Karst Feature Survey for the Leander Independent School District Vandegrift and Four Points Campus Proposed Access Road within the Balcones Canyonland Conservation Plan Preserve

Prepared for

Sedgwick, LLP

and

Leander Independent School District

Prepared by

SWCA Environmental Consultants
Board of Professional Geoscientists Firm Registration No. 50159

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KARST FEATURE SURVEY FOR THE LEANDER INDEPENDENT SCHOOL DISTRICT VANDEGRIFT AND FOUR POINTS CAMPUS PROPOSED ACCESS ROAD WITHIN THE BALCONES CANYONLAND CONSERVATION PLAN PRESERVE

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1.0 INTRODUCTION

SWCA Environmental Consultants (SWCA) assessed the potential for the presence of habitat suitable for federally endangered karst invertebrate species within the limits of an area that will be potentially disturbed during construction of a proposed access road to the existing Leander Independent School District (LISD) Vandegrift High School and Four Points Middle School campus located in the northwest area of the City of Austin, Texas (Appendix A: Figure 1).

2.0 THREATENED AND ENDANGERED KARST INVERTEBRATE SPECIES BACKGROUND

On 16 September 1988 and 18 August 1993, the United States Fish and Wildlife Service (USFWS) published Final Rules to list seven species of invertebrates known only from caves in Travis and Williamson Counties as endangered species under the provisions of the Federal Endangered Species Act (ESA). The seven species are Bee Creek Cave harvestman (*Texella reddelli*), Bone Cave harvestman (*Texella reyesi*), Tooth Cave pseudoscorpion (*Tartarocreagris texana*), Tooth Cave spider (*Neoleptoneta myopica*), Tooth Cave ground beetle (*Rhadine persephone*), Kretschmarr Cave mold beetle (*Texamaurops reddelli*), and Coffin Cave mold beetle (*Batrisodes texanus*). The USFWS considers potential threats to these species to include destruction and/or deterioration of habitat by commercial, residential, and road construction; filling of caves; loss of permeable cover; contamination from such things as septic effluent, sewer leaks, runoff, and pesticides; predation by and competition with non-native fire ants; and vandalism.

Generally, habitat requirements for these species include subsurface void spaces in permanent darkness, moisture input sufficient to maintain high humidity, and a source of organic material from the surface. Organic material can be washed into the void by surface water or brought into the void by small mammals or trogloxene species such as cave crickets (*Ceuthophilus secretus*) and daddy longlegs (*Leiobunum townsendii*). Features that can host these organisms include caves, enlarged rock joints, sinkholes, and smaller karst conduits. All seven species are believed to be restricted to karst features within the Edwards Limestone and associated formations.

In 1992, the USFWS commissioned a study that delineated four geographic zones according to their potential to provide suitable habitat for karst invertebrates (Veni 1992). The zones were based on lithology, distributions of known caves and cave fauna, and geologic controls on cave development. The zones were delineated as follows:

- Zone 1: Areas known to contain endangered cave species.
- Zone 2: Areas having a high probability of containing endangered or other endemic invertebrate cave fauna.
- Zone 3: Areas that probably do not contain endangered cave species.
- Zone 4: Areas that do not contain endangered cave species.

The proposed project occurs within karst zones 1 and 2. A map showing the karst zones is presented as Figure 2 (Appendix A).

The study also discussed the overall karst geography of the Austin region as well as potential geologic and geographic barriers to karst invertebrate dispersal and limits to their distribution. Distinct Karst Fauna Regions (KFRs) were delineated within Travis, Williamson, Hays, and Burnet Counties based on "geologic continuity, hydrology, and the distribution of 38 rare troglobites" (USFWS 1994); though more species are now known from the area. In Travis and Williamson Counties they include the North

Williamson County, Georgetown, McNeil/Round Rock, Cedar Park, Jollyville Plateau, and Central Austin KFRs.

The proposed project lies within the Jollyville KFR. The Jollyville KFR is known to contain Bee Creek harvestman, Bone Cave harvestman, Tooth Cave pseudoscorpian, Tooth Cave spider, Tooth Cave ground beetle, and Coffin Cave mold beetle.

3.0 METHODS

Prior to conducting field inspection, SWCA reviewed aerial, topographic, karst invertebrate zone maps, and geologic maps of the property, and other published information from the following:

- Aerial photography from the 2012 National Agricultural Imagery Program (NAIP);
- Texas Parks and Wildlife Department *Vegetation Types of Texas* (McMahan et al. 1984);
- United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Web Soil Survey (USDA NRCS 2014);
- University of Texas Bureau of Economic Geology. *Geologic Atlas of Texas, Austin Sheet, 1:250,000*. (Barnes 1974);
- USFWS karst zone maps (Veni 1992)
- U.S. Geological Survey (USGS) digital 7.5-minute topographic quadrangle map, Jollyville Quadrangle, Texas (USGS 1985).

On 11 and 12 August 2014, SWCA karst biologist and geoscientists (including Chris Collins USFWS, Permit No. TE800611-4, and Philip Pearce, P.G., Texas License No. 691) conducted site visits of the project area. The area was inspected for karst habitat features similar to those known to provide habitat for threatened and endangered species. The project area occurs within karst invertebrate zone 1, an area known to contain endangered cave species, and zone 2, an area having a high probability of containing endangered or other endemic invertebrate cave fauna. Following USFWS guidelines, a karst terrain features survey was conducted on the project area to search for features that have potential to provide suitable habitat for karst invertebrates (USFWS 2014). Please note, that the methodology used for this survey cannot preclude the presence of sub-grade karst features that lack surface expression.

4.0 EXISTING ENVIRONMENT

4.1 Topography, Surface Drainage, and Land Use

The project area appears on the Jollyville, Texas USGS 7.5-minute topographic quadrangle map (USGS 1985). The project area is located within the Bull Creek watershed of the Middle Colorado-Llano River Basin. General surface drainage is to the northeast, with topography ranging from approximately 1,060 feet above mean sea level (msl) in the western portion and sloping to 880 feet above msl at the base of the Bull Creek drainage. The project area is within the Balcones Canyonland Conservation Plan preserve just north of the LISD campus and 3M Corporation campus. The project site partially follows an overhead electrical easement.

4.2 Geology

The project site lies within a geographical area known as the Jollyville Plateau. Geologic formations outcropping within the project site include the Edwards Limestone and Walnut Formation, which constitute the Fredericksburg Group (Appendix A: Figure 3). The Edwards Limestone outcrops at the surface over most of the project site, while the Walnut Formation outcrops within the bottom of the canyon. The Glen Rose Formation is present beneath the project site but is not exposed at the surface. Based on the geologic mapping shown on Figure 3, the elevation of the Edwards-Walnut contact is at approximately 900 to 920 feet above msl in the vicinity of the project site. The Edwards Limestone contains karst features, such as caves, sinkholes, and solution-enlarged fractures that allow for recharge of surface water to subsurface conduits that discharge to springs. Many springs of the Jollyville Plateau discharge at or near the contact of the Edwards Limestone and Walnut Formation.

No mapped faults (Barnes 1974) occur within the project area, nor was any evidence of faulting observed during the field survey.

4.3 Soils

According to the USDA Natural Resources Conservation Service (USDA NRCS 2014), the project site includes the following five soil map units: Speck stony clay loam, 1 to 5 percent slopes (SsC), Tarrant soils, 5 to 18 percent slopes (TaD), Tarrant and Speck soils, 0 to 2 percent slopes (TcA), Tarrant-Rock outcrop complex, 18 to 50 percent slopes (TdF), and Volente silty clay loam, 1 to 8 percent slopes (VoD). Speck soils are shallow, well-drained soils over limestone; the SsC soil map unit occupies gently sloping topography and has a profile representative of the series. Tarrant soils are shallow, stony, clayey soils overlying limestone. The TaD soil map unit occupies broad areas of complex slopes and is considered representative of the series. The TcA soil map unit occurs on ridges and is split approximately two-thirds Tarrant soils to one-third Speck soils. The TdF soil map unit can be very steep and occupies breaks and ravines along major rivers. Volente soils are deep, well-drained soils originating in slope alluvium. The VoD soil map unit occupies large areas in long valleys, which is representative of the series.

4.4 Vegetation

The project site is located within the Level III Edwards Plateau ecoregion and the Level IV Balcones Canyonlands ecoregion, which supports a relative abundance of running water due to the Trinity and Edwards Aquifers discharging through highly erodible Edwards Formation (Griffith et al. 2007). The water resources and the significant elevation change inherent in the canyonlands promote diverse vegetation communities. Vegetation within the project site is classified mainly as Live Oak-Ashe Juniper Woods (McMahan et al. 1984). This vegetation type consists primarily of mixed juniper-oak woodlands with smaller sections of broadleaf evergreen woodlands, grassland, and evergreen shrublands. Aerial imagery from 2012 shows that most of the vegetative land cover is dense juniper-oak woodland. Smaller areas of grassland, shrubland, and bare or disturbed ground also occur within the project site, mostly associated with maintenance of the existing utility lines or habitat management by Travis County for the benefit of the black-capped vireo (Travis County 2012). Species associated with the woodlands and shrublands may include Ashe juniper (*Juniperus ashei*), plateau live oak (*Quercus fusiformis*), Texas oak (*Q. buckleyi*), shin oak (*Q. sinuate* var. *breviloba*), cedar elm (*Ulmus crassifolia*), evergreen sumac (*Rhus virens*), escarpment cherry (*Prunus serotina*), elbowbush (*Forestiera pubescens*), and twistleaf yucca (*Yucca rupicola*). Species associated with the grassland may include little bluestem (*Schizachyrium scoparium*), Texas wintergrass (*Nassella leucotricha*), Texas grama (*Bouteloua rigidiseta*), meadow dropseed (*Sporobolus drummondii*), and cedar sedge (*Carex planostachys*).

5.0 FINDINGS

The project area is within the outcrop areas of the Edwards Limestone and Walnut Formation (Barnes 1974), and lies within areas delineated as karst zone 1, an area known to contain endangered cave species, and zone 2, an area having a high probability of containing endangered or other endemic invertebrate cave fauna (Veni 1992).

Field surveys identified four potential karst features within the limits of the project site. The locations of the features are displayed on Figure 3 (Appendix A). Photographs of the features are provided in Appendix B.

Feature F-1 is a solution cavity measuring approximately 0.5 foot by 1 foot by 3.5 feet deep (Photograph 1). The feature had coarse infilling with loose soil and is located approximately 548 feet east of the proposed project's zone of physical disturbance (Figure 3).

Feature F-2 is a small depression, which is possibly a sinkhole. The feature measures approximately 4 feet in diameter and is approximately 1 foot deep (Photograph 2). The feature is filled with loose cobble-sized rocks. Feature F-2 is located within a cleared electrical transmission line easement and may be a manmade feature created during land clearing activities. It is located approximately 500 feet east of the proposed project's zone of physical disturbance (Figure 3).

Feature F-3 is a small seep located a few feet below a cliff face. Water seeps out of a clayey gravel layer and flows a few feet down slope before soaking into the soil in a muddy puddle (Photograph 3). It is located approximately 30-ft north the proposed project's zone of physical disturbance and 632 feet northeast of the proposed bridge (Figure 3).

Feature F-4 is a small spring where water discharges at the base of a cliff. The outlet is approximately 1 foot high by 1 foot wide and is triangular in shape (Photograph 4). It has a small pool with a flowstone dam. The spring is located approximately 3 feet within the northern boundary of the proposed project's zone of physical disturbance and approximately 292 feet northeast of the proposed bridge (Figure 3). Water drains down the hillside to a pond. Two small crawfish were within the spring outlet when the spring was discovered.

6.0 REFERENCES

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APPENDIX A

FIGURES

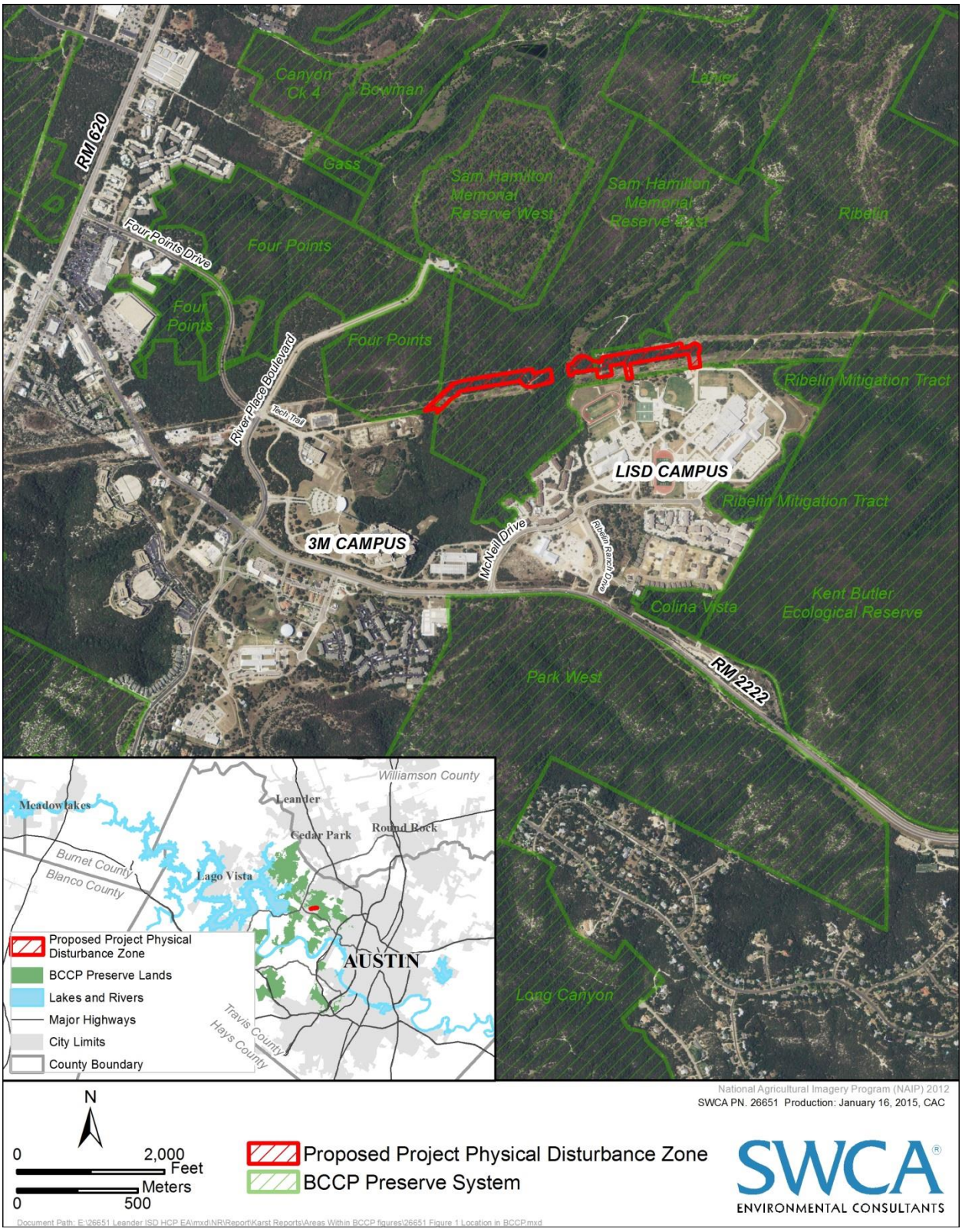

Figure 1. Site Location Map

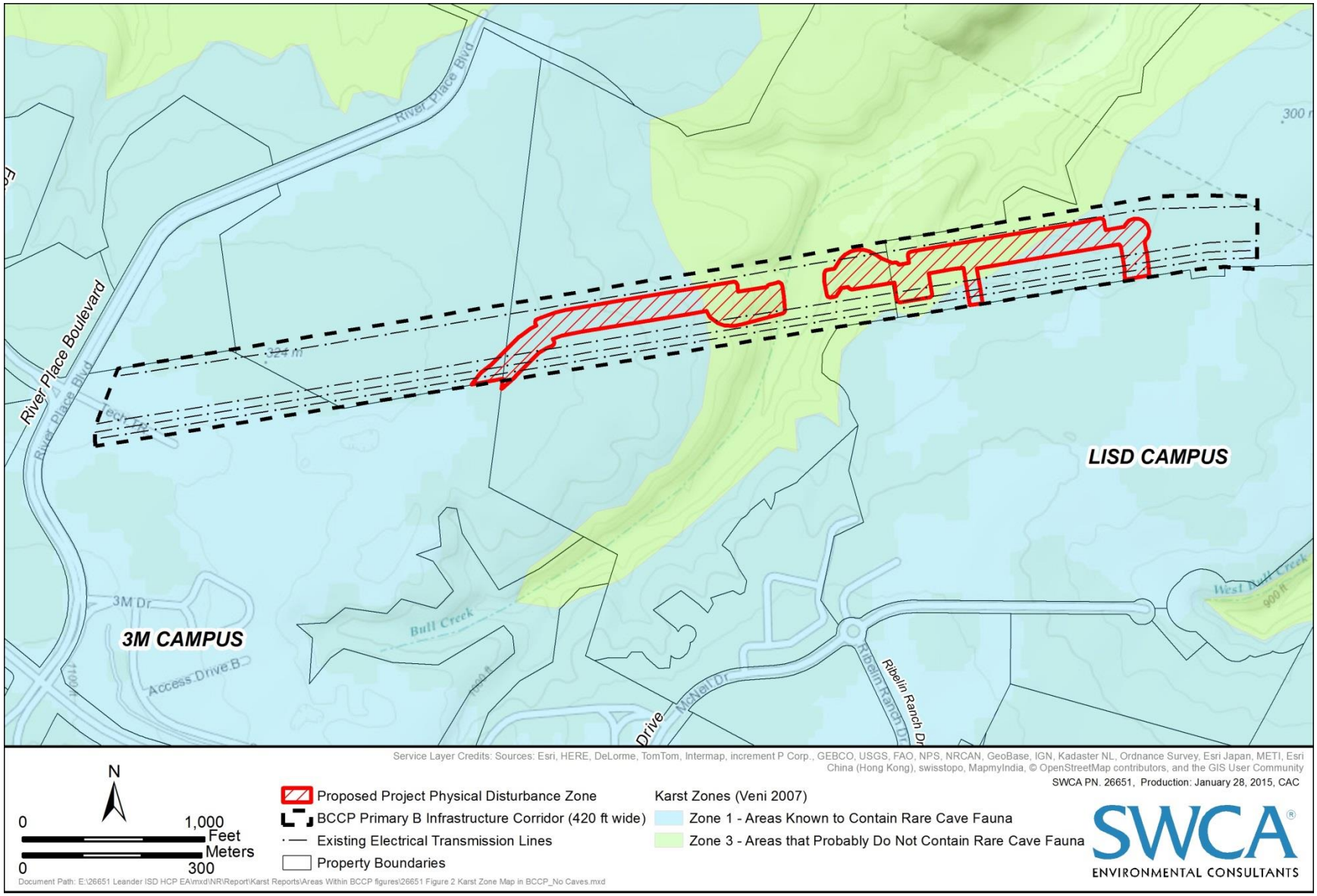

Figure 2. Karst Zones Map

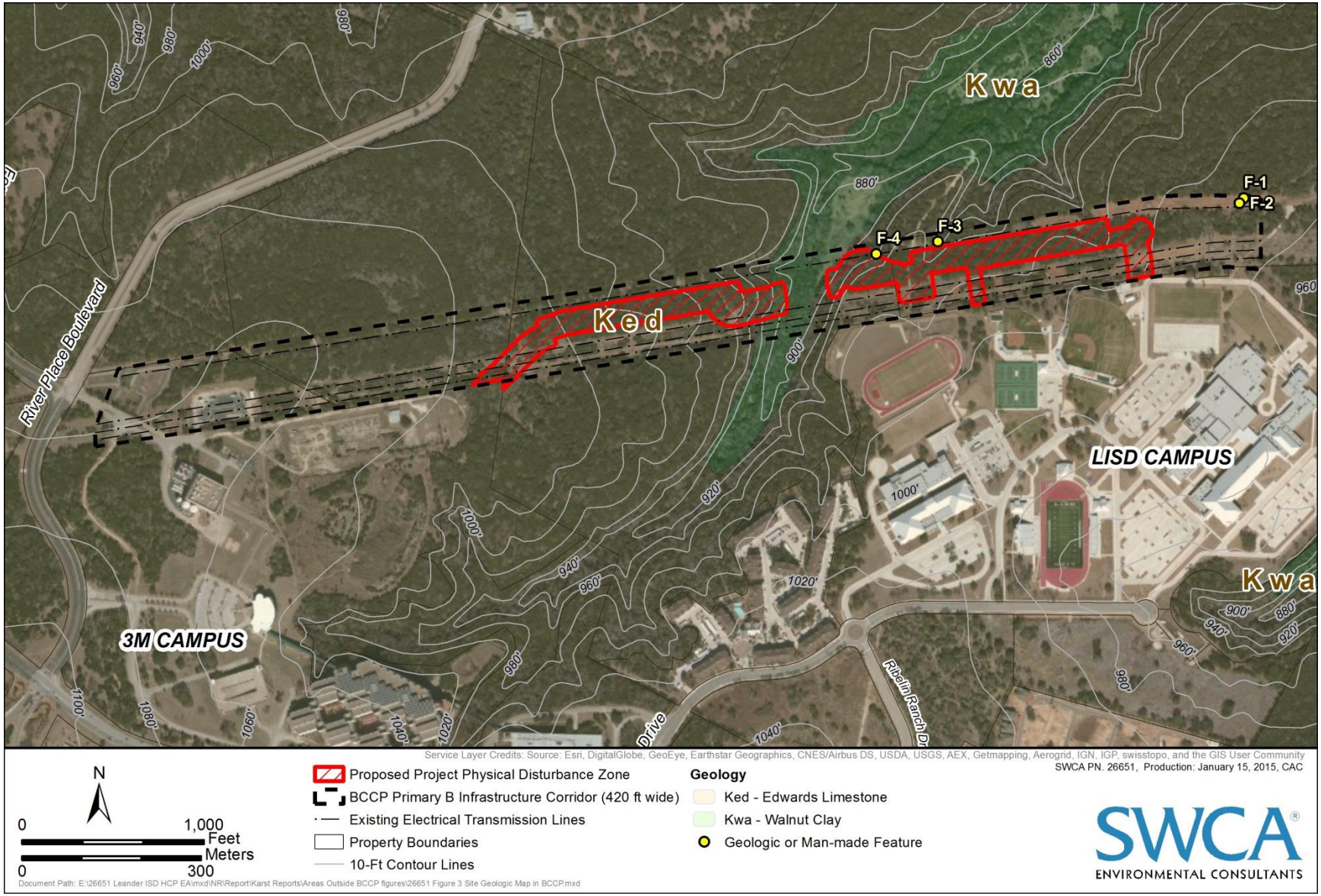

Figure 3. Geologic Map

APPENDIX B

SITE PHOTOGRAPHS

Photograph 1. Feature F-1

Photograph 2. Feature F-2

Photograph 3. Feature F-3

Photograph 4. Feature F-4