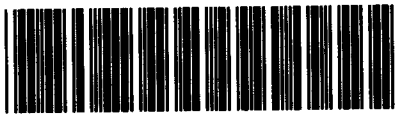

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SOAH NO. 473-11-0072
PUC NO. 38597

APPLICATION OF ONCOR ELECTRIC DELIVERY COMPANY, LLC, TO AMEND ITS CCN FOR THE KRUM WEST TO ANNA 345 KV CREZ TRANSMISSION LINE PROJECT IN COLLIN, COOKE, DENTON, AND GRAYSON COUNTIES, TEXAS	§	PUBLIC UTILITY COMMISSION OF TEXAS

DIRECT TESTIMONY AND EXHIBITS

OF

TOM VAN ZANDT

ON BEHALF OF

O3 RESOURCES, LLC

November 16, 2010

2184

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DIRECT TESTIMONY AND EXHIBITS
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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Tom Van Zandt. My business address is 1504 West 5th Street Austin, TX 78703.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am a Senior Principal of Hicks & Company Environmental Consulting of Austin, Texas

Q. PLEASE DESCRIBE HICKS & COMPANY?

A. Hicks & Company was founded in 1988 by Sandra Hicks and Tom Van Zandt as a consulting firm providing ecological, archeological, and environmental management services to public and private clients in Texas and other Southwestern states. The company has specialized in performing impact assessments under the National Environmental Policy Act (NEPA) and obtaining permits and approvals under federal and state regulatory programs dealing with wetlands, endangered species, cultural resources, socioeconomic impacts, and other environmental issues. From the outset, the firm and its senior professionals have been involved in route selection, impact assessment, and permitting for highways, electric transmission lines and other linear infrastructural projects.

Q. WOULD YOU PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL QUALIFICATIONS?

A. I have a B.A. degree from the University of Texas at Austin, a J.D. degree from the University of Texas School of Law, and a M.Sc. degree in Water Resources Management from the University of Wisconsin—Madison. I have been employed in the field of environmental management for more than 30 years and have written numerous articles, made conference presentations, and taught courses in environmental impact assessment, wetlands regulation, endangered species

protection, and environmental management systems. I am a member of the Texas State Bar and have testified as an expert witness in State District Court litigation and administrative hearings in New Mexico and Texas, including testimony to the Public Utilities Commission.

My resume is attached to this testimony as **Appendix 1**.

Q. HOW HAVE YOU BEEN INVOLVED IN THE PROPOSED TRANSMISSION PROJECT THAT IS THE SUBJECT OF THIS PROCEEDING?

A. I was retained by O3 Resources, LLC, a group formed by a group of affected property owners to review and evaluate Oncor Electric Delivery Company, LLC's (Oncor) Certificate of Convenience and Necessity (CCN) Application and Environmental Assessment and Alternative Route Analysis ("EA") filed in connection with Oncor's application in this docket.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to evaluate the environmental impact analysis and route selection performed by Oncor and its engineering/route selection consultant, Halff and Associates (Halff), and also to make an independent comparative assessment of the environmental suitability of the Preferred Route and Primary Alternative Routes identified by Oncor.

Q. HOW WILL YOU APPROACH THE COMPARISON OF THE PREFERRED AND ALTERNATIVE ROUTES?

A. The first step will be to summarize and evaluate the environmental assessment and route selection process developed by Oncor and Halff based on the requirements of PURA §37.056(c)(4) and P.U.C. SUBSTANTIVE RULE 25.101(b)(3)(B), as well as on my own understanding of the principles and best

practices in the field of environmental impact analysis. Next, I will undertake an independent evaluation of the suitability of the routes both qualitatively and quantitatively. I will qualitatively compare (1) the likely impacts of the Preferred Route, No. 2288, focusing on the environmental implications of the decision to limit the point of crossing of the USACE greenbelt to a single location (Link Z8); with (2) the likely impacts of any one of several northern alternatives that avoid crossing the greenbelt altogether. I will supplement these qualitative judgments with a quantitative analysis using a variable weighting method. This method, which I have used successfully in previous route or alignment selection projects, allows for end-to-end comparison of a representative set of northern and southern alternative routes using the measured units in each of the 35 routing criteria presented by Oncor in its CCN Application and supporting testimony.

Finally, I will present my findings that these analyses consistently support the greater overall environmental suitability of a northern route as compared with the applicant's Preferred Route, which in my opinion is the product of a flawed and irregular routing procedure and substantively fails to qualify, in the words of the PUC's Order of Referral, as "the best alternative", based on the applicant's own documentation in the EA and route selection testimony.

Q. WAS YOUR TESTIMONY PREPARED BY YOU OR BY KNOWLEDGEABLE PERSONS UPON WHOSE EXPERTISE, JUDGMENT AND OPINIONS YOU RELY IN PERFORMING YOUR DUTIES?

A. Yes, it was.

Q. IS THE INFORMATION CONTAINED IN YOUR TESTIMONY AND THE INFORMATION YOU ARE SPONSORING TRUE AND CORRECT TO THE BEST OF YOUR KNOWLEDGE AND BELIEF?

A. Yes, it is.

Q. WHAT IS THE SOURCE OF THE INFORMATION USED TO DEVELOP THIS REPORT?

A. The sources of information for the report are Oncor's CCN Application, supporting testimony, and attachments, including the consultant's route selection study and Environmental Assessment. We also reviewed available maps, aerial photography, cultural resources site information and other on line environmental resource data, and relevant information from the PUC interchange for the West Krum to Anna project. I made a trip to the project area in Collin, Cooke, Denton, and Grayson Counties to make first hand observations, including an overflight of the project study area.

In the course of my work, I also supervised research and analysis of other Hicks & Company staff, including a wildlife biologist, surface water hydrologist, GIS cartographer, archeologist and historian, and reviewed the maps and aerial photographs included with the Oncor application.

Q. IS THIS THE TYPE OF INFORMATION THAT EXPERTS IN THIS FIELD WOULD NORMALLY RELY UPON?

A. Yes.

III. ENVIRONMENTAL ASSESSMENT AND ROUTE SELECTION PROCESS

Q. WHAT ARE THE EVALUATION FACTORS THAT MUST BE CONSIDERED BY THE PUBLIC UTILITY COMMISSION ACCORDING TO P.U.C. SUBST. R. 25.101 AND AS SET FORTH IN PURA §37.056(c) (4)?

A. P.U.C. SUBST. R. 25.101(b)(3)(B) requires Oncor to consider the criteria in PURA §37.056(c), as well as the following factors when selecting a preferred route and alternative routes: 1) whether the routes utilize existing compatible rights-of-way, including the use of vacant positions on existing multiple-circuit transmission lines; 2) whether the routes parallel existing compatible rights-of-

way; 3) whether the routes parallel property lines or other natural or cultural features; and 4) whether the routes conform with the policy of prudent avoidance. "Prudent avoidance" is defined as "[t]he limiting of exposures to electric and magnetic fields that can be avoided with reasonable investments of money and effort". The provisions of PURA 37.056(c)(4) require the PUC to grant a certificate for a transmission line only after considering, among other factors, the following:

- community values;
- recreational and park areas;
- historical and aesthetic values; and
- environmental integrity.

Q. DID YOU REVIEW ONCOR'S ENVIRONMENTAL ASSESSMENT AND SUBSEQUENT TESTIMONY DESCRIBING THE PROCESS FOR SELECTING A PREFERRED ROUTE AND ALTERNATIVE ROUTES?

A. Yes. I reviewed the environmental document prepared by Oncor's environmental and route selection consultant, Halff and Associates, entitled "Environmental Assessment and Alternative Route Analysis for the Proposed Krum West – Anna CREZ 345 kV Transmission Line Project in Collin, Cooke, Denton, and Grayson Counties, Texas". I also reviewed the direct testimony concerning the route selection process by Halff's Project Manager, Russell J. Marusak, Oncor's primary route selection consultant, Charles T. Jasper, and other officials involved in the route selection process.

Q. CAN YOU DESCRIBE THE KEY ELEMENTS OF THAT PROCESS?

A. From the standpoint of environmental impact analysis best practices, the main elements at issue in the Krum West – Anna project are: (1) alternatives analysis, (2) transparency and fairness of the public process, and (3) the 'rational connection' standards of impact assessment.

Q. CAN YOU DESCRIBE THOSE PRINCIPLES OR BEST PRACTICES AS THEY APPLY TO THE ALTERNATIVES ANALYSIS IN THE PRESENT CASE?

A. I provided a somewhat lengthy exposition of some of these practice elements in previous testimony (Riley – Krum West, PUC Docket No. 38140), so I will just recap briefly here to provide a basis for comments on the route selection sequence in the current action. A competent alternatives analysis should:

- Present impacts of alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public.
- Choose an appropriate range and number of alternatives. A range that is too broad (too many alternatives) is unworkable; too narrow a range may render a meaningless result.
- Provide for an iterative process that initially screens out less suitable alternatives and subsequently focuses on one or more rounds of progressively more detailed analysis
- For linear projects, compare alternatives on an end-to-end basis.
- Apply established evaluation criteria consistently across the range of alternative actions under consideration by the decision maker, with equivalent level of detail provided for each alternative including the proposed action.

Q. IS A BONA FIDE ALTERNATIVES ANALYSIS REALLY REQUIRED IN THE CCN APPLICATION PROCESS?

A. I think it is. The statutory and regulatory requirements to consider environmental factors in making a decision have been cited earlier. The environmental criteria in PURA Section 37.056(c) are broad ("community values", "environmental integrity"), and neither the statute nor the substantive rules provide much guidance on how the environmental evaluations are to be carried out. However, it is reasonable to expect that the methods and level of effort applied to the comparative evaluation of environmental considerations affecting route selection

will be reasonably designed and implemented to achieve the goals of the PURA and to "moderate the impact on the affected community and landowners" [§25.101(b)(3)(B)].

Q. IS AN ALTERNATIVES ANALYSIS REQUIRED FOR THE PRESENT ADMINISTRATIVE PROCEEDING?

A. Yes. The PUC's *Order of Referral and Preliminary Order*, dated September 10, 2010, for the present docket (Item 9) states, under "Issues to Be Addressed – Route" (p. 4 of 8): "Which proposed transmission line route is the **best alternative**, weighing the factors set forth in PURA § 37.056(c)(4), excluding 4(E), and P.U.C. SUBST. R. 25.101(b)(3)(B)?" (emphasis added), and "Are there alternative routes or facility configurations that would have a less negative impact on landowners? What would be the incremental cost of those routes?"

Q. CAN YOU SUMMARIZE ONCOR'S ROUTE SELECTION SEQUENCE FOR THE KRUM WEST – ANNA PROJECT?

A. That sequence is described in the Direct Testimony of Mr. Marusak (Docket Item 6) and Mr. Jasper (Docket Item 5), which I paraphrase as follows:

1. Identification of the project study area and constraints mapping.
2. Identification of preliminary route links, which were combined to make 654 preliminary alternative routes. Mr. Marusak states that these preliminary routes are identified in Section 4.0 of the EA.
3. Presentation of preliminary alternative links to the public at four public open house meetings, held in Gainesville, Aubrey, Celina, and Whitesboro, on June 14-17, 2010.
4. As a result of public comments, Halff added 22 new route links and modified 44 existing route links, a procedure described in Section 6.0 of the EA. These modifications resulted in identification of 3,818 preliminary alternative routes.

5. According to Mr. Marusak's testimony (p. 10,11), the Halff project team evaluated the 3,818 alternative routes according to the PUC's statutory and regulatory criteria and described that evaluation in Section 7.0 of the EA. He states: "Section 7.0 of the Environmental Assessment and Routing Study describes in detail the results of the alternative route evaluations and any potential impacts for all the routes".
6. Mr. Marusak concludes: "No significant impact to existing land use, geological, hydrological, or wetland resources and no adverse effects to historic-age or archeological resources are anticipated as a result of the construction of the Proposed Transmission Line Project on any of the 3,818 routes evaluated by Halff."

Q. IS THAT THE FINAL STEP IN THE ALTERNATIVES ANALYSIS?

A. No. As with the connecting Oncor project, Riley – Krum West, the task of reducing the number of alternative routes to be further evaluated and then selecting the Preferred Alternative was handed off to another Oncor consultant, Charles Jasper. (Mr. Jasper is a former colleague of mine many years ago at Espey, Huston & Associates, now PBS&J. I can attest that he is a highly qualified environmental analysis and transmission routing specialist). Mr. Jasper provides an account of the end of the process in his Direct Testimony (Item No. 5) and in his memo dated September 7, 2010, "Preferred Route Recommendation Krum West – Anna 345 kV Transmission Line Project".

Q. HOW WAS THE PREFERRED ROUTE EVENTUALLY IDENTIFIED?

A. Mr. Jasper describes a process of screening the number of alternatives under consideration from 3,818 routes identified as preliminary alternatives in the EA down to 1,584 routes as a result of the elimination of several links late in the route selection process.

Q. WHY WERE THOSE LINKS ELIMINATED?

A. Oncor determined at some point in the process that an existing Oncor 138kV right-of-way through the greenbelt could accommodate the double circuit 345kV CREZ line as well as the under-built 138kV within its existing 100 foot easement. Mr. Jasper notes that a "specialty structure" will be necessary to accomplish the combination of the two electric lines. That structure is shown in the EA as Figure 1-3, "Typical 345kV/138kV Quadruple Circuit H-Frame with Distribution Underbuild". The USACE determined that this right-of-way, the newly denominated Link Z8, which had not been under consideration before, would not require any additional grant of easement and therefore dropped consideration of the other alternative crossings of the greenbelt. According to the EA, p. 4-3, the USACE had prepared an EA under NEPA to evaluate the impacts of four alternative crossings of the greenbelt at points that were much narrower than Z8. Most of these crossing points could easily be spanned, including Link H18, which parallels an existing Brazos Electric 138kV line. The USACE Fort Worth District, Real Estate Division, announced its decision in a letter dated September 3, 2010, stating that the Link Z8 crossing would have the least environmental impact to Federal lands, when compared to the other alternative paths crossing the greenbelt.

Q. WAS THE ADDITION OF LINK Z8 THE ONLY CHANGE TO THE SET OF ALTERNATIVES UNDER CONS?

A. No, the USACE decision resulted in a significant expansion of the project study area to the south, with new alternative links added on either side of the greenbelt, most prominently Links Z1 and Z7 to the west of the greenbelt and O3 and Z9 to the east. The properties along Links Z1, Z7, and O3 went from being outside the study area to being on the Preferred Route in a matter of days. The USACE letter designating Z8 as the single crossing point of the greenbelt was issued on September 3, 2010, and Oncor's CCN Application identifying its Preferred Alternative was filed on September 7, 2010.

Q. WAS THE PUBLIC MADE AWARE OF THESE CHANGES IN ADVANCE?

A. Not that I can determine from the record or from talking with some of the affected property owners. The EA states, at p. 4-3, that at the four open house meetings in June 2010 public was shown the preliminary links as depicted "on the 11x17-inch figures located in Appendix B" of the EA. These figures show the southern boundary of the study area to be about one mile south of Aubrey, or about 2.5 miles *north* of the Preferred Route on Link O3.

Q. HOW WERE THE ALTERNATIVE ROUTES FURTHER EVALUATED?

A. Mr. Jasper's memo of September 7, 2010, states that from the now reduced number of 1,584 alternative routes he selected 96 routes, also called preliminary routes, to be filed with the CCN Application. Of the 96 chosen routes, 45 percent use Link Z8 and 41 percent use Link O3. Mr. Jasper asserts that all 96 routes are fully compliant with PUC's CCN statutory and regulatory criteria. After confirmation of engineering feasibility from Oncor, Mr. Jasper then selected Route 2288 as Oncor's Preferred Route.

Q. DID MR. JASPER EXPLAIN ON WHAT ENVIRONMENTAL BASIS HE WAS ABLE TO REDUCE THE NUMBER OF PRELIMINARY ALTERNATIVES TO 96.

A. No, but it should be recalled that all 3,818 alternative routes were declared in Mr. Marusak's testimony to be fully compliant as well.

Q. WHAT WAS THE ENVIRONMENTAL BASIS FOR MR. JASPER'S SELECTION OF ROUTE 2288 AS THE PREFERRED ALTERNATIVE?

A. He provides a list of bullet points that recap the 35 matrix criteria. Most prominently he notes that the line parallels existing compatible corridors for 79 percent of its length; that it comes within 500 feet of "only" 215 habitable structures, and is among the shortest of all the routes. He notes that the alternative uses an existing transmission line right-of-way to cross the Greenbelt

Corridor, thus does not require an additional crossing of the greenbelt (the source of significant public comments). In his direct testimony, he states that only "a tiny percentage of the route traverses park or recreational areas". In fact, the 8,285 foot crossing of the greenbelt (3 percent of Route 2288's total length) is more than twice the park crossing length as the nearest alternative.

Q. IN LIGHT OF THE ALTERNATIVES ANALYSIS BEST PRACTICES YOU DESCRIBED EARLIER, WHAT COMMENTS WOULD YOU OFFER, FOR EXAMPLE, ABOUT THE SIZE OF THE PRELIMINARY AND PRIMARY SETS OF ALTERNATIVE ROUTES?

A. The initial combination of route links, adding up to 3,818 preliminary route alternatives, is unmanageably large. Just accounting for the quantifications of the 35 routing criteria requires a data set of over 133,000 items (as demonstrated by the enormous Table 7-1 in Appendix C of the EA). This may give the appearance of an exhaustive or comprehensive study, but in fact the compilation represents only a massive data set. Without further procedural refinement, the study is analytically problematic. The intermediate set of 96 alternatives, also called "preliminary route alternatives" in the testimony, is similarly over-sized, with over 3,300 data points to presumably be integrated in the comparative analysis. Without further procedural elaboration, it is poorly adapted to a more intensely focused second iteration that would normally be undertaken in a route selection of this scope.

Q. WHAT ABOUT THE FINDING THAT ALL ALTERNATIVE ROUTES WERE EQUALLY COMPLIANT WITH THE CCN CRITERIA?

A. In my opinion, it highly unlikely that a thorough and detailed assessment would not find some basis for differentiating among potential impacts to 3,818 alternatives. It is interesting that Mr. Marusak distinguishes between *significant* and *adverse* as characterizations or thresholds of degree in assessing environmental impacts. "Significance" is an important standard for EAs and EISs

under the National Environmental Policy Act, which does not apply in state-level CREZ proceedings. Although the discussion in Section 7.0 does addresses differences in type and extent of impacts among alternative links, the Oncor/Halff alternatives analysis process in this proceeding (as with the connecting project to the west, Riley to Krum West, Docket No. 38140) makes no attempt to compare the aggregate impacts of end-to-end routes for the purpose of screening out less worthy alternatives and narrowing the field of primary alternatives to a manageable number. To state that 3,818 out of 3,818 alternatives are essentially equal with respect to their environmental suitability is to render moot the purpose and underlying rationale for performing the alternatives analysis.

Q. YOU ALSO CITED THE IMPORTANCE OF AN EQUITABLE ADMINISTRATIVE PROCESS THAT IS TRANSPARENT TO THE PUBLIC AND FAIR TO ALL AFFECTED PARTIES. HOW IS THIS AN ENVIRONMENTAL ISSUE?

A. Public involvement is an essential element in environmental processes, as set forth in guidelines for NEPA, the European Union, the World Bank, and Texas state agencies, among others, recognizing the value of public input in environmental decision making and the crucial importance of public confidence in the legitimacy of environmental decision making. In the present set of circumstances, it is not clear that a bona fide evaluation of the relative merits of the crossing locations was undertaken, or completed. The EA states that "a NEPA EA was prepared" by the USACE, but other statements elsewhere in the document and in the testimony suggests that the impact analysis was suspended, leaving substantive questions regarding potential environmental impacts unanswered. There are certainly reasons to suspect that the construction and maintenance of the monumental H-frame structures along a crossing that is eight times the length of the shortest alternative crossing; crosses 7791 linear feet of a regionally significant expanse of riparian forest; spans nearly a mile of potential wetlands; lies adjacent to a 483 acre swamp according to TPWD's Texas

Ecological Systems Classification; will utilize structures that may stand as much as 80 feet above the canopy (about 2.5 times the height of the existing 138kV wooden pole structures); will come within 500 feet of at least 215 habitable structures and several communities or concentrated residential areas – that this alternative may not in fact have the least environmental impact, in comparison especially with one of the eliminated alternative routes that parallels a Brazos Electric 138kV at a narrowly vegetated point on the greenbelt (eliminated Link H18). I confirmed by flying over it that this crossing could easily be spanned by monopoles. These are issues of environmental integrity that remain unanswered as a result of the truncated process occasioned by the USACE's decision.

IV. COMPARISON OF SOUTHERN (GREENBELT-CROSSING) ROUTES WITH NORTHERN ROUTES

Q. HOW WOULD YOU COMPARE THE SUITABILITY OF THE SOUTHERN CORRIDOR, INCLUDING THE PREFERRED ROUTE, WITH THE ALTERNATIVE ROUTES THAT PASS TO THE NORTH OF RAY ROBERTS LAKE?

A. In the broadest sense, the choice is between a relatively short, straight route through a more developed and densely populated corridor vs. a longer route through less developed areas that have some ecologically sensitive elements. The classic confrontation between human and natural elements of the environment is complicated in the present case by several atypical circumstances: (1) the higher construction costs normally associated with substantially longer routes are at least partially neutralized by Oncor's decision to use the more expensive monopoles on the southern routes and lattice towers on the northern routes; (2) the environmental trade-offs between south and north corridors are further complicated by the crossing of the greenbelt at a USACE-mandated location on an existing transmission right-of-way which also has ecologically sensitive elements. These factors should be kept in mind in sorting out the relative

suitability of the alternative corridors according to the §37.056(c) criteria. To simplify the discussion I will focus on the standards of environmental integrity and community values.

Q. WHAT ECOLOGICAL CONSIDERATIONS INFLUENCE THE COMPARISON OF THE SOUTHERN AND NORTHERN CORRIDORS?

A. The project area crosses several ecological regions of Texas, including from west to east, the Grand Prairie, Eastern Cross Timbers, and the Blackland Prairie. The broad center of the study area contains habitats associated with the Eastern Cross Timbers, both north and south of Ray Roberts Lake. Figure 1 in Appendix 3 shows some large areas of scattered Post Oak Woodlands north of the lake; to the south is the USACE greenbelt, which broadens as it moves south toward Lewisville Lake and contains a very large expanse of bottomland habitat classified by TPWD Texas Ecological Systems (TES) Project, Phase 1, as floodplain hardwood forest with an adjacent 483 acre swamp.

Q. HAS THE TEXAS PARKS AND WILDLIFE DEPARTMENT PROVIDED COMMENT ON THE PREFERRED ROUTE?

A. TPWD in its letter of November 1, 2010, to the PUC, finds Oncor's Preferred Route 2288 to be "relatively acceptable" based upon information presented by the Applicant, particularly the data provided by Mr. Jasper in Table 2 of his September 7, 2010, memorandum identifying the 96 preliminary alternative routes (Attachment 4 to Oncor's CCN Application). TPWD also noted the presence of remnant Eastern Cross Timbers upland woodlands north of Ray Roberts Lake, which would be impacted in varying degrees by the northern route alternatives.

Q. WHAT SPECIFIC FINDINGS DOES TPWD MAKE IN SUPPORT OF THIS OPINION?

A. TPWD notes, among other facts derived from the Oncor Table 2 data, that Route 2288 ranks second for the least amount of riparian woodlands crossed, accounting for two percent of its length. Table 2 indicates that Route 2288 crosses 5,298 linear feet of riparian woodland, which is 1.96 percent of the total length of the route. However, the crossing of the USACE greenbelt along Link Z8 alone is shown to be 8,285 linear feet in Oncor's Table 7-1 (compilation of link data). A calculation performed by Hicks & Company's GIS department measured the crossing by Link Z8 of TES-classified floodplain hardwood forest through the greenbelt at 7,791 linear feet. Oncor's Table 7-1 shows *zero feet* of riparian woodland crossing for Link Z8. However, Table 7-1 does indicate that Link Z8 crosses 9,373 linear feet of *rangeland pasture*.

Q. IS THIS DATA CORRECT?

A. No, given our GIS calculation of the crossing length of TES-classified floodplain hardwood forest, illustrated on Figure 1 of Appendix 3, and my own visual inspection of this crossing from the air, the data cannot possibly be correct.

Q. HOW MIGHT THIS MISCALCULATION AFFECT TPWD'S FINDING REGARDING THE ACCEPTABILITY OF THE PREFERRED ROUTE?

A. The TPWD letter lists 10 bullet points in support of its acceptance of the Preferred Route, one of which notes the route's crossing of 7,951 feet of potential wetlands, which is not really supportive as it is among the highest of any of the 96 preliminary alternatives (5,167 feet of this total occurs along Link Z8 within the greenbelt). The mistaking of riparian woodlands crossed for rangeland pasture crossed affects not only the route's second-best ranking for riparian woodlands, it affects the high evaluation given for cropland/hay meadow/rangeland pasture. Thus two of the most ecologically significant remaining nine supportive bullet points appear to be based on erroneous data.

Q. WHAT OTHER INFORMATION DID TPWD RELY ON TO REACH THEIR DETERMINATION?

A. The November 1, 2010, letter states,

> Although TPWD prefers that this federally-owned, state-managed recreational area be avoided, TPWD does not consider it practical to route the line north of Ray Roberts Lake in order to avoid crossing the Greenbelt. This is based on the costs and environmental impacts presented in the EA. The Preferred Route would require 618 acres of ROW, whereas the routes north of Lake Ray Roberts would require from 841 to 1,165 acres.

Oncor has determined that, due to the more densely populated nature of the southern corridor, monopoles would be used for the Preferred Route and other alternatives that are required to cross the greenbelt, while the cost estimates for the northern alternative routes assumed steel lattice construction. As a result, the cost differential is minor. In the case of near north Route 1863, for example, the cost is about $2.5 million less than the Preferred Route, according to cost information provided in Attachment 3 of Oncor's CCN Application. Using acres of right-of-way as a proxy for environmental impact, Route 1863 would require about 882 acres of right-of-way, or 263 acres more than the Preferred Route.

Q. GIVEN THIS INFORMATION, MIGHT TPWD RECONSIDER ITS OPINION ABOUT THE PRACTICALITY OF ROUTING THE LINE NORTH OF RAY ROBERTS LAKE?

A. TPWD has made it clear in the past that non-ecological factors do not enter into the agency's review of projects, including costs and effects on habitable structures. Leaving cost aside, and assuming that TPWD is able to rely on correct information regarding the extent of riparian woodland vs. rangeland pasture through the bottomland habitat of the greenbelt, it is possible that they might reach a different conclusion regarding the competing habitat values and wildlife protection issues associated with the northern and southern alternatives TPWD

mentions the potential impact on resident and migratory birds, including large waterfowl, of placing more conductors at a greater height in close proximity to the upper reaches of Lewisville Lake, and in fact in the midst of one of the largest expanses of wetlands and swamp, not just in the project area but in the four-county region north of Dallas-Fort Worth. Figure 1 in Appendix 3 provides a more regional picture of the vegetation types of concern in the present case – upland forest (primarily Post Oak Woodland in this area), floodplain forest, and areas classified by the TES as swamp. The southern end of the USACE greenbelt contains one of the largest, if not the largest, contiguous areas of floodplain woodland and associated swamp in the region.

Q. HOW SHOULD POTENTIAL IMPACTS ON MIGRATORY BIRDS AND WATERFOWL BE ACCOUNTED FOR IN THIS DECISION?

A. Without minimizing the potential fragmentation effects of the northern alternatives on remnant areas of Eastern Cross Timbers upland woodlands, I think a balanced view of long term effects on environmental integrity should give more attention to an avoidance alternative with respect to protection of migratory birds and waterfowl. Even with no additional clearing of the riparian greenbelt just north of Lake Lewisville, this area, by virtue of its proximity to the upper reaches of the lake, can be expected to attract more waterfowl, herons, egrets, and other wetland dependent wildlife than the riparian corridors north of Ray Roberts Lake. Because of the length of the right-of-way crossing across the greenbelt, a larger transmission line would create more risk for bird collisions and other flight interactions than the existing smaller line because the towers would be wider and taller and thus affect more flight space. If additional right-of-way and associated timber clearing is required to construct the larger 345 kV towers across the greenbelt, the impacts to the riparian corridor within the greenbelt would likely be more adverse due to its overall length.

Q. DOESN'T TPWD ADDRESSES THIS PROBLEM BY RECOMMENDING LINE MARKING WITH BIRD FLIGHT DIVERTERS TO MINIMIZE BIRD COLLISIONS?

A. Yes, that is the standard procedure for post-route selection, pre-construction mitigation. I am not a wildlife biologist, but I am aware that many avian specialists are increasingly skeptical, in the face of continuing research on the subject, of the success of flight diverters and other physical protective measures. For example, recent research published in the journal *Biological Conservation* has determined that large birds, like cranes, bustards, and storks, cannot see obstacles straight ahead when they tilt their heads downwards in flight. Birds often look down to spot other birds or nesting and feeding areas. The evidence suggests that that the problem cannot be prevented by altering the appearance of power lines.[1] This suggests that more consideration be given to an avoidance alternative, which in this case would involve selecting a different route alternative.

Q. HASN'T ONCOR ASSERTED THAT THE CONSTRUCTION AND LONG TERM MAINTENANCE OF THE LINE WITHIN THE EXISTING RIGHT-OF-WAY WILL NOT AFFECT ADJACENT VEGETATION, HABITAT OR WILDLIFE?

A. They have, with the result that the impacts have in many cases been quantified as zero. Given the scale and non-standard construction and operational requirements associated with the quad-circuit H-frame structures to be used in the greenbelt crossing, it seems to me that the burden should be placed on Oncor to demonstrate more fully that its zero impacts assumptions are justified. The unusual and accelerated process that led to the currently proposed Preferred Alternative has not allowed that to occur, and as a result uncertainties remain about the long term environmental effects of the proposed project. This regionally significant area of the southern greenbelt, with its extended and largely unfragmented habitats

[1] Martin, G.R., Shaw, J.M. Bird Collisions with power lines: Failing to see the way ahead? Biol. Conserv. (2010) doi:10.1016/j.biocon.2010.07.014

combining floodplain woodlands, wetlands, and swamp land, provides an abundance of food and shelter to wildlife. Given the uncertainties about the long term impacts of the proposed project, an avoidance solution would seem advisable, in my opinion, to ensure the environmental integrity of the resource.

Q. DOES TPWD RULE OUT ROUTES TO THE NORTH OF RAY ROBERTS LAKE?

A. No. They indicate that although they prefer a southern alternative, near north Routes 42, 576, 1866, and 2181 would be acceptable with appropriate efforts to minimize adverse effects.

Q. IN YOUR OPINION, HOW WOULD THE PREFERRED ALTERNATIVE AFFECT COMMUNITY VALUES?

A. As I mentioned earlier, the essential decision in this case turns on the choice between a short, relatively straight alignment affecting a more densely populated corridor with diverse land uses and cohesive enclaves and communities, vs. a longer (but not costlier) alignment affecting fewer people and resulting in fewer community impacts. The habitable structures tally begins to illustrate the point: at least 215 habitable structures within 500 feet of the Preferred Route, vs. 71 habitable structures within 500 feet of near north Route 1863, or 88, 80, or 81 habitable structures for very similar Routes 1865, 1866, and 42, respectively.

Q. SHOULD THE ASSESSMENT OF COMMUNITY VALUES EFFECTS BE LIMITED TO COUNTING HABITABLE STRUCTURES AFFECTED?

A. Not at all. I think habitable structures effects is more of a diagnostic indicator of community values effects, rather than a determinant. In the present proposal, the Applicant's Preferred Route and other south alternatives would pass through or border the cities or towns of Denton, Crossroads, Krugerville, Aubrey, Parvin, Prosper, and Frisco, according to Figures 3-1A and 3-1B in Halff's EA. The area, particularly in the US 377 corridor south of Aubrey, is experiencing its share of

the continued steady urban and suburban growth outwards from Dallas along the I-35 and US 377/ US 380 corridors. The Aubrey area in particular has seen the growth of a small but vital sub-economy based on horse breeding and sales, a development that could be significantly hampered by the effects of the proposed project in the Link O3 area. Other successful stock breeding operations have developed in the Aubrey area, such as the properties along Blackjack Road, that would be aesthetically and operationally damaged if one of the Link H2 routes were selected.

Q. WOULD THE PREFERRED ROUTE ADVERSELY AFFECT EXISTING NEIGHBORHOODS?

A. Yes. As the new Link Z1 moves southeast through suburban Denton along Loop 288 it will pass very close to a community off Kings Row, apparently passing directly over some homes along Deerfield Drive and just south of the Lifegate Church and Hodge Elementary School. The line will pass between a group of homes around Copper Creek Road, cross US 377 and then turn to the north east on Link Z7. After crossing US 377 again, Link Z7 will continue to the northeast into an older lower- to middle-income neighborhood along North Trinity Road and Riverside Drive, parts of which back up to the western border of the greenbelt. About 30-40 habitable structures are shown within 500 feet of the transmission centerline in this neighborhood.

Q. ARE THERE SIMILARLY AFFECTED NEIGHBORHOODS EAST OF THE GREENBELT?

A. Yes. As Link Z8 exits the greenbelt on the east side it crosses through some middle- to upper-income neighborhoods along Rockhill Road, including the Harmony Ranch community.

Q. AREN'T THESE NEIGHBORHOODS TO THE WEST AND THE EAST OF THE GREENBELT ALREADY AFFECTED BY THE EXISTING ONCOR 138KV LINE?

A. To describe the present Oncor line as an existing compatible right-of-way is misleading in the extreme. The existing H-frame wooden structures are about 60 feet high and 35 feet wide and are visually unobtrusive. According to one local resident they have existed since the 1920s. The proposed structures will be 2-2.5 times the height of the present structures and will fill the 100 foot-wide right-of-way, at the least. The scale of the structures will dominate the landscape in the quiet, spread out communities at the edges of the greenbelt.

Q. WHERE DOES THE PREFERRED ROUTE 2288 LEAVE THE EXISTING ONCOR 138KV LINE?

A. The point at which the Preferred Route turns due east marks the beginning of Link O3. The link bisects a working horse farm owned by Steve and Mauri Chase, then turns south along New Hope Road, affecting a neighboring horse breeding and training operation owned by Ann and Bob Gattuso.

Q. ARE THESE HORSE RANCHES SERIOUS BUSINESS ENTITIES?

A. Yes. As I noted earlier, breeding raising, and training has developed into a specialized economy in this area, and has contributed to a shared identity and cohesion among neighbors in this area that certainly meets the definition of "community values" that has been frequently used in CCN proceedings: "...a shared appreciation of an area or other natural or human resources by members of a national, regional, or local community." These properties and others in the Krugerville-Aubrey area are economically viable horse raising businesses; the area has become known as a center for raising high quality horses. The Chase operation regularly sells to buyers from Egypt and the Middle East. These businesses are likely to be seriously damaged economically, aesthetically and operationally by the proposed placement of the Preferred Route. Further east, as

Link O3 crosses US 377, the proposed transmission line would pass very close to the Covenant Church on Liberty Road. The Church has recently completed construction of a new school.

Q. HOW WOULD THESE COMMUNITY EFFECTS COMPARE WITH THOSE LIKELY TO OCCUR IF ONE OF THE NORTH ROUTES WERE SELECTED?

A. A 345kV transmission line project will inevitably have unwanted effects, usually visual and aesthetic, on property owners and residents. The lattice towers of the near north alternatives would pass through a less developed rural landscape with substantially fewer direct or indirect impacts on individuals, by way of affected habitable structures, or identifiable communities or neighborhoods. The routes move north out of the Krum West substation passing well to the west of Valley View and then turn east to run along the corridor made up of Links F1 through F7, passing south of the impoundment at Kiowa Lake, with a detour around a developing area along Link F5. This corridor passes well to the south of Collinsville, and then some of the routes would turn south and affect a number of residences along Block Road, to the west of Bridges Golf Club. Route 1863 would avoid many of these houses by skirting Bridges Golf Club to the north, but would require cutting across the southeast corner of the Club property.

Q. CAN YOU SUMMARIZE YOUR OVERVIEW OF POTENTIAL EFFECTS OF THE SOUTHERN VS. THE NORTHERN ROUTES?

A. Yes. My qualitative assessment attempted to balance the major PURA §37.0569(c) criteria, especially community values and environmental integrity. My opinion is that the more densely populated southern corridor is at greater risk socioeconomically and ecologically than the northern routes and should be avoided.

It should be recalled that the Applicant's Preferred Route is a late entry in the Oncor route selection process. It is centered on a greenbelt crossing location that

was not evaluated in detail, or was evaluated in a NEPA process that was suspended and not released to the public. Yet the effect on the overall Oncor EA/route selection process was dramatic: 44 percent of the alternative routes recommended for consideration use this Z8 crossing location, and 41 percent use Link O3 to connect to the Anna substation. The balancing of potential impacts on the human environment seems to clearly favor avoidance of the more densely populated communities in the southern corridor, while the ecological evidence raises environmental integrity concerns for both the southern and northern options. Questions have been raised about the engineering feasibility of building and maintaining the preferred under-built transmission line option within the existing right-of-way without adverse impacts to adjacent sensitive habitats and water resources. Since the goal of the PUC process is select "the best" alternative route, it seemed to me that it would be useful to develop an analysis that could more transparently integrate and balance the multiple CCN criteria, an analysis that would rely on explicit rather than assumed weighting values.

V. VARIABLE WEIGHTING ANALYSIS

Q. HAVE YOU PERFORMED SUCH AN ANALYSIS?

A. Yes.

Q. WHY DO YOU THINK A WEIGHTING PROCEDURE IS APPROPRIATE IN THE PRESENT CASE?

A. In a complex alternatives analysis like this one, you need to have a systematic way to balance competing factors, decide which are more or less important under the broad mandate of PURA §37.056(c), and then apply those factors consistently. The value of weighting systems has been affirmed in many circumstances, especially involving linear projects like highways or transmission lines.

Q. HOW DID YOU ARRIVE AT THE CRITERIA WEIGHTS IN YOUR ANALYSIS?

A. To get a better understanding of how the routing criteria were applied, I used a variable weighting procedure to compare the 14 representative route alternatives selected for analysis

Q. HAVE YOU USED THIS ROUTE SELECTION PROCEDURE PREVIOUSLY?

A. Yes, the process is similar to the one I have used successfully in the past for EIS-level selection of new location highway alignments. I have also used the technique to evaluate alternative transmission line routes in a recent CREZ project.

Q. CAN YOU BRIEFLY SUMMARIZE THE VARIABLE WEIGHTING PROCESS?

A. Yes. The basic steps are as follows, with reference to tables provided in Appendix 2 of this testimony:

1. Select a group of alternative routes, including the Preferred Route 2288, that are representative of the southern ("Z8") routes (including the O3 and Z9/H2 branches east of the greenbelt) and the north alternatives, which are divided into "near north" (north of Ray Roberts Lake and south of Kiowa Lake), "north" (immediately north of Kiowa Lake) and "far north" (further north into Gainesville and Whitesboro areas) options.
2. Rank these 14 representative alternatives according to the 35 CCN criteria (Table 1).
3. For each alternative route, assign quartile values in each criterion according to rank (1^{st} quartile = 4; 4^{th} quartile = 1 (Table 1).
4. Group the 35 routing criteria by eight major categories; determine average quartile values for each route for each category (Table 2).
5. Identify variable weighting scenarios (Cases I – III) (Table 3).
6. Apply variable weights to average quartile values in major categories and determine composite weighted score for each route alternative (Table 4).

7. Rank routes by weighted scores (Table 5).

8. Summary: side-by-side comparison of ranked alternative routes in the three weighting scenarios (Table 7).

Q. HOW DOES THE ANALYSIS DEAL WITH THE ISSUE OF SUBJECTIVITY IN APPLYING WEIGHTS?

A. The weighting of selection criteria can be subject to criticism, as a form of bias. In maintaining credibility in a public route selection process, an essential element is disclosure, of both the weights and the methods by which they were established. Weighting is often accomplished by a collaborative judgment process, with route selection or environmental experts representing different disciplines collectively deciding on weights to be applied.

Q. HOW DOES VARIABLE WEIGHTING DIFFER FROM COLLABORATIVE JUDGMENT, COMMUNITY SURVEY, OR OTHER APPROACHES?

A. To avoid subjectivity, my approach was to represent possibly different points of view by creating three different weighting scenarios, or cases. Each of the cases represents a reasonable distribution of weights reflecting different perspectives on what is important in determining transmission line routes. The three cases are:

I. Transmission Service Provider/PUC Precedent -- Strong emphasis (66 percent) given to cost, paralleling existing compatible rights-of-way, and habitable structures.

II. Balance of §37.056(c) factors -- More parity given to ecological, community, and cultural resources considerations

III. TPWD priorities – Weight given only to ecological factors, parks and recreation, and existing compatible rights-of-way (interpreted by TPWD as avoiding "new" right-of-way).

The weights for each case are shown as percentages in Appendix 2, Table 3.

Q. IN GROUPING THE CRITERIA, WHY WAS TOTAL LENGTH OF THE ALTERNATIVE ROUTES NOT INCLUDED?

A. Normally total length serves as a proxy for cost, an important issue to the PUC and the public in CCN decisions. The present case is unusual in that the Applicant has committed to use the more expensive monopole construction for the southern routes, acknowledging the greater interaction with a more densely populated area, but would use lattice towers should the project be shifted to the more northern corridors. Thus the cost advantage ordinarily associated with shorter routes is neutralized in this case, and to include total length as one of the weighting factors would in effect double count that element of the analysis.

Another consideration in deciding whether to include total length is the use of that factor by TPWD in evaluating the extent to which a route alternative uses "new" right-of-way, i.e., habitat areas previously unaffected by development. TPWD has already integrated that factor into its analysis, as indicated in its November 1, 2010, letter, through its consideration of use or paralleling of existing compatible corridors. Because the unusual circumstances of the Krum West – Anna project make consideration of more lengthy alternative routes worthy of serious consideration, I determined that the fairest and most objective framework for the weighted analysis would include the criterion of cost rather than total length.

Q. WHAT WAS THE BASIS FOR SELECTING THE 14 ROUTES TO BE WEIGHTED AND ANALYZED?

A. The Routes were chosen for the Weighted Analysis for the reasons given below:

123 – Follows the far north route, north of Kiowa Lake utilizing Link W4 (Far North)

141 – Has the most compatible right-of-way (Far North)

1863 – Has the fewest habitable structures (Near North)

1865 – Follows the route north of lake Ray Roberts and south of Kiowa Lake (Near North)

1886 – Follows the north route, north of Kiowa Lake (North)

2153 – Has the most ROW following transmission lines (Far North)

2202 – Has the shortest distance across wetlands (Near North)

2288 – Preferred Route by Oncor utilizing Z8-03 (South)

2317 – Has the shortest length across riparian woodlands (South)

2317A – Modification of 2317 to use unutilized H3-J (South)

2317B – Modification of 2317 to use unutilized H3-I11-I12 (South)

2320 – Route utilizing Z9 then H2 (South)

2328 – Route utilizing Z9 then H2 (South)

3476 – Has the shortest length across archeological high probability areas (South)

28-03

Q. HOW ARE THE WEIGHTS IN EACH CASE APPLIED TO THE ROUTE SELECTION CRITERIA?

A. To reduce the complexity of the process and neutralize potential bias resulting from the varying number of criteria addressing similar topics, I grouped the 35 criteria into eight logical categories, shown in Appendix 2, Table 2. Using a process that grouped route rankings into quartile values (i.e, routes ranked 1-4 received a first quartile value of 4; second quartile is valued at 3, and so on), the weights associated with Case I were applied to the category values for each route alternative, and a composite score was obtained. That process was then repeated for Cases II and III (Appendix Table 4). Based on these composite scores, the 14 Route Alternatives can then be ranked in each of the variable weight cases, with the results shown in Appendix 2, Table 5. The same rankings are presented for side-by-side comparison in Appendix 2, Table 7, also shown below:

***Table 7 Alternative Routes Ranked by Variable Weighting Scenarios**

Rank	I. TSP Presentation	II. §37.056 (c) Balance	III. TPWD Priorities
1	1863	1863	3476
2	2288	2288	2288
3	1865	1865	2328
4	123	123	2320
5	1886	3476	2317B
6	3476	1886	123

*Table 7 Alternative Routes Ranked by Variable Weighting Scenarios			
Rank	I. TSP Presentation	II. §37.056 (c) Balance	III. TPWD Priorities
7	2202	2202	1863
8	2153	2153	2317
9	2328	2328	141
10	141	141	2153
11	2317B	2317B	2202
12	2317	2320	1886
13	2317A	2317A	2317A
14	2320	2317	1865

Q. WHAT OBSERVATIONS CAN BE DRAWN FROM THE RESULTS OF THE VARIABLE WEIGHTING EXERCISE SHOWN ABOVE?

A. Table 7 indicates that a near north route (1863) ranks first in two of the three weighting scenarios. Near north routes occupy two of the top three ranks in two of the three weighting scenarios.

Q. HOW DO THE PREFERRED AND OTHER ROUTE ALTERNATIVES PERFORM UNDER THE VARIOUS WEIGHTING CASES?

A. Preferred Route 2288 ranks 2nd in the TSP scenario, which emphasizes cost, proximity to habitable structures, and paralleling existing compatible rights-of-way. Route 2288 places second to Route 3476, another southern (Z8-O3) route, in the TPWD scenario. As expected, the southern (Z8) routes perform well in the the TPWD scenario because habitable structures are weighted at zero percent. Further observations follow in this testimony.

The Table suggests that Route 1863 is preferable under two of three weighting scenarios. Route 1863 is very similar to other near north routes including 41, 42, 1865 and 1866.

VI. CONCLUSIONS AND RECOMMENDATIONS

Q. CAN YOU SUMMARIZE YOUR FINDINGS FROM THE RESEARCH AND ANALYSIS DESCRIBED IN THE FOREGOING TESTIMONY?

A. Yes. My review of Oncor's EA/Route Selection effort was divided into three main parts: First, an analysis of the CCN Application, the EA document, and accompanying testimony of Oncor and Halff personnel who sponsored the documents and were responsible for implementation of the routing process. Second, a substantive evaluation of the relative suitability of several routes that I judged to be representative of the fundamental decision before the decision maker in this matter: whether to support Oncor's Preferred Route, with its predetermined and under-evaluated greenbelt crossing location, or to recommend instead one of the less environmentally damaging alternatives to the north of Ray Roberts Lake. And finally, a quantitative side-by-side, end-to-end comparison of these representative routes, based on a variable weighting method, as an attempt to verify the foregoing qualitative but still compelling findings of suitability.

Q. CAN YOU SUMMARIZE YOUR ASSESSMENT OF THE EA/ROUTE SELECTION DOCUMENTS AND THE PROCESS THAT THEY DESCRIBE?

A. Yes. My assessment was based on the standards set forth in the PURA and PUC's substantive rules as well as on my knowledge and experience of commonly employed and accepted practices in the field of environmental impact analysis. To state it simply, the EA/route selection documents for the Krum West – Anna project were incomplete. This has generally been my observation in all the CREZ administrative processes that I have reviewed and is symptomatic of the unrealistic time frames imposed on these processes. Some applicants and route selection consultants do a better job than others under these circumstances, but in all cases the procedures, if not the substantive recommendations, have been found to be acceptable by the PUC. As I discussed in more detail earlier, the issues that concerned me in the present case were threefold:

(1) an alternatives analysis that failed to present impacts of end-to-end routes in comparative form in a way that would permit the decision maker and the public to discriminate among a massive number of route options, which were reduced from 3,818 to 1,584 to 96 to 1 on the basis of conclusory assurances that all routes met the statutory and regulatory criteria.

(2) an administrative and public process that was unusual and, in my opinion, less than fair to a large group of property owners who stand to be significantly damaged thereby. The due process and other legal issues surrounding these proceedings are not within my purview, but the substantive result is an environmental issue of concern, namely, the selection of an alternative route of uncertain environmental consequences, one that was not assessed even to the same level of detail as the other alternatives, a deficiency masked by the officially accepted assumption that the technical engineering solution embodied in the Z8 H-frame underbuild can be accomplished with zero adverse impacts to the environment.

(3) An impact analysis that fails to disclose the rational connection between facts cited and conclusions made. This tenuous linkage is not sufficient to establish a substantial evidentiary basis for the requested approval of Route 2288 as the Preferred Alternative.

Q. WHAT ARE YOUR FINDINGS REGARDING THE RELATIVE SUITABILITY OF THE SOUTHERN AND NORTHERN ROUTES YOU ANALYZED?

A. After looking at the environmental data presented in the EA, consulting other sources of information and other environmental professionals who I routinely rely on, and conducting a field inspection that included an overflight of all route alternatives within the study area, I concluded that the balance of environmental criteria favor a near northern route, such as Routes 1863, 1865, 41, or some of the

routes deemed acceptable by TPWD like 42, 1866, and 2181. I fully appreciate the difficulty of avoiding or minimizing adverse impacts in such a highly constrained study area, but the combination of community, ecological, and park-related factors associated with the Z8 option (leaving aside its awkward last-minute appearance) would seem to weigh against any alternative that crosses the USACE greenbelt. The greater length and potentially greater cost of the northern routes was also of concern, both economically and environmentally, and the position taken by TPWD supporting Oncor's Preferred Route had to be given serious consideration, as always. Those uncertainties motivated me to undertake an additional quantitative analysis that would test my qualitative judgment against other weighting preferences.

Q. THAT ADDITIONAL QUANTITATIVE COMPARISON TOOK THE FORM OF THE VARIABLE WEIGHTING ANALYSIS. HOW DID THE RESULTS OF THAT ANALYSIS COMPARE WITH YOUR MORE QUALITATIVE COMPARISON?

A. As I noted earlier, Oncor's Z8 solution (Preferred Route 2288) had much to recommend it on its face, primarily its much shorter length and the its "pre-approved" status with the USACE. However, there remain uncertain aspects of the Z8 crossing, from both environmental and engineering perspectives, that required us to accept all environmental and cost data provided by Oncor at face value, which considerably handicapped the comparison for any of the northern alternatives. I felt if any of the northern routes proved at least comparable to the Preferred Route in any of the weighting scenarios, it would justify a recommendation to avoid the greenbelt and go north.

Q. IN THAT LIGHT, WHAT DID THE WEIGHTING ANALYSIS CONTRIBUTE?

A. The analysis showed that a near-north alternative (Route 1863) ranked number one – above the Preferred Route – in two of the three weighting scenarios: the

Transmission Service Provider Presentation scenario, which reflects the TSPs' heavy emphasis in previous CREZ projects on cost, proximity to habitable structures, and paralleling existing compatible rights-of-way, especially transmission lines; and the §37.056(c) Balance scenario, which more evenly spreads the weight among the three TSP criteria and the ecological, parks, and cultural resources criteria. As expected, the near north alternatives did not perform as well in the TPWD scenario, which weights proximity to habitable structures at zero percent, heavily weighted the crossings of upland Post Oak Woodlands north of Ray Roberts Lake and, as mentioned, accepts the face value scoring of zero for the 7791 linear foot crossing of riparian woodlands through the greenbelt (based on GIS measurement of the route over Texas Ecosystem Classification Phase One mapping of Floodplain Hardwood Forest). TPWD did count, however, Z8's 5,167 linear foot crossing of potential wetlands, by far the highest number for any individual link in the project study area. Given these outcomes, I believe the weighting analysis provides ample verification of the overall suitability findings to justify a recommendation.

Q. WHAT IS YOUR RECOMMENDATION REGARDING A PREFERRED ROUTE FOR THE KRUM WEST – ANNA PROJECT?

A. I would recommend that the PUC decline to confirm Oncor's Preferred Route 2288 or any other southern route using Link Z8 to cross the USACE greenbelt and instead identify as the Preferred Route one of the near north alternatives discussed above, in roughly the following order of priority: 1863, 1865, 41, and some of the routes deemed acceptable by TPWD, like 42, 1866, and 2181.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?

A. Yes it does.

Appendix I – Resume of Tom Van Zandt

THOMAS VAN ZANDT
Principal/Environmental Management

HICKS COMPANY
ENVIRONMENTAL
ARCHEOLOGICAL
AND PLANNING
CONSULTANTS

EDUCATION
B A , Government, History, University of Texas at Austin, 1966

J D , University of Texas Law School, 1970

M Sc , Water Resources Management, University of Wisconsin, 1974

PROFESSIONAL MEMBERSHIPS; CONTINUING EDUCATION
State Bar of Texas, 1973 - present

American Bar Association, 1980 – present

Land Use Forecasting Resource Group, Member Advisory Committee, Austin Transportation Study, November 1984

American Institute of Comprehensive Planners Seminar on Affordable Housing February 1986 Miami, Florida

Government Institutes, Inc Environmental Law Compliance Course November 1986 Washington, D C

Texas A&M University - Engineering Extension. Inland Oil Spill Control Short Course April 1988 Galveston, Texas.

Texas Bar Association/Continuing Legal Education – NEPA, Section 404, ESA, other environmental conferences 1986 - present

Texas Water Development Board - Water for Texas October, 1988

Wetlands Delineation course, Wetlands Training Institute Houston, Texas. February 1991

NEPA/Section 4(f) Applied to Transportation Projects Project Development and Environmental Documentation Short course, Las Vegas, Nevada, 1998

Environmental Management Systems ISO 14001 Training ABS, New Orleans, 2002

Environmental Management Systems Training Texas Commission on Environmental Quality, Austin, Texas, 2003

The Instructor Development Course. John M Campbell & Company, Norman, OK, March 2007

FIELDS OF EXPERIENCE

Mr Van Zandt's professional experience is principally in the fields of environmental management and compliance, water resources, and law For the past decade, his practice has focused on NEPA and environmental management of transportation infrastructure, water resources development, and community impact assessment

During law school, Mr Van Zandt worked on the Texas Water Code codification project of the Texas Legislative Council

As Legal Adviser to the Ministry of Public Works and Water Resources in Ethiopia, Mr Van Zandt was principally concerned with the drafting of legislation concerning the registration of building professionals and water resource development Other responsibilities involved public works contract negotiation

Mr. Van Zandt participated in a research project for the University of Wisconsin dealing with water and land use patterns related to Colorado oil shale development.

As a researcher for the Smithsonian Center for Natural Areas, Mr Van Zandt investigated critical environmental area programs in the 50 states, under contract to the U.S Department of Interior His principal responsibilities concerned an evaluation of policies and administrative and technical methods used by state and local governments for the identification and management of critical environmental areas

While with the University of Wisconsin, Mr Van Zandt helped develop the Wisconsin Heritage Areas Program, of which he became the first Program Director The program was created to inventory the State's valuable cultural and natural resources and, through a variety of public participation techniques, enhance citizen awareness of resource values.

While with Espey, Huston & Associates, Inc , Mr Van Zandt managed or participated in projects dealing with deepwater port development, oil and gas production, flood control, reservoir development, hazardous waste management, and surface mining, with emphasis on the regulatory constraints associated with these activities He has also conducted investigations of community impact management alternatives for the State of Texas and has conducted environmental audits and regulatory seminars for the oil and gas and other industries

Mr Van Zandt has assisted clients in regulatory matters and provided expert testimony in regulatory hearings and trials He has done right-of-way and easement acquisition work for MUDs, river authorities, and other entities. He has managed projects developing oil spill prevention, control, and countermeasure (SPCC) plans and hazardous waste management and permitting programs

THOMAS VAN ZANDT
Principal/Environmental Management

for the utility industry Mr Van Zandt has also directed growth management and environmental planning projects for municipal, school district, and other public sector clients

TECHNICAL SPECIALTIES

Environmental law and management; Environmental impact assessment under NEPA, Public participation, Community Impact Assessment, Environmental management systems, Water resources planning, Regulatory affairs, Institutional and policy analysis; Expert testimony

Mr Van Zandt recently completed three years of service as Environmental Compliance Manager for the $1 3 billion S H 130 project in Central Texas, the first design-build highway project in the state In this capacity, he has developed innovative applications of Environmental Management Systems (EMS) to highway construction He currently leads a team of Hicks & Company environmental professionals in assisting TxDOT in the development of further EMS applications throughout the state

As a Founding Principal of Hicks & Company, Inc , Mr Van Zandt provides leadership in professional staff development, agency consultation, and quality assurance for the firm He has managed numerous environmental assessment and EIS efforts concerning major highway, airport, and rail projects, water and wastewater facilities, transmission lines, solid and nuclear waste facilities, private land developments and other public and private projects He has recently been active in the development and implementation of community impact assessment and environmental justice techniques for solid waste, low level nuclear waste, and other major infrastructural development Mr Van Zandt has coordinated a variety of litigation and hearing support services for major environmental actions.

EMPLOYMENT HISTORY

Revisor, Texas Legislative Council, Austin, 1966-1968

Legal Advisor, Ministry of Public Works and Water Resources, Ethiopian Government, Addis Ababa (U S Peace Corps), 1970-1973

Researcher, Center for Natural Areas, Washington, D C (research affiliate of the Smithsonian Institution), 1974-1975

Program Director, Wisconsin Heritage Areas Program, Madison, Wisconsin, 1975-1977.

Environmental Consultant, Resource Associates, Austin, 1977-1979

Project Staff, Espey, Huston & Associates, Inc , Austin, 1979-1983

Senior Project Manager, Espey, Huston & Associates, Inc , Austin, 1983-1987

Founding Principal, Horizon Environmental Services, Inc , Austin, 1987-1990

Founding Principal and Senior Program Manager, Hicks & Company, Inc , 1988-present

Environmental Compliance Manager, SH 130, Lone Star Infrastructure/Hicks & Company, 2002-2006

PUBLICATIONS/PRESENTATIONS

"Water for Oil Shale," Water Resources Bulletin of the American Water Resources Association, vol 11, no 6, 1975.

Water and Land Resources for an Oil Shale Industry, Institute for Environmental Studies, University of Wisconsin, Madison, June 1976

"Heritage Areas of St Croix County," University of Wisconsin, 1976

"Heritage Areas of Iron County," University of Wisconsin, 1977

"Heritage Areas of Brown County," University of Wisconsin, 1977

"Heritage Areas of Manitowoc County, University of Wisconsin, 1978

"A Heritage Tour of St Croix County," audio-visual presentation produced by University of Wisconsin - Eau Claire, 1978.

"Citizens Resource Evaluation Workshop, Kewaunee County," University of Wisconsin, 1978

National conference of American Water Resources Association, San Juan, Puerto Rico, November 1974 Paper dealing with institutional alternatives for water allocation in arid regions

University of Wisconsin, Madison. Presentation on citizen participation in resource planning to annual Bureau of Land Management seminar, January 1976

Regional conference on critical areas management, U S Department of Interior, Chicago Represented State of Wisconsin as Governor's designee, made panel presentation of Wisconsin's Critical Resources Information Program and related state programs, April 1976.

University of Missouri, Columbia Lecture on citizen participation in environmental planning, principles, and techniques to graduate seminar in historical preservation, March 1977

"A Fatal Flaw Analysis for a Proposed Mine/Power Plant Complex in Milam County," Confidential Client and Location, EH&A Doc No 79252, January 1980

"An Analysis of Environmental and Regulatory Constraints for a Proposed Lignite Surface Mine, Robertson County, Texas," Confidential Client and Location, EH&A Doc. Nos 8045 and 8046, February 1980

"An Analysis of Economic Costs Associated with Surface Mine Development in an Active Natural Gas Production Area," Confidential Client and Location, EH&A Doc No 80147, May 1980

"An Analysis of Environmental and Regulatory Constraints for a Proposed Lignite Surface Mine in Natchitoches Parish, Louisiana," Confidential Client and Location, EH&A Doc No 8044, April 1980

"An Analysis of Environmental and Regulatory Constraints for a Proposed Lignite Surface Mine, Calhoun County, Arkansas," Confidential Client and Location, EH&A Doc No 80392, 1980

"An Analysis of Environmental and Regulatory Constraints for a Proposed Lignite Surface Mine, Harrison County, Texas," Confidential Client and Location, EH&A Doc No 80414, 1980

"Environmental Report Proposed Deepwater Channel and Multipurpose Terminal Construction and Operation, Brownsville, Texas," Brownsville Navigation District Project Management and Alternative Analysis, EH&A Doc No 80475, April, 1981

"St Louis Harbor Feasibility Study: Interim Report," U S Corps of Engineers, St. Louis District Institutional Analysis, EH&A Doc No 81006

"Environmental Regulation of Oil and Gas Operations," workshop and training handbook, General American Oil Co of Texas, Inc , EH&A Doc No 81383, October 1981

"Draft Environmental Impact Statement Proposed Deepwater Channel and Multipurpose Terminal Construction and Operation, Brownsville, Texas," Brownsville Navigation District, for U.S Army Corps of Engineers, Galveston District, Project Management and Comment Response, EH&A Doc No 81568, January 1982

"Land Use and Compatibility Study," City of Port Arthur, Texas, EH&A Doc No. 81617, January 1982.

"Preliminary Feasibility Study of a Proposed Corpus Christi Foreign Trade Zone," Corpus Christi Industrial Commission, EH&A Doc No 82-078, March 1982

"Draft Socioeconomic and Land Use Impact Assessment for Henry W. Pirkey Power Plant Unit-1/South Hallsville Surface Lignite Mine Project, Harrison County, Texas," EH&A Doc No. 82193, March 1982.

"Final Environmental Impact Statement Proposed Deepwater Channel and Multipurpose Terminal Construction and Operation, Brownsville, Texas," Brownsville Navigation District, for U S Army Corps of Engineers, Galveston District, Project Management and Comment Response, EH&A Doc No 82118, May 1982

"Development in Coastal Waters and Wetlands Some of the Rules are Changing," State Bar of Texas Environmental Law Journal, vol 12, no 4, April 1982
"Constraints Analysis for Zenith-Twin Oak Transmission Corridor," Houston Light & Power Co., EH&A Doc. No 82245, May 1982.

"Pre-acquisition Assessment of High Island Field" (environmental audit), Aminoil U S A , Inc , EH&A Doc. No 82257, June 1982

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Petroskills Conducted 5-day course on Impact Assessment and Corporate Social Responsibility London, England, December 2008

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RECENT PAPERS, PRESENTATIONS (2003 - present)

April 28, 2004 Austin, TX
Presentation Environmental Issues & Permitting Pitfalls SH 130 Compliance Management and EMS
Austin Contractors & Engineers Association (ACEA) Central Texas Design and Construction Symposium

May 4, 2004. Austin, TX
Presentation: The Value of Community Involvement in the EMS the Case of SH 130
TCEQ Environmental Trade Fair/Clean Texas Conference

October 13, 2004, College Station, TX
Presentation SH 130 EMS and Adaptive Management
TxDOT Short Course

October 14-15, 2004, Austin, TX
CLE International Endangered Species Act and Habitat Conservation Planning

Presentation and Paper "Cities, Farms & Fountain Darters: the Edwards Aquifer Authority's Habitat Conservation Plan and the Search for Sustainable Water Management in South Central Texas"

December 1, 2004, Austin, TX.
Presentation SH 130 EMS, EPICs, and Adaptive Management
TxDOT Environmental Coordinators Conference

January 10, 2005, Austin, TX
FHWA Staff Symposium
Presentation SH 130 EMS Integrating NEPA, EPICs and Adaptive Management

April 8, 2005 Austin, TX
CLE International National Environmental Policy Act (NEPA) Conference
Presentation and Paper "Resource Assessment and Agency Coordination in the NEPA Process"

April 8, 2005 Austin, TX
American Society of Civil Engineers (ASCE), Texas Section, Conference, SH 130 Super-track
Paper: "EMS Applications in a Design-Build Environment" (with Melita Elmore and Jason Buntz)

April 8, 2005, Austin, TX
American Society of Civil Engineers (ASCE), Texas Section, Conference, SH 130 Super-track
Paper: "Stream Dynamics A Central Mitigation Concept in SH 130's Innovative Section 404 Permit" (with Ed Rashin)

April 8, 2005, Austin, TX
American Society of Civil Engineers (ASCE), Texas Section, Conference, SH 130 Super-track
Paper "Turning a Borrow Pit into a Multi-dimensional Wetland Mitigation Site An Example of 'Opportunistic' Environmental Management" (with Eddie Sutherland)

April 11-14, 2005, Chicago, IL
EPA National Environmental Partnership Summit
Presentation "NEPA Integration and the Adaptive EMS Lessons from a Design-build Highway Project"

June 1-3, 2005, Philadelphia, PA
EPA Green Highways Forum
Presentation "The Adaptive EMS in a Design-build Environment Notes from State Highway 130 in Central Texas"

July 2005, Charlotte, N C
Transportation Research Board Environmental Stewardship in Transportation
Presentation: "The Adaptive EMS in a Design-build Environment: Notes from State Highway 130 in Central Texas"

October 2005, Dallas, Texas
Associated General Contractors of America
National Environmental Management Systems National Training Program (video)
Presentation. "EMS in Highway Construction: SH 130 Case Study."

November 2005, College Park, MD
FHWA-EPA Green Highways Forum
"Adaptive Management in Highway Development Environmental Management Systems"

March 2006, Austin, Texas
CLE International National Environmental Policy Act (NEPA) Conference
Presentation and Paper "After the ROD Pitfalls and Strategies for Dealing with Supplementals, Reevaluations, and Post-Record of Decision Mitigation Commitments "

July 2007, Fort Worth, Texas
Transportation Research Board Committee ADC60 – Waste Management and Resource Efficiency in Transportation Summer Workshop (hosted by TxDOT Environmental Affairs Division)
TCEQ's Clean Texas Program and EMS Applications for Highway Construction – Five Years into the SH 130 Design-build Project. (with Co-presenter Kelly Coleman, TCEQ)

January 2008, Washington, D C
Transportation Research Board Annual Meeting, ADC60 Committee Presentation
Presentation: "Performance-based EMS in Transportation: Five Years into the Texas 130 Project EMS – A Reality Check"

October 2008, Austin, Texas
Balfour Beatty Infrastructure, Inc., Environmental Training Program Presentation "Environmental Compliance Management in Highway Construction"

December 2008, London, England
Petroskills Oil & Gas Training Programs course development and principal instructor for 5-day course on Impact Assessment and Corporate Social Responsibility.

Transmission Line Projects

(a) Transmission projects Mr Van Zandt participated in and nature of participation
South Interconnect Transmission Line", Central and Southwest Services, Inc , 1983 – member of environmental assessment team for Espey, Huston & Associates and expert witness before the PUC on community values

Turtle Creek to Hunt 138 kV Transmission Line, Kerr county, Texas," Lower Colorado River Authority -- member of environmental assessment team for Espey, Huston & Associates, 1983.

Flint Creek, Arkansas, to Oklahoma 345 Kilovolt Transmission Line," Southwestern Electric Power Company, Shreveport, Louisiana – member of "Environmental Impact Statement team for Espey, Huston & Associates, 1983.

TNP One Project, Robertson County, Texas – member of environmental assessment team, author of Community Values and Aesthetics" (Technical Memorandum Supporting Pre-filed Testimony in Public Utility Commission Power Plant Certification Proceedings) for Mark H Zeppa, P C. and Texas-New Mexico Power, September 1986

Garfield Transmission Line/Substation Alternatives siting and alignment study for City of Austin Electric Utility Department (now Austin Energy) – participated in route selection and author of environmental report, for Abbe-Garrett Engineering, 1993

As Project Principal, Mr Van Zandt reviewed and participated in numerous transmission line environmental documents prepared under Environmental General Services Contracts with Brazos Electric Power Cooperative from 1992 to the present.