



Control Number: 37448



Item Number: 575

Addendum StartPage: 0

**SOAH DOCKET NO. 473-10-1097  
PUC DOCKET NO. 37448**

<b>APPLICATION OF LCRA</b>	<b>§</b>	
<b>TRANSMISSION SERVICES</b>	<b>§</b>	
<b>CORPORATION TO AMEND ITS</b>	<b>§</b>	<b>BEFORE THE STATE OFFICE</b>
<b>CERTIFICATE OF CONVENIENCE AND</b>	<b>§</b>	
<b>NECESSITY FOR THE GILLESPIE TO</b>	<b>§</b>	
<b>NEWTON 345-KV CREZ</b>	<b>§</b>	<b>OF</b>
<b>TRANSMISSION LINE IN GILLESPIE,</b>	<b>§</b>	
<b>LLANO, SAN SABA, BURNET, AND</b>	<b>§</b>	
<b>LAMPASAS COUNTIES, TEXAS</b>	<b>§</b>	<b>ADMINISTRATIVE HEARINGS</b>
	<b>§</b>	

**DIRECT TESTIMONY OF**

**BARBARA RAE BARRON**

**ON BEHALF OF**

**POINT PEAK MOUNTAIN RESORT**

**January 7, 2010**

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**TABLE OF CONTENTS**

I.	Introduction	Page 3
II.	Purpose of Testimony	Page 4
III.	Background and Involvement in Docket #37448	Page 5
IV.	Evaluation of Geology	Page 7
V.	Evaluation of Errors for Numbers of Habitable Structures on Links C14 and C17	Page 10
VI.	Conclusion	Page 22

**EXHIBITS**

Exhibit BRB-1 (TP&WD letter, December 23 2009)  
Exhibit BRB-2 (Map - [www.geology.uprm.edu/Morelock/thcgeol.htm](http://www.geology.uprm.edu/Morelock/thcgeol.htm))  
Exhibit BRB-3 (Map – Roadside Geology of Texas)  
Exhibit BRB-4 (Map – Bureau of Economic Geology)  
Exhibit BRB-5 (Information Llano Uplift - Roadside Geology of Texas, pgs. 121-124, 154-156, 158-160)  
Exhibit BRB-6 (Table of Habitable Structures from EA)  
Exhibit BRB-7 (Attachment 4 – Detail Map 6.3 Western Sec)  
Exhibit BRB-8 (Attachment 4 – Detail Map 6.2 Western Sec)  
Exhibit BRB-9 (Attachment 4 – Detail Map 6.2 Eastern Sec)  
Exhibit BRB-10 (Attachment 4 – Detail Map 7.2 Western Sec)  
Exhibit BRB-11 (Attachment 4 – Detail Map 7.1 Eastern Sec)  
Exhibit BRB-12 (Spreadsheets of C14 and C17 properties)

## **I. INTRODUCTION**

1   **Q.   Please state your name and address.**

2   A.   My name is Barbara Rae Barron. My mailing address is: 1860 FM 359 Rd., Richmond,  
3       Texas 77406.

4   **Q.   On whose behalf are you submitting this testimony?**

5   A.   I am submitting testimony on behalf of myself and my husband, Allen R. Paksima,  
6       community property owners of Point Peak Mountain Resort, LLC.

7   **Q.   What is your educational background, profession and experience?**

8   A.   I graduated from the University of Texas at Austin with a Bachelor's Degree (B.S.) in  
9       Geology in 1983 and a Master's Degree (M.A.) in 1985. I am a licensed Professional  
10      Geologist in the State of Texas. My professional geologist license number is 5696.

11     I also graduated from the University of Houston with a Master's Degree (M.S.) in  
12      Computer Science in 1995. I attended the University of Houston on a part-time basis  
13      while working. I also graduated from the University of Houston with a Doctor of  
14      Jurisprudence (J.D.) in December of 2003. I attended the University of Houston on a  
15      part-time basis while working.

16     I am licensed in the State of Texas as an attorney and my law license is 24048342.

17     From September 3, 1985 to March 1, 2004 I worked for ExxonMobil. I was a heritage  
18      Exxon employee before the Exxon and Mobil merger in 2000. I spent almost the entirety  
19      of my career in exploration as a User Support Geologist assisting and training exploration

1 professionals in the use of interpretive tools. When I resigned from ExxonMobil, my  
2 final title was Senior Exploration Geologist. I resigned to pursue a ranching profession.  
3 While at Exxon and ExxonMobil, I worked the Gulf of Mexico and Alaska from shortly  
4 after I started September 3, 1985 until 1989. Then, I worked at Exxon Production  
5 Research from 1989 until 1991. After that, Communism ended and I was assigned to the  
6 Russia/CIS (Commonwealth of Independent States) foreign affiliate from 1991 to 1999.  
7 While working for the Russia/CIS foreign affiliate, I worked the majority of areas  
8 including: Russia (including Siberia and Sakhalin Islands), Azerbaijan, Kazakhstan &  
9 Uzbekistan. From 1999 to 2002, I helped with the Exxon and Mobil merger by traveling  
10 to foreign Mobil offices and converting software, data and users to all using same  
11 interpretive tools. During this project, I worked in Stavanger, Norway, Celle, Germany  
12 and Lagos, Nigeria. I returned to the United States in January 2002 to finish the part-time  
13 J.D. degree at U.H.  
14 Since my resignation from ExxonMobil March 1, 2004, I have been pursuing ranching.

## 15 **II. PURPOSE OF TESTIMONY**

16 **Q. What is the purpose of your testimony?**

17 **A.** The purpose of my testimony is to:

- 18 1) Voice my opposition to the preferred route, GN11, selected by the LCRA  
19 Transmission Services Corporation ("LCRA TSC") in Docket No. 37448;
- 20 2) Provide background information about our property affected by the proposed  
21 transmission line;

1           3)     Discuss some of the geologic and rock features that could be encountered along  
2           the placement of the proposed transmission lines specifically in and around the areas of  
3           segments C14 and C17; and

4           4)     Address the incorrect numbers of habitable structures along segments C14 and  
5           C17 and the quality and type of structures identified by LCRA TSC as habitable.

6                   **III. BACKGROUND AND INVOLVEMENT IN DOCKET #37448**

7   **Q.     Are you familiar with the application by LCRA TSC to amend its Certificate of**  
8           **Convenience and Necessity for the Newton to Gillespie 345kV transmission line?**

9   A.     Yes.

10 **Q.     When did you become familiar with this application?**

11 A.     I became familiar with this application on Tuesday, November 3, 2009 when I received a  
12         packet from LCRA in the mail.

13 **Q.     Did you ever receive any notice of public hearings?**

14 A.     No, we did not receive any notice of the public hearings in the mail, and do not know  
15         why we did not receive a notice. We reside on a ranch in Fort Bend County, but our mail  
16         is delivered to a commercial mail service. Although we received the packet from LCRA  
17         on November 3, 2009, notice of the public hearings were never received by us. We  
18         reside in Fort Bend County, and therefore, we were unable to read any notices placed in  
19         many of the newspapers published in the affected area. Because we received no notice of  
20         the public hearings, we were not able to offer modifications to the proposed transmission  
21         line route on our property with a representative of LCRA TSC.

22 **Q.     Can you describe any property interest you have on the property that will be**  
23 **impacted by Project #37448?**

1 A. The property that will be impacted by Project #37448 is located on link C16, and it is  
2 owned by Point Peak Mountain Resort, LLC. My husband, Allen R. Paksima, and I have  
3 community property interest in Point Peak Mountain Resort, LLC.

4 **Q. How long have you had an ownership interest in this property?**

5 A. My husband, Allen R. Paksima, and I have owned this property known as Point Peak  
6 Mountain Resort, LLC since November 30, 2007.

7 **Q. What was the purpose for the purchase of this property?**

8 A. At present, the property is used for cattle, but our original goal for the property was to  
9 eventually develop the property for views of Lake Buchanan. If the transmission line  
10 runs along C16, that will not happen and the current use of ranching will continue now  
11 and into the foreseeable future.

12 **Q. Do you plan to convey this property in the future?**

13 A. No. However, my husband, Allen R. Paksima, and I each have wills that will convey this  
14 property upon our deaths. The wills are basically the same as to all substantive items,  
15 and we are leaving a large percentage of our total assets to the Texas Parks & Wildlife  
16 Department and another equal percentage to Wildlife Rehab & Education, which is a  
17 branch of Texas Parks & Wildlife.

18 **Q. Are there any unique physical features to the property?**

19 A. In our opinion, the feature that should be considered unique is Point Peak Mountain.  
20 This is one of the few named mountains in Texas. The proposed transmission line, near  
21 our ranch, will be located at an elevation of 1,200 ft. A lattice structure is approximately  
22 180 feet tall, so the total height of the lattice structure and land will be about 1,380 ft.

1 The height of the mountain at the peak is approximately 1,440 feet. The proposed  
2 distance of transmission easement from the mountain base is less than 2,000 feet.

3 **Q. Are there any proposed routes which directly impact the property?**

4 A. Yes, the preferred route G11. Point Peak Mountain Resort is on link C16. There are  
5 alternate routes including link C16 which are the routes GN2, GN3, GN4, and GN5.

6 **Q. Do you have any concerns about the impact to the property from the construction  
7 and existence of the transmission line?**

8 A. Yes, I have several concerns about the proposed transmission line and its impact on our  
9 property:

10 1) loss of property value (property just purchased 11/30/2007);

11 2) loss of choice in future property use (less chance of development);

12 3) loss of Lake Buchanan view (blocked by proposed transmission line);

13 4) safety concerns from lightning strikes (Point Peak almost same elevation as the  
14 proposed transmission line); and

15 5) safety concerns from electric/magnetic fields of the proposed transmission line.

16 **Q. Do you personally support another route or routes for the transmission line?**

17 A. Yes, I support the use of alternate routes GN6, GN7 or GN8.

18 **Q. Why do you support that route or routes?**

19 A. I support these alternate routes because I believe that LCRA should build this  
20 transmission line on existing ROW. Specifically, I believe the December 23 letter from  
21 the Texas Parks and Wildlife Department, Item No. 446 filed in this Docket describes the  
22 reasons I specifically support GN6 (see EXHIBIT BRB-1).

23 **IV. EVALUATION OF GEOLOGY**



1   **Q.    Do you have any comments about the rock composition along any proposed route**  
2       **for the transmission line?**

3    A.    Yes, specifically I would like to address some of the issues concerning the rock  
4       composition in and around the area of Lake Buchanan including Segments C14 and C17.  
5       One need only examine the basic geology of the area as illustrated in EXHIBIT BRB-2.  
6       As a reference for the reader or someone viewing the exhibit, Lake Buchanan is next to  
7       the map legend. There are only four basic rock types illustrated by the exhibit: 1)  
8       Precambrian Metamorphic, 2) Precambrian Igneous, 3) Paleozoic Sedimentary, and then  
9       4) Cretaceous Sedimentary. The relative hardness of the rocks goes hardest Precambrian  
10      rocks to the softer Cretaceous sedimentary rocks. West of Lake Buchanan is where the  
11      Precambrian metamorphic and igneous rocks are found. South of Lake Buchanan is  
12      where there are a small patch of Paleozoic sedimentary rocks. East of Lake Buchanan  
13      going towards Burnet is where the softest (and youngest) rocks are found, Cretaceous  
14      sedimentary rocks.

15      It is important to remember the testimony and exhibits of Curtis D. Symank, P.E. on  
16      behalf of LCRA TSC in regards to the geologic conditions of the rocks. On pages 12 of  
17      the direct testimony by Curtis D. Symank, P.E., lines 20-28 states:

18      *"Geologic conditions were important because they affected foundation costs. Two*  
19      *primary geologic types would be encountered along the routes for this project along with*  
20      *a minimal amount of sand which has been accounted for in the estimates. The two*  
21      *primary geologic types are: 1) cretaceous limestone and 2) crystalline rocks and hard*  
22      *limestone. Crystalline rocks in this project area include granite and other igneous rocks.*  
23      *As compared to foundations installed in other geologic types (i.e. clays or mixed clays*

1        *and limestone), LCRA TSC has estimated higher unit costs (per cubic yard) for*  
2        *foundations in cretaceous limestone and higher unit costs for foundations in crystalline*  
3        *rocks and hard limestone."*

4        In addition, on page 13 of the direct testimony by Curtis D. Symank, P.E., lines 6-26  
5        states:

6        *"Geologic conditions affect lattice towers and other structure types (i.e. tubular steel*  
7        *poles and tower poles) differently, since four smaller foundations would be installed for*  
8        *each lattice tower compared to one large foundation for each tubular steel pole or tower*  
9        *pole. LCRA TSC estimated the costs for structures in cretaceous limestone and in*  
10       *crystalline rocks and hard limestone. Compared to lattice tower foundation installation*  
11       *costs, the costs for foundations for tubular steel poles and for tower poles are*  
12       *significantly higher due to larger volumes of concrete required and the sizes of holes*  
13       *required in the more challenging limestone and crystalline rocks present in this project*  
14       *location."*

15       *"Terrain was important because, as compared to construction in a different project area*  
16       *with more level terrain, rugged terrain increases construction costs for structure*  
17       *installation due to increased construction difficulties (i.e. more difficult access and*  
18       *equipment maneuvering). This transmission line project included construction over some*  
19       *of the more difficult terrain in the LCRA TSC system due to the presence of harder*  
20       *limestone and granite, which in some locations is at the surface with little or no topsoil.*  
21       *Traversing the ROW is also difficult in some locations due to the presence of outcrops or*  
22       *very large granite cobbles which cannot be traversed, requiring off ROW access trails*  
23       *and/or additional construction of roads. The project will also cross the Llano and*

1 *Colorado River in locations that will not be traversed by construction equipment,*  
2 *requiring drive of many miles for construction crews to reach the opposite side."*

3 The following two diagrams show the geology of the project area. The first diagram,  
4 EXHIBIT BRB-3, comes from the book, Roadside Geology of Texas, by Darwin  
5 Spearing, page 158. It gives a basic look at the rocks outcropping the area of C14 and  
6 C17 as described below.

7 The second geologic diagram, EXHIBIT BRB-4, and the three pages of rock  
8 descriptions are a much more detailed geologic look at the project area between the town  
9 of Llano and town of Burnet. The source is from The University of Texas at Austin  
10 Bureau of Economic Geology. The map and the accompanying rock descriptions are  
11 from the Geologic Atlas of Texas – Llano Sheet, map and pages 8, 9 and 11. I have also  
12 reviewed certain references to the geology of the area as outlined form the Roadside  
13 Geology of Texas, by Darwin Spearing, pages x-x (see EXHIBIT BRB-5).

14 In my opinion, LCRA TSC would be better served utilizing segments C14 and C17 based  
15 on the terrain and rock composition of the impacted land that would be encountered in  
16 the construction of the transmission line for this project.

17 **V. EVALUATION OF ERRORS FOR NUMBERS OF**  
18 **HABITABLE STRUCTURES ON LINKS C14 AND C17**

19 **Q. Are you aware that LCRA TSC selected Route GN11 because LCRA TSC believes**  
20 **that the alternative routes have more habitable structures located on those routes**  
21 **than Route GN 11?**

22 **A. Yes, I am aware that was one factor in the selection of Route GN11 as the preferred route**  
23 **by LCRA TSC.**

1   **Q.    Do you believe that to be correct?**

2   A.    No, and I based that on my personal observations along C14 and C17 of structures that  
3       LCRA TSC consider habitable structures.

4   **Q.    Are you aware of the definition of “habitable structure” found in the PUC rules?**

5   A.    Yes, I am aware of the definition of “habitable structure” found in PUC Substantive Rule  
6       §25.101(b)(3), which states habitable structures are “Structures normally inhabited by  
7       humans or intended to be inhabited by humans on a daily or regular basis. Habitable  
8       structures include, but are not limited to, single-family and multi-family dwellings and  
9       related structures, mobile homes, apartment buildings, commercial structures, industrial  
10       structures, business structures , churches, hospitals, nursing homes, and schools.”

11   **Q.    Can you explain your personal observations and concerns about the errors used by**  
12       **LCRA TSC in determining the number of habitable structures (“HS”) along**  
13       **segments C14 and C17?**

14   A.    Yes.   There are 8 HS at or near the 500 ft. from the proposed transmission ROW  
15       easement, 8 VACANT HSs, 7 CAMPER HSs & 5 MISC./NO IMP HSs for a total of 28  
16       habitable structures (HSs) in question that lowers the total number of HS to 76 on C14 &  
17       C17. If the habitable structures on the 500 ft. ROW centerline, not already deleted based  
18       on other criteria, were deleted then the number would go from 76 to 73 (deleting HSs  
19       139, 141-143, 144). In addition, the vast majority of the HSs identified by LCRA TSC  
20       were built next to the existing transmission lines. Therefore, it is hard to see how these  
21       properties would be adversely affected by the installation of the proposed new line.  
22       The way data are expressed on LCRA TSC maps and spreadsheets implies a fewer  
23       number of habitable structures on preferred route GN11 than really exist. When you look

1 at just a small piece of link C16, LCRA TSC ignores habitable structures including  
2 recently built homes on C16. For example, on LCRA TSC # C16-031, there are (at least  
3 1 each) habitable structures on Llano County Appraisal District numbers ("LCAD") -  
4 #51188, #51186, #51185, #6105 and #5569, in addition to any structures located in the  
5 clearings that possibly could have barns or other habitable structures on LCAD # 51187  
6 and #5731.

7 On other alternate routes, for example GN6, GN7 or GN8, the LCRA TSC maps and  
8 spreadsheets imply a greater the number of habitable structures than really seem to exist.  
9 Table 6-9 from the Environmental Assessment ("EA") states there are 87 individual  
10 habitable structures on C14 and that there are 17 individual habitable structures on C17.  
11 However, these numbers are inflated as I will discuss further.

#### 12 Habitable Structures - Irregular Counts Along Links both C14 and C17

13 The LCRA TSC lists 52 residential HSs which are Single Family Residences ("SFR") or  
14 Mobile Homes ("MHs"). LCRA TSC lists 52 commercial HSs which total 104 total  
15 structures HSs. There are a total of 28 Irregular or Error Counts which encompass the  
16 following scenarios:

- 17 1) At or very near 500 ft. from ROW Centerline – 8 (3 residential & 5 commercial)
- 18 2) Vacant habitable structures – 8 (3 residential & 5 commercial)
- 19 3) Campers (not mobile homes) – 7 (6 residential & 1 commercial)
- 20 4) No or miscellaneous improvements - 5 (3 residential & 2 commercial)
- 21 TOTAL - 28 (15 residential & 13 commercial)

#### 22 Link C14

1 The LCRA TSC lists 45 residential HSs which are either SFRs or MHs and 42  
2 commercial HSs for a total of 87 HSs. There are a total of 18 Irregular or Error Counts  
3 which encompass the following scenarios:

4 1) At or very near 500 ft. from ROW Centerline – 1 (0 residential & 1 commercial)

5 2) Vacant habitable structures – 7 (3 residential & 4 commercial)

6 3) Campers (not mobile homes) – 7 (6 residential & 1 commercial)

7 4) No or miscellaneous improvements -3 (3 residential & 0 commercial)

8 TOTAL - 18 (12 residential & 6 commercial)

9 Link C17

10 The LCRA TSC lists 7 residential HSs which are either SFRs or MHs and 10 commercial  
11 HSs for a total of 17 HSs. There are a total of 10 Irregular or Error Counts which  
12 encompass the following scenarios:

13 1) At or very near 500 ft. from ROW Centerline – 7 (3 residential & 4 commercial)

14 2) Vacant habitable structures – 1 (0 residential & 1 commercial)

15 3) Camper (not mobile homes) habitable structures – 0 (0 residential & 0 commercial)

16 4) No or miscellaneous improvements - 2 (0 residential & 2 commercial)

17 TOTAL - 10 (3 residential & 7 commercial)

18 In conclusion, there are 8 HS at or near the 500 ft. from the proposed transmission ROW  
19 easement, 8 vacant HSs, 7 camper HSs & 5 no or miscellaneous improvements HSs for a  
20 total of 28 habitable structures (HSs) in question that lowers the total number to 76 HSs  
21 on C14 & C17.

22 Habitable Structures – LCRA TSC Application

1 On page 25 of the application by LCRA TSC to amend its Certificate of Convenience and  
2 Necessity for the Newton to Gillespie 345kV transmission line, and updated using LCRA  
3 errata filed in this docket, LCRA TSC states:

4 *“For the Gillespie to Newton project, preferred route GN11 has 45 habitable structures*  
5 *within approximately 500 feet of the centerline. Sixteen (16) of the 45 habitable*  
6 *structures are already within 500 feet of the centerline of an existing transmission line*  
7 *and twenty-six (29) of the habitable structure are not within 500 feet of the centerline of*  
8 *an existing transmission line. These structures are listed and described in Table 6-3 in*  
9 *the EA, which is included as Attachment 1 in this application. Table 6-3 also included*  
10 *the approximate distance of each habitable structure or group of habitable structures to*  
11 *the preferred route centerline. The locations of these habitable structures are shown in*  
12 *the EA on figures 6-1a, 6-1b, and 6-1c and Attachment 4 to this Application.*

13 *The locations of habitable structures within 500 feet of the centerline of the ten (10)*  
14 *alternate routs for the Gillespie to Newton project are also shown in the EA on figures 6-*  
15 *1a, 6-1b and 6-1c and Attachment 4 to this Application. The number of habitable*  
16 *structures located within approximately 500 feet of the centerline for each of the ten (10)*  
17 *alternate routes are listed below. The number of newly affected habitable structures*  
18 *within approximately 500 ft. of the ROW centerline is also listed in the following table. A*  
19 *listing, description and approximate distance from the centerline for each of the ten*  
20 *alternate routes are provided on tables 6-4 through 6-13 of the EA (see EXHIBIT BRB-*  
21 *6).*

22 Habitable Structures – Table 6-9 and Attachment 5 – Links C14 & C17

23 Table 6-9

1 For links C14 and C17, LCRA TSC's Table 6-9 contains a total of 104 habitable  
2 structures. For links C14 and C17, LCRA TSC's Attachment 5 contains a total of 69  
3 groupings of habitable structures. LCRA TSC made an attempt to merge multiple  
4 habitable structures located on one piece of property to one record on Attachment 5.

5 For link C14, LCRA TSC's Table 6-9 contains 87 habitable structures, from Map  
6 Number 47 through 139. For link C17, LCRA TSC's Table 6-9 contains 17 habitable  
7 structures, from Map Number 140 through 156. Portions of these maps are found in  
8 EXHIBITS BRB 7 – EXHIBITS BRB 11.

9 Attachment 5

10 For link C14, LCRA TSC's Attachment 5 contains a total of 109 records, with 55 of  
11 those records showing a property with one or more habitable structures. For link C17,  
12 LCRA TSC's Attachment 5 contains a total of 64 records, with 14 of those records  
13 showing a property with one or more habitable structures.

14 Illustrative Spreadsheet EXHIBIT BRB 12

15 I merged Table 6-9 with Attachment 5 basically adding the Structures or Feature column  
16 from Table 6-9 to the Attachment 5 spreadsheet. Then, I located the numbers of the  
17 habitable structures on the Attachment 4 maps and comparing the property outlines with  
18 maps I received from the Llano County Appraisal District (LCAD) I was able to add the  
19 LCAD property ID number to the spreadsheet. After that, I downloaded all LCAD tax  
20 records for the habitable structures. I used these to verify the data given by LCRA TSC.

21 The spreadsheet (EXHIBIT BRB 12) now has 24 columns – 13 columns from  
22 Attachment 5, 1 column from Table 6-9, 1 column of LCAD Property IDs, and 9 columns  
23 that I added. I added the following columns: 1) Record # - shows the unique instances in



1 of HSs in Attachment 5, 2) LCRA TSC # of HSs, 3) LCAD/BRB # of HSs – reduced  
2 from LCRA TSC's count based on criteria presented in testimony, 4) Comments –  
3 usually showing ownership errors, 5) Additional Comments – usually showing  
4 Homestead/Non Homestead, 6) Property Address per LCAD, 7) LCAD year built, 8)  
5 LCAD sq. ft., and 9) LCAD value.

6 The spreadsheet (EXHIBIT BRB 12) has several colors. The following colors are used to  
7 designate certain criteria: 1) red – errors, 2) green – commercial properties, 3) gold –  
8 residential properties, 4) blue – LCAD property ids, and 5) yellow – highlighted  
9 information.

10 Errors in Table 6-9 & Attachment 5 – Errors #1: Ownership Info - Links C14 & C17

11 There are many errors in both LCRA TSC's Attachment 5 spreadsheet and Table 6-9.  
12 The first problem with Attachment 5 was that most records in the spreadsheet were off  
13 one record from the Habitable Structure number and the Tract\_ID and owner  
14 information. For any habitable structure number, the Tract\_ID and ownership  
15 information is one record above the correct number for the habitable structure.  
16 Somehow, the records were shifted by one record. I indicate this by shading the  
17 Comments, Tract\_ID, Habitable Structure, Prefix, FirstName, Last/Name columns in red.  
18 On link C14, there are at least 45 habitable structure records with incorrect Tract\_ID  
19 and/or ownership information. On link C17, there are at least 14 habitable structure  
20 records with incorrect Tract\_ID and/or owner info.

21 Errors in Table 6-9 & Attachment 5 – Errors #2: Duplicate Records - Links C14 & C17

22 On link C14, there are at least 7 duplicate records. On link C17, there are at least 0  
23 duplicate records.

1                   Errors in Table 6-9 & Attachment 5 – Errors #3: Structure or Feature Info -

2                                   Links C14 & C17

3           On link C14, there are at least 12 habitable structure records with incorrect information in  
4           the Structure and Feature column. On link C17, there are at least 2 habitable structure  
5           records with incorrect information in the Structure and Feature column.

6                   Errors in Table 6-9 & Attachment 5 – Errors #4: No/Misc. Imp. Info - Links C14 & C17

7           On link C14, there are at least 3 records with NO/MISC. IMPROVEMENTS, and  
8           therefore cannot be counted as habitable structures. On link C17, there are 0 records with  
9           NO/MISC. IMPROVEMENTS. Therefore, records with NO/MISC. IMPROCVEMENTS  
10          for links C14 and C17 reduce the number of habitable structures by at least 3 habitable  
11          structures.

12          There is an instance where 3 habitable structures were counted instead of just 1. HSs  
13          141, 142 and 143 are all one long Storage Unit building. LCRA TSC counted it as 3.

14          There is a photo of the Storage Unit building showing it as one structure in Exhibits BRB  
15          7 - 11.

16          Therefore, of the total of 104 habitable structures identified by LCRA TSC, 5 of those  
17          habitable structures should be stricken because there were some errors or don't exist.

18   **Q.   Based on your personal knowledge and research, what additional information did**  
19   **you gather for the types of structures you actually encountered along any of the**  
20   **alternative routes or segment links?**

21                                   Habitable Structures – LCAD Data

22          Along links C14 and C17, half of the structures are commercial and half residential. I did  
23          two types of research. First, based on the LCAD id maps, I figured out the LCAD

1 property id for each of LCRA TSC's habitable structures. Then, I downloaded each and  
2 every LCAD property record. Second, on Monday, December 28, 2009 and Wednesday,  
3 December 30, 2009, I went to most HSs, and took pictures when possible. Along links  
4 C14 and C17, in those two days, I took 206 pictures. I have included about 60 of those  
5 pictures as Exhibits to this testimony (See EXHIBITS BRB 7 – EXHIBITS BRB 11).  
6 Each are identified by the number of the habitable structure that LCRA TSC assigned,  
7 along with the picture id/file name.

8 Note that I did not visit all habitable structures. Some HSs were inaccessible by public  
9 road as they are only accessible by the exiting ROW of the current transmission line.  
10 Habitable structures not accessible from any public view are 47, 61, 62, 63, 64, 65 & 66  
11 on link C14 and 140 and 155 on link C17.

#### 12 Habitable Structures – Residential vs. Commercial – Link C14

13 Of the 87 habitable structures (HSs) along link C14, only about 45 of those HSs are  
14 residential. Of the 45 HSs, only 11 of those HSs are identified by LCAD as homesteads.  
15 Along link C14, there are 42 commercial HSs which are:

16 Western Section (viewed) 13 residential HSs / 7 Homesteads

17 Western Section (not viewed) 7 residential HSs / 3 Homesteads / only assumptions made

18 Ida Norris 8 residential HSs / 0 Homesteads / 5 identified as campers

19 Michael / Richard Mathys 12 residential HSs / 0 Homesteads / mobile home park

20 Eastern Section 5 residential HSs / 1 Homestead

21 TOTAL of 45 residential HSs – 11 Homesteads

22 Many of the properties may have multiple homes/mobile homes/campers on the property  
23 with signs indicating the use of these properties are for rental purposes (Norris/Mathys).

1 There are 87 habitable structures (HSs) along link C14, of the 45 residential HSs, at least  
2 25 of those HSs are rental properties either with signs or sitting in mobile home rental  
3 parks.

4 Habitable Structures – Residential vs. Commercial – Link C17

5 Of the 17 habitable structures (HSs) along link C17, only about 7 of those HSs are  
6 residential. Of the 7 HSs, only 3 of those HSs are identified by LCAD as homesteads.

7 Along link C17, there are 10 commercial HSs.

8 Western Section (viewed) 1 residential HSs / 0 Homesteads

9 Western Section (not viewed) 2 residential HSs / 0 Homesteads / only assumptions made

10 Eastern Section 4 residential HSs / 3 Homestead

11 TOTAL - 7 residential HSs – 3 Homesteads

12 Habitable Structures – Residential HSs ~500 Ft. from Centerline – Links C14 & C17

13 There are 17 habitable structures (HSs) along link C17, of the 7 residential HSs, are 3  
14 HSs that are homesteads sitting almost 500 ft. from the proposed transmission easement.  
15 HS #151 is 500 ft. NW APPROXIMATE distance from the centerline of link C17, and  
16 HS #152 is 490 ft. NW APPROXIMATE distance from the centerline of link C17, and  
17 HS #154 is 470 ft. NW APPROXIMATE distance form the centerline of link C17.

18 There are photos of all three residences 500 ft. from the existing ROW in EXHIBITS  
19 BRB 7 – EXHIBITS BRB 11.

20 Therefore, within the error limits of mapping at the map scales used by LCRA TSC, the  
21 count of HSs that are LCAD homesteads could be 11 on link C14 and ZERO on link C17.

22 Of 50 residential habitable structures (HSs) along links C14 & C17, 14 are homesteads.

1 Or if the number of HSs is reduced by the number sitting 500 ft. from the ROW  
2 centerline, then of the 47 residential habitable structures (HSs) along links C14 & C17,  
3 11 are homesteads.

4 Habitable Structures – Commercial HSs ~500 Ft. from Centerline – Links C14 & C17

5 There are 17 habitable structures (HSs) along link C17, of the 10 commercial HSs, are 5  
6 HSs that are commercial sitting almost 500 ft. from the proposed transmission easement.

7 HS #139 is 500 ft. N APPROXIMATE distance from the centerline of link C14, and

8 HS #141 is 500 ft. NW APPROXIMATE distance from the centerline of link C17, and

9 HS #142 is 500 ft. NW APPROXIMATE distance from the centerline of link C17, and

10 HS #143 is 500 ft. NW APPROXIMATE distance form the centerline of link C17, and

11 HS #144 is 500 ft. NW APPROXIMATE distance form the centerline of link C17.

12 HS #139 is also a TEMPORARY structure. HS #139 is the sales office for The Cliffs.

13 There are photos of the sales office for The Cliffs and the existing ROW in EXHIBITS  
14 BRB 7 – EXHIBITS BRB 11.

15 Therefore, within the error limits of mapping at the map scales used by LCRA TSC, the  
16 count of HSs that are LCAD commercial could be 41 on link C14 and 6 on link C17.

17 Habitable Structures – Conclusion – Links C14 & C17

18 In conclusion, along links C14 and C17, per LCRA TSC and LCAD, there are a total of  
19 (87 + 17) 104 HSs. On both C14 and C17, about half (52) of the HSs are residential  
20 leaving a count of 52 of the HSs as commercial. I viewed all but ~9 of the HSs.

21 Of the 104 HSs along links C14 & C17, there are a total of 8 HSs that are at the “500 ft.  
22 from Centerline” limit - 3 residential and 5 commercial HSs. If the total number of

habitable structures were reduced by 8, to 96, then only 11 (~11.5%) of those habitable structures are homesteads. Then 85 (~88.5%) of HSs are commercial.

#### Habitable Structures – Personal Observations

Along links C14 and C17, there are many HSs that are VACANT businesses or residences. There are other HSs that are not SFR nor MH. These HSs are either campers or misc. / other improvements.

#### Habitable Structures – VACANT Structures – Links C14 & C17

Of the 104 habitable structures (HSs) along links C14 & C17, at least 8 of the HSs are identified by either LCRA TSC or by myself as VACANT.

LCRA TSC identified the following HSs as VACANT (ALL COMMERCIAL):

HS 76 (green metal building owned by Ida Norris)

HS 86 (night club named “The Ranch” owned by James Spillane)

HS 118 (rotten wood & boarded up wood structure owned by C. B. Lewis)

HS 148 (small beige wood building with sign “For Sale Marie Inks Real Estate”)

I identified the following HSs as VACANT (ONE COMMERCIAL):

HS 87 (green metal building owned by Ida Norris)

HS 91 (beige wood 1<sup>st</sup> floor & grey metal 2<sup>nd</sup> floor owned by Buchanan Machine Shop)

HS 92 (small camper owned by Wayne and Linda Davis)

HS 93 (small single-wide silver metal mobile home owned by Wayne and Linda Davis)

Of the 8 VACANT HSs, pictures of 6 of the HSs (87, 91, 92, 93, 118 & 148) are in EXHIBITS BRB 7 – EXHIBITS BRB 11.

#### Habitable Structures – CAMPER Structures – Links C14 & C17

1 Of the 104 habitable structures (HSs) along links C14 & C17, at least 7 of the HSs are  
2 seen by me not as SFR or MH.

3 I identified the following HSs as CAMPERS:

4 HS 77 (mobile home/camper park owned by Ida Norris)

5 HS 80 (mobile home/camper park owned by Ida Norris)

6 HS 82 (mobile home/camper park owned by Ida Norris)

7 HS 83 (mobile home/camper park owned by Ida Norris)

8 HS 84 (mobile home/camper park owned by Ida Norris)

9 HS 92 (camper on VACANT property owned by Wayne Davis)

10 HS 126 (camper on FOR SALE property owned by Cross & Spurs Ministry)

11 Of the 7 CAMPER HSs, pictures of all 7 of the HSs (see list above) are in EXHIBITS  
12 BRB 7 – EXHIBITS BRB 11.

13 Habitable Structures – NO/MISC. IMPROVEMENTS – Links C14 & C17

14 Of the 104 habitable structures (HSs) along links C14 & C17, at least 5 of the HSs are  
15 seen by me not as SFR or MH or there was an error in counting the number of habitable  
16 structures along links C14/C17.

17 I identified the following HSs as MISC. or NO IMPROVEMENTS:

18 HS 55 (garage of mobile home, HS 56 at 326 Old Spanish Trail owned by Gary Willard)

19 HS 111 (“no imp” per Llano Co. Appraisal District - LCAD)

20 HS 113 (“no imp” per Llano Co. Appraisal District - LCAD)

21 There is an instance where 3 habitable structures were counted instead of just 1. HSs  
22 141, 142 and 143 are all one long Storage Unit building. LCRA TSC counted it as 3.

1 Of the 5 NO/MISC. IMPROVEMENT HSs, pictures of most (4) the HSs (HSs #55, 141 -  
2 143) are in EXHIBITS BRB 7 – EXHIBITS BRB 11. The others (HSs #111 & #113)  
3 simply do not exist.

## 4 **VII. CONCLUSIONS**

### 5 Habitable Structures – Conclusion – Links C14 & C17

6 In conclusion, there are 8 HS at or near the 500 ft. from the proposed transmission ROW  
7 easement, 8 VACANT HSs, 7 CAMPER HSs & 5 MISC./NO IMP HSs for a total of 28  
8 habitable structures (HSs) in question that lowers the total number of HS to 76 on C14 &  
9 C17. If the habitable structures on the 500 ft. ROW centerline, not already deleted based  
10 on other criteria, were deleted then the number would go from 76 to 73 (deleting HSs  
11 139, 141-143, 144).

12 **Q. Do you have any additional issues you wish to discuss regarding Project #37448?**

13 **A.** There are several additional issues:

- 14 1. I believe there was no proper environmental study done;
- 15 2. The December 23, 2009 Texas Parks and Wildlife Department letter raises several  
16 environmental concerns;
- 17 3. The process for this docket is extremely short which has resulted in quick work,  
18 usually not correct, provided by LCRA TSC & PBS&J which is evident by three errata  
19 being filed by LCRA TSC in this docket as of this date; and
- 20 4. The misconception that there are million dollar homes along links C14 and C17 that  
21 should be avoided because of investment and the incorrect numbers of habitable  
22 structures. In reality, the HSs in links C14 & C17 are commercial structures, several  
23 campers which should not be included in the number of HSs, and very few SFRs.



1 Q. Does that conclude your testimony?

2 A. Yes.

AFFIDAVIT

STATE OF TEXAS

COUNTY OF TRAVIS

*Ft Bend*

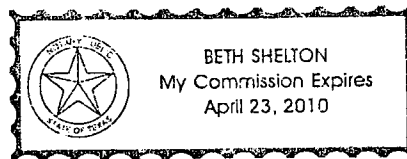
BEFORE ME, the undersigned authority, on this day personally appeared Barbara Rae Barron who, having been placed under oath by me, did depose as follows: My name is Barbara Rae Barron. I am of legal age and a resident of the State of Texas. The foregoing testimony offered by me are true and correct, and the opinions stated therein are, to the best of my knowledge and belief, accurate, true and correct.

*Barbara Rae Barron*  
BARBARA RAE BARRON

This instrument was SUBSCRIBED AND SWORN TO BEFORE ME on the 7<sup>th</sup> day of January, 2010 by Barbara Rae Barron.

*Beth Shelton*  
(Signature of Notary)

*Beth Shelton*  
(Name of Notary)  
Notary Public, State of Texas





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December 23, 2009

12/23/09 9:08

TPWD CLERK

Mr. Brian Almon, P.E.  
Public Utilities Commission  
P.O. Box 13326  
Austin, TX 78711-3326

RE: PUC Docket No. 37448 – Application of LCRA Transmission Services Corporation (LCRA TSC) to Amend Its Certificate of Convenience and Necessity (CCN) for the Gillespie to Newton 345-kilovolt (kV) CREZ Transmission Line in Gillespie, Llano, San Saba, Burnet and Lampasas Counties

Dear Mr. Almon:

Texas Parks and Wildlife Department (TPWD) reviewed the LCRA TSC Application To Amend Its CCN for the Gillespie to Newton 345-kV Transmission Line which includes the Environmental Assessment (EA) (CCN Application Attachment 1) prepared by PBS&J. TPWD would like to offer the following information, comments and recommendations.

Please be aware that a written response to a TPWD recommendation or informational comment received by a state governmental agency on or after September 1, 2009 may be required by state law. For further guidance, please see the attached Texas Parks and Wildlife Code, Section 12.0011. For tracking purposes, please refer to TPWD project number 14640 in any return correspondence.

#### Project Description

The proposed project entails construction of a new double-circuit-capable 345 kV transmission line from the existing Gillespie Station in Gillespie County to the proposed Oncor Newton Switching Station in Lampasas County. The proposed transmission line would be approximately 85 miles long and built on double-circuit 345 kV 120-foot to 185-foot tall lattice steel-V tower structures on 100-foot to 160-foot wide right-of-way (ROW).

Of the 11 alternatives considered to be acceptable by LCRA TSC, Route GN11 was selected [CCN Application Attachment 1 (EA, Section 6.1.4)] as the

#### Commissioners

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Mr. Brian Almon, P.E.  
Page Two  
December 23, 2009

preferred alternative. The selection was based on consideration of potential environmental, cultural and land use impacts, engineering constraints, maintenance and construction considerations, public input and community values, estimated costs, system planning, and landowner and agency concerns and preferences. Based on these factors, LCRA TSC selected route GN11 because "best balances community values, potential impacts to the environmental and aesthetics and paralleling and using existing ROW with reasonable cost and effort."

#### TPWD Coordination History

TPWD provided preliminary information and recommendations regarding the entire CREZ Scenario 2 Project to the PUC on January 21, 2009. TPWD provided project-specific information regarding the development of this EA for in a letter to PBS&J dated May 12, 2009. This letter provided a summary of Texas Natural Diversity Database (TXNDD) records of rare and protected species for the project study area and recommended that PBS&J obtain the most current TXNDD Element Occurrence Data Records (EODs) from TPWD. The TPWD letter attached the previous January 21, 2009 TPWD correspondence, which includes maps of all known TXNDD records for the CREZ scenario. The May 12, 2009 letter referred PBS&J to the January 21, 2009 letter Figure 17, Edwards Plateau and Llano Uplift, which contains the map of TXNDD records for the project area. The May 12, 2009 letter also made recommendations for routing and avoiding impacts to vegetation, water resources and migratory birds. Please review these letters, because they still apply.

#### Federally Protected Species and Use of TXNDD Records

**TPWD is concerned that the TXNDD information has been misinterpreted and misused in Table 6-1 of the EA. As a result, real information on potential adverse impacts to species has not been evaluated as a constraint in the alternatives analysis and preferred route selection, nor are potential impacts addressed.**

The EA provides the following information regarding the use of endangered species information in Chapter 3, Environmental and Land Use Constraints. Section 3.3 defines "Known habitat of federally listed endangered/threatened species" as a "Constraint Area" to be avoided, if practicable, by all alternative routes" or "crossed with special care and possible mitigation." The EA Table 6-1, Environmental Data for Primary Alternative Route Evaluation, lists constraint

Mr. Brian Almon, P.E.  
Page Three  
December 23, 2009

#28, "Length of ROW across known habitat of federally endangered/threatened species," as equal to zero for all alternatives. The EA, Section 5.1.4.4 states "According to TPWD (2009b), several previously documented records of protected wildlife species exist from within the study area; however, no previously documented occurrences occur along the proposed alternative routes."

**Comment:** This information is not consistent with TXNDD information provided to PBS&J. TPWD review of the TXNDD indicates that TXNDD records for federally endangered species are present either directly on or within the action area of 8 of the 11 proposed alternative routes, including preferred alternative GN11. The "action area" is defined by federal regulation (50 CFR §402.02) as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action. The definition is not limited to the "footprint" of the action. Rather, it is a biological determination of the reach of the proposed action on listed species.

TXNDD records for federally endangered Golden-cheeked Warbler (*Dendroica chrysoparia*) and Black-capped Vireo (*Vireo atricapilla*) occur within the action area of Links C20 and C22. TXNDD records for Bald Eagles (*Haliaeetus leucocephalus*) occur within the action area of Links C13-15, C20 and C22. Although Bald Eagle was removed from the Endangered Species list in July 2008, it remains federally protected from take by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald Eagle remains listed as threatened (and is protected) by the State of Texas.

Links C13-15, on alternatives GN1, GN2, GN3, GN4, GN5, GN9, GN10 and GN11 are located on the Llano River, 1.6 miles from a Bald Eagle nest (EOID 2298) and within the eagle habitat management zone. Link C20 on GN1, GN9, and GN10 crosses Black-capped Vireo (EOID 2670) habitat and habitat for the Buchanan Lake Bald Eagle wintering population (EOID 3318). Link C20 is also located within the action area (less than a mile) of Golden-cheeked Warbler territory (EOID 6864). Link C22, on GN2, GN3 GN5 and GN11 crosses habitat for the Buchanan Lake Bald Eagle (EOID 3318) wintering population. TPWD review of aerial imagery indicates that potential habitat for Golden-cheeked Warbler (EOID 6864) and Black-capped Vireo (EOID 2670) may extend into the action area of Link C22 as well.

Mr. Brian Almon, P.E.  
Page Four  
December 23, 2009

**Request:** TPWD requests that Row 28 be removed from Table 6-1 since it is not a valid criterion upon which decisions about route selection should be based.

**Recommendation:** TPWD recommends Table 6-1, Row 28 be replaced with an objective criterion stating whether endangered species/habitat is present **within the action area**. The answer would be "yes," "no" or "potential." TPWD recommends that this information be used as a constraint in the alternatives analysis and selection of the preferred alternative.

**Recommendation:** Before a determination can be made as to whether the project would affect protected species, the evaluation would have to be carried further with appropriate use of the TXNDD records. Use of TXNDD records should be used only within the context described above. As noted in previous TPWD correspondence to PBS&J, TXNDD records, including mapped boundaries, do not necessarily indicate the extent of "known" habitat. The boundary of any mapped record is a best estimate and does not necessarily represent the total real extent of the element occurrence. The true boundary may actually be smaller or larger.

As noted in the May 12, 2009 letter, TPWD recommends identifying any preferred habitat for rare and protected species within the areas being considered in the alternative analysis. On-ground surveys by qualified biologists should be conducted to identify potential habitat throughout the project action area(s). If habitat is present, a survey for the presence of the species should be conducted during the season when the species is most likely to be found on-site. Determination of species impacts should be based on review of current and best scientific available data, including the TXNDD, and on-ground surveys for potential habitat and species.

As noted in TPWD correspondence of May 12, 2009, consultation with the U.S. Fish and Wildlife Service (USFWS) would be required for adverse effects to federally listed or protected species. Any take (incidental or otherwise) of state listed species is prohibited. State listed species may only be handled/relocated by permitted individuals authorized by TPWD. Any harm to rare species should be avoided. There are penalties and restitution values associated with unauthorized take of state listed species.  
*Protection of State-Listed Species - Texas Parks and Wildlife Department*

Mr. Brian Almon, P.E.  
Page Five  
December 23, 2009

*Guidelines*, which lists penalties, is attached. If impacts to rare species are unavoidable, contact this office for further guidance.

Route GN11- Preferred Alternative

Route GN11 -- Federally Protected Species

***Llano River Crossing*** – Route GN11 would cross the Llano River approximately 1.6 miles west of a known Bald Eagle nest (EOID 2298) and within the eagle habitat management zone, as noted above. Placement of the line in close proximity to eagle nesting habitat may put eagles at risk for collisions and electrocutions. Removal of trees and other woody vegetation for the transmission line corridor ROW may adversely affect the existing habitat that eagles utilize for food, shelter and nesting.

**Recommendation:** TPWD recommends that LCRA TSC address the potential for Route GN11 to adversely affect Bald Eagles at the Llano River crossing. If impacts are determined to be adverse, then this finding should be used as a constraint in route selection.

***Colorado River Crossing*** – Route GN11 would cross the Colorado River approximately 2 miles north of Lake Buchanan. At the crossing, the line would be located along the existing 80-foot-wide Seminole Natural Gas Pipeline ROW for approximately 1.6 miles (1.3 miles on the west of the river and 0.3 mile on the east). Otherwise, the supporting links (C16, C22, C26, C27, C28, C29 and 31A) would be located on new location ROW to the east and west.

Placement of Route GN11 on the Seminole Natural Gas Pipeline crossing has potential to adversely affect rare and protected species. As noted above, Route GN11 crosses the Colorado River in known habitat for Bald Eagle and potential habitat for Golden-cheeked Warbler and Black-capped Vireo. These and other migratory birds would be at risk from construction harassment, habitat loss/fragmentation, and collisions/electrocutions once the transmission line is built. Although the existing Seminole Natural Gas Pipeline is cleared of woody vegetation at the crossing, clearing of this segment from 80-feet-wide to 160-feet-wide would likely impact adjacent forest which contains potential habitat for all three bird species.

TXNDD records indicate that the crossing would be located in the middle of the residential range of wintering Bald Eagle habitat (the river, the cliffs and

Mr. Brian Almon, P.E.

Page Six

December 23, 2009

vegetation) between the LCRA Buchanan Lake Canyon of the Eagles Nature Park and Colorado Bend State Park. Review of records for known locations of Black-capped Vireo and Golden-cheeked Warbler place territories for both species along the river to the north and south, approximately 4.5 miles distant, respectively, of the crossing. This data indicates that both Golden-cheeked Warbler and Black-capped Vireo territories could also be present adjacent to the pipeline ROW.

TXNDD records identified a cave containing a large maternity colony of Mexican free-tailed bats (*Tadarida brasiliensis mexicana*) located 4.3 miles south of the crossing and 1.5 miles east of the river. The record is a historical one, dating to 1958. The cave is no longer accessible to researchers, so the present day status of the bat population is unknown. Gorman Cave and other caves in Colorado Bend State Park host numerous bat colonies, including the Cave myotis bat (*Myotis velifer*), a species of concern. Bats are known to collide with transmission line towers along migratory flyways (Jim Kennedy, Bat Conservation International, pers. comm.). Recent research indicates that bats avoid electromagnetic frequencies. Such avoidance may adversely affect bat foraging and roosting behavior along the Colorado River. (See The Aversive Effect of Electromagnetic Radiation on Foraging Bats—A Possible Means of Discouraging Bats from Approaching Wind Turbines. B. Nicholls and P. A. Racey, PLoS One. 2009; 4(7): e6246; <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2705803/>).

**Recommendation:** TPWD recommends that LCRA TSC address the potential for Route GN11 to adversely affect Bald Eagles, Golden-cheeked Warbler, Black-capped Vireo and other rare and protected species that would be affected by the Colorado River crossing. If impacts are determined to be adverse, then this finding should be used as a constraint in route selection.

#### Route GN11 - Impacts to Vegetation and Wildlife Habitat in General

Of its total 85-mile length, GN11 would cross approximately 50 miles x 160 feet (969 acres) of new ROW (Links C13, C16, C22, C26, C27, C28 and C30). ROW construction along Links C13, C16, C22 and C26 of the GN11 transmission line ROW would impact approximately 30 more miles x 160 feet (528 acres) of rangeland and undeveloped woodland than would GN6, the TPWD recommended alternative, discussed below. Habitat for many of the rare and protected species on the *TPWD Annotated County Lists of Rare Species* for Llano, Burnet and Lampasas counties as well as wildlife in general, is present in this area. All of



Mr. Brian Almon, P.E.  
Page Seven  
December 23, 2009

these species could be expected to experience presently unquantified adverse impacts from construction of these links.

**Comment:** TPWD does not recommend selection of Route GN11 as the preferred route because of the presence of federally listed species, and the potential adverse impacts to the large amount of undeveloped wildlife habitat present along this route, including a segment of the Colorado River. Fifty-nine percent of GN11 would be built on new location compared to Route GN6, of which 25 percent would be built on new location ROW.

#### Other Alternatives

Routes GN1, GN2, GN3, and GN4 - Potential Impacts to Enchanted Rock State Natural Area, Colorado Bend State Park, and Protected Species

**Comment:** TPWD does not recommend the selection of Routes GN1, GN2, GN3 or GN4 for the following reasons. Construction of these routes would have a permanent, adverse impact on Enchanted Rock State Natural Area. Link C7 of Routes GN1 and GN 2 would be located 2.8 miles west of the summit of Enchanted Rock. Link C8 of Routes GN3 and GN 4 would be located 2.1 miles east of the summit of Enchanted Rock. The granite batholith that makes up Enchanted Rock is a world-renown geologic feature which provides an unobstructed 360-degree view of the Texas Hill Country from its summit. Construction of either of these routes in such close proximity to the summit would permanently diminish the scenic beauty of the Enchanted Rock view shed and seriously threaten the viability of the park.

**Comment:** Route GN1 crosses the Colorado River approximately 0.9 mile south of Colorado Bend State Park. TPWD is concerned that such close proximity to Colorado Bend State Park would compromise park use and may have unforeseen effects on the wildlife within. Like Enchanted Rock, the viability of the park may be threatened. Routes GN2, GN3 and GN4 would cross the Colorado River 4 miles south of Colorado Bend State Park in the same location as GN11, the preferred alternative. Routes GN1, GN2, GN3 and GN4 cross the Llano River in the same location as GN11, within 1.6 miles of known Bald Eagle nesting habitat. As discussed above, placement of transmission lines at these crossings could adversely impact wintering Bald Eagles, Golden-checked Warbler, and/or Black-

Mr. Brian Almon, P.E.  
Page Eight  
December 23, 2009

capped Vireo in addition to potential habitat for currently undocumented rare and protected species.

#### Route GN6

Based on the information provided, Route GN6 would have the least amount of adverse impact on biological resources, and substantially less than Route GN11, the preferred route, as noted above. TPWD recommends selection of GN6 in keeping with *TPWD Recommendations for Electrical Transmission/Distribution Line Design and Construction* (attached) to minimize potential project effects on wildlife. Of the 11 proposed routes, Route GN6 would be located on the greatest amount of existing transmission line ROW, 47 miles of its total 85-mile length. Further, an additional 17 miles of GN6 would be located parallel to already developed existing transmission line or other utility/highway ROW. As a result, impacts to existing vegetation and habitat for rare and protected species and wildlife in general would be substantially minimized compared to any of the other routes. Most importantly, GN6 would cross 30 fewer miles of comparable new ROW (Links C27, C29 and C31a) than on GN11. GN6 would best afford protection of the view sheds of Enchanted Rock State National Area and Colorado Bend State Park. Route GN6 would cross the Colorado River on the developed south side of Buchanan Lake along the existing transmission line corridor, an area of less favorable habitat for wintering eagles, Golden-cheeked Warbler and Black-capped Vireo.

#### Mitigation

##### Impacts to Wildlife Habitat

**Request:** All of the proposed alternatives would permanently convert various amounts of existing native wildlife habitat to grass and herbaceous cover. TPWD requests in-kind replacement/conservation of all existing native wildlife habitat (both regulated and unregulated) that would be permanently altered by the proposed project. Mitigation values would be commensurate with the habitat value. TPWD recommends that the EA be amended to include a compensatory mitigation plan.

**Recommendation:** *TPWD Guidelines for Construction and Clearing within Riparian Areas* is attached. Please review since they apply to this project.

Mr. Brian Almon, P.E.

Page Nine

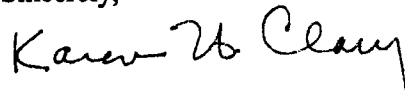
December 23, 2009

#### Invasive Species and Revegetation

**Recommendation:** Invasive species pose a significant threat to the existence of native plant communities in disturbed areas. In accordance with Executive Order on Invasive Species (EO 13112) and the Executive Memorandum on Beneficial Landscaping, TPWD recommends that practices be implemented to prevent the establishment of invasive species and sustain native species, particularly during the early stages of revegetation. Assistance on invasive prevention can be obtained from several natural resource agencies including the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). The NRCS can provide standards and specifications for revegetation using native species within the project area. A copy of *TPWD Guidelines for Revegetation of Disturbed Landscapes* is attached. Assistance on selection of native plants for landscaping and revegetation may be found in the **Texas Parks and Wildlife Texas Plant Information Database (TPID)** online at <http://tpid.tpwd.state.tx.us/PlantFind.asp>. or the **TPWD Wildscapes** website at <http://www.tpwd.state.tx.us/huntwild/wild/wildscapes/guidance/plants/>.

I appreciate the opportunity to review and comment on this CCN Application and EA. Please contact me at (512) 389-8054 if you have any questions.

Sincerely,



Karen H. Clary, Ph.D.  
Wildlife Habitat Assessment Program  
Wildlife Division

KHC:gg.114640

Attachments (5)

cc: Ms. Martha Henson, Oncor EDC (w/attachments)

Sec. 12.0011. RESOURCE PROTECTION.

(a) The department is the state agency with primary responsibility for protecting the state's fish and wildlife resources.

(b) The department's resource protection activities include:

(1) investigating fish kills and any type of pollution that may cause loss of fish or wildlife resources, taking necessary action to identify the cause and party responsible for the fish kill or pollution, estimating the monetary value of lost resources, and seeking restoration through presentation of evidence to the agency responsible for permitting or through suit in county or district court;

(2) providing recommendations that will protect fish and wildlife resources to local, state, and federal agencies that approve, permit, license, or construct developmental projects;

(3) providing information on fish and wildlife resources to any local, state, and federal agencies or private organizations that make decisions affecting those resources; and

(4) providing recommendations to the Texas Department of Water Resources on scheduling of in-stream flows and freshwater inflows to Texas estuaries for the management of fish and wildlife resources.

(c) An agency with statewide jurisdiction that receives a department recommendation or informational comment under Subsection (b) shall respond to the department in writing concerning the recommendation or comment. A response must include for each recommendation or comment provided by the department:

(1) a description of any modification made to the proposed project, fish and wildlife resource decision, or water flow schedule resulting from the recommendation or comment;

(2) any other disposition of the recommendation or comment; and

(3) as applicable, any reason the agency disagreed with or did not act on or incorporate the recommendation or comment.

(d) A response under Subsection (c):

(1) must be submitted to the department not later than the 90th day after the date the agency makes a decision or takes other action related to the recommendation or informational comment provided by the department; and

(2) is public information under Chapter 552, Government Code.

## **Protection of State-Listed Species Texas Parks and Wildlife Department Guidelines**

### **Protection of State-Listed Species**

State law prohibits any take (incidental or otherwise) of state-listed species. State-listed species may only be handled by persons possessing a **Scientific Collecting Permit** or a **Letter of Authorization** issued to relocate a species.

- **Section 68.002 of the Texas Parks and Wildlife (TPW) Code** states that species of fish or wildlife indigenous to Texas are endangered if listed on the United States List of Endangered Native Fish and Wildlife or the list of fish or wildlife threatened with statewide extinction as filed by the director of Texas Park and Wildlife Department. Species listed as Endangered or Threatened by the Endangered Species Act are protected by both Federal and State Law. The State of Texas also lists and protects additional species considered to be threatened with extinction within Texas.
- **Animals** - Laws and regulations pertaining to state-listed endangered or threatened animal species are contained in **Chapters 67 and 68 of the Texas Parks and Wildlife (TPW) Code and Sections 65.171 - 65.176 of Title 31 of the Texas Administrative Code (TAC).** State-listed animals may be found at **31 TAC §65.175 & 176.**
- **Plants** - Laws and regulations pertaining to endangered or threatened plant species are contained in **Chapter 88 of the TPW Code and Sections 69.01 - 69.9 of the TAC.** State-listed plants may be found at **31 TAC §69.8(a) & (b).**

### **Prohibitions on Take of State Listed Species**

**Section 68.015 of the TPW Code** states that no person may capture, trap, take, or kill, or attempt to capture, trap, take, or kill, endangered fish or wildlife.

**Section 65.171 of the Texas Administrative Code** states that except as otherwise provided in this subchapter or **Parks and Wildlife Code, Chapters 67 or 68,** no person may take, possess, propagate, transport, export, sell or offer for sale, or ship any species of fish or wildlife listed by the department as endangered or threatened.

"Take" is defined in **Section 1.101(5) of the Texas Parks and Wildlife Code** as:

*"Take," except as otherwise provided by this code, means collect, hook, hunt, net, shoot, or snare, by any means or device, and includes an attempt to take or to pursue in order to take.*

### **Penalties**

The penalties for take of state-listed species (**TPW Code, Chapter 67 or 68**) are:

- 1<sup>ST</sup> Offense = Class C Misdemeanor:  
\$25-\$500 fine
- One or more prior convictions = Class B Misdemeanor  
\$200-\$2,000 fine and/or up to 180 days in jail.
- Two or more prior convictions = Class A Misdemeanor  
\$500-\$4,000 fine and/or up to 1 year in jail.

Restitution values apply and vary by species. Specific values and a list of species may be obtained from the TPWD Wildlife Habitat Assessment Program.

## TPWD Guidelines for Revegetation of Disturbed Landscapes

Establishing plant cover onto disturbed landscapes should occur as a result of careful consideration of the management objectives, existing site characteristics, and the ecological factors affecting the area. In general, selecting native plant species which mimic naturally occurring plant communities in similar habitat situations will create landscapes which meet the developer's goals and have value for wildlife while preventing loss of soil resources. (Keeping the soil in place is fundamental to any vegetation management scheme.)

The following management goals will generally create or improve habitat for wildlife and are compatible with agricultural production and rural residential situations:

- **Ecosystem Functioning** (climax plant communities known to occur historically, e.g., Water Tupelo-Cypress swamp or Little bluestem-Indiangrass grassland)
- **Increased Biodiversity** (i.e., incorporation of tree and shrub communities within a grassland landscape or mixed edge associations for game and nongame species)
- **Plant Communities for Specific Habitat Needs** (may be needed for specialist/endangered wildlife)

Information concerning species components of native plant communities within a given locality can be obtained from Soil Conservation Service *Range Site Descriptions* and county *Soil Surveys*, investigation of undisturbed sites within the local area, and historical botanical and ecological reports for the local area. Remember that many of our historical climax plant communities developed under a regime of natural processes which are no longer functioning because of the influence of man (e.g., fire). Climax plant communities may be difficult to establish and maintain without continued manipulation to simulate these natural processes.

If "tailored" plant associations (non-climax) are being developed to maximize certain objectives, then the following criteria and notes can be used to develop a species list which will provide for wildlife habitat value while providing soil erosion protection:

- Selected plants should be native and adapted for the same local climatic and ecological region, topography, and soil conditions.
- Selected plants should be compatible.
- The association should cover as much area as possible (overlapping canopies).
- The association should form at least 2 canopy layers above the soil surface.
- Selected plants should include a mixture of physical and habitat forms, e.g., deciduous, evergreen, tree, shrub, vine, forb, grass.
- The association should provide annual, all-season fruits.

- The association should provide areas of adequate cover for the species being managed for.
- A ground cover should be established quickly to prevent solid erosion.
- Selected plants should include species which improve fertility (i.e., nitrogen-fixing species).
- In as much as they can be found suitable with slope, soil characteristics, aspect, source of moisture and wind direction, plants should be arranged in irregular groups rather than uniform rows so that the association will produce a more natural form.
- Native plants are adapted to the local environment and will persist through periods of environmental stress. Most exotic plants cannot similarly persist and are also overrated as wildlife food and cover. However, a few exotic species can establish themselves by out-competing native plants. They then become serious persistent pests, difficult if not impossible to control or eradicate. Exotic species should, therefore, be omitted from permanent revegetation plans.
- Weedy, invader native species can be problematic as they have great capacity for dispersal and are adapted to disturbed solid sites. Selecting species associated with climax or near climax plant communities may be slightly more difficult to establish but be more useful as wildlife habitat.

Landscape planning and erosion control assistance can be obtained from several natural resource agencies. For instance, the Soil Conservation Service (SCS) maintains standards and specifications for revegetation within each county of the state. These standards include information concerning site and seedbed preparation, litter requirements to reduce erosion, solid moisture and temperature requirements for germination and growth, seeding and planting methods, weed control, fertilizer rates and nutrient requirements, etc. The Texas Forest Service and the U.S. Forest Service can also provide assistance in revegetation of forest and shrubland landscapes. Texas Parks & Wildlife Department. U.S. Fish & Wildlife Service, and the U.S. Corps of Engineers can provide additional assistance in development of vegetation for use by fish and wildlife (i.e., habitat).

***Texas Parks & Wildlife Department Guidelines for Construction  
and Clearing Within Riparian Areas***

**A. Summary of Impacts Anticipated With Clearing of Rights-of-Way and Construction Within Riparian Habitats**

The following discussion lists a portion of the adverse impacts often incurred to natural resources with clearing of vegetation along streams and rivers as a result of construction disturbance and right-of-way (ROW) preparation.

***(1) Direct Vegetation Loss***

Removal of vegetation along stream systems is usually very damaging to fish and wildlife habitat and to natural processes associated with these systems. Vegetation associated with forested stream systems usually reflects highest value wildlife habitats. The degree of adverse impact to habitat resulting from this vegetation loss relates directly to the quantity of the vegetation loss and quality of the vegetation assemblage in fulfilling life requisites of those organisms using it.

***(2) Disruption of Habitat Continuity***

Habitat fragmentation is a serious threat to biological diversity. Because of the high use of riparian systems in general by wildlife, TPWD recommends that forest systems associated with floodplains be managed so as to avoid habitat fragmentation. Wildlife use river corridors to travel across the landscape and to move between food, cover, and breeding locations. Fish use habitat features within stream systems where appropriate physical parameters of light, temperature and water quality exist. As human development activity continues to compete for the natural resources existing within these riverine systems, remaining forested floodplains become increasingly valuable and scarce. Clearing for construction and utility ROW's, widening of utility ROW's, realignment of roadways crossing riverine systems, and abandonment of roads which cross these systems contribute significantly to increasing fragmentation of high value riparian habitats.

***(3) Impacts to Protected and Rare Species and Natural Resources***

Riverine systems are more prone to function as protected species habitat than upland areas because they tend to be less disturbed and represent higher value systems. Consequently, endangered species and natural plant community investigations should always be conducted when disturbance of these systems is projected or planned.



#### ***(4) Impacts to Natural Functions Associated with Forested Stream Systems***

Riparian area management, which was once considered to be essentially a fish and wildlife concern, is a broader issue that cuts across various agency functions, including not only fish and wildlife but also range management, watershed management, and soil management. Streamside forests are complex ecosystems vital to the protection of our streams and rivers. Functions served by these forested riparian systems include:

Improving the quality of water resources by removing or ameliorating the effects of pollutants in runoff; Increasing biological diversity and productivity of stream communities by improving habitat and adding organic matter to the food base; Removing sediment and sediment-attached phosphorus by filtration;

Transforming nitrate to nitrogen gas as a part of nutrient cycling;

Acting as a sink by storing nutrients for extended periods of time;

Dampening sedimentation and erosion and providing organic energy to downstream reaches.

#### **B. Recommendations Concerning Construction in Riparian Areas**

Construction and clearing of vegetation for development can drastically affect natural resources and natural processes associated with stream systems. These resources and processes are fundamental to the development of habitat for fish and wildlife. The following general recommendations concerning disturbances within riparian systems should be followed to minimize adverse impacts to fish, wildlife, and plant resources.

##### ***(1) Channel Modification (channelization, realignment, relocation, modification, "improvement")***

Channel modification projects serve to destroy natural aquatic and riparian habitats through direct removal of woody vegetation along streambanks and alteration of the physical attributes affecting the stream's configuration and flow characteristics. Therefore, TPWD supports channel modification projects only if vegetation impacts are avoided or mitigated and the reconstructed channel provides for a stream floodplain, natural stream meandering, pools and riffles, streamside vegetation, overhead canopy vegetation and appropriate width/depth/velocities.

##### ***(2) Stream Crossing Structures ((culverts, bridges, transmission lines, pipelines, utility rights-of-way)***

- cross at right angles to the stream;
- locate crossings where the channel is straight and exhibits unobstructed flows;

- avoid crossing at bends;
- structure design (span) must ensure that the natural stream-bed and bank remains intact;
- during construction, work from only one bank;
- vegetation and overstory canopy should be preserved (i.e. preserve the streamside vegetation corridor), especially the more southerly or westerly banks to maximize shading;
- construction of conduit for fluids or transmission lines across waterways should be installed by boring under streams versus trenching through the stream substrate;
- accommodate low-flow fish passage,
- Avoid vegetation buffer areas adjacent to wetlands and riparian corridors by a minimum of 100'.

**(3) *Stream Maintenance (stream cleaning and desnagging)***

- Rocks and boulders are usually part of the natural stream-bed and should not be removed unless they cause significant ponding, sediment deposition, or accumulation problems with logs, small debris, or garbage.
- Trees should not be removed from stream banks unless they: are dying, dead, or have damaged root systems; are leaning over the channel at an angle greater than 30 degrees off vertical; have root systems undercut to the degree that they rely on adjacent vegetation for support (if so, leave the root system for stabilization).
- Logs should not be removed from streams if they: are isolated or single logs that are embedded, jammed, rooted, or water logged in the channel or floodplain; are not subject to displacement by the current; are not blocking flows; are embedded logs parallel to the channel or stabilizing a shoreline.

**(4) *General Mitigation Measures***

- Restore, replant, or revegetate with native vegetation (85% survivability required) all areas incurring minor or temporary disturbance.
- If soil replacement is required, the replacement soils should be native to the area (similar physical and chemical characteristics) and non-toxic.
- If wetland disturbance is involved, in-kind, in-basin replacement is recommended.

Wetland creation should not destroy good to excellent quality upland habitat.

**(5) General Stream Conservation Criteria**

- Construction and development activities should occur in such a manner to prevent or minimize damage to any stream, river or lake from pollution by debris, sediment, foreign material or from the manipulation of equipment and/or materials in or near such waterways.
- Water used for wash purposes or any other operation which might cause the water to become polluted with sand, silt, cement, oil or other impurities should not be returned directly to a stream, river or lake or to a ditch immediately flowing into a stream, river or lake. Such waters should be detained and treated prior to release to the natural ecosystem.
- Any water used from a stream, river or lake should be taken in such a manner that maintains water rights and sustains fish life downstream or around a stream, river or lake's perimeter.
- If the proposed development indicates substantial disturbance or removal of the State-owned streambed material, a permit from TPWD under Chapter 86, Parks & Wildlife Code may be required. Application forms and instructions are available by contacting the Inland Fisheries Division at (512) 389-4639.

## TPWD Recommendations for Electrical Transmission/Distribution Line Design and Construction

Construction of the line should be performed to avoid adverse impacts not only to the environment but the local bird populations and to restore or enhance environmental quality to the greatest extent practical. In order to minimize the possible project effects upon wildlife, the following measures are recommended.

*TPWD recommends that each electrical company develop an Avian Protection Plan to minimize the risks to avian species that are protected by the Migratory Bird Treaty Act.*

### Avian Electrocutation Risks

Birds can be electrocuted by simultaneously contacting energized and/or grounded structures, conductors, hardware, or equipment. Electrocutions may occur because of a combination of biological and electrical design. Biological factors are those that influence avian use of poles, such as habitat, prey and avian species. The electrical design factor most crucial to avian electrocutions is the physical separation between energized and/or grounded structures, conductors, hardware, or equipment that can be bridged by birds to complete a circuit. As a general rule, electrocution can occur on structures with the following:

- Phase conductors separated by less than the wrist-to-wrist or head-to-foot (flesh-to-flesh) distance of a bird;
- Distance between grounded hardware (e.g. grounded wires, metal braces) and any energized phase conductor that is less than the wrist-to-wrist or head-to-foot (flesh-to-flesh) distance of a bird (Avian Power Line Interaction Committee 2006).

To protect raptors and eagles, procedures should be followed as outlined in:

Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006. by Avian Power Line Interaction Committee (APLIC). 2006. Distributed by the Avian Power Line Interaction Committee (APLIC).

Mitigating Bird Collisions with Power Lines: the State of the Art in 1994.  
Avian Power Line Interaction Committee (APLIC). 1994. Edison Electric Institute. Washington D.C.

Line alterations to prevent bird electrocutions should not necessarily be implemented after such events occur, as all electrocutions may not be known or documented. Incorporation of preventative measures along portions of the routes that are most attractive to birds (as indicated by frequent sightings) prior to any electrocutions is much preferred.

Preventative measures include: phase covers, bushing cover, arrester covers, cutout covers, jumper wire hoses, and covered conductors. In addition, perch discouragers may be used to deter birds from landing on hazardous (to birds) pole locations where isolators, covers, or other insulating techniques cannot be used (Avian Power Line Interaction Committee 2006).

Use wood or non-conducting cross arms, for distribution lines, to minimize the possibility of electrical contact with perching birds.

When possible, for distribution lines, install electrical equipment on the bottom cross arm to allow top cross arm for perching.

TPWD recommends using nest management strategies which include installing nesting platforms on or near power structures to provide nesting sites for several protected species while minimizing the risks of electrocution, equipment damage, or outages (Avian Power Line Interaction Committee 2006).

## **Avian Collisions Risks**

Birds typically establish flight corridors along and within river and creek drainages. Transmission lines that cross or are located very near these drainages should have line markers installed at the crossings or closest points to the drainages to reduce the potential of collisions by birds flying along or near the drainage corridors.

If transmission lines are located in an area with tall trees, the height of the transmission line should not be taller than the trees to reduce collision risks.

Transmission lines should be located to avoid separating feeding and nesting areas. If this cannot be avoided lines should be clearly marked to minimize avian collisions with the lines (Avian Power Line Interaction Committee 1994).

Transmission lines should be buried, when practical, to reduce the risks of avian collisions.

## **Habitat Impacts**

Construction should avoid identified wetland areas. Coordination with appropriate agencies should be accomplished to ensure regulatory compliance. Construction should occur during dry periods.

Construction should attempt to minimize the amount of flora and fauna disturbed. Reclamation of construction sites should emphasize replanting with native grasses and leguminous forbs.

Existing rights-of-way should be used to upgrade facilities, where possible, in order to avoid additional clearing and prevent adverse impacts associated with habitat loss and fragmentation of existing blocks of wooded habitat.

Forest and woody areas provide food and cover for wildlife, these cover types should be preserved. Mature trees, particularly those which produce nuts or acorns, should be retained. Shrubs and trees should be trimmed rather than cleared.

Transmission lines should be designed to cross streams at right angles, at points of narrowest width, and/or at the lowest banks whenever feasible to provide the least disturbance to stream corridor habitat.

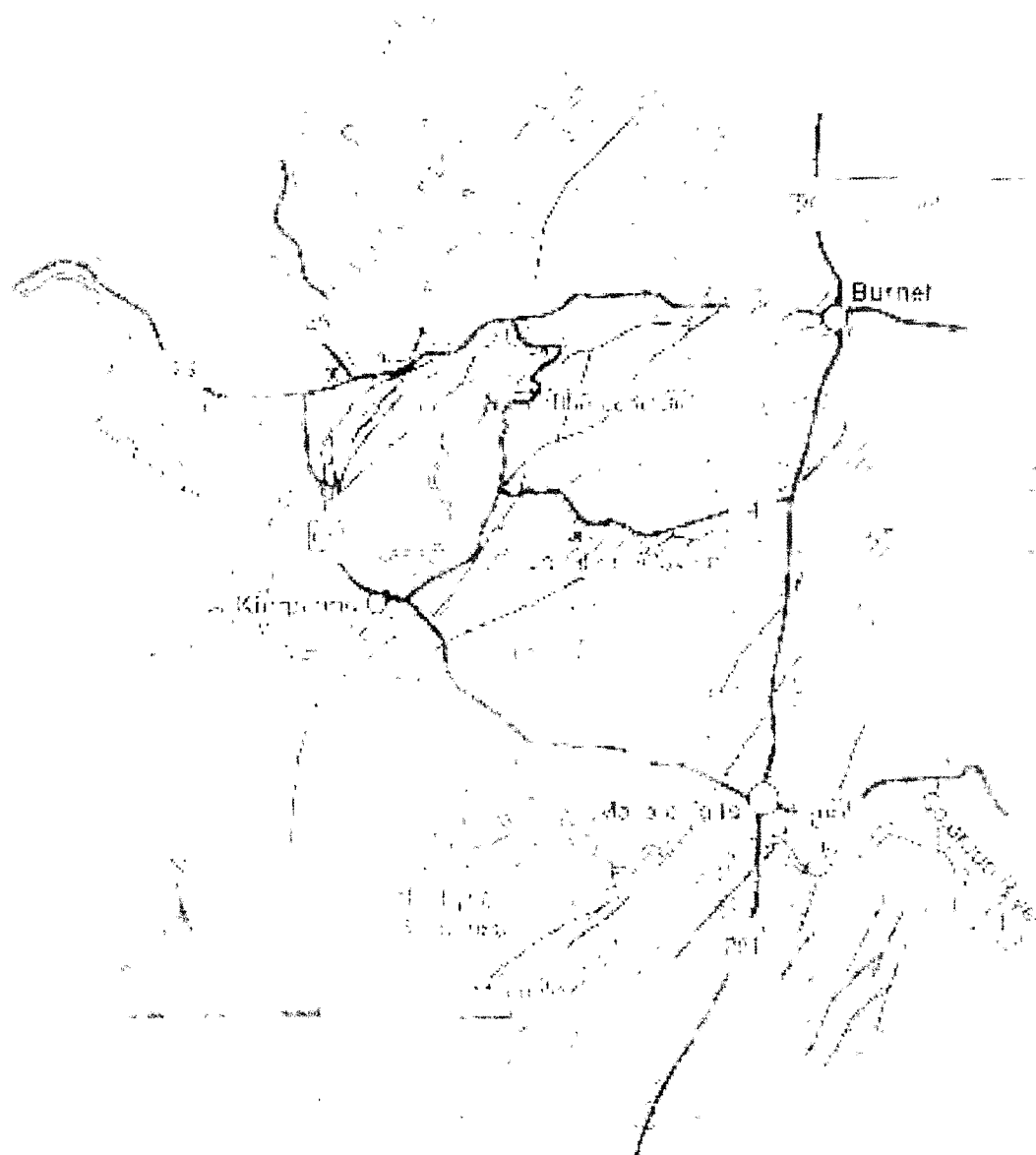
Implementation of wildlife management plans along rights-of-way should be considered whenever feasible.

All pole design should be single phase (without arms), where possible, to preserve the aesthetics of the area.



Source: Roadside Geology of Texas by Darwin Spearing, page 158.

*Geologic map of the west side of Interstate 35 to the Marble Falls area.*



158

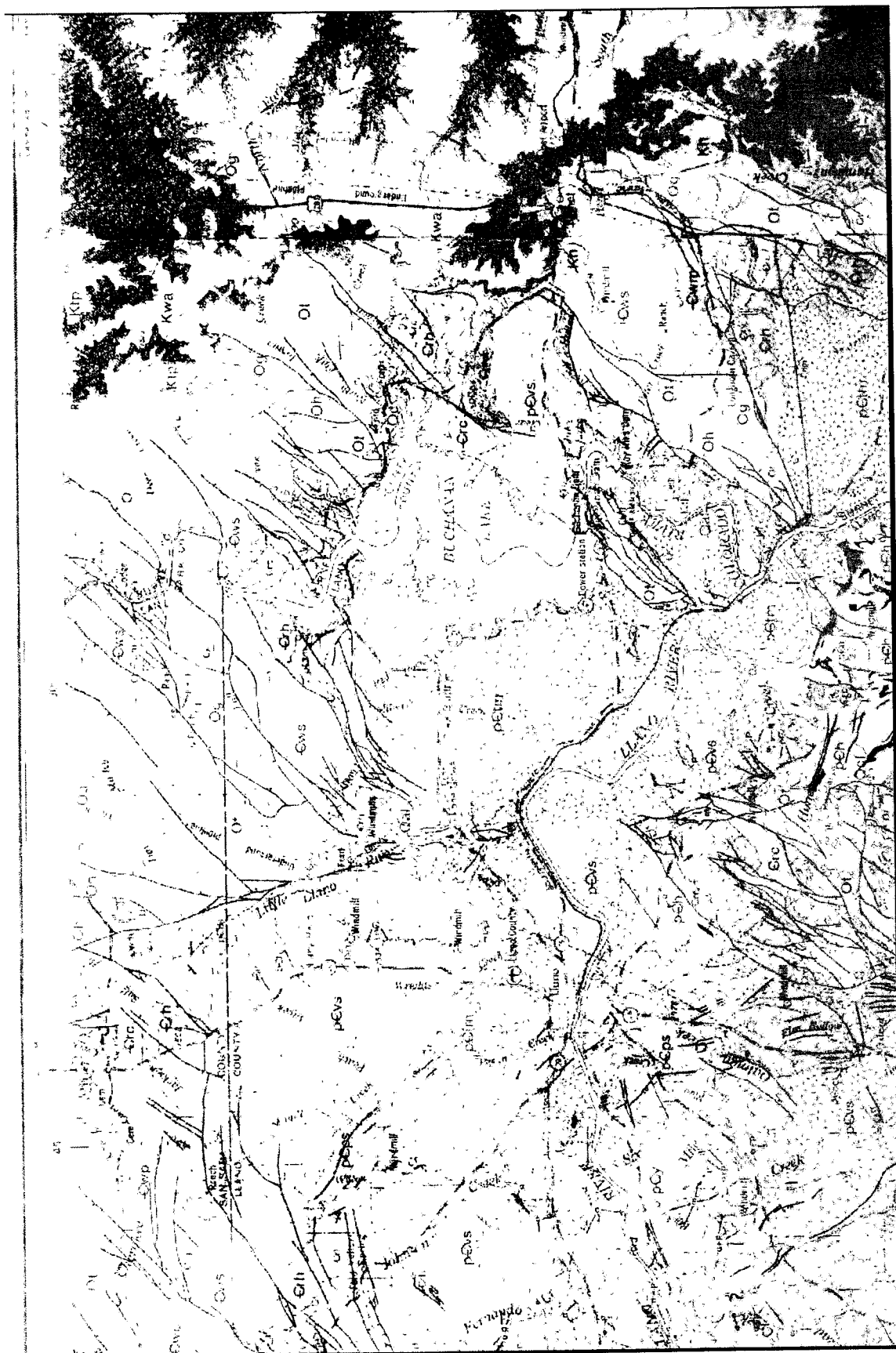
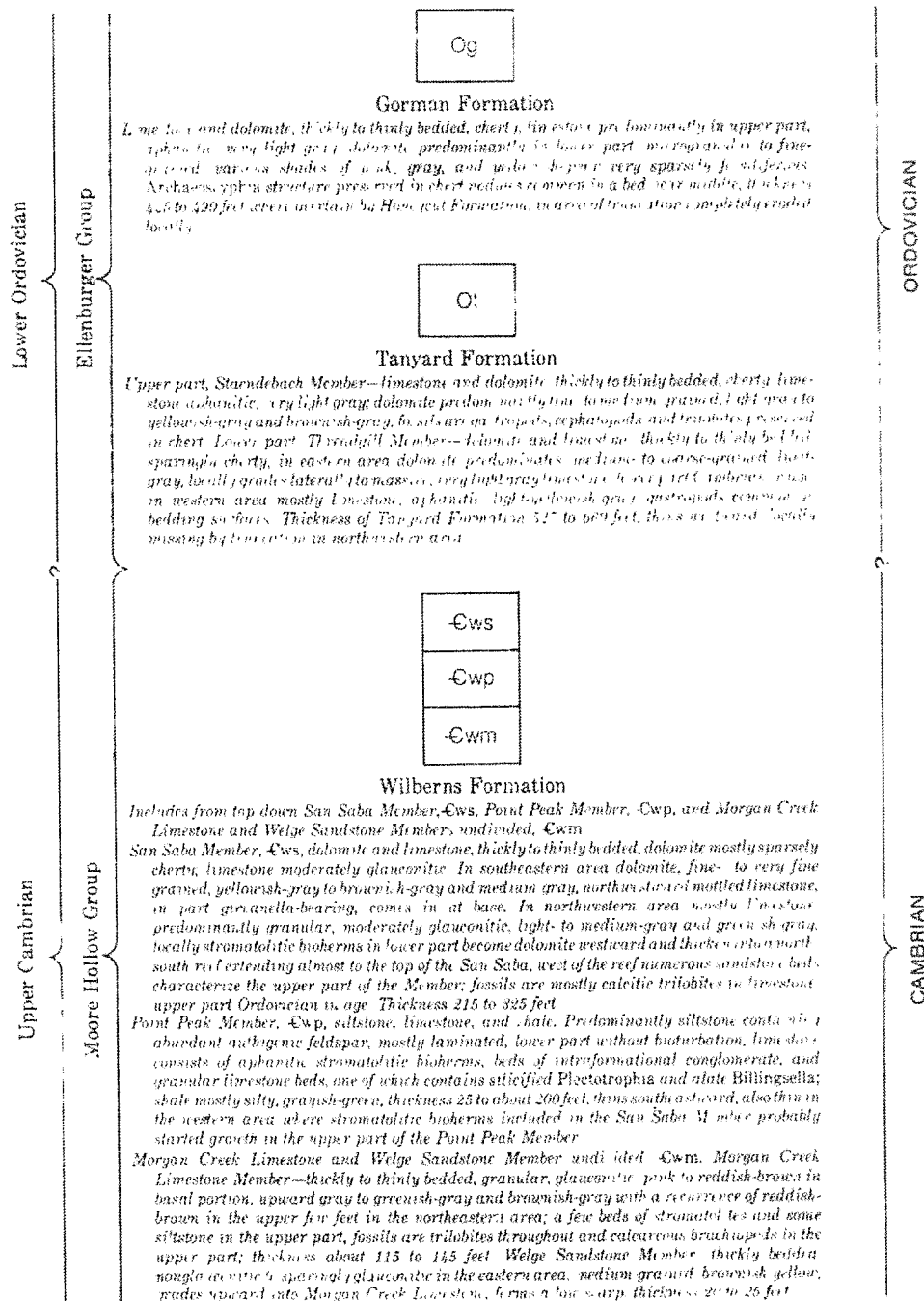


Exhibit BRB-4





Upper Cambrian

Middle Cambrian

Moore Hollow Group

-Crc

-Crh

## Riley Formation

Includes from top down Lion Mountain Sandstone and Cap Mountain Limestone Members undivided, Crc, and Hickory Sandstone Member, Crh

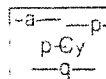
Lion Mountain Sandstone and Cap Mountain Limestone Members undivided, Crc. Lion Mountain Sandstone Member—quartzose greensand, glauconitic quartz-sandstone, impure limestone beds containing phosphatic brachiopods, and minor shale and siltstone; dusky green to grayish olive-green studded with white to yellowish-gray crossbeds of trilobate coquinae. Thickness about 30 to 80 feet. Cap Mountain Limestone Member—in southeastern area from top down limestone, siltstone and silty limestone, and mottled limestone grading to calcareous sandstone at base, limestone thickly bedded, glauconitic to sparingly glauconitic, in part calcitic, various shades of light olive gray, moderate- to dark yellowish-brown, yellowish gray and greenish gray, in dikes are dark yellowish-orange. Joints in lower limestone widened by solution produce distinctive pattern on aerial photographs, thickness about 175 to 500 feet, this southeastward by lateral gradation in lower part to Hickory Sandstone.

Hickory Sandstone Member, Crh, in northwestern area, upper part—medium- to coarse grained sandstone, grains exceptionally well rounded, hematite cemented, iron (Fe) content averages about 16 percent, dusky-red, forms a sharp sloping down to a calcified bench that enters on the contact between the red and the silty parts of the Hickory, thickness about 90 feet. Middle part—mostly fine- to medium-grained sandstone, argillaceous, silty, commonly thinly bedded and micaceous, forms a low hill (scarp), thickness about 270 feet. Lower part—mostly fine- to coarse grained poorly sorted grains rounded to subrounded, light yellow to green, forms gently rolling topographic, mostly irrigated as in water from this contact, used for pleistocene sand—thickness 100 feet variable because of irregularity of thickness, which sandstone was deposited. All the upper part most of the middle part probably in southeastward to Cap Mountain Limestone. Thickness 275 to 470 feet in all by a series of thin beds of Permian sand rock are present.



## Llanite

Porphyry characterized by phenocrysts of red feldspar and blue chatoyant quartz in dark aphanitic groundmass, occurs as a series of quasi-concordant dike-like bodies north-northeast of Llano



## Younger granitic intrusive rocks

Includes Outman Creek Granite, Silemle Granite and granite dikes and aplite dikes, a pegmatite dikes, p, and quartz masses, q. Outman Creek Granite, relatively fine grained, pink, mildly cataclastic, quartz plagioclase-microcline rock, occurs as irregularly bedded and blocky in size and in elongate or ribbon dikes or sills, appears to be a late differentiates of Town Mountain Granite. Silemle Granite, uniformly fine grained, to be generally colorless, quartz plagioclase-microcline rock, occurs as irregularly bedded bodies, penetrating metamorphic rocks and Town Mountain Granite. Dikes and aplite dikes are bodies shown as bedrock.

p-Ctm

## Town Mountain Granite

Coarse-grained, pink, quartz plagioclase-microcline rock, in part porphyritic with large microcline phenocrysts, occurs in plutons up to 13 miles in size that tend to be concordant over large vertical cylinders with concentric textural variations, boundaries range from sharp and

CAMBRIAN

PRECAMBRIAN