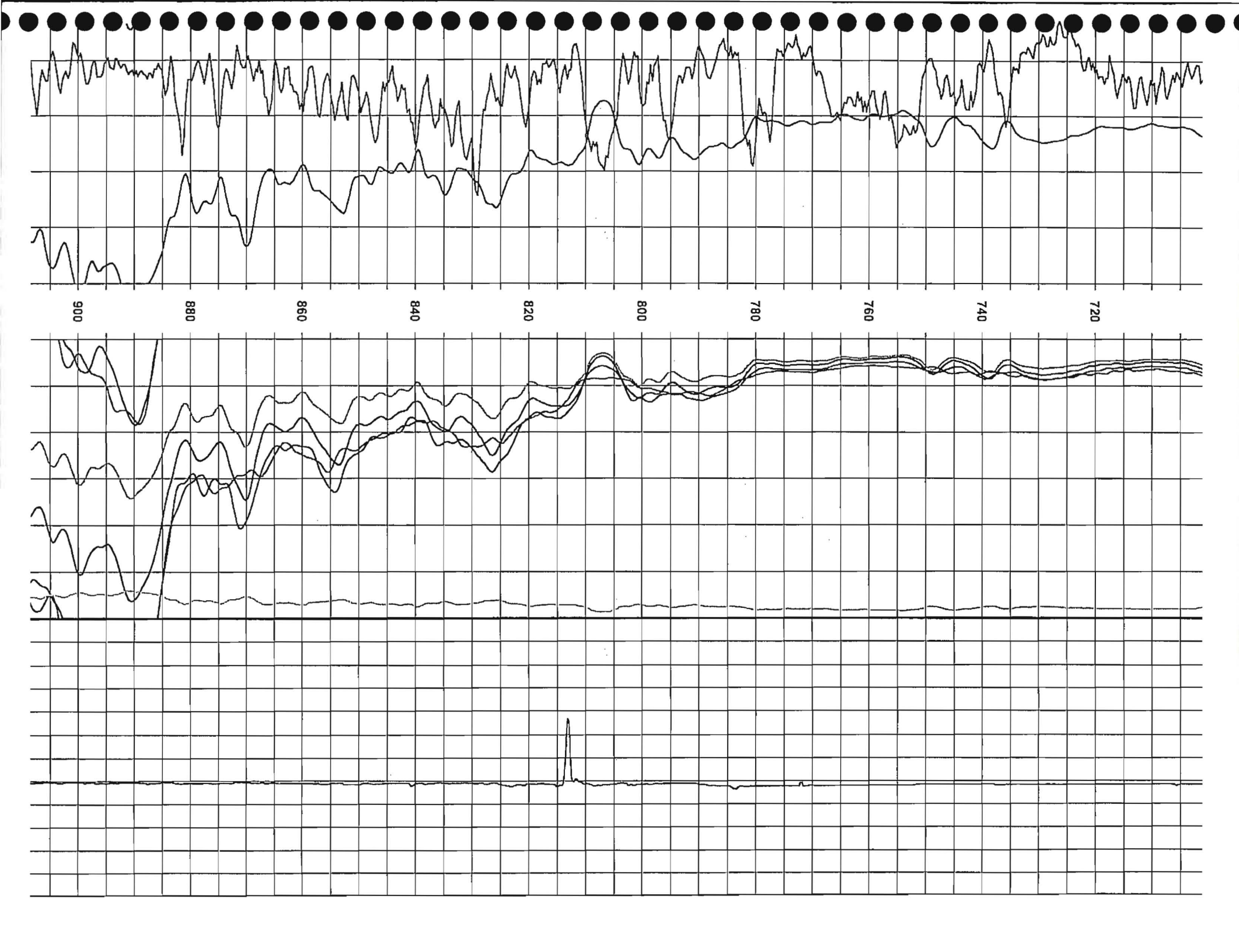
580
600
620
640
660
680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880
860
840
820
800
780
760
740
720

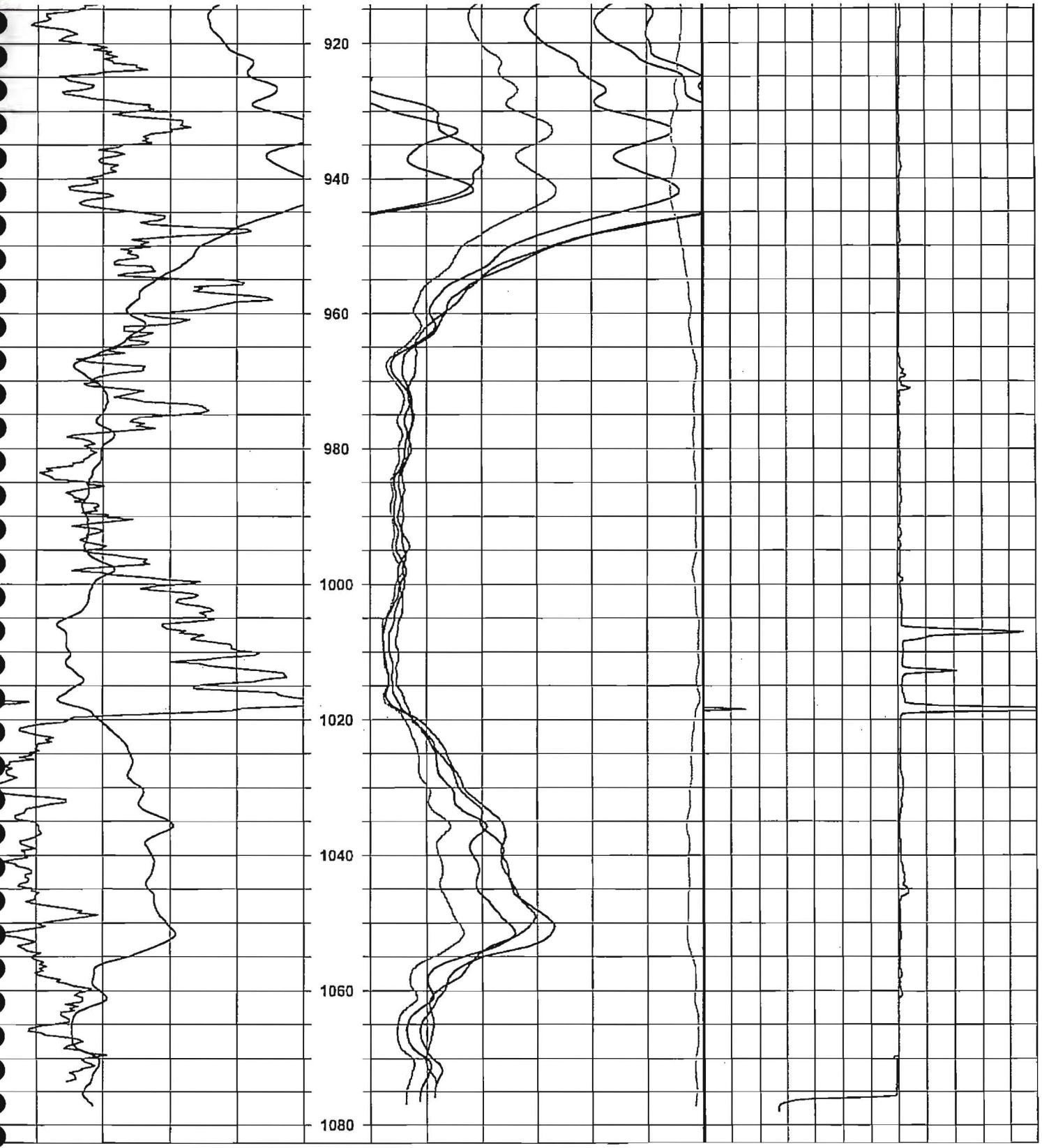

920
940
960
980
1000
1020
1040
1060
1080

Plate 1 - Soils Map
Natural Bridge Caverns

98°21'0"W

98°20'30"W

98°20'0"W

ErG

RUD

CrD

NBS-48 MB 40 pts.
NBS-46 SH 40 pts.
NBS-47 CD 20 pts.
NBS-45 SF 35 pts.
NBS-44 CD 20 pts.
NBS-43 MB 40 pts.
NBS-40 SF 40 pts.
NBS-41 SH 40 pts.
NBS-42 SH 35 pts.
NBS-61 CD 10 pts.
NBS-60 SH 30 pts.
NBS-58 SH 45 pts.
NBS-39 SH 45 pts.
NBS-57 SF 45 pts.
NBS-36 CD 15 pts.
NBS-62 MB 45 pts.
NBS-56 C 50 pts.
NBS-59 SH 40 pts.
NBS-35 MB 40 pts.
NBS-34 C 75 pts.
NBS-51 C 50 pts.
NBS-50 SH 20 pts.
NBS-49 SH 20 pts.
NBS-54 MB 50 pts.
NBS-53 MB 40 pts.
NBS-32 SH 55 pts.
NBS-33 SH 30 pts.
NBS-38 SF 50 pts.
NBS-19 SH 50 pts.
NBS-18 SH 50 pts.
NBS-20 SH 45 pts.
NBS-55 MB 50 pts.
NBS-52 C 75 pts.
NBS-66 C 70 pts.
NBS-27 SH 35 pts.
NBS-63 MB 50 pts.
NBS-31 MB 40 pts.
NBS-21 SH 50 pts.
NBS-22 SH 35 pts.
NBS-30 MB 50 pts.
NBS-15 SC 40 pts.
NBS-29 MB 40 pts.
NBS-14 SH 30 pts.
NBS-04 SH 35 pts.
NBS-05 CD 20 pts.
NBS-37 SC 40 pts.
NBS-24 MB 40 pts.
NBS-23 EF 35 pts.
NBS-25 SH 35 pts.
NBS-26 SH 30 pts.
NBS-16 SH 40 pts.
NBS-13 MB 35 pts.
NBS-10 MB 40 pts.
NBS-65 F 40 pts.
NBS-12 SH 35 pts.
NBS-03 SC 60 pts.
NBS-11e SH 40 pts.
NBS-11f SH 40 pts.
NBS-02 CD 20 pts.
NBS-17 SH 30 pts.
NBS-09 FZ 55 pts.
NBS-06 CD 10 pts.
NBS-64 F 40 pts.
NBS-01 MB 40 pts.
NBS-07 CD 20 pts.
NBS-08 SH 40 pts.

1 inch = 67 feet
Meters
0 37.5 75 150

Geology data sources: USGS SIM 2873, 2005 TNRIS, Geologic Atlas of Texas, 2010 USGS DLG

ZARA ENVIRONMENTAL LLC

STATE OF TEXAS — BRIAN D COWAN — GEOLOGY 11180 — LICENSED — PROFESSIONAL GEOSCIENTIST

Brian Cowan, M.S., P.G.
license- 11180

0 300 600 1,200 Meters
0 875 1,750 3,500 Feet

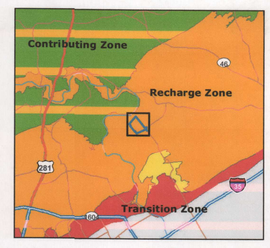
Karst features
- 10 - 39
- 39 - 49
- 49 - 75

Topographic Lines (20 ft.)

proposed zip-line
proposed zip-line structures
Cave Passage
Project Area

CrD - Comfort Rock Outcrop
ErG - Eckrant-Rock Outcrop
RUD - Rumple Comfort Association

Edwards Aquifer Contributing Zone
Edwards Aquifer Contributing Zone within the Transition Zone
Edwards Aquifer Recharge Zone
Edwards Aquifer Transition Zone



NATURAL BRIDGE CAVERNS

98°21'0"W

98°20'30"W

98°20'0"W

Kkbn

Kgru

Kkbn

Kkke

NBS-48
MB 40 pts.

Kkke

NBS-46
SH 40 pts.

NBS-47
CD 20 pts.

NBS-45
SF 35 pts.

NBS-44
CD 20 pts.

NBS-43
MB 40 pts.

NBS-40
SF 40 pts.

NBS-41
SH 40 pts.

NBS-42
SH 35 pts.

NBS-61
CD 10 pts.

Kkke

NBS-60
SH 30 pts.

NBS-58
SH 45 pts.

NBS-39
SH 45 pts.

Kkke

NBS-57
SF 45 pts.

NBS-36
CD 15 pts.

Kkd

NBS-62
MB 45 pts.

NBS-56
C 50 pts.

NBS-59
SH 40 pts.

NBS-35
MB 40 pts.

NBS-34
C 75 pts.

Kkbn

NBS-51
C 50 pts.

NBS-50
SH 20 pts.

NBS-49
SH 20 pts.

NBS-54
MB 50 pts.

NBS-53
MB 40 pts.

NBS-32
SH 55 pts.

NBS-33
SH 30 pts.

NBS-38
SF 50 pts.

NBS-19
SH 50 pts.

NBS-55
MB 50 pts.

NBS-20
SH 45 pts.

NBS-18
SH 50 pts.

Kplc

NBS-52
C 75 pts.

NBS-66
C 70 pts.

NBS-27
SH 35 pts.

NBS-63
MB 50 pts.

NBS-21
SH 50 pts.

NBS-31
MB 40 pts.

NBS-22
SH 35 pts.

NBS-30
MB 50 pts.

NBS-15
SC 40 pts.

NBS-29
MB 40 pts.

NBS-14
SH 30 pts.

NBS-05
CD 20 pts.

NBS-04
SH 35 pts.

Kprd

NBS-37
SC 40 pts.

NBS-24
MB 40 pts.

NBS-23
EF 35 pts.

NBS-25
SH 35 pts.

NBS-26
SH 30 pts.

NBS-16
SH 40 pts.

NBS-13
MB 35 pts.

Kkbn

NBS-65
F 40 pts.

Kprd

NBS-12
SH 35 pts.

NBS-03
SC 60 pts.

NBS-10
MB 40 pts.

NBS-11f
SH 40 pts.

NBS-02
CD 20 pts.

NBS-11g
SH 40 pts.

NBS-17
SH 30 pts.

NBS-09
FZ 55 pts.

NBS-06
CD 10 pts.

NBS-64
F 40 pts.

NBS-01
MB 40 pts.

NBS-07
CD 20 pts.

NBS-08
SH 40 pts.

Kkg

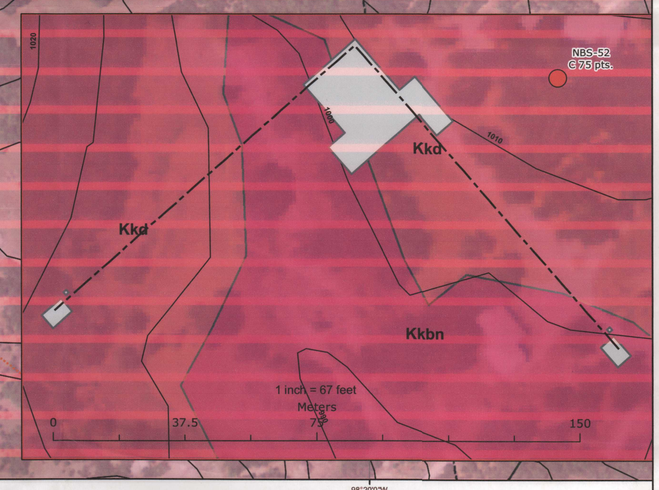
Kprd

Kplc

Kprd

Kplc

Kprd



98°21'0"W

98°20'30"W

98°20'0"W

Plate 2 - Geology Map
Natural Bridge Caverns

Meters
0 300 600 1,200
0 875 1,750 3,500
Feet

Geology data sources: USGS SIM 2873, 2005 TNRIS, Geologic Atlas of Texas, 2010 USGS DLG

ZARA ENVIRONMENTAL LLC

STATE OF TEXAS
BRIAN D COWAN
GEOLOGY
11180
LICENSED
PROFESSIONAL GEOSCIENTIST

Brian Cowan, M.S., P.G.
license- 11180

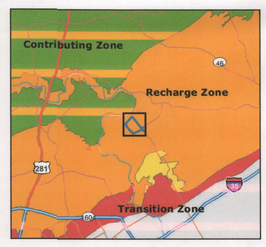
Karst features
- 10 - 39
- 39 - 49
- 49 - 75

Topographic Lines (20 ft.)

- proposed zip-line structures
- proposed zip-line
- Cave Passage
- Project Area
- Faults

- Qt - Fluviatile Terrace
- Kpcm - Cyclic and Marine Member
- Kplc - Leached and Collapsed Member
- Kprd - Regional Dense Member
- Kkg - Grainstone Member
- Kkke - Kirschberg Evaporite Member
- Kkd - Dolomitic Member
- Kkbn - Basal Nodular Member
- Kgr(u) - Upper Glen Rose

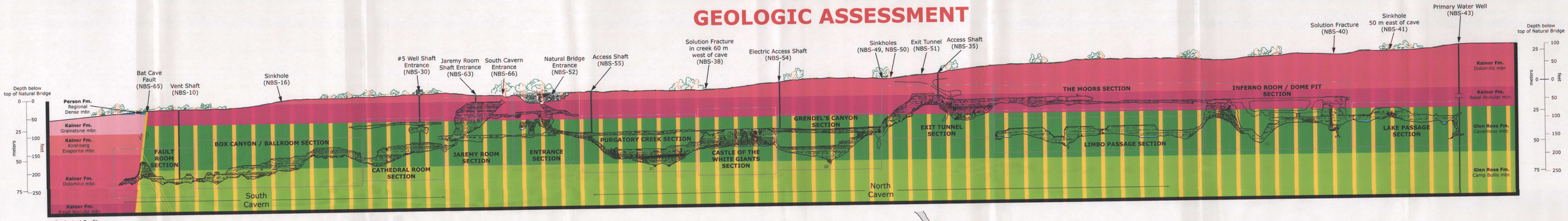
- Edwards Aquifer Contributing Zone
- Edwards Aquifer Contributing Zone within the Transition Zone
- Edwards Aquifer Recharge Zone
- Edwards Aquifer Transition Zone



NATURAL BRIDGE CAVERNS

NATURAL BRIDGE CAVERNS

GEOLOGIC ASSESSMENT



Projected Profile

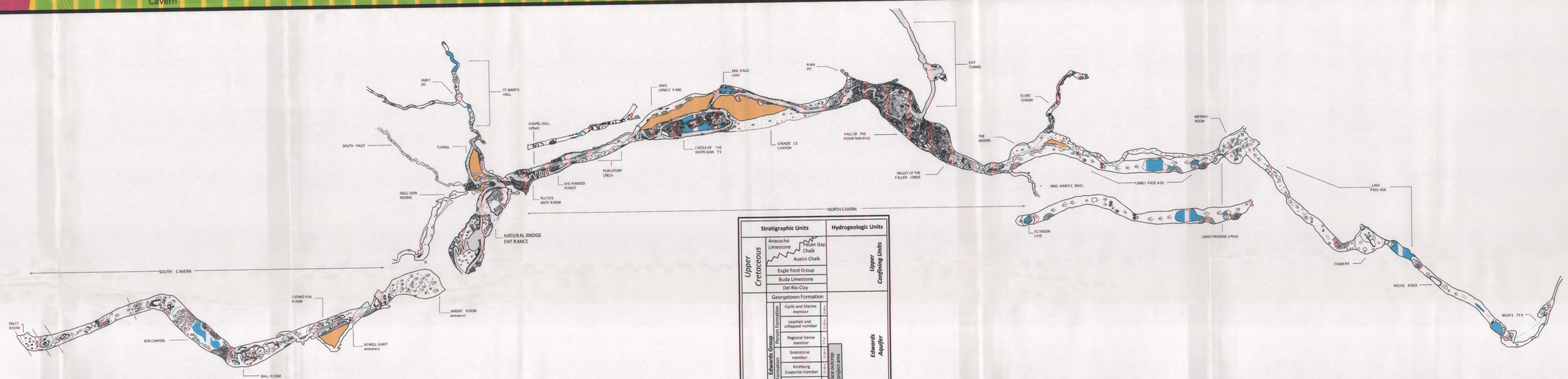


Plate 3 - Geologic Cross-section
Natural Bridge Caverns

ZARA ENVIRONMENTAL LLC

GEOLOGIC ASSESSMENT PERFORMED BY:
Zara Environmental LLC, Manchaca, TX

STATE OF TEXAS — BRIAN D COWAN — GEOLOGY 11180 — LICENSED PROFESSIONAL GEOSCIENTIST

Brian D. Cowan, Texas Professional Geologist No. 11180

SURVEY:
TRANSIT / BRUNTON / SUNTO / TAPE

Principal Surveyers (1960 – 1978):
Jack Burch, Jan Knox, Orion Knox, & James Reddell

Survey Support by Members of :
Alamo Grotto, Dallas-Fort Worth Grotto, St. Mary's Univ. Speleological Society, Univ. of Texas Grotto, and Natural Bridge Caverns' owners & staff.

Principal Recent Surveyers (1990 – 2000):
Aaron Addison, Joe Ivy, Jim Jase Becky Jones, JanKnox, Orion Knox, Danny Lecopold, Paul Thomas, Brian Vauter, George Veni, Brad Wuest, Travis Wuest.

Total survey length June, 2000: 11,600 feet (2.18 miles) / 3,535 meters

Original draft by Orion Knox, 1978
Computer draft and revisions by Brian Vauter, 2000

0 100 200 300 400 FEET
0 25 50 75 100 METERS

N_T
8½°–1973
N_M

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Stratigraphic Units				Hydrogeologic Units
Upper Cretaceous		Anacacho Limestone / Pecan Gap Chalk		Upper Confining Units
		Austin Chalk		
		Eagle Ford Group		
		Buda Limestone		
		Del Rio Clay		
Lower Cretaceous		Georgetown Formation		Edwards Aquifer
	Edwards Group / Person Formation	Cyclic and Marine member	0–60	
		Leached and collapsed member	0–60	
	Edwards Group / Kainer Formation	Regional Dense member	0–5	
		Grainstone member	0–15	
		Kirshberg Evaporite member	15–35	
		Dolomitic member	35–45	
		Basal Nodular member	45–55	
	Trinity Group / Glen Rose Formation	Cavernous member	55–75	Upper Trinity Aquifer
		Camp Bullis member	75–90	
		Upper evaporite member	90–110	
		Fossiliferous member	110–130	
		Lower evaporite member	130–145	
	Trinity Group	Lower member	145–165	Middle Trinity Aquifer
		Hensell Formation	165–185	
		Cow Creek Formation	185–205	
		Hamett Formation	205–215	

Surface outcrop in project area
Cave Development Zone
Principal Water Production Zone

LEGEND

- PRINCIPAL PASSAGE
- UPPER LEVEL PASSAGE
- LOWER LEVEL PASSAGE
- UNSURVEYED PASSAGE
- COMMERCIAL TRAIL
- LOW STEEP SLOPE
- LOW SLOPE
- PIT
- SHARP DROP IN CEILING
- DOME
- 211 DEPTH BELOW NATURAL BRIDGE
- STREAM COURSE
- LAKE OR POOL
- RIMSTONE DAMS
- FLOWSTONE
- COLUMN
- STALACTITES
- STALAGMITES
- SODA STRAWS
- CLAY OR MUD
- FINE LOOSE DEPOSITS
- SMALL BREAKDOWN
- MASSES OF BREAKDOWN
- LARGE BREAKDOWN BLOCKS
- GUANO
- FAULT
- INFERRED FAULT
- SHAFT OR WELL