

Exhibit E

Austin Tree Experts

Professional Arborist Services

(512) 996-9100 | www.AustinTreeExperts.com



Arborist Report

Tree Condition Evaluation

September 14, 2018

Camelback Project, 78730

Introduction

This report contains information about the general forest makeup and some specific trees' conditions located on the Camelback project located to the north west of Loop 360 and the Pennybacker bridge. The site is in the design phase of site planning. I have been provided some information about the site:

- An incomplete tree survey
- Infrared red imagery for the site
- A map of priority areas for tree evaluations
- A list of heritage trees in the proposed development area

Tree Species Clarification

All trees referred to as "cedar" in this report are ash junipers (*juniperus ashei*), and all trees referred to live oak are escarpment live oak (*quercus fusiformis*).

Overall Forest Composition and Condition

There are two distinguishable site types: there is the waterfront section of land that is mostly a severe slope/cliff along the edge of Ladybird lake, and the second area is the upper slopes of the site. Most of the trees in the forest are very young. I have been told that the site used to be a goat farm. I observed in the field many dead and charred cedar stumps. It appears the site was likely nude of trees and vegetation in recent history.

Upper Slopes

The northern slopes are very steep and rocky. The slope is so steep that all leafy debris is washed away. There is likely nearly zero rain water penetration into the rock. The trees on

these slopes are approximately 12' tall on average. The species composition is 99% cedar with a sporadic live oak mixed in.

The southern slopes are more gradual and there is some litter layer on the soil surface. The trees in this area range between 15-25' tall; trees are tallest near the drainage valleys and progressively get smaller as you get farther from drainage valleys. There is one portion of the drainage valleys near the center of the site where the trees are largest. The few trees surveyed to be heritage are documented below. I was unable to locate a few of the identified heritage trees; I believe they have fallen or were misidentified. The area where these heritage trees grow are steeper slopes of the drainage valleys. There are some live oaks along the drainage valleys. The largest one I found was 20.5" dbh; most are in the 10-16" dbh range. Trees at the peak of the hill are stressed, many of the cedars are dead. I would estimate that approximately 80% of the trees on the upper slopes are cedar.

Waterfront

There are many large trees along the waterfront. I have not yet inventoried trees along this area, but from looking a video captured by drone, I can see that there are large bald cypress, pecan, elm and live oak. My understanding is there is no planned development along the waterfront and all these trees will be preserved.

Heritage Tree Condition Information

This section only contains information about heritage trees in the proposed development area. All of the surveyed heritage trees are multi-stem red oaks located along a drainage valley on the upper slopes. There are many fallen trees in this area; some fully uprooted and some broken off in the main stems. Overall, the structural integrity of these trees is questionable at best. Average lifespan of spanish oaks on hillsides in the hill country are known to be fairly short, +/- 50 years. Development activity near these trees would further shorten life expectancy.

Tree 23179 : Red Oak

All of the stems on this tree are regrowth from an old rotten stump. Half the stems are dead and all have decay and structural defects



Tree 23231 : Red Oak

Multi-stem tree with extensive decay at the base and root flare area. Armillaria mushrooms are present near the base of the tree.



23399 : Red Oak

Multi-stem tree with one stem already failed. Other stems have significant lean. High likelihood of extensive decay in the lower trunk and buttress roots.



23381, 23472, 24317

I was unable to find these trees. I think it is highly likely they have fallen or were misidentified.

Infrared Imagery

The infrared imagery below shows two trees that stand out and are circled on the image. I located these two trees in the field. The northern tree is the 20.5" live oak referenced previously in this report and the other is a group of two oaks: 17.5" multi-stem and 14" dbh red oaks. In the same way these two trees stand out on IR, they are also the best quality trees I observed in the field.



PHOTOS OF THE CIRCLED TREES BELOW

20.5" dbh Live Oak (northern tree circled above)

I was unable to get a good canopy photo due to surrounding vegetation.



17.5" dbh Red Oak (one of the trees in the southern circle above)



14" Red Oak (other tree in southern circle above)



Priority Areas of My Work

The red areas indicated below were identified to me as priority areas to inventory. I have thoroughly walked these areas and can confidently confirm there are no heritage trees in these areas. The one exception is the red area along the waterfront. I have not thoroughly inventoried these trees. In addition to the red areas, I have very thoroughly walked the center of the site and found no additional heritage trees. The large, yellow area to the north (low priority) are very steep slopes with no realistic possibility of significant trees. The medium priority, orange area in the center of the large yellow area is a drainage valley. The best trees from this north tract are surely located here but I don't expect they are significantly different from the large trees found on the southern slopes' drainage valleys (probably no heritage trees other than multi-stem red oaks).



Regards,
Keith Brown
Board Certified Master Arborist TX-0985BT
Austin Tree Experts

Exhibit F



May 31, 2018, updated July 6, 2018

Mr. Joel Wixson, P.E.
Kimley-Horn
10814 Jollyville Road, Avallon IV, Suite 300
Austin, Texas 78759

Telephone: 512 418-4525
Email: joel.wixson@kimley-horn

RE: Environmental Resource Inventory (ERI)
Camelback Tract
Bridgepoint Parkway and Coldwater Canyon Parkway
Austin, Travis County, Texas
Terracon Project No. 96187142

Dear Mr. Wixson:

Terracon Consultants, Inc. (Terracon) is pleased to submit this updated Environmental Resource Inventory (ERI) report addressing City of Austin (COA) compliance requirements as they may affect the above referenced project site in accordance with Terracon Proposal No. P96187142 dated February 27, 2018 and authorized on April 17, 2018.

The results of this report are based on the professional opinion of Terracon and site conditions observed during the field reconnaissance. It should be noted that some critical environmental features (CEFs) may be seasonal or ephemeral, indicating that their presence/absence and condition are dependent on various weather conditions (including rainfall) and other changes to the surrounding ecosystem.

Terracon is not liable for ephemeral and/or seasonal CEFs that are exposed or created after Terracon's field assessment. Additionally, Terracon's opinion is based on current COA regulations; therefore, changes in regulations may require a re-evaluation of the findings of this report.

It is recommended this report be promptly submitted to the COA, otherwise an updated report (based on an additional field assessment) may be required to evaluate ephemeral and/or CEFs.

It should be noted that the COA has the ultimate authority for CEF classifications.



Environmental Resource Inventory (ERI)

Camelback Tract ■ Austin, Travis County, Texas

May 31, 2018, updated July 6, 2018 ■ Terracon Project: 96187142



We appreciate the opportunity to provide this report. If you have questions regarding the content of this report, please feel free to contact Miranda Reinhard at (512) 891-2692 or miranda.reinhard@terracon.com.

Sincerely,

Terracon Consultants, Inc.

Approved by:

Miranda Reinhard
Staff Scientist

Ann M. Scott, PhD, RPA
Authorized Project Reviewer
Natural/Cultural Resources Group Manager

City of Austin Environmental Resource Inventory

**Camelback Tract
Bridgepoint Parkway and Coldwater Canyon Parkway
Austin, Travis County, Texas**

May 31, 2018, updated July 6, 2018

Terracon Project No. 96187142



Prepared for:

Kimley-Horn
Austin, Texas

Prepared by:

Terracon Consultants, Inc.
Austin, Texas

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

**ENVIRONMENTAL RESOURCE INVENTORY FORM
FOR THE CITY OF AUSTIN
RELATED TO LDC 25-8-121, CITY CODE 30-5-121, ECM 1.3.0 & 1.10.0**

APPENDICES

APPENDIX A – ADDITIONAL DISCUSSION

APPENDIX B – EXHIBITS

APPENDIX C – SITE PHOTOGRAPHS

APPENDIX D – CREDENTIALS

APPENDIX E – GENERAL COMMENTS

Environmental Resource Inventory

For the City of Austin
Related to LDC 25-8-121, City Code 30-5-121, ECM 1.3.0 & 1.10.0

The ERI is required for projects that meet one or more of the criteria listed in LDC 25-8-121(A), City Code 30-5-121(A).

1. SITE/PROJECT NAME: Camelback Tract
2. COUNTY APPRAISAL DISTRICT PROPERTY ID (#'s): 130428 and 474563
3. ADDRESS/LOCATION OF PROJECT: Bridgepoint Parkway & Coldwater Canyon Parkway, Austin
4. WATERSHED: Coldwater Creek and Lake Austin
5. THIS SITE IS WITHIN THE (Check all that apply)

Edwards Aquifer Recharge Zone* (See note below)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> No
Edwards Aquifer Contributing Zone*	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> No
Edwards Aquifer 1500 ft Verification Zone*	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> No
Barton Spring Zone*	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> No

*(as defined by the City of Austin – LDC 25-8-2 or City Code 30-5-2)

Note: If the property is over the Edwards Aquifer Recharge zone, the Hydrogeologic Report and karst surveys must be completed and signed by a Professional Geoscientist Licensed in the State of Texas.

6. DOES THIS PROJECT PROPOSE FLOODPLAIN MODIFICATION?.....☐ YES** ☒ NO
If yes, then check all that apply:
 - ☐ (1) The floodplain modifications proposed are necessary to protect the public health and safety;
 - ☐ (2) The floodplain modifications proposed would provide a significant, demonstrable environmental benefit, as determined by a **functional assessment** of floodplain health as prescribed by the Environmental Criteria Manual (ECM), or
 - ☐ (3) The floodplain modifications proposed are necessary for development allowed in the critical water **quality zone under LDC 25-8-261 or 25-8-262, City Code 30-5-261 or 30-5-262.**
 - ☐ (4) The floodplain modifications proposed are outside of the Critical Water Quality Zone in an area determined to be in poor or fair condition by a **functional assessment** of floodplain health.

**** If yes, then a functional assessment must be completed and attached to the ERI (see ECM 1.7 and Appendix X for forms and guidance) unless conditions 1 or 3 above apply.**

7. IF THE SITE IS WITHIN AN URBAN OR SUBURBAN WATERSHED, DOES THIS PROJECT PROPOSE A UTILITY LINE PARALLEL TO AND WITHIN THE CRITICAL WATER QUALITY ZONE? ☐ YES*** ☒ NO

*****If yes, then riparian restoration is required by LDC 25-8-261(E) or City Code 30-5-261(E) and a functional assessment must be completed and attached to the ERI (see ECM1.5 and Appendix X for forms and guidance).**

8. There is a total of 44 (#s) Critical Environmental Feature(s)(CEFs) on or within 150 feet of the project site. If CEF(s) are present, attach a detailed **DESCRIPTION** of the CEF(s), color **PHOTOGRAPHS**, the **CEF WORKSHEET** and provide **DESCRIPTIONS** of the proposed CEF buffer(s) and/or wetland mitigation. Provide the number of each type of CEFs on or within 150 feet of the site (Please provide the number of CEFs):

26 (#'s) Spring(s)/Seep(s) 1 (#'s) Point Recharge Feature(s) 1 (#'s) Bluff(s)
 10 (#'s) Canyon Rimrock(s) 6 (#'s) Wetland(s)

Note: Standard buffers for CEFs are 150 feet, with a maximum of 300 feet for point recharge features. Except for wetlands, if the standard buffer is not provided, you must provide a written request for an administrative variance from LDC 25-8-281(C)(1) and provide written findings of fact to support your request. Request forms for administrative variances from requirements stated in LDC 25-8-281 are available from Watershed Protection Department.

9. The following site maps are attached at the end of this report (Check all that apply and provide):

All ERI reports must include:

- **Site Specific Geologic Map with 2-ft Topography**
- **Historic Aerial Photo of the Site**
- **Site Soil Map**
- **Critical Environmental Features and Well Location Map on current Aerial Photo with 2-ft Topography**

Only if present on site (Maps can be combined):

- ☐ **Edwards Aquifer Recharge Zone with the 1500-ft Verification Zone**
(Only if site is over or within 1500 feet the recharge zone)
- ☐ **Edwards Aquifer Contributing Zone**
- **Water Quality Transition Zone (WQTZ)**
- **Critical Water Quality Zone (CWQZ)**
- ☐ **City of Austin Fully Developed Floodplains for all water courses with up to 64-acres of drainage**

10. **HYDROGEOLOGIC REPORT** – Provide a description of site soils, topography, and site specific geology below (Attach additional sheets if needed):

Surface Soils on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups*. If there is more than one soil unit on the project site, show each soil unit on the site soils map.

Soil Series Unit Names, Infiltration Characteristics & Thickness		
Soil Series Unit Name & Subgroup**	Group*	Thickness (feet)
BID - (Appendix A for name)	D	0-4'
BoF - (Appendix A for name)	D	0-5'
TaD - (Appendix A for name)	D	0-1'
TdF - (Appendix A for name)	D	0-1'
Ya - (Appendix A for name)	A	0-6'

***Soil Hydrologic Groups 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.

**Subgroup Classification – See Classification of Soil Series Table in County Soil Survey.

Description of Site Topography and Drainage *(Attach additional sheets if needed):*

Based on a review of the 1981 USGS Austin West, Texas topographic map, site elevation is depicted from approximately 500 to 920 feet above sea level. A topographic uplift is depicted in the southwest portion of the site. An unnamed tributary to the Colorado River transects the site from the northwest to the southeast and the site is bounded by the Colorado River (known locally as Lake Austin) to the south. Continued in Appendix A...

List surface geologic units below:

Geologic Units Exposed at Surface		
Group	Formation	Member
Trinity Group	Upper Glen Rose Limestone(Kgru)	N/A
Fredericksburg Group	Walnut Formation (Kfr)	N/A

Brief description of site geology *(Attach additional sheets if needed):*

According to the Geologic Atlas of Texas, the site is underlain by the Upper Glen Rose Formation (Kgru) and the Fredericksburg Group (Kfr). Kgru which consists of gray to tan; thick to thin bedded; fine to medium grained; alternating hard and soft layers of limestone, dolomite, and marl. The upper member of the Glen Rose consists of shale and marl alternating with thin beds of limestone and dolomite; this alternating bedding forms stair-step topography. The upper 100 feet is typically heavily weathered and contains abundant porous soft dolomite and burrowed limestone resulting in many springs. The Glen Rose Formation forms the lower confining unit to the Edwards aquifer. This formation has the ability to form solution and collapse caves and voids suitable for utilization by Terrestrial Karst Invertebrates (TKIs).

Continued in Appendix A...

Wells – Identify all recorded and unrecorded wells on site (test holes, monitoring, water, oil, unplugged, capped and/or abandoned wells, etc.):

There are 0 (#) wells present on the project site and the locations are shown and labeled

 (#'s) The wells are not in use and have been properly abandoned.

 (#'s) The wells are not in use and will be properly abandoned.

 (#'s) The wells are in use and comply with 16 TAC Chapter 76.

There are 0 (#'s) wells that are off-site and within 150 feet of this site.

11. **THE VEGETATION REPORT** – Provide the information requested below:

Brief description of site plant communities (Attach additional sheets if needed):

The site is located within the Balcones Canyonlands region of the Edwards Plateau physiographic province (Gould, 1960). The vegetation in the region is classified as juniper-oak savanna and is dominated primarily by woodland vegetation. Grasslands are generally restricted to drainage divides and associated valleys (Amos and Gehlbach, 1988). Mesic (moist) slopes generally support deciduous woodlands dominated by Texas oak (*Quercus texana*), plateau live oak (*Q. fusiformis*), Ashe juniper (*Juniperus ashei*), and Texas ash (*Fraxinus texensis*).
Continued in Appendix A...

There is woodland community on site ☒ YES ☐ NO (Check one).

If yes, list the dominant species below:

Woodland species	
Common Name	Scientific Name
Escarpment oak	<i>Quercus fusiformis</i>
Ashe juniper	<i>Juniperus ashei</i>
Texas red oak	<i>Quercus buckleyi</i>
eastern red cedar	<i>Juniperus virginiana</i>
mountain laurel	<i>Sophora secundiflora</i>

There is grassland/prairie/savanna on site..... ☒ YES ☐ NO (Check one).

If yes, list the dominant species below:

Grassland/prairie/savanna species	
Common Name	Scientific Name
silvery bluestem	<i>Bothriochloa saccharoides</i>
western ragweed	<i>Ambrosia psilostachya</i>
Bermuda grass	<i>Cynodon dactylon</i>
agarita	<i>Mahonia trifoliolata</i>
greenbrier	<i>Smilax bona-nox</i>
prickly pear cactus	<i>Opuntia spp.</i>
twisted leaf yucca	<i>Yucca rupicola</i>

There is hydrophytic vegetation on site ☒ YES ☐ NO (Check one).

If yes, list the dominant species in table below (next page):

Hydrophytic plant species		
Common Name	Scientific Name	Wetland Indicator Status
maidenhair fern	<i>Adiantum capillus -veneris</i>	FACW
Virginia chain fern	<i>Woodwardia virginica</i>	OBL
common spike-rush	<i>Eleocharis palustris</i>	OBL
Emory's sedge	<i>Carex emoryi</i>	OBL
small-spike false nettle	<i>Boehmeria cylindrica</i>	FACW
California bulrush	<i>Schoenoplectus californicus</i>	OBL
Lindheimer's muhly	<i>Muhlenbergia lindheimeri</i>	FACW

A tree survey of all trees with a diameter of at least eight inches measured four and one-half feet above natural grade level has been completed on the site.

☐ YES ☒ NO (Check one).

A partial tree survey has been completed. An additional tree survey of the proposed development areas is currently underway.

12. WASTEWATER REPORT – Provide the information requested below.

Wastewater for the site will be treated by (Check of that Apply):

- ☐ On-site system(s)
☒ City of Austin Centralized sewage collection system
☐ Other Centralized collection system

Note: All sites that receive water or wastewater service from the Austin Water Utility must comply with City Code Chapter 15-12 and wells must be registered with the City of Austin

The site sewage collection system is designed and will be constructed to in accordance to all State, County and City standard specifications.

☒ YES ☐ NO (Check one).

Calculations of the size of the drainfield or wastewater irrigation area(s) are attached at the end of this report or shown on the site plan.

☐ YES ☐ NO ☒ Not Applicable (Check one).

Wastewater lines are proposed within the Critical Water Quality Zone?

☐ YES ☒ NO (Check one). If yes, then provide justification below:

Is the project site is over the Edwards Aquifer?

☐ YES ☒ NO (Check one).

If yes, then describe the wastewater disposal systems proposed for the site, its treatment level and effects on receiving watercourses or the Edwards Aquifer.

13. One (1) hard copy and one (1) electronic copy of the completed assessment have been provided.

Date(s) ERI Field Assessment was performed: May 8,9, & 21, 2018; June 4, 6, 7, 8, & 26, 2018
Date(s)

My signature certifies that to the best of my knowledge, the responses on this form accurately reflect all information requested.

Miranda Reinhard

(512) 442-1122

Print Name

Telephone

Miranda.Reinhard@terracon.com

Signature

Email Address

Terracon Consultants, Inc.

July 6, 2018

Name of Company

Date

For project sites within the Edwards Aquifer Recharge Zone, my signature and seal also certifies that I am a licensed Professional Geoscientist in the State of Texas as defined by ECM 1.12.3(A).

P.G.
Seal

City of Austin Environmental Resource Inventory - Critical Environmental Feature Worksheet

1	Project Name:	Camelback Tract
2	Project Address:	Bridgepoint & Coldwater Canyon Pkwy, Austin
3	Site Visit Date:	May 8, 9 & 21, 2018; June 4, 6, 7, 8 & 26, 2018.
4	Environmental Resource Inventory Date:	May 31, 2018; Updated July 6, 2018

5	Primary Contact Name:	Miranda Reinhard
6	Phone Number:	(512) 442-1122
7	Prepared By:	Terracon Consultants, Inc.
8	Email Address:	Miranda.Reinhard@terracon.com

9	FEATURE TYPE {Wetland,Rimrock, Bluffs,Recharge Feature,Spring}	FEATURE ID (eg S-1)	FEATURE LONGITUDE (WGS 1984 in Meters)		FEATURE LATITUDE (WGS 1984 in Meters)		WETLAND DIMENSIONS (ft)		RIMROCK/BLUFF DIMENSIONS (ft)		RECHARGE FEATURE DIMENSIONS			Springs Est Discharge cfs
			coordinate	notation	coordinate	notation	X	Y	Length	Avg Height	X	Y	Z	
	Spring/Seep	S-1	-97.804376	W	30.356048	N								<1
	Spring/Seep	S-2	-97.804640	W	30.357632	N								<1
	Spring/Seep	S-3	-97.804540	W	30.357788	N								<1
	Spring/Seep	S-4	-97.804287	W	30.358079	N								<1
	Spring/Seep	S-5	-97.804802	W	30.358061	N								<1
	Spring/Seep	S-6	-97.804830	W	30.358476	N								<1
	Spring/Seep	S-7	-97.806658	W	30.357732	N								<1
	Spring/Seep	S-8	-97.806990	W	30.357874	N								<1
	Spring/Seep	S-9	-97.807213	W	30.357940	N								<1
	Spring/Seep	S-10	-97.807343	W	30.358039	N								<1
	Spring/Seep	S-11	-97.807319	W	30.358560	N								<1
	Spring/Seep	S-12	-97.807238	W	30.358656	N								<1
	Spring/Seep	S-13	-97.807561	W	30.358212	N								<1
	Spring/Seep	S-14	-97.808155	W	30.358366	N								<1
	Spring/Seep	S-15	-97.808230	W	30.358405	N								<1
	Spring/Seep	S-16	-97.808336	W	30.358420	N								<1
	Spring/Seep	S-17	-97.808542	W	30.358528	N								<1

Please state the method of coordinate data collection and the approximate precision and accuracy of the points and the unit of measurement.

Method

GPS ☒ Surveyed ☐ Other ☐

Accuracy

sub-meter ☒ meter ☐ > 1 meter ☐

Professional Geologists apply seal below

Legend:

* = Previously Identified CEF (4/8/2015)

City of Austin Use Only	CASE NUMBER:
-------------------------	--------------

For rimrock, locate the midpoint of the segment that describes the feature.

For wetlands, locate the approximate centroid of the feature and the estimated area.

For a spring or seep, locate the source of groundwater that feeds a pool or stream.

City of Austin Environmental Resource Inventory - Critical Environmental Feature Worksheet

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			coordinate	notation	coordinate	notation	X	Y	Length	Avg Height	X	Y	Z	Trend
	Spring/Seep	S-18	-97.809134	W	30.359360	N								<1
	Spring/Seep	S-19	-97.809161	W	30.359512	N								<1
	Spring/Seep	S-20	-97.809155	W	30.359774	N								<1
	Spring/Seep	S-21	-97.809155	W	30.359774	N								<1
	Spring/Seep	S-22*	-97.808298	W	30.353309	N								<1
	Spring/Seep	S-23	-97.799036	W	30.353080	N								<1
	Spring/Seep	S-24	-97.798928	W	30.353043	N								<1
	Spring/Seep	S-25	-97.798549	W	30.352796	N								<1
	Spring/Seep	S-26	-97.798548	W	30.352737	N								<1
	Rimrock	R-1	-97.804303	W	30.355998	N			-50	-6-8				
	Rimrock	R-2	-97.805128	W	30.356516	N			-50	-6				
	Rimrock	R-3	-97.805345	W	30.357169	N			-50	-4				
	Rimrock	R-4	-97.805846	W	30.357659	N			-70	-5				
	Rimrock	R-5*	-97.807878	W	30.353472	N			-50	-8				
	Rimrock	R-6*	-97.806578	W	30.353846	N			-50	-4				
	Rimrock	R-7	-97.805942	W	30.354077	N			-50	-5				
	Rimrock	R-8	-97.804098	W	30.353746	N			-70	-8				

City of Austin Use Only
CASE NUMBER:

Legend:
* = Previously Identified CEF (4/8/2015)

Please state the method of coordinate data collection and the approximate precision and accuracy of the points and the unit of measurement.

Method	Accuracy
GPS <input checked="" type="checkbox"/>	sub-meter <input checked="" type="checkbox"/>
Surveyed <input type="checkbox"/>	meter <input type="checkbox"/>
Other <input type="checkbox"/>	> 1 meter <input type="checkbox"/>
Professional Geologists apply seal below	

For rimrock, locate the midpoint of the segment that describes the feature.

For wetlands, locate the approximate centroid of the feature and the estimated area.

For a spring or seep, locate the source of groundwater that feeds a pool or stream.

City of Austin Environmental Resource Inventory - Critical Environmental Feature Worksheet

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6	Phone Number:	(512) 442-1122
7	Prepared By:	Terracon Consultants, Inc.
8	Email Address:	Miranda.Reinhard@terracon.com

[illegible]

City of Austin Use Only
CASE NUMBER:

Legend:
* = Previously Identified CEF (4/8/2015)

Please state the method of coordinate data collection and the approximate precision and accuracy of the points and the unit of measurement.

Method	Accuracy
--------	----------

☒ GPS

Survived

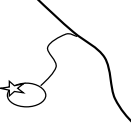
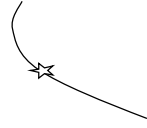
Other

Professional Geologists apply seal below

For rimrock, locate the midpoint of the segment that describes the feature.	For wetlands, locate the approximate centroid of the feature and the estimated area.
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For wetlands, locate the approximate centroid of the

For a spring or seep, locate the source of groundwater that feeds a pool or stream.



APPENDIX A
ADDITIONAL DISCUSSION

Environmental Resource Inventory (ERI)

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Surface Soils:

BID – Brackett-Rock outcrop complex, 1 to 12 percent slopes

BoF – Brackett-Rock outcrop-Real complex, 8 to 30 percent slopes

TaD – Tarrant soils, 5 to 18 percent slopes

TdF – Tarrant-Rock outcrop complex, 18 to 50 percent slopes

Ya – Yahola very fine sandy loam, 0 to 1 percent slopes, occasionally flooded

W – Water

Description of Site Topography and Drainage Continued...

The National Wetlands Inventory (NWI) Map of the project site was reviewed to identify suspect wetland areas and waterbodies within the project site boundaries. The review of the NWI map indicated the presence of three suspect waterbodies in the project site. These areas are further described below:

- Waterbody (R4SBC) is depicted transecting the central portion of the project site. R4SBC is further described as a riverine, intermittent, streambed that is seasonally flooded.
- Forested wetland (PSS1A) is depicted in the southwest portion of the project site. PSS1A is further described as a palustrine, scrub-shrub, broad-leaved deciduous area that is temporary flooded.
- Waterbody (L1UBHh) is depicted in the south portion of the site. L1UBHh is further described as a lacustrine, limnetic, unconsolidated bottom area that is permanently flooded and is diked/impounded.

Other suspect wetlands or waterbodies are not depicted on the project site or within 150 feet of the site.

Additionally, as mapped by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 48453C0435J (Effective January 6, 2016), the majority of the project site is mapped outside the 100-year and 500-year floodplain zones and is in Zone X (unshaded). South portions of the site are mapped in 100-year floodplain (Zone A) and 500-year floodplain (Zone C shaded).

Terracon accessed (May 4, 2018) the City of Austin (COA) Development Web Map to review previously identified Natural Features and setbacks within and adjoining the site. The review of the COA Development Web Map indicated the presence of 24 natural feature and three setbacks/buffers. These areas are further described below:

- Lake Austin (Object ID: 325, Lakes ID: 2) is mapped adjoining the project site to the south.
- A northwest-southeast oriented creek (Object ID: 26939, Creek ID: 8364) is mapped in the northwest portion of the project.
- A northwest-southeast oriented creek (Object ID: 96537, Creek ID: 46109) is mapped in the northwest portion of the project.

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- A northwest-southeast oriented creek (Object ID: 97582, Creek ID: 46103) is mapped in the northwest portion of the project.
- A northwest-southeast oriented creek (Object ID: 68399, Creek ID: 28511) is mapped in the northwest portion of the project.
- A northwest-southeast oriented creek (Object ID: 29678, Creek ID: 8366) is mapped in the northwest portion of the project.
- A northwest-southeast oriented creek (Object ID: 74479, Creek ID: 32581) is mapped in the northwest portion of the project.
- A northwest-southeast oriented creek (Object ID: 97581, Creek ID: 46102) is mapped in the northwest portion of the project.
- A northeast-southwest oriented creek (Object ID: 30511, Creek ID: 6372) is mapped in the central portion of the project.
- A northwest-southeast oriented creek (Object ID: 27379, Creek ID: 6351) is mapped in the central portion of the project.
- A northwest-southeast oriented creek (Object ID: 99535, Creek ID: 46115) is mapped in the northeast portion of the project.
- A northeast-southwest oriented creek (Object ID: 60504, Creek ID: 25204) is mapped in the northeast portion of the project.
- A northeast-southwest oriented creek (Object ID: 200, Creek ID: 31827) is mapped in the northeast portion of the project.
- A northwest-southeast oriented creek (Object ID: 80830, Creek ID: 50667) is mapped in the southeast portion of the project.
- A northwest-southeast oriented creek (Object ID: 30058, Creek ID: 7732) is mapped to the southeast of the project.
- A northeast-southwest oriented creek (Object ID: 99, Creek ID: 31723) is mapped in the southeast portion of the project.
- A northeast-southwest oriented creek (Object ID: 95678, Creek ID: 45281) is mapped off-site to the northeast of the project.
- A northwest-southeast oriented creek (Object ID: 97661, Creek ID: 46270) is mapped off-site to the northeast of the project.
- A northwest-southeast oriented creek (Object ID: 94559, Creek ID: 29078) is mapped in the southeast portion of the project.
- A northeast-southwest oriented creek (Object ID: 73109, Creek ID: 32398) is mapped off-site to the southwest of the project.
- A northeast-southwest oriented creek (Object ID: 65232, Creek ID: 24383) is mapped in the southwest portion of the project.
- A northeast-southwest oriented creek (Object ID: 27469, Creek ID: 7754) is mapped off-site to the northeast of the project.
- A northwest-southeast oriented creek (Object ID: 27382, Creek ID: 6354) is mapped off-site to the east of the project.

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- A northeast-southwest oriented creek (Object ID: 75232, Creek ID: 33271) is mapped off-site to the east of the project.
- A Critical Water Quality Zone (Object ID: 24903, Creek Buffer ID: 1828) is mapped in the south portion of the site.
- A Critical Water Quality Zone (Object ID: 24900, Creek Buffers ID: 1825) is mapped transecting the central portion of the site.
- A Water Quality Transition Zone (Object ID: 24897, Creek Buffers ID: 1822) is mapped transecting the central portion of the site.

For additional information please refer to the online COA Development Web Map (<http://www.austintexas.gov/GIS/developmentwebmap/Viewer.aspx>).

Brief Description of Site Geology

Remnant Fredericksburg Group (Kfr) strata was observed on the topographic high areas in the northwestern and south central portions of the site. The Fredericksburg Group deposits mapped onsite include the Walnut Formation (Kwa). The Walnut Formation is composed of limestone and marl and underlies the Edwards Limestone. The formation is generally not a water bearing unit and forms part of the lower confining unit of the Edwards Aquifer.

No evidence of faulting was observed on the site and none is shown on any of the available published geologic maps of the area. Additionally, a review of aerial photographs did not reveal any lineations, which typically indicate the presence of faulting. The nearest mapped fault is located approximately two miles east of the site. The fault, known as the Mount Bonnell Fault, trends toward the northeast, and is associated with the Balcones Fault zone which represents the dominant structural trend in the vicinity of the site and forms the edge of the Edwards Aquifer recharge zone.

Field Reconnaissance

During the site reconnaissance and subsequent field visits with COA staff, Terracon assessed areas for CEF characteristics throughout the project site and identified 26 CEF spring/seep areas, one CEF bluff area, one CEF point recharge feature area, 10 CEF rimrock areas, and six CEF wetland areas. Coordinate locations for the CEF areas are listed in the above CEF Worksheet and are illustrated on Exhibits 2.0 and 2.1 in Appendix B. The CEF areas are further described below:

Spring/Seeps S-1 through S-21 and S-23 through S-26 displayed moss lines and flowing water during the site visits. Each of these spring/seeps displayed at least one of the following characteristics: moisture, standing/stagnant water, and hydrophytic vegetation including Emory's sedge (*Carex emoryi* - OBL), Virginia chain fern (*Woodwardia virginica* - OBL), and/or maidenhair fern (*Adiantum capillus -veneris* - FACW).

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Bluff B-1 is located in the south portion of the site and continues beyond the east and west site boundaries.

Point Recharge Features K-1 was observed in the southcentral portion of the site. Dimensions of the feature were approximated.

In order to further evaluate a suspected geologic karst feature, Terracon personnel hand excavated the feature on May 21 and June 6, 2018. The feature excavation and evaluation was conducted by Mr. Russell C. Ford, P.G., and Mr. Anthony Reid, G.I.T., of Terracon. The feature which was further evaluated has been identified as K-1. At the feature location, loose rock and debris was hand excavated down to either bedrock or compacted clay and the feature was evaluated for recharge potential. Photographs of the feature prior to excavation and following excavation are attached in Appendix C. The following provides a description of the feature evaluated:

- Feature K-1 is classified as a solution enlarged fracture located within the Walnut Formation. The feature consists of two intersecting fractures; the primary fracture trends N85°E and the secondary fracture is nearly normal to this fracture and trends N15°W. Neither of the fractures corresponds to the dominant structural trend of the area, which is toward the northeast. The primary fracture measures approximately 3 inches wide and 30 inches long and extends vertically to about 36 inches where it appears to pinch closed. The secondary fracture measures about 8-inches wide by 24 inches long and extends vertically to about 7 feet deep where it appears to pinch closed. The feature has a limited catchment area and its potential for recharge is considered low to moderate. The feature is considered to be a CEF and a developmental buffer appears to be warranted.

In order to further evaluate some additional suspected geologic karst features, Terracon personnel hand excavated selected features on May 21, 2018 and June 6 and 7, 2018. The feature excavation and evaluation was conducted by Mr. Russell C. Ford, P.G., of Terracon. These features were not considered to be a critical environmental features (CEFs).

Rimrock features R-1 through R-4 and R-7 through R-10 were observed throughout the site. Rimrock dimensions were approximated by Terracon field staff.

Spring/Seep S-22 and Rimrock features R-5 and R-6 were observed and identified on April 8, 2015 during a previous COA ERI site visit conducting by Terracon. During the May 8-9, 2018 site visit, Terracon was unable to access and locate these features. According to the previous 2015 COA ERI, Spring/Seep S-22 displayed some hydrophytic vegetation including common fern (*Onoclea sensibilis*), and moss lines and flowing water were observed during the previous site visit.

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Wetland W-1 is dominated by common spike-rush (*Eleocharis palustris* - OBL), Emory's sedge (*Carex emoryi*), and Roosevelt weed (*Baccharis neglecta* - FACW) throughout the wetland and displays surface water and saturation. W-1 appears to be associated with a natural channel (Object ID: 80830; Creek ID: 50667) and R4SBC in the southeast portion of the site.

Spring/Seep S-4 and Wetland W-2 is dominated by Lindheimer's muhly (*Muhlenbergia lindheimeri* - FACW), seep muhly (*Muhlenbergia reverchonii* - FAC), and tapered rosette grass (*Dichanthelium acuminatum* - FAC) throughout the seep/wetland area and displays surface water and saturation along an unnamed tributary. S-4/W-2 appears to be associated with a natural channel (Object ID: 60504, Creek ID: 25204) in the northeast portion of the site.

Spring/Seep S-5 and Wetland W-3 is dominated by Lindheimer's muhly (*Muhlenbergia lindheimeri* - FACW), seep muhly (*Muhlenbergia reverchonii* - FAC), and tapered rosette grass (*Dichanthelium acuminatum* - FAC) throughout the seep/wetland area and displays surface water and saturation along an unnamed tributary. S-5/W-3 appears to be associated with a natural channel (Object ID: 99535, Creek ID: 46115) in the northeast portion of the site.

Wetland W-4 is dominated by Lindheimer's muhly (*Muhlenbergia lindheimeri* - FACW) throughout the wetland and displays pockets of surface water and saturation along an unnamed tributary. W-2 appears to be a fringe wetland associated with a natural channel (Object ID: 30511; Creek ID: 6372) in the central portion of the site.

Wetland W-5 is dominated by Lindheimer's muhly (*Muhlenbergia lindheimeri* - FACW) and brookweed (*Samolus parviflorus* - OBL) throughout the wetland and displays pockets of surface water and saturation along an unnamed tributary. W-3 appears to be a fringe wetland associated with two natural channels (Object ID: 96537; Creek ID: 46109; and Object ID: 97582, Creek ID: 46103) and R4SBC in the northwest portion of the site.

Wetland W-6 is dominated by small-spike false nettle (*Boehmeria cylindrica* - FACW), smooth horsetail (*Equisetum laevigatum* - FAC), California bulrush (*Schoenoplectus californicus* - OBL), elephant ear (*Colocasia esculenta* - OBL), Chinese tallow tree (*Triadica sebifera* - FAC), whorled pennywort (*Hydrocotyle verticillata*), curly dock (*Rumex crispus* - FAC), and black willow (*Salix nigra* - FACW) throughout the wetland and displays surface water and saturation along the Colorado River. W-4 appears to be associated with (Object ID: 325, Lakes ID: 2) and PSS1A in the southwest portion of the site. Terracon also observed some upland vegetation throughout the wetland area including Turk's cap (*Malvaviscus arboreus* var. *drummondii*), greenbriar (*Smilax bona-nox*), wild rye (*Elymus* spp.), wild grape (*Vitis* spp.), and *Iris* spp.

Due to steep elevation Terracon personnel were not able to access a portion of the site. See Exhibits 2.0 and 2.1, attached, for the area not accessible.

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CEF dimensions were approximated by Terracon field staff.

Description of Site Plant Communities *Continued...*

During the site visit, Terracon assessed areas that represented different vegetative communities throughout the project site to thoroughly review if these areas may exhibit hydrophytic vegetation. Upland vegetative communities were observed to be dominated by species including escarpment oak (*Quercus fusiformis*), Ashe juniper (*Juniperus ashei*), Texas red oak (*Quercus buckleyi*), eastern red cedar (*Juniperus virginiana*), mountain laurel (*Sophora secundiflora*). Dominant herbaceous vegetation includes silvery bluestem (*Bothriochloa saccharoides*), western ragweed (*Ambrosia psilostachya*), Bermuda grass (*Cynodon dactylon*), agarita (*Mahonia trifoliolata*), greenbrier (*Smilax bona-nox*), prickly pear cactus (*Opuntia spp.*), and twisted leaf yucca (*Yucca rupicola*). Overall canopy cover for the site is an estimated 95 percent.

Hydrophytic plant species are listed above in the Field Reconnaissance section.

APPENDIX B

EXHIBITS