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SOAH DOCKET NO. 473-21-0247
PUC DOCKET NO. 51023

APPLICATION OF CITY OF SAN ANTONIO TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE SCENIC LOOP 138-KV TRANSMISSION LINE PROJECT IN BEXAR COUNTY, TEXAS	§ § § § § §	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY

OF

HAROLD L. HUGHES JR., P.E.

ON BEHALF OF

SAVE HUNTRESS LANE AREA ASSOCIATION ("SHLAA")

FEBRUARY 17, 2021

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

CCN	CERTIFICATE OF CONVENIENCE AND NECESSITY
CPSB	CITY PUBLIC SERVICE BOARD
EAA	ENVIRONMENTAL ASSESSMENT AND ALTERNATE ROUTE ANALYSIS
EMF	ELECTRO-MAGNETIC FIELD
KV	KILO-VOLT (1,000 VOLTS)
NRHP	NATIONAL REGISTER OF HISTORIC PLACES
NWI	NATIONAL WETLAND INVENTORY
POWER	POWER ENGINEERS INC.
PUC	PUBLIC UTILITY COMMISSION OF TEXAS
PURA	PUBLIC UTILITY REGULATORY ACT
TPWD	TEXAS PARKS AND WILDLIFE DEPARTMENT
RFI	REQUEST FOR INFORMATION
ROW	RIGHT-OF-WAY
SHLAA	SAVE HUNTRESS LANE AREA ASSOCIATION

I. INTRODUCTION

Q. PLEASE INTRODUCE YOURSELF.

A. My name is Harold L. Hughes Jr. I am employed by ReSolved Energy Consulting, LLC, as an Executive Consultant. My business address is 11044 Research Blvd., Suite A-420, Austin, Texas 78759.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I have a Bachelor of Science degree in Civil Engineering and a Master of Business Administration degree. My over 45 years of professional experience include power plant construction, transmission line design and construction, fossil fuel procurement, and 14 years of electric utility regulatory experience with the Public Utility Commission of Texas (PUC). During my tenure at the Commission, I initiated the formation of the Electro-Magnetic Field (EMF) Task Force, made up of a noted epidemiologist, doctors, engineers, and environmental professionals, to investigate and recommend to the Commission a policy for dealing with EMF associated with transmission lines. This Task Force's report led to the endorsement of the Commission's policy of "prudent avoidance." I also filed testimony on applications for amendments to Certificates of Convenience and Necessity (CCN) for transmission lines and reviewed the testimony of the staff I supervised on a variety of issues, including applications for amendments to Certificates of Convenience and Necessity for transmission lines. As a consultant, I have advised and presented testimony on

behalf of landowners who may be impacted by proposed transmission lines. Additional details regarding my experience and qualifications are shown in Appendix A.

Q. ARE YOU A REGISTERED PROFESSIONAL ENGINEER?

A. Yes, number 49159 in the State of Texas.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

A. Yes, I have testified many times before the PUC on a variety of issues as a staff member at the PUC. Following my employment with the PUC, I have testified numerous times on behalf of affected landowners in CCN cases. A summary of my previously filed testimony regarding transmission line CCN Applications is provided in Appendix B. I also provided analysis and recommendations in other CCN proceedings that resulted in settlements that did not require filing written testimony.

Q. ON WHOSE BEHALF ARE YOU OFFERING TESTIMONY IN THIS PROCEEDING?

A. I am providing testimony on behalf of Save Huntress Lane Area Association (SHLAA).

Q. PLEASE DESCRIBE THE SAVE HUNTRESS LANE AREA ASSOCIATION.

A. Save Huntress Lane Area Association (SHLAA) is an unincorporated nonprofit association organized to represent the interest of its members in this proceeding. The members of SHLAA include over thirty individual landowners, the Canyons Property Owners Association (Canyons) with over 700 individual landowners and the Altair Subdivision Property Owners Association (Altair) with over a dozen individual landowners. The Intervenors Map, which I have provided with my testimony as

Attachment I, shows the location of the association members in relation to the proposed line segments. The individual members of SHLAA are colored in bright yellow, while the Canyons and Altair areas are outlined in the same bright yellow.

Q. WHICH LINE SEGMENTS WOULD IMPACT THE SAVE HUNTRESS LANE AREA ASSOCIATION MEMBERS?

A. Members of the Save Huntress Lane Area Association have properties that would be crossed or adjacent to numerous line segments. Fifteen of the 31 Alternate Routes City Public Service Board (CPSB) has presented in its Application as amended (i.e., proposed Routes F1, K, L, N1, O, P, Q1, R1, S, T1, U1, V, W, BB, and CC) contain one or more of these segments. Substation sties 6 and 7 also abut some members' property. The testimony of SHLAA members describes more fully the specific impacts on their members.

Q. WHO ARE THE OTHERS WHO WILL TESTIFY AND DESCRIBE IN MORE DETAIL THE SAVE HUNTRESS LANE AREA ASSOCIATION MEMBERS' PROPERTIES AND POTENTIAL IMPACTS THE LINE COULD HAVE ON THESE PROPERTIES?

A. SHLAA leadership members and landowners Cynthia Grimes, David Clark, and Jerry Rumpf will be testifying.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. My testimony presents my conclusions and recommendations regarding the transmission line routing proposed in this application. I have been retained by Save Huntress Lane Area Association to perform an analysis of CPSB's Application and

other documents submitted by CPSB in support of its Application. I was asked to evaluate this information specifically to analyze the routes that utilize segments or substation sites that would impact SHLAA members' properties to determine how those routes compare to other routes proposed by CPSB under the Commission criteria for routing transmission lines.

Q. WILL YOU ADDRESS THE NEED FOR THE LINE OR ALTERNATIVES TO THE TRANSMISSION LINE?

A. No. SHLAA members understand and appreciate the need for the proposed line and CPSB's efforts to improve the quality of service to their area. My testimony focuses on the Commission's criteria for routing; the Environmental Assessment and Alternate Route Analysis (EAA) prepared by Power Engineers, Inc. (POWER) to support CPSB's Application; and the evaluations and cost estimates CPSB used to recommend the route that it considers best meets the Commission's routing criteria.

Q. HOW ARE THE REMAINING SECTIONS OF YOUR TESTIMONY ORGANIZED?

A. In Section II of my testimony I will present my analysis of the routes proposed by CPSB in the Environmental Analysis and Alternate Route Analysis (EAA) prepared by POWER; CPSB's Application, including cost estimates, and the associated testimony. In Section III of my testimony, I summarize my conclusions and recommendations.

II. ROUTING ANALYSIS

Q. PLEASE DESCRIBE THE PROCESS YOU USED FOR EVALUATING THE ROUTING OF THIS LINE.

A. I began by reading and analyzing the information in CPSB's CCN Application, the Environmental Assessment and Alternate Route Analysis prepared by Power Engineers and supporting testimony. After my initial review of this material, I then did a close analysis of the data presented in Table 4-1 of the EAA and the cost data prepared by CPSB and presented in Table 2 of the Application. During this same period, I made a trip to the Study Area to look at the proposed routes and determine the accuracy of the representations made in the Application and to see if there were any other potential constraints that may have not been noted in the EAA. I also met with affected SHLAA landowners and discussed specific impacts to their properties. As the case progressed, I reviewed Request for Information (RFI) responses, the amended Application, testimony, and EAA, and other information filed in this docket. Finally, based on all the above and my prior experience with CCN Applications, I made my conclusions and recommendations.

Q. YOU MENTIONED TABLE 4-1 OF THE EAA AS AN IMPORTANT PART OF YOUR ANALYSIS. PLEASE EXPLAIN WHAT INFORMATION IS IN THAT TABLE AND WHY IT IS IMPORTANT.

A. Section 37.056 of the Texas Utilities Code, Commission Substantive Rule §25.101, the Commission's CCN application requirements and the Commission's policy of prudent avoidance list the factors that must be considered before the Commission can approve or deny a CCN application. To address each of these factors on a quantitative basis, POWER developed a list of 48 criteria that quantify the impact of each proposed line segment and route. These criteria are grouped into land use, aesthetic, ecology, and cultural resource categories and are tabulated in Table 4-1 (as amended). This data, in

conjunction with the cost data prepared by CPSB, serve as a summary quantitative basis for analyzing the impact of each criteria on each line segment and route. I took this data and sorted and evaluated it to determine the relative impacts of each criterion on each route. Once that was completed, I determined what I consider to be the key criterion in this docket that should be given the most weigh in ultimately determining the route that best complies with the Commission's factors that must be considered. I then found the best performing routes in the key criterion and then looked at each of these routes more closely to determine if any of them performed particularly badly in any of the other criteria.

A. Land Use

Q. WHAT CRITERIA DID POWER USE TO ASSESS THE IMPACTS ON LAND USE?

A. POWER used the following 29 criteria to assess the impacts on land use. However, as can be seen on my Table I below, of these 29 criteria, 20 of them had values of zero or were either very small or identical for each route (note: the numbers in the left column of the following tables refer to the number of the criterion listed in Table 4-1 as amended of the EAA, and the right column includes RFI response information):

Table I – Land Use Criteria

	Criterion	**Range**
1	Length of alternative route (miles)	4.53 – 6.91
2	Number of habitable structures within 300 feet of the route centerline	6 - 70
3	Length of ROW using existing transmission line ROW (miles)	0

4	Length of ROW parallel and adjacent to existing transmission line ROW (miles)	0
5	Length of ROW parallel to other existing ROW (roadways, railways, canals, etc.) (miles)	0.51 – 3.01
6	Length of ROW parallel and adjacent to apparent property lines (miles)	0.68 – 3.96
7	Sum of evaluation criteria 4, 5, and 6 (miles)	2.72 – 5.50
8	Percent of evaluation criteria 4, 5, and 6	49% - 83%
9	Length of ROW across parks/recreational areas (miles)	0
10	Number of additional parks/recreational areas within 1,000 feet of ROW centerline and substation site	0
11	Length of ROW across cropland (miles)	0
12	Length of ROW across pasture/rangeland (miles)	0 – 1.69
13	Length of ROW across land irrigated by traveling systems (rolling or pivot type) (miles)	0
14	Length of route across conservation easements and/or mitigation banks (Special Management Area) (miles)	0
15	Length of route across gravel pits, mines, or quarries (miles)	0
16	Length of ROW parallel and adjacent to pipelines (miles)	0
17	Number of pipeline crossings	0
18	Number of transmission line crossings	0
19	Number of IH, US and state highway crossings	0
20	Number of FM or RM road crossings	0
21	Number of cemeteries within 1,000 feet of the ROW centerline and substation site	0 - 2
22	Number of FAA registered airports with at least one runway more than 3,200 feet in length located within 20,000 feet of ROW centerline and substation site	0
23	Number of FAA registered airports having no runway more than 3,200 feet in length located within 10,000 feet of ROW centerline and substation site	0

24	Number of private airstrips within 10,000 feet of the ROW centerline and substation site	0
25	Number of heliports within 5,000 feet of the ROW centerline and substation site	0
26	Number of commercial AM radio transmitters within 10,000 feet of the ROW centerline and substation site	0
27	Number of FM radio transmitters, microwave towers, and other electronic installations within 2,000 feet of ROW centerline and substation site	0 - 1
28	Number of identifiable existing water wells within 200 feet of the ROW centerline and substation site	0 - 6
29	Number of oil and gas wells within 200 feet of the ROW centerline (including dry or plugged wells) and substation site	0

Q. WHAT DID YOU CONCLUDE FROM THE INFORMATION IN TABLE I?

A. The only criteria that provide enough information to help differentiate among the routes are length, number of habitable structures, and amount of paralleling.

Q. WHAT DID YOU DETERMINE FROM COMPARING THE LENGTHS OF THE ALTERNATIVE ROUTE?

A. As shown in Table II below, the shortest route was considerably shorter than either the average or maximum lengths of the other alternate routes.

Table II – Alternate Route Lengths

Route	**Length (Miles)**
Shortest - Route Z1	4.53
Average	5.68
Longest – Route L	6.91

Q. WHAT DID YOU DETERMINE FROM COMPARING THE NUMBER OF HABITABLE STRUCTURES WITHIN 300 FEET OF EACH OF THE ALTERNATIVE ROUTE?

A. As shown on Table III below the number of habitable structures within 300 feet of a proposed route range from six to sixty-nine; however, ten of the alternate routes are within plus or minus five of the average of 35 habitable structures. When looking at the lengths of the alternate routes with the number of habitable structures within 300 feet it reflects a housing density one would expect in a suburban area.

Table III – Habitable Structures

Route	**Number**
Least – Routes Q1 & U1	6
Average	35
Most – Route A	70

Q. WHAT DID YOU DETERMINE FROM COMPARING THE AMOUNT OF PARALLELING FOR EACH OF THE ALTERNATIVE ROUTES?

A. As shown on Table IV below, even the poorest performing alternate route still had a significant amount of paralleling (49%) and the best performing a very high amount (83%). In other words, all the alternate routes performed well in this category.

Table IV – Percent of Paralleling

Route	**Percent**
Most – Route A	83%
Average	67%
Least – Route S	49%

B. Aesthetics

Q. WHAT CRITERIA DID POWER USE TO ASSESS AESTHETIC IMPACTS OF THE ALTERNATE ROUTES?

A. POWER used the following three criteria to assess the aesthetic impacts of each of the alternative routes. However, all these criteria have a zero value and give us no useful information.

Table V – ROW Within Visual Zones

	Criteria	Range
30	Estimated length of ROW within foreground visual zone of IH, US and state highways (miles)	0
31	Estimated length of ROW within foreground visual zone of FM/RM roads (miles)	0
32	Estimated length of ROW within foreground visual zone of parks/recreational areas (miles)	0

Q. WHAT THEN CAN YOU DETERMINE REGARDING THE AESTHETIC IMPACTS OF EACH OF THE ALTERNATIVE ROUTES?

A. After making a field investigation of the study area I determined from my visual examination that I agree with POWER's assessment that:

> *Overall, the character of the study area maintains a suburban feel characteristic of the Texas Hill Country region. The residential and commercial developments within the study area have already impacted the aesthetic quality within the region from public viewpoints.*[1]

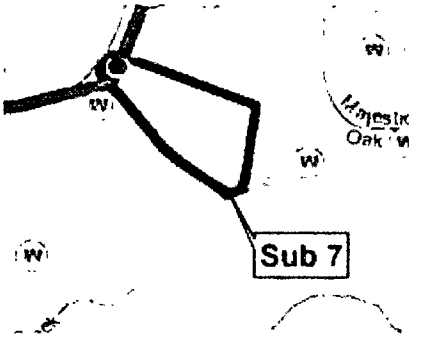
[1] Scenic Loop 138kV Transmission Line and Substation Project Environmental Assessment and Alternative Route Analysis, page 4-24.

Although there are specific spots that have an exception visual quality, I do not believe one can point to a specific part of the study area and say it has a significantly higher visual quality than the other parts of the study area. For that reason, I believe the best way to minimize the aesthetic impacts of the line is to minimize its length.

Q. ARE THERE OTHER OBSERVATIONS YOU MADE REGARDING THE AESTHETIC IMPACTS OF EACH OF THE ALTERNATIVE ROUTES?

A. Yes. During my field investigation I observed each of the proposed substation sites. I observed that substation seven was larger than the other sites, was heavily wooded and because of its shape, only bordered a short section of road, as shown in Figure 1 below:

Figure 1 – Substation 7 Location



Source: Figure 2-4 Constraints (Map) -Amended

For this reason, I agree with CPSB's statement made in support of identifying the alternative route that it believes best addresses the requirements of PURA and the PUC's Substantive Rules:

> *Utilizes Substation Site 7, which will allow for greater shielding of the substation from public roadways;*[2]

[2] Application Question 17.

This was further confirmed by CPSB in its discovery responses regarding the Substation Site 7:[3]

> *[The Substation Site 7] facilities will be designed and constructed on the property in a way that minimizes the footprint on the property and leaves as much of the existing vegetation as possible for a visual buffer. No clear cutting" is anticipated. Based on CPS Energy's current understanding of the property without the benefit of on the ground surveys, it is anticipated the substation facilities will be constructed in the center area of the property.*
>
> *The oversized and heavily vegetated property provides CPS Energy with an opportunity to construct and operate the [Substation Site 7] facilities away from the property lines with existing vegetation around the facility reducing the visual impacts.*

C. Ecology

Q. WHAT CRITERIA DID POWER USE TO ASSESS IMPACTS OF THE ALTERNATE ROUTES ON THE ECOLOGY OF THE AREA?

A. POWER used the following 11 criteria to assess the impacts of the alternate routes on the ecology of the area. However, as can be seen on the table below, four of these 11 criteria (34, 35, 36, and 39) have values of zero and provide us no information and four others (40, 41, 42, and 43) have a very small range and are generally not very important criteria. Therefore, I concluded that only criteria 33 and 37 needed further analysis.

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[3] CPSB Responses to Brad Jauer & BVJ Properties, LLC Questions 2-10 and 2-13.

Table VI – Ecology Impacts

	Criteria	Range
33	Length of ROW across upland woodlands/brushlands (miles)	3.12 – 6.52
34	Length of ROW across bottomland/riparian woodlands (miles)	0
35	Length of ROW across NWI mapped wetlands (miles)	0
36	Length of ROW across critical habitat of federally listed endangered or threatened species (miles)	0
37	Area of ROW across golden-cheeked warbler modeled habitat designated as 3-Moderate High and 4-High Quality (acres)	2.95 – 25.11
38	Area of ROW across golden-cheeked warbler modeled habitat designated as 1-Low and 2-Moderate Low Quality (acres)	10.5 – 22.81
39	Length of ROW across open water (lakes, ponds) (miles)	0
40	Number of stream and river crossings	3 - 12
41	Length of ROW parallel (within 100 feet) to streams or rivers (miles)	0 - .26
42	Length of ROW across Edwards Aquifer Contributing Zone (miles)	4.53 – 6.91
43	Length of ROW across FEMA mapped 100-year floodplain (miles)	0 – 1.49

Q. WHAT DID YOU DETERMINE FROM COMPARING THE LENGTHS OF ROW ACROSS UPLAND WOODLANDS/BRUSHLANDS FOR EACH OF THE ALTERNATIVE ROUTES?

A. As shown in Table VII below, there was a considerable difference among the proposed routes with the more northern routes, such as Route DD performing better in this category than the more southern routes such as Route V.

Table VII – Length of ROW across upland woodlands/brushlands

Route	Length (Miles)
Longest- Route V	6.52
Average	4.72
Shortest – Route DD	3.12

Q. WHAT DID YOU DETERMINE FROM COMPARING THE AREA OF ROW ACROSS GOLDEN-CHEEKED WARBLER MODELED HABITAT DESIGNATED AS 3-MODERATE HIGH AND 4-HIGH QUALITY FOR EACH OF THE ALTERNATIVE ROUTES?

A. As shown in Table VIII below, there was a considerable difference among the proposed routes with the more northern routes, such as Route DD performing better in this category than the more southern routes such as(Route V).

Table VIII – Area of ROW across golden-cheeked warbler modeled habitat designated as 3-Moderate High and 4-High Quality

Route	Area (Acres)
Least – Route W	2.95
Average	13.04
Most – Route P	25.11

Q. TEXAS PARKS AND WILDLIFE DEPARTMENT (TPWD) REVIEWS ALL CCN APPLICATIONS TO EVALUATE THEM FOR IMPACTS ON NATURAL RESOURCES. WHAT DID THEY RECOMMEND IN THIS APPLICATION?

A. TPWD recommended Route AA as the route that appears to be the route that causes the least adverse impacts to natural resources primarily because it:

- *is the fourth shortest route of the 29 alternative routes, at 4.77 miles (Route Z is the shortest at 4.58 miles).*
- *is the fourth shortest route across upland woodlands/bushlands; at 3.77 miles (Route Z is the shortest at 3.59).*
- *has a relatively high percentage of ROW parallel to other existing ROW at 39% (Route Y has the highest percentage at 58%, Route T has the lowest at 9%).*
- *is tied with Route J as having the fifth least amount of area of ROW across golden-cheeked warbler modeled habitat designated as 3-Moderate High and 4-High Quality, at 7.39 acres.*
- *is located almost entirely in Karst Zone 5, defined as cavernous and non-cavernous areas that do not contain endangered karst invertebrate species. Approximately 650 feet of the west end of the 4.77-mile-long route occurs in Karst Zone 3, defined as areas that probably do not contain endangered karst species.*[4]

Q. SINCE TPWD HAS MADE ITS RECOMMENDATION, ROUTE AA HAS BEEN MODIFIED AND RENAMED ROUTE AA1. HOW DOES THAT MODIFICATION CHANGE THE LIST OF IMPACTS TO NATURAL RESOURCES LISTED ABOVE?

A. Route AA1 is little changed from Route AA. Specifically, Route AA1 differs from Route AA in the following ways: AA1 is the fifth shortage route at 4.82 miles; sixth shortest route across upland/woodlands at 3.81 miles; ROW parallel to other existing ROW changes slightly from 39% to 38%; has the eighth least amount of area of ROW

[4] TPWD letter to PUCT of September 10, 2020 Interchange no. 343.

across golden-cheeked warbler modeled habitat designated as 3-Moderate High and 4-High Quality, at 9.6 acres, and does not change its impacts to the karst zones.

D. Cultural Resources

Q. WHAT CRITERIA DID POWER USE TO ASSESS THE POSSIBLE IMPACTS OF THE ALTERNATE ROUTES ON CULTURAL RESOURCES?

A. POWER used the following three criteria to assess the cultural impacts of each of the alternative routes. However, these criteria do not tell us anything about the size, location, or importance of these resources. The main importance of this table is to indicate areas that need to be looked at more closely to determine potential impacts. That requires studying the narrative in Section 4.0 of the EAA and examining the tables included in the Environmental Assessment 4.0 (Amended).

Table IX – Cultural Resource Criteria

	Criterion	Range
44	Number of recorded cultural resource sites crossed by ROW	0 - 2
45	Number of additional recorded cultural resource sites within 1,000 feet of ROW centerline	0 - 12
46	Number of NRHP listed properties crossed by ROW	0 - 1
47	Number of additional NRHP listed properties crossed by ROW	0 - 2
48	Length of ROW across areas of high archeological site potential (miles)	1.44 – 4.77

Q. WHAT DID YOU DETERMINE AFTER REVIEWING THE NARRATIVE AND TABLES IN THE ENVIRONMENTAL ASSESSMENT (AMENDED)?

A. I determined that because of the size and location of the listed sites, none of the proposed routes pose any or very minimal potential impacts to cultural resources.

Therefore, from a cultural resources impact perspective, none of the routes stand out as being particular better than another.

E. Costs

Q. HOW DID THE DIFFERENT ROUTES COMPARE ON THE BASIS OF COST?

A. Table X below summarize the least, average, and highest cost of the different routes.

Table X – Total Estimated Costs

Route	Cost
Lowest Cost - AA1	$38,291,572
Average	$47,572,292
Highest Cost - O	$56,194,703

Q. WHAT OBSERVATIONS DID YOU MAKE CONCERNING THE COSTS OF THE DIFFERENT ROUTE?

A. I observed that the three lowest cost routes (AA1, Z1, and DD) were all located in the north of the Study Area and utilized links where developers have agreed to donate substantial portions of the ROW.

F. Key Criteria

Q. WHAT DID YOU CONSIDER THE MOST IMPORTANT OR KEY CRITERIA TO CONSIDER IN THIS CASE?

A. I determined that the most important criteria (not listed in any rank order) to consider under the circumstances of this case were:

1. Cost of the line

2. Length of the line
3. Length of line paralleling property lines and compatible ROWs
4. Number of habitable structures within 300 feet of the line

Q. HOW DID YOU DETERMINE THESE CRITERIA TO BE THE MOST IMPORTANT?

A. I determined these criteria to be the most important criteria based on my experience, review of the Environmental Assessment and Alternate Route Analysis and precedent from prior CCN cases where the Commission found these criteria to be important. Also, in this case, the proposed routes are comparatively short for transmission lines and cross areas that are fairly homogenous. As noted in CPSB's application, the Study Area is only 5.2 miles long, 6.1 miles wide at its widest point, and encompasses approximately 28 square miles.[5] For this reason, the differences among the routes are limited, as shown in my discussion of the various criteria. Ultimately, in these conditions, the main differences among the routes are simply the length and cost.

Q. PLEASE DESCRIBE EACH OF THESE KEY CRITERION AND WHY IT IS IMPORTANT.

A. **Costs:** Beginning with costs, the PUC's Substantive Rule §25.101 lists costs of the proposed line as one of the criteria that the Commission must examine when considering an application for a CCN. And of course, ratepayers will ultimately be responsible for paying the cost of the line.

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[5] Environmental Assessment and Alternate Route Analysis page 2-2.

Line Length The length of the line is important because the length of the line will determine the amount of land that will be burdened by easements and will affect the cost to construct and maintain the line. Also, the longer the line the greater the potential for more environmental, cultural, or aesthetic impacts and exposure to weather or accidents that could affect its operation. Finally, length is also an important consideration when considering other criteria or metrics.

Paralleling Paralleling existing linear features is an important consideration since the Commission's Substantive Rule §25.101 requires that consideration be given to routing a transmission line along property lines and other compatible rights-of-way (ROW). Routing a transmission line across the center of a property imposes a significant barrier to any operations on the property, not only because of its physical presence, but because of additional easement restrictions. Routing a transmission line across the center of a property also increases the probability that the line will have a higher visual/aesthetic impact on the property being crossed. However, if the line is located along the property boundary, it may provide the property owner with more flexibility regarding the use of the land away from the transmission line.

Paralleling other linear features, such as transmission lines, roads, and railroad lines is also generally considered desirable by the Commission since it avoids new habitat fragmentation and can minimize other impacts since the line would be adjacent to land that is already encumbered.

Habitable Structures: The number of habitable structures near a proposed line is an important consideration because the PUC requires the applicant for a CCN to consider in its selection of alternate routes whether the routes conform with the policy

of prudent avoidance and moderates the impact on affected landowners. The PUC's Substantive Rule §25.101(a)(6) defines prudent avoidance as; "The limiting of exposures to electric and magnetic fields that can be avoided with reasonable investments of money and effort." Exposure to electric and magnetic fields (EMF) can be limited when routing transmission lines by proposing alternative routes that minimize, to the extent reasonable, the number of habitable structures, and hence the number of people, within proximity of the proposed routes.

Although the number of habitable structures near a proposed line is an important consideration in virtually every CCN application I have worked on, I do not believe it to be quite as strong a consideration in this particular case.

Q. WHY IS THAT?

A. Because, as has been noted in the EAA and my own observations, this area is undergoing rapid development and it is difficult to pin down the number of habitable structures at a particular point in time and this number is likely to change in the future. I think this was amply demonstrated by the fact that since CPSB filed its Application on 7/22/20 and its Amended Application on 12/22/20 it has identified five additional habitable structures.[6] Additionally, as noted in the SHLAA landowners' testimony, they have identified additional habitable structures in the SHLAA area that had not been counted as such by CPSB.

[6] Amendment to CPS Energy's Application page 6.

Q. HOW DID THE ALTERNATE ROUTES PERFORM ON EACH OF THE KEY CRITERIA?

A. The table below shows how the routes I think best performed overall on the key criteria compared to the best and worst performers. I have also included not only the rank, but the value for each of these key criteria since the difference between the actual values of each criteria give a better perspective of the relative strength of each of these criteria (note that the habitable structures row does not include the additional habitable structures SHLAA has identified in the SHLAA area since CPSB has not yet addressed those, but the number for Route Q1 would be increased accordingly):

Table XI – Key Criteria Comparison

	Best	**Route AA1**	**Route Z1**	**Worst**
Cost	Route AA1 $38,791,572	Rank – 1st $38,791,572	Rank – 2nd $38,174,144	Route O $56,194,703
Habitable Structures	Route Q1 6	Rank – 12th 31	Rank – 11th 31	Route A 70
Length	Route Z1 4.53 Miles	Rank – 5th 4.82 Miles	Rank – 1st 4.53 Miles	Route L 6.91 Miles
Paralleling	Route A 83%	27 56%	18 68%	Route S 49%

Q. ONCE YOU HAD COMPLETED YOUR ANALYSIS AND DETERMINED THE BEST PERFORMING ROUTES BASED ON THE KEY CRITERIA, DID YOU DO ANY FURTHER ANALYSIS?

A. Yes. After determining the best performing routes based on the key criteria I went back and looked at Routes AA1 and Z1 to determine if they performed very poorly in any of the other criteria.

Q. WHAT DID YOU DETERMINE FROM THIS EXAMINATION?

A. I determined that there were no "deal killers", i.e., neither Route AA1 nor Z1 performed so poorly in any of the other criteria that it outweighed their performance on the key criteria.

Q. CPSB SELECTED ROUTE Z AS THE ROUTE THAT BEST MEETS THE COMMISSIONS CRITERIA, BUT ROUTE Z HAS BEEN MODIFIED AND RENAMED ROUTE Z1. HOW DOES ROUTE Z COMPARE TO ROUTE Z1 ON THE KEY CRITERIA YOU HAVE DISCUSSED ABOVE?

A. Ranking the key criteria with number one being the best rank in each category, the table below shows that there is little difference between Route Z and Z1 and Route Z1 performs better than Route Z based on cost and length.

Table XII – Key Criteria Comparison – Z vs Z1

Criterion	**Route Z**	**Route Z1**
Cost	Rank – 1st $38,330,469	Rank – 2nd $38,174,144
Habitable Structures	Rank – 13th 31	Rank – 11th 31
Length	Rank – 1st 4.58 Miles	Rank – 1st 4.53 Miles
Paralleling	Rank – 15th 69%	Rank – 18th 68%

III. CONCLUSION

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.

A. Based on my review of the Company's Application and supporting documents, I conclude that Routes AA1 and Z1 performed well on all the Key Criteria and did not score so poorly on the other criteria that this would outweigh their good performance on the key criteria. Therefore, I recommend that the Commission select either Route AA1 or Z1 as one of the routes best meeting the Commission's requirements for selecting a line route.

Q. DOES THIS COMPLETE YOUR DIRECT TESTIMONY?

A. Yes.

Appendix A

QUALIFICATIONS AND PROFESSIONAL EXPERIENCE
OF
HAROLD L. HUGHES JR.

Harold L. Hughes Jr. is a Professional Engineer with over 40 years of experience in the energy business. His broad background includes utility regulation and legislation, transmission line design and construction and power plant construction and operations. While with the Public Utility Commission of Texas (PUC), Mr. Hughes served as Manager of the Fuels section, Manager of Engineering, and later as the Director of the Electric Utility Division with responsibility for overseeing all electric utility matters before the PUC. He has served as an expert witness on a broad range of technical topics including Certificate of Convenience and Necessity (CCN) applications, quality of service, fuel audits, depreciation, and system operations. Mr. Hughes has prepared and presented training on numerous utility related topics such as system operations, transmission line routing, and industry history and structure. As a consultant, he has been an active participant in the electric industry restructuring in Texas. He has prepared a general plant allocation study and filed testimonies on behalf of municipal clients regarding proposed increases to the Transmission Cost of Service and Price-to-Beat fuel cases. Mr. Hughes was also active in attending Electric Reliability Council of Texas (ERCOT) meetings and representing clients on the Protocols Revision Subcommittee which handles all requests for changes to the current ERCOT Protocols. Mr. Hughes has prepared expert testimony on behalf of landowners impacted by proposed transmission lines. He is also editor-in-chief of a weekly newsletter to clients which summarizes activities at ERCOT and at the PUC.

EDUCATION

MBA
Corpus Christi State University, Corpus Christi Texas

BS – Civil Engineering
University of Texas at El Paso, El Paso Texas

PROFESSIONAL HISTORY

ReSolved Energy Consulting
(formerly R. J. Covington Consulting)
Consultant

Public Utility Commission of Texas
Director of Electric Division

Saber Refining Company
Staff Engineer

Central Power and Light Company
Transmission Engineer

Brown and Root
Cost Engineer/Estimator

REPRESENTATIVE TRANSMISSION EXPERIENCE

As a Transmission Engineer, designed foundations for structures in problem soils for the Lon C. Hill – STP 345 kV line. Inspected all foundation installations and worked with the contractor to design special foundations and structures to overcome problems in the field so that the project could stay on schedule.

As a Transmission Engineer, worked as an internal consultant to design foundations and structures for lines in problem areas, such as across Nueces Bay and adjacent to Padre Island.

Designed and conducted full scale tests for the first concrete transmission poles used by Central Power and Light. Developed special installation technique with contractor to install poles using air and water jets. Testing and installation techniques led to acceptance by the company for use in coastal areas and their use on Padre Island, Texas.

As a Transmission Engineer, designed numerous 69kV and 138kV lines in Texas. Duties included line design, routing, ordering material, preparing bid documents, and inspecting construction. Worked with contractors, sub-contractors, land men and the affected public to ensure the projects stayed on budget and on schedule.

As an Engineer with the Public Utility Commission of Texas (PUC), reviewed and recommended acceptance or denial of over 50 applications for Certificates of Convenience and Necessity (CCN). Review included determining if the project was needed; reasonability of cost; and probable environment and community impact of the line routing.

As Engineering Manager with the PUC, supervised engineering staff in the review of all aspects of all transmission line CCN applications made in Texas. Reviewed and approved all staff recommendation or testimony concerning transmission line CCNs. All recommendations were accepted and endorsed by the PUC.

As Engineering Manager, led the staff team to revise the PUC's rules pertaining to transmission lines. Led the effort to update and improve the application forms.

As Engineering Manager, wrote and developed booklet entitled "Transmission Line ROW" that was used to educate the Commissioners on why different ROW widths were used by the utilities and how these widths were determined.

As Engineering Manager, developed, wrote and presented numerous papers, seminars and presentations on transmission topics for presentation to PUC staff, Legislative staff and industry groups.

Served as an expert witness for the PUC staff for contested transmission line applications. Testified on need, routing, environmental and community impacts, and costs. The PUC accepted all his recommendations.

Served as project leader to develop the transmission line construction reporting rules and forms that are currently used by the PUC.

As a Consultant, prepared and defended expert testimony for municipal client regarding the projected cost of transmission projects to be included in the rate base.

As a Consultant, prepared expert testimony on behalf of landowners impacted by proposed transmission lines.

Appendix B

LIST OF CCN DOCKETS CONTAINING TESTIMONY OF
Harold L. Hughes Jr.

BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

Docket 7356	Texas Utilities Transmission CCN Scope of Testimony: CCN Evaluation August 1987
Docket 7437	Rio Grande Electric Cooperative Transmission CCN Scope of Testimony: CCN Evaluation November 1987
Docket 7726	Brazos Electric Power Cooperative CCN Scope of Testimony: CCN Analysis March 1988
Docket 9728	Texas New Mexico Power Company Transmission Line CCN Scope of Testimony: CCN Evaluation July 1991
Docket 29684	Application of LCRA Transmission Services Corporation to Amend its Certificate of Convenience and Necessity for a 138 kV Transmission Line in Kendall and Bexar Counties Scope of Testimony: Transmission line route May 2005
Docket 30168	Application of TXU Electric Delivery to Amend a Certificate of Convenience and Necessity for a Proposed Transmission Line in Jack, Wise and Denton Counties Scope of Testimony: Transmission line route March 2005
Docket 31011	Application of TXU Electric Delivery Company to Amend a Certificate of Convenience and Necessity for a Proposed Transmission Line within Dallas, Johnson, Tarrant, and Ellis Counties Scope of Testimony: Transmission line route January 2006

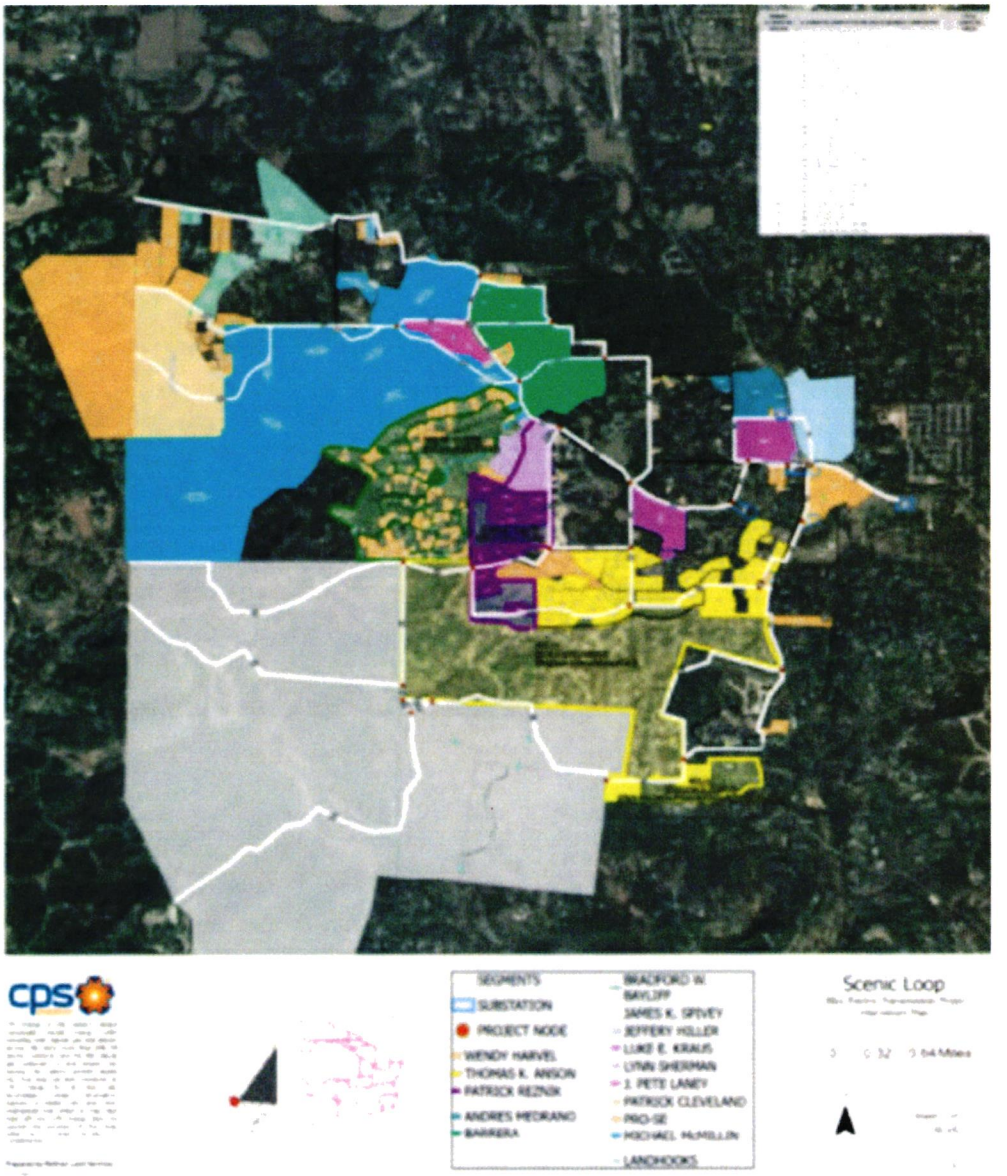
Docket 33800	Application of Brazos Electric Power Cooperative, Inc. for a Certificate of Convenience and Necessity for a Proposed Transmission Line in Johnson and Hood Counties, Texas Scope of Testimony: Transmission line route July 2007
Docket 33844	Application of LCRA Transmission Services Corporation to Amend its Certificate of Convenience and Necessity for a 138 kV Transmission Line in Kerr County Scope of Testimony: Transmission line route August 2007
Docket 33978	Application of LCRA Transmission Services Corporation to Amend its Certificate of Convenience and Necessity for a 345 kV Transmission Line in Caldwell, Guadalupe, Hays Travis and Williamson Counties Scope of Testimony: Transmission line route September 2007
Docket 36995	Application of Oncor Electric Delivery Company, LLC to Amend a Certificate of Convenience and Necessity for a Proposed Transmission Line Within Bell, Falls, Milam, and Robertson Counties Scope of Testimony: Transmission line route November 2009 – Direct testimony December 2009 – Intervenor cross testimony
Docket 37463	Application of Oncor Electric Delivery Company, LLC to Amend its Certificate of Convenience and Necessity for the Newton-Killeen 345 kV CREZ Transmission Line in Bell, Burnet and Lampasas Counties, Texas Scope of Testimony: Transmission line route December 2009 – Direct testimony January 2010 – Cross rebuttal testimony
Docket 36978	Application of Electric Transmission Texas, LLC to Amend a Certificate of Convenience and Necessity to Construct a Proposed Uvalde to Castroville 138 kV Transmission Line in Uvalde and Medina Counties, Texas Scope of Testimony: Transmission line route February 2010

Docket 38230	Application of Lone Star Transmission, LLC for a Certificate of Convenience and Necessity for the Central A to Central C to Sam Switch/Navarro Proposed CREZ Transmission Line Scope of Testimony: Transmission line route August 2010-Direct Testimony and Cross Rebuttal
Docket 38290	Application of Sharyland Utilities, L.P. to Amend its Certificate of Convenience and Necessity for the Proposed Hereford to White Deer 345 kV CREZ Transmission Line in Armstrong, Carson, Deaf Smith, Oldham, Potter, and Randall Counties Texas Scope of Testimony: Transmission line route August 2010 – Direct Testimony September 2010 – Cross Rebuttal
Docket 38324	Application of Oncor Electric Delivery Company, LLC to Amend a Certificate of Convenience and Necessity for the Willow Creek-Hicks 345 kV CREZ Transmission Line in Denton, Parker, Tarrant and Wise Counties, Texas Scope of Testimony: Transmission line route September 2010 – Direct Testimony and Cross Rebuttal
Docket 38354	Application of LCRA Transmission Services Corporation to Amend its Certificate of Convenience and Necessity for the Proposed McCamey D to Kendall to Gillespie 345 kV CREZ Transmission Line in Schleicher, Sutton, Menard, Kimbel, Mason, Gillespie, Kerr, and Kendall Counties Scope of Testimony: Transmission line route September 2010 – Direct Testimony October 2010 – Cross Rebuttal
Docket 38743	Application of Electric Transmission Texas, LLC to Amend its Certificate of Convenience and Necessity for the Tesla to Edith Clarke to Clear Crossing to West Shackelford 345 kV CREZ Transmission Line in Childress, Cottle, Hardeman, Shackelford Counties Scope of Testimony: Intervenor Rebuttal January 2011 – Intervenor Cross Rebuttal

Docket 38877	Application of Southwestern Public Service Company to Amend Certificate of Convenience and Necessity for a Proposes TUCO to Texas/Oklahoma Interconnection 345 kV Transmission Line within Hale, Floyd, Motley, Cottle, Briscoe, Hall, Childress, Donley, Collingworth, and Wheeler Counties Scope of Testimony: Transmission Line Route September 2011 – Direct Testimony November 2011 – Intervenor Cross Rebuttal
Docket 40728	Application of Electric Transmission Texas, LLC to Amend its Certificate of Convenience and Necessity for the Proposed Lobo to Rio Bravo to North Edinburg 345 kV Transmission Line in Webb, Zapata, Jim Hogg, Brooks, Starr, and Hidalgo Counties, Texas Scope of Testimony: Transmission line route January 2013 – Direct Testimony
Docket 41785	Application of South Texas Electric Cooperative, Inc. to Amend its Certificate of Convenience and Necessity for a Proposed 138 kV Transmission Line in LaSalle and McMullen Counties Scope of Testimony: Transmission line route April 2014 – Direct Testimony
Docket 43599	Application of LCRA Transmission Services Corporation to Amend its Certificate of Convenience and Necessity for the Proposed Blumenthal Substation and 138 kV Transmission Line Project in Blanco, Gillespie, and Kendal Counties Scope of Testimony: Transmission line route April 2015 – Direct Testimony
Docket 44060	Application of Brazos Electric Power Cooperative, Inc. to Amend a Certificate of Convenience and Necessity for a 138 kV Transmission Line in Denton County Scope of Testimony: Support underground transmission line May 2015 – Direct Testimony
Docket 43878	Application of Brazos Electric Power Cooperative, Inc. to Amend a Certificate of Convenience and Necessity for a 138 kV Double Circuit Transmission Line in Collin and Denton Counties Scope of Testimony: Transmission line route June 2015 – Direct Testimony

Docket 44547	Application of Centerpoint Energy Houston Electric, LLC to Amend a Certificate of Convenience and Necessity for a Proposed 345 KV Transmission Line within Grimes, Harris, and Waller Counties, Texas Scope of Testimony: Transmission line route July 2015 – Direct Testimony
Docket 45170	Application of Brazos Electric Power Cooperative, Inc. for a Certificate of Convenience and Necessity for a 138 KV Transmission Line in Denton County Scope of Testimony: Transmission line route February 2016 – Direct Testimony
Docket 45866	Application of LCRA Transmission Services Corporation to Amend a Certificate of Convenience and Necessity for the Round Rock-Leander 138 kV Transmission Line in Williamson County Scope of Testimony: Transmission line route September 2016 – Direct Testimony October 2016 – Cross Rebuttal Testimony
Docket 49523	Application of LCRA Transmission Services Corporation to Amend its Certificate of Convenience and Necessity for the Proposed Mountain Home 138 kV Transmission Line in Gillespie, Kerr, and Kimble Counties Scope of Testimony: Transmission line route November 2019 – Direct Testimony

ATTACHMENT I
Intervenor Map



Source: Scenic Loop Substation and Transmission Line Project Webpage, Scenic Loop Intervenors Overall Map (2-11-2021)