BECK BRIDGE CAVE
PARKING LOT ALTERNATIVE REVIEW

Brushy Creek MUD Disc Golf Parking Lot Project
Williamson County, Texas

March 2009

Submitted to:

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March 2009

Beck Bridge Cave Parking Lot Alternative Review
Williamson County, Texas

1.0 PURPOSE

The purpose of this document is to evaluate the alternatives for the Brushy Creek Municiple Utility District (MUD) Disc Golf Parking Lot Project in regard to potential negative impacts to Beck Bridge Cave. To evaluate the impact that the proposed development will have on the quantity and quality of stormwater that may recharge to and across this feature, **aci consulting** has reviewed each alternative for the proposed parking lot and the implications of each held therein.

2.0 PROJECT LOCATION

The proposed project area is located east of Liberty Walk Drive, approximately 0.86 mile west of the FM 620 and O'Connor Road intersection in the area known as Cat Hollow Subdivision in Williamson County, Texas. The location of the project area is identified in Figure 1.

The project area lies within the Edwards Aquifer Recharge Zone as defined by the Texas Commission on Environmental Quality (TCEQ) (2001). The surface geology of the area consists of Edwards Limestone (Ked) (Barnes 1974). Rock types include chert, dolomite, limestone, and dolomitic limestone.

The project area lies within the Endangered Cave Species Zone 1. Zone 1 is defined as an area having known suitable habitat for endangered karst invertebrate species (Veni & Associates 1992).

3.0 PREVIOUS BECK BRIDGE CAVE STUDIES

Previous cave studies for Beck Bridge Cave have been performed to determine the presence or absence of endangered karst species (EKS). An initial cave survey in 1991 did not reveal the cave to be EKS habitat, but a subsequent survey in 1995 reported the presence of a federally-listed endangered karst invertebrate species (M. Walsh, Personal Communication 2009; Karst Management Plan 2000).

4.0 KARST INVERTEBRATE BACKGROUND

Williamson County contains habitat occupied by three federally-listed endangered karst invertebrate species: Bone Cave harvestman (*Texella reyesi*), Coffin Cave mold beetle (*Batrisodes texanus*), and Tooth Cave ground beetle (*Rhadine Persephone*). These species are troglobites, which are specially adapted to subterranean existence and spend their entire life underground. They have small or absent eyes, elongated appendages, and have adapted to areas with consistent humidity and temperature levels and a continual influx of nutrients from the surface. The caves in which karst invertebrates occur were formed as a result of dissolution of the limestone formations making up the Edwards aquifer (USFWS 1994).

5.0 PROJECT AREA BACKGROUND

In 2001, Cat Hollow subdivision was developed and came under the authority of the Brushy Creek MUD. Road infrastructure, stormwater drainages, and regrading activities typically associated with residential developments took place. The Brushy Creek MUD Karst Management Plan was established to maintain greenspace buffers, and establish a vegetation and cave maintenance program for known features within the boundaries of the Brushy Creek MUD. The implementation of this plan was agreed to be carried out through the Texas Cave Conservancy (TCC) to provide long term protection and management of these caves.

Preserve areas and cave setbacks were established through consultation with Mike Warton and Associates and James Reddell of the Texas Memorial Museum. Protection of Beck Bridge Cave was included within the Karst Management Plan and a natural area buffer was placed around the cave in addition to a lock controlled high-fence and cave gate to prevent vandalism and unauthorized entrants. The 1.78-acre natural area preserve surrounding the cave was established to protect potential endangered cave species by protecting the quality and quantity of water flowing into and across the feature. However, due to the nature of the road infrastructure, curb placement, and regraded topography of the area, road drainage is directed towards Beck Bridge Cave through a system of drains (See Figures 2 & 3 and Photo Plate 1). The road drainage towards the cave drains approximately 0.50 acre of Liberty Walk Drive up-gradient of the cave.

6.0 BRUSHY CREEK MUD DISC GOLF PARKING LOT

The proposed project consists of a 0.47 acre parking lot intended to service the patrons of the Cat Hollow Neighborhood Park and Brushy Creek MUD Disc Golf Course. The project area is located just south of Beck Bridge Cave and will incorporate into the proposed design bioretention best management practices for stormwater control and treatment. The proposed project aims to redirect the current drainage along Liberty Walk

Drive towards the parking lot bioretention drainage facility. The bioretention facility will serve to naturally clean and filter any stormwater runoff through a grass filter strip, sand bed, ponding area, organic or mulch layer, planting soil, and plants. Redirecting the flow of stormwater runoff will greatly reduce the potential impact of poor water quality that currently threatens the natural state of the cave. Incidental threats to the cave via road drainage include such contaminants as gasoline, used oil, and other hydrocarbons. The TCEQ has been notified of the situation and the intention for correcting the situation. The TCEQ concurs that action is needed and requests plans for the correction, once developed, to be included in the approved Water Pollution Abatement Plan.

7.0 PROJECT ALTERNATIVES

Jacob Engineering has proposed three parking lot alternatives based on accessibility, feasibility, safety, and proximity to Beck Bridge Cave. Each of the alternatives maintains the same surface area and impervious cover, but each differs primarily by the entrance design. Refer to Figure 4 for the project area alternatives. The alternatives are listed and discussed below.

7.1 Alternative One

Alternative one is designed to have the main entrance and exit at the intersection of Dorman Drive and Liberty Walk Drive. The current curbline is maintained until the entrance and for the purposes of stormwater drainage, would redirect the water along the main entrance drive and into the bioretention facility. This design will greatly attenuate the current drainage situation and would successfully redirect the flow away from Beck Bridge Cave. This alternative encroaches approximately 0.21 acre of the Beck Bridge Cave natural area, with the back curbline located within 55 feet of the cave entrance.

7.2 Alternative Two

Alternative Two is similar to Alternative One as it is designed to have the main entrance and exit at the intersection of Dorman Drive and Liberty Walk Drive. However, the entrance to Alternative Two is wider, maintaining the existing curbline until the entrance. For the purposes of stormwater drainage, water would be redirected along the main entrance drive and into the bioretention facility. This design will greatly attenuate the current drainage situation and would successfully redirect the flow away from Beck Bridge Cave. From a hydrologic perspective, the design of Alternative Two's entrance may more naturally control and receive the flow of stormwater due to the gentle change in the curbline. This alternative encroaches approximately 0.22 acre of the Beck Bridge Cave natural area, with the back curbline located within 58 feet of the cave entrance.

7.3 Alternative Three

Alternative Three is designed to have the main entrance located approximately 100 feet south of the intersection of Dorman Drive and Liberty Walk Drive. The curbed inlet opposite of the Dorman Drive and Liberty Walk Drive will be removed in order to

maintain the current curbline north of the proposed entrance. For the purposes of stormwater control, flow will be directed towards the entrance of the main drive and into the bioretention facility. This design will greatly attenuate the current drainage situation and would successfully redirect the flow away from Beck Bridge Cave. This alternative encroaches on 0.18 acre of the Beck Bridge Cave natural area, with the parking lot back curbline located approximately 80 feet and down gradient from the cave entrance.

The removed curbed inlet at the intersection of Dorman Drive and Liberty Walk Drive would be reclaimed as well as the drain system and resulting drainage towards Beck Bridge Cave. The surface would be returned at grade level and reclaimed with native vegetation. This would recover approximately 1,450 square feet of the Beck Bridge Cave natural area.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Following **aci consulting**'s review of pertinent data, planned activities and consultation with other experts, **aci consulting** concludes the following:

- The area draining the upslope portion of Liberty Walk, poses a risk of degradation of water quality entering the feature by direct recharge and infiltration;
- Alternatives 1 and 2 encroach too closely to possible cross-grade recharge to the feature;
- Alternative 3 is entirely down gradient of the feature by approximately 80 feet and does not affect the quality or quantity of recharge to Beck Bridge Cave. Additionally, this alternative adds approximately 1,450 square feet back to the greenbelt cross-grade of the feature.
- Review of the agreement between the Brushy Creek MUD and the TCC indicates that consultation with the USFWS is required prior to certain activities within the setback. Additionally, the Brushy Creek MUD Karst Management Plan grants a conservation easement to the TCC and will need to be addressed accordingly.

8.2 Recommendations

Based on the foregoing, **aci consulting** recommends the following:

- Consult with legal counsel regarding the agreement between the Brushy Creek MUD and the TCC;
- Consult with the USFWS after legal review;
- Upon approval, construct Alternative 3 to provide the highest level of protection to the natural water quality and quantity recharge.

9.0 REFERENCES

Barnes, V.E., Project Director. 1974. *Geologic Atlas of Texas, Austin Sheet*. Bureau of Economic Geology. Austin, Texas. Reprinted 1995.

[Karst Management Plan] Naismith Engineering, Inc. 2000. *Brushy Creek Municipal Utility District Karst Management Plan*. Austin, Texas.

M.Walsh, Texas Cave Conservancy. Personal Communication. 2009.

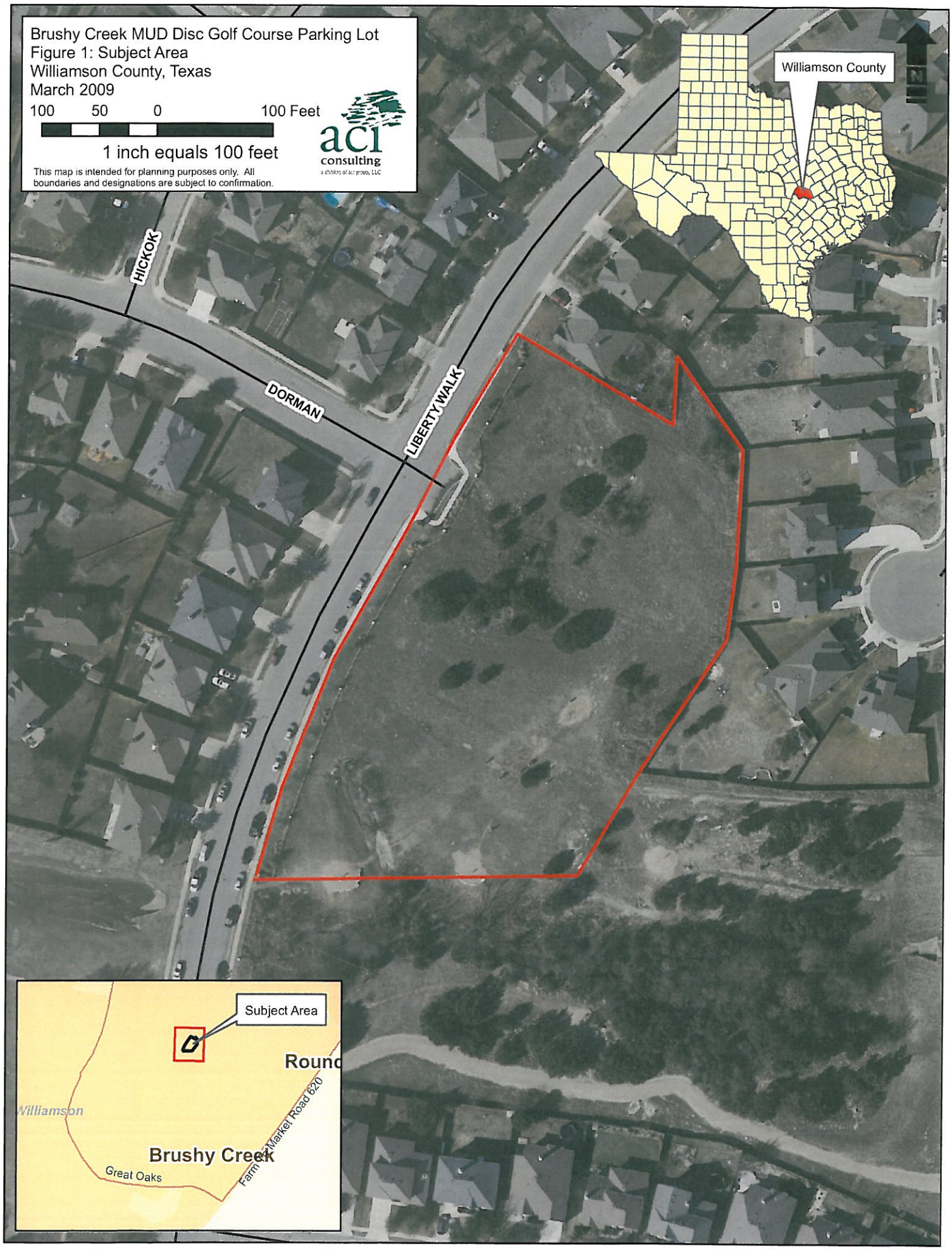
[TCEQ] Texas Commission on Environmental Quality. 2001. "Edwards Aquifer Protection Program, Chapter 213 Rules - Recharge Zone, Transition Zone, Contributing Zone, and Contributing Zone within the Transition Zone." Map. Digital data. November 28, 2001. Austin, Texas.

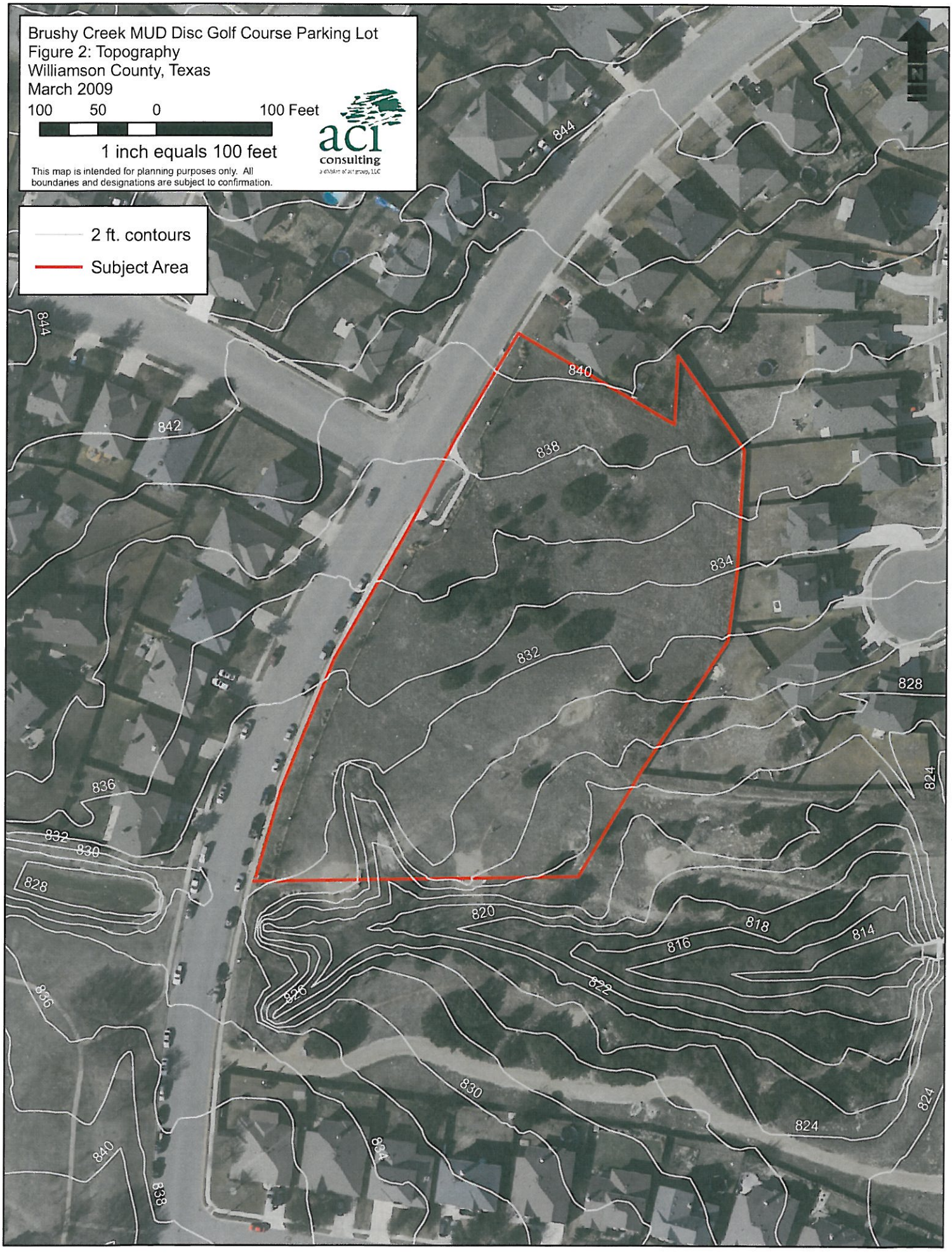
[USFWS] United States Fish and Wildlife Service. 1994. *Recovery Plan for Endangered Karst Invertebrates in Travis and Williamson Counties, Texas*. U.S. Fish and Wildlife Service Region 2. Albuquerque, New Mexico.

Veni & Associates. 1992. *Geologic Controls on Cave Development and the Distribution of Cave Fauna in the Austin, Texas, Region*. Prepared for U.S. Fish and Wildlife Service.

APPENDIX A

Site Figures and Photos


Brushy Creek MUD Disc Golf Course Parking Lot
Figure 1: Subject Area
Williamson County, Texas
March 2009
100 50 0 100 Feet
1 inch equals 100 feet
This map is intended for planning purposes only. All boundaries and designations are subject to confirmation.
aci consulting
Williamson County
N
HICKOK
DORMAN
LIBERTY WALK
Subject Area
Round
Williamson
Brushy Creek
Great Oaks
Farm to Market Road 620


Brushy Creek MUD Disc Golf Course Parking Lot
Figure 2: Topography
Williamson County, Texas
March 2009
100 50 0 100 Feet
1 inch equals 100 feet
This map is intended for planning purposes only. All boundaries and designations are subject to confirmation.
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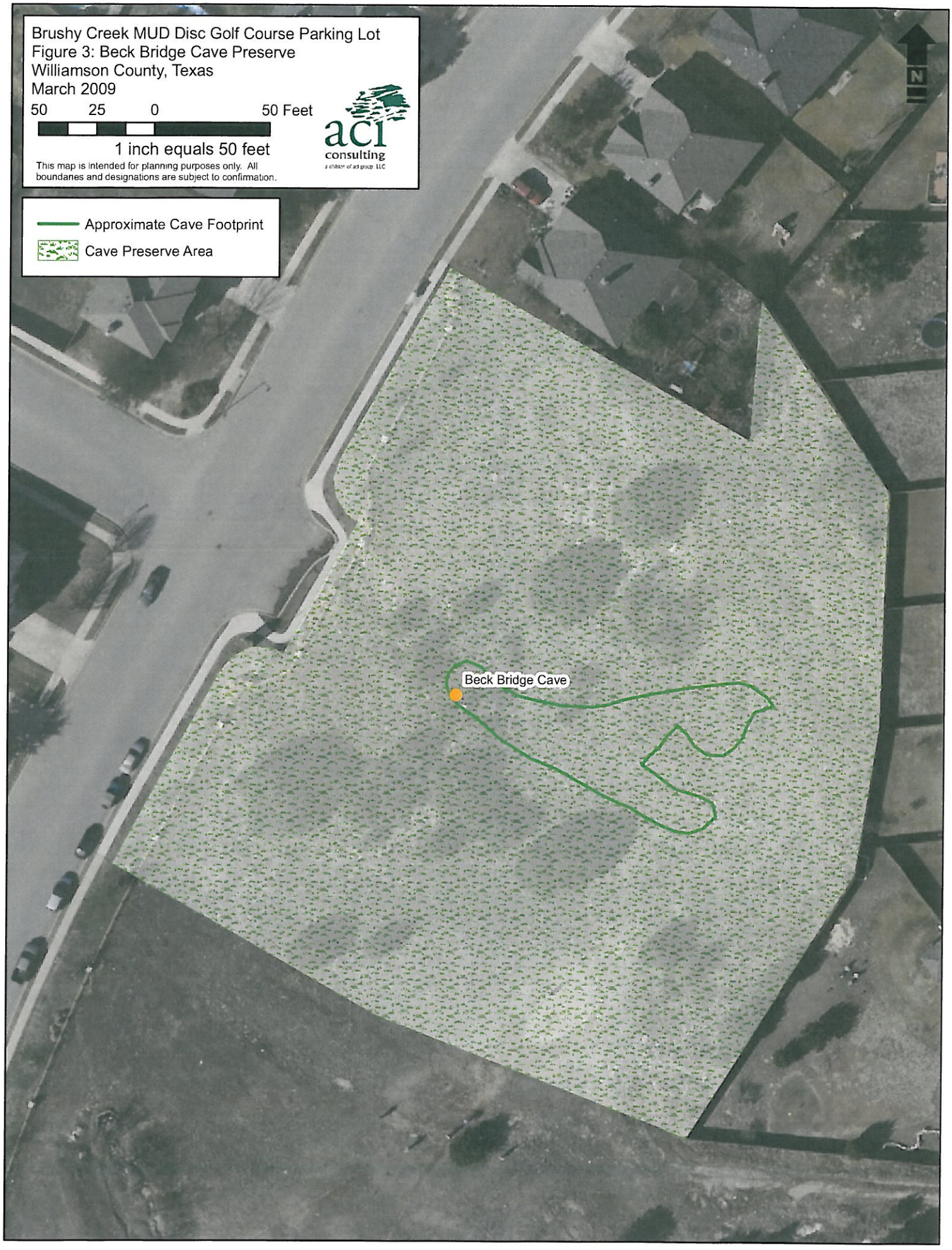
2 ft. contours
Subject Area
N
844
842
840
838
836
834
832
830
828
826
824
822
820
818
816
814


Brushy Creek MUD Disc Golf Course Parking Lot
Figure 3: Beck Bridge Cave Preserve
Williamson County, Texas
March 2009
50 25 0 50 Feet
1 inch equals 50 feet
This map is intended for planning purposes only. All boundaries and designations are subject to confirmation.
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Approximate Cave Footprint
Cave Preserve Area
N
Beck Bridge Cave

Brushy Creek MUD Disc Golf Course Parking Lot
Figure 4: Proposed Alternatives
Williamson County, Texas
March 2009

75 37.5 0 75 Feet

1 inch equals 75 feet

This map is intended for planning purposes only. All boundaries and designations are subject to confirmation.

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Approximate Cave Footprint

Beck Bridge Cave

Alternative One

Beck Bridge Cave

Alternative Two

Beck Bridge Cave

Alternative Three

Photo Plate 1