Southwest Power Pool

Feasibility Study For Generation Interconnection Request GEN-2006-035

SPP Tariff Studies
(#GEN-2006-035)

February, 2007

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 225MW of wind generation within the control area of American Electric Power West (AEPW) in Roger Mills County, Oklahoma. The proposed point of interconnection is a new switching station in the existing Elk City – Grapevine 230kV transmission line, which is jointly-owned by AEPW and Southwestern Public Service (SPS). The proposed in-service date is December, 2008. This request is behind a prior queued request to interconnect into the same point. The prior queued request, GEN-2006-002, is for 150MW.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 225MW of generation with transmission system reinforcements within the local transmission systems. In order to maintain acceptable reactive power compensation, the Customer will need to install 40Mvars of 34.5kV capacitor banks in the Customer's collector substation on the 34.5kV bus. Dynamic Stability studies performed as part of the impact study will provide additional guidance as to whether the required reactive compensation can be static or a portion must be dynamic (such as a SVC).

The requirements to interconnect the 225MW of generation at the new switching station on the Elk City – Grapevine 230kV line will consist of building a new 230kV ring bus substation that would be used to interconnect both GEN-2006-002 and this request. The method to interconnect one of the requests would consist of a three breaker ring bus substation with terminals to Elk City, Grapevine, and the generating facility. If both this request and GEN-2006-002 interconnect into the station, a fourth ring bus terminal will be required. It is assumed that obtaining all necessary right-of-way for the new switching station will not be a significant expense.

The total minimum cost for building the three breaker 230kV ring bus substation required for stand alone interconnection is $3,500,000. If the prior queued request signs an Interconnection Agreement, the cost for the incremental interconnection facilities for this request is $500,000. These costs are shown in Table 2 and Table 3. Other Network Constraints in the AEPW, SPS, Western Farmers Electric Cooperative (WFEC), and transmission systems that may be verified with a transmission service request and associated studies are listed in Table 4. These Network Constraints are in the local area of the new generation when this generation is sunk throughout the SPP footprint for the Energy Resource (ER) Interconnection request. With a defined source and sink in a Transmission Service Request (TSR), this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements. This cost does not include building the 230kV line from the Customer substation into the new 230kV ring bus. This cost does not include the Customer's 230-34.5kV substation or the 40Mvar of 34.5kV capacitor banks.

In Table 5, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. These values may be used by the Customer for future analyses including the determination of lower generation capacity levels that may be installed. When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Introduction

<OMITTED TEXT> (Customer) has requested a Feasibility study for the purpose of interconnecting 225MW of wind generation within the control area of American Electric Power West (AEPW) in Roger Mills County, Oklahoma. The proposed point of interconnection is a new switching station in the existing Elk City – Grapevine 230kV transmission line, which is jointly-owned by AEPW and Southwestern Public Service (SPS). The proposed in-service date is December, 2008.

Interconnection Facilities

The primary objective of this study is to identify the system problems associated with connecting the plant into the area transmission system. The Feasibility and other subsequent Interconnection Studies are designed to identify attachment facilities, Network Upgrades and other direct assignment facilities needed to accept power into the grid at the interconnection receipt point.

The Customer requested interconnection to a point on the Elk City – Grapevine 230kV transmission line at a point in northwest Beckham County, Oklahoma. This point also is the point of interconnection for a prior queued request in the SPP queue. Request GEN-2006-002 also requested interconnection into a new substation in northwest Beckham County, Oklahoma on the Elk City – Grapevine 230kV transmission line.

The requirements for interconnection of the 225MW consist of building a new 230kV ring bus substation in the existing Elk City – Grapevine 230kV transmission line, jointly-owned by AEPW and SPS. This station will have terminals to Elk City, Grapevine, the GEN-2006-002 substation, and the Customer substation. This 230kV substation shall be constructed and maintained by AEPW. The Customer has not proposed a route of its 230kV line to serve its 230/34.5kV facilities. This interconnection request is the second to request interconnection into this new switching station. Assuming the prior queued project progresses into an Interconnection Agreement, the incremental facilities to accommodate this Customer's request will be a fourth terminal in the 230kV ring bus at the substation. It is assumed that obtaining all necessary right-of-way for the substation construction will not be a significant expense.

The total cost for building a new 230kV 3-breaker ring switching station is estimated at $3,500,000. If the prior queued Customer drops out of the queue for any reason, this will be the cost assigned to this Request. If the prior queued Customer stays in the queue and advances to an Interconnection Agreement, the cost for adding a fourth terminal is $500,000. Other Network Constraints in the AEPW, SPS, and Western Farmers Electric Cooperative (WFEC) systems that were identified are listed in Table 3. These estimates will be refined during the development of the impact study based on the final designs. This cost does not include building the 230kV facilities from the Customer substation into the new AEPW 230kV switching station. The Customer is responsible for these 230kV facilities up to the point of interconnection. This cost also does not include the Customer's 230-34.5kV substation, which should be determined by the Customer.

The costs of interconnecting the facility to the AEPW transmission system are listed in Table 1 & 2. **These costs do not include any cost that might be associated with short circuit study results or dynamic stability study results**. These costs will be determined when and if a System Impact Study is conducted.

A preliminary one-line drawing of the interconnection and direct assigned facilities are shown in Figure 1.

Table 1: Direct Assignment Facilities

FACILITY	ESTIMATED COST (2006 DOLLARS)
Customer – 230-34.5 kV Substation facilities.	*
Customer – 230kV transmission line facilities between Customer facilities and AEPW 230kV switching station.	*
Customer - Right-of-Way for Customer facilities.	*
Customer – 34.5kV, 40MVAR capacitor bank(s) in Customer substation.	*
Total	*****

*Note: *Estimates of cost to be determined by Customer.*

Table 2: Required Interconnection Network Upgrade Facilities
(Assuming prior queued project withdraws)

FACILITY	ESTIMATED COST (2006 DOLLARS)
AEPW – Build 230kV, 3-breaker ring bus switching station. Station to include breakers, switches, control relaying, high speed communications, all structures, and metering and other related equipment.	$3,500,000
Total	**$3,500,000**

Table 3: Required Interconnection Network Upgrade Facilities
(Assuming prior queued project stays in the queue)

FACILITY	ESTIMATED COST (2006 DOLLARS)
AEPW – Add 230kV line and breaker terminal to the ring bus switching station built initially for request GEN-2006-002.	$500,000
Total	**$500,000**

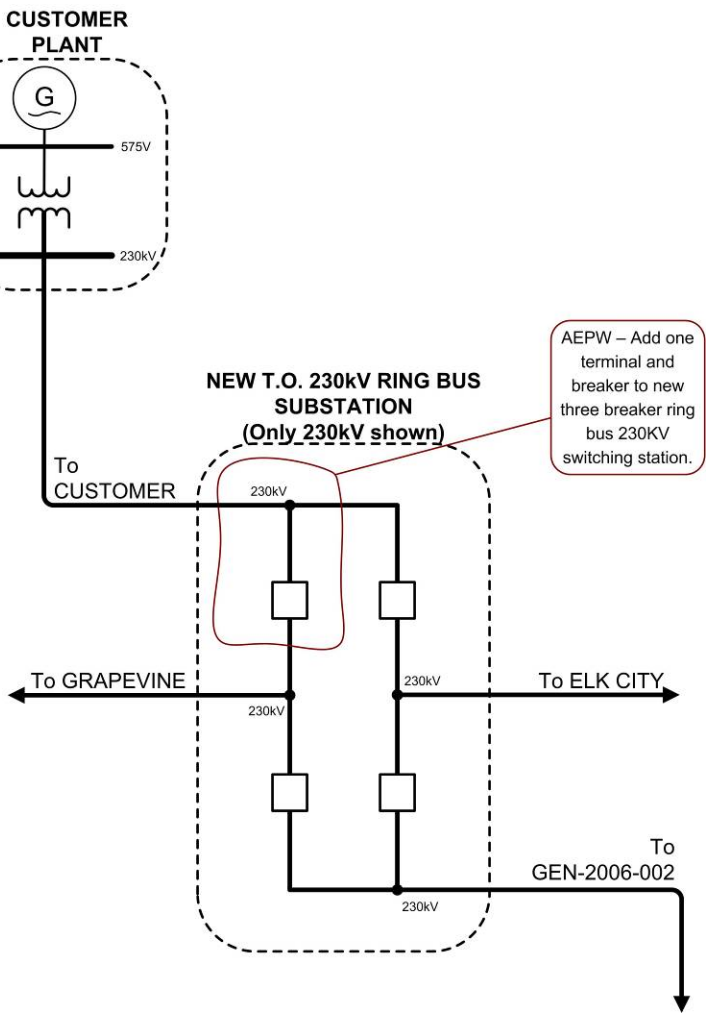

Figure 1: Proposed Interconnection
(Final substation design to be determined)

Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2008 & 2011 summer and winter peak, and 2016 summer peak models. The output of the Customer's facility was offset in each model by a reduction in output of existing online SPP generation. This method allows the request to be studied as an Energy Resource (ER) Interconnection request. The proposed in-service date of the generation is December, 2008. The available seasonal models used were through the 2016 Summer Peak of which is the end of the current SPP planning horizon.

The analysis of the Customer's project indicates that, given the requested generation level of 225MW and location, additional criteria violations will occur on the existing AEPW, SPS, and WFEC transmission systems under steady state and contingency conditions in the peak seasons.

In Table 5, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. These values may be used by the Customer to determine lower generation capacity levels that may be installed. When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. When a facility is overloaded for more than one contingency, only the highest loading on the facility for each season is included in the table.

In order to maintain a zero reactive power flow exchange at the point of interconnection, additional reactive compensation is required at the point of interconnection. The Customer will be required to install 40Mvar of capacitor banks in their substation on the 34.5kV buses in the Customer substation. Dynamic Stability studies performed as part of the impact study will provide additional guidance as to whether the reactive compensation can be static or a portion must be dynamic (such as a SVC or STATCOM). It is possible that an SVC or STATCOM device will be required at the Customer facility because of FERC Order 661A Low Voltage Ride Through Provisions (LVRT) which went into effect January 1, 2006. FERC Order 661A orders that wind farms stay on line for 3 phase faults at the point of interconnection even if that requires the installation of a SVC or STATCOM device.

There are several other proposed generation additions in the general area of the Customer's facility. These local projects that were previously queued were assumed to be in service in this Feasibility Study. Those local projects that were previously queued and have advanced to nearly complete phases were included in this Feasibility Study.

Powerflow Analysis Methodology

The Southwest Power Pool (SPP) criteria states that: "The transmission system of the SPP region shall be planned and constructed so that the contingencies as set forth in the Criteria will meet the applicable *NERC Planning Standards* for System Adequacy and Security – Transmission System Table l hereafter referred to as NERC Table l) and its applicable standards and measurements".

Using the created models and the ACCC function of PSS\E, single contingencies in portions or all of the modeled control areas of American Electric Power West (AEPW), Midwest Energy (MIDW), Oklahoma Gas and Electric OKGE, Southwestern Public Service Company (SPS), Sunflower Electric Power Corporation (SUNC), West Plains (WEPL), Western Farmers Electric Cooperative (WFEC) and other control areas were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

Table 4: Network Constraints

AREA	ELEMENT
AEPW	CLINTON CITY - FOSS TAP 69KV CKT 1
AEPW	CLINTON CITY - THOMAS TAP 69KV CKT 1
AEPW	CLINTON JCT - ELK CITY 138KV CKT 1
AEPW	CLINTON JCT - FOSS TAP 69KV CKT 1
AEPW	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
AEPW	ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1
AEPW	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
AEPW	GEN-2006-02 TAP - ELK CITY 230KV CKT 1
AEPW	HOBART JUNCTION - TAMARAC TAP 138KV CKT 1
AEPW	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
AEPW	SHAMROCK1 (SHAM 2WT - SHAM 3WT) 115/69/14.4KV TRANSFORMER CKT 1
AEPW	SHAMROCK2 (SHAM 2WT - SHAM 4WT) 138/69/14.4KV TRANSFORMER CKT 1
AEPW	THOMAS TAP - WEATHERFORD 69KV CKT 1
AEPW-SPS	GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1
AEPW-WFEC	ELK CITY - ELK CITY 69KV CKT 1
SPS	BOWERS (BOWERS3) 115/69KV TRANSFORMER CKT 1
SPS	CHERRY ST - NICHOLS STATION 115KV CKT 1
SPS	CONWAY - KIRBY 115KV CKT 1
SPS	CONWAY - YARNELL3 115KV CKT 1
SPS	GRAPEVINE - KIRBY 115KV CKT 1
SPS	GRAPEVINE (GRAPEVN6) 230/115KV TRANSFORMER CKT 1
SPS	HAPPY INTERCHANGE - PALODU 115KV CKT 1
SPS	NICHOLS STATION - YARNELL 115KV CKT 1
SPS	PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1
SPS	ROSWELL (ROSWIN3) 115/69KV TRANSFORMER CKT 1
SPS	TERRY COUNTY - LG-BRWN2 69KV CKT 1
SPS	YARNELL - CONWAY 115KV CKT 1
WFEC	CARTER JCT - DILL JCT 69KV CKT 1
WFEC	DILL JCT - ELK CITY 69KV CKT 1

Table 5: Contingency Analysis

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
2008 WINTER PEAK					
ELK CITY - ELK CITY 69KV CKT 1	08wp	39	194	0	GEN-2002-05 TAP - MOREWOOD SW 138KV CKT 1
ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	08wp	287	178	0	O.K.U. - L.E.S. 345KV CKT 1
ELK CITY - ELK CITY 69KV CKT 1	08wp	36	158	0	BASE CASE
CLINTON CITY - FOSS TAP 69KV CKT 1	08wp	53	137	0	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
SHAMROCK1 (SHAM 2WT - SHAM 3WT) 115/69/14.4KV TRANSFORMER CKT 1	08wp	69	131	0	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
GRAPEVINE - KIRBY 115KV CKT 1	08wp	195	115	0	NICHOLS STATION - YARNELL 115KV CKT 1
CONWAY - KIRBY 115KV CKT 1	08wp	218	112	0	NICHOLS STATION - YARNELL 115KV CKT 1
GRAPEVINE (GRAPEVN6) 230/115KV TRANSFORMER CKT 1	08wp	140	105	0	NICHOLS STATION - YARNELL 115KV CKT 1
GEN-2006-02 TAP - ELK CITY 230KV CKT 1	08wp	351	145	18	O.K.U. - L.E.S. 345KV CKT 1
ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	08wp	72	117	26	GEN-2002-05 TAP - MOREWOOD SW 138KV CKT 1
SHAMROCK2 (SHAM 2WT - SHAM 4WT) 138/69/14.4KV TRANSFORMER CKT 1	08wp	69	120	45	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
DILL JCT - ELK CITY 69KV CKT 1	08wp	61	114	113	GEN-2002-05 TAP - MOREWOOD SW 138KV CKT 1
ELK CITY - CLINTON JCT 138KV CKT 1	08wp	143	120	120	O.K.U. - L.E.S. 345KV CKT 1
DILL JCT - ELK CITY 69KV CKT 1	08wp	47	108	143	BASE CASE
JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	08wp	46	105	159	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
GEN-2006-02 TAP - ELK CITY 230KV CKT 1	08wp	319	111	173	BASE CASE
CLINTON CITY - THOMAS TAP 69KV CKT 1	08wp	55	104	178	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
THOMAS TAP - WEATHERFORD 69KV CKT 1	08wp	53	104	179	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1	08wp	351	110	192	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
CLINTON JCT - FOSS TAP 69KV CKT 1	08wp	72	101	205	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
2011 SUMMER PEAK					
ELK CITY - ELK CITY 69KV CKT 1	11sp	39	187	0	MOREWOOD - MORWOOD 69KV CKT 1
ELK CITY - ELK CITY 69KV CKT 1	11sp	36	157	0	BASE CASE
GRAPEVINE - KIRBY 115KV CKT 1	11sp	161	141	0	NICHOLS STATION - YARNELL 115KV CKT 1
BOWERS (BOWERS3) 115/69KV TRANSFORMER CKT 1	11sp	97	137	0	NICHOLS STATION - YARNELL 115KV CKT 1
CONWAY - KIRBY 115KV CKT 1	11sp	180	132	0	NICHOLS STATION - YARNELL 115KV CKT 1
ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	11sp	72	124	0	MOREWOOD - MORWOOD 69KV CKT 1
PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1	11sp	99	122	0	AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1

Table 5: Contingency Analysis (continued)

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
HAPPY INTERCHANGE - PALODU 115KV CKT 1	11sp	99	120	0	AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
ROSWELL (ROSWIN3) 115/69KV TRANSFORMER CKT 1	11sp	40	103	0	GRAPEVINE - NICHOLS STATION 230KV CKT 1
GRAPEVINE (GRAPEVN6) 230/115KV TRANSFORMER CKT 1	11sp	129	102	0	NICHOLS STATION - YARNELL 115KV CKT 1
DILL JCT - ELK CITY 69KV CKT 1	11sp	61	107	135	MOREWOOD - MORWOOD 69KV CKT 1
ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	11sp	287	129	141	GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1
CLINTON JCT - FOSS TAP 69KV CKT 1	11sp	72	103	176	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
SHAMROCK1 (SHAM 2WT - SHAM 3WT) 115/69/14.4KV TRANSFORMER CKT 1	11sp	69	105	178	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
DILL JCT - ELK CITY 69KV CKT 1	11sp	47	104	178	BASE CASE
CLINTON CITY - FOSS TAP 69KV CKT 1	11sp	72	103	182	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
YARNELL - CONWAY 115KV CKT 1	11sp	180	102	190	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1	11sp	351	110	192	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
ELK CITY - GEN-2006-02 TAP 230KV CKT 1	11sp	351	106	204	GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1
NICHOLS STATION - YARNELL 115KV CKT 1	11sp	180	101	211	GRAPEVINE - NICHOLS STATION 230KV CKT 1
2011 WINTER PEAK					
ELK CITY - ELK CITY 69KV CKT 1	11wp	39	200	0	GEN-2002-05 TAP - MOREWOOD SW 138KV CKT 1
ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	11wp	287	174	0	O.K.U. - L.E.S. 345KV CKT 1
ELK CITY - ELK CITY 69KV CKT 1	11wp	36	167	0	BASE CASE
SHAMROCK1 (SHAM 2WT - SHAM 3WT) 115/69/14.4KV TRANSFORMER CKT 1	11wp	69	125	0	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	11wp	72	122	0	GEN-2002-05 TAP - MOREWOOD SW 138KV CKT 1
ELK CITY - GEN-2006-02 TAP 230KV CKT 1	11wp	351	142	28	O.K.U. - L.E.S. 345KV CKT 1
DILL JCT - ELK CITY 69KV CKT 1	11wp	47	115	76	BASE CASE
DILL JCT - ELK CITY 69KV CKT 1	11wp	61	117	80	GEN-2002-05 TAP - MOREWOOD SW 138KV CKT 1
SHAMROCK2 (SHAM 2WT - SHAM 4WT) 138/69/14.4KV TRANSFORMER CKT 1	11wp	69	115	84	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
ELK CITY - CLINTON JCT 138KV CKT 1	11wp	143	114	148	O.K.U. - L.E.S. 345KV CKT 1
ELK CITY - GEN-2006-02 TAP 230KV CKT 1	11wp	319	108	187	BASE CASE
GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1	11wp	351	110	192	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
CARTER JCT - DILL JCT 69KV CKT 1	11wp	61	103	198	GEN-2002-05 TAP - MOREWOOD SW 138KV CKT 1
JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	11wp	46	102	199	ELK CITY - GEN-2006-02 TAP 230KV CKT 1
CLINTON JCT - FOSS TAP 69KV CKT 1	11wp	72	102	199	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
CLINTON CITY - THOMAS TAP 69KV CKT 1	11wp	55	102	199	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
THOMAS TAP - WEATHERFORD 69KV CKT 1	11wp	53	102	202	WEATHERFORD TAP - WTH WF 4 138KV CKT 1

Table 5: Contingency Analysis (continued)

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
CLINTON CITY - FOSS TAP 69KV CKT 1	11wp	72	101	204	WEATHERFORD TAP - WTH WF 4 138KV CKT 1
2016 SUMMER PEAK					
NO SOLUTION OBTAINED	16sp			0	TOLK 1 (TOLKE6 - TOLK 1)
NO SOLUTION OBTAINED	16sp			0	TOLK 2 (TOLKW6 - TOLK2)
NO SOLUTION OBTAINED	16sp			0	TUCO (TUCO7) 345/230/13.2KV TRANSFORMER CKT
NO SOLUTION OBTAINED	16sp			0	TUCO - O.K.U. 345KV CKT 1
NO SOLUTION OBTAINED	16sp			0	AEPW-03: O.K.U. - L.E.S. 345KV CKT 1 & O.K.U. OUTAGE
ELK CITY - ELK CITY 69KV CKT 1	16sp	39	176	0	MOREWOOD - MORWOOD 69KV CKT 1
GRAPEVINE - KIRBY 115KV CKT 1	16sp	161	144	0	CONWAY - YARNELL3 115KV CKT 1
ELK CITY - ELK CITY 69KV CKT 1	16sp	36	143	0	BASE CASE
CONWAY - YARNELL3 115KV CKT 1	16sp	180	131	0	GRAPEVINE - NICHOLS STATION 230KV CKT 1
NICHOLS STATION - YARNELL3 115KV CKT 1	16sp	180	131	0	GRAPEVINE - NICHOLS STATION 230KV CKT 1
CONWAY - KIRBY 115KV CKT 1	16sp	180	124	0	NICHOLS STATION - YARNELL 115KV CKT 1
ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	16sp	72	123	0	MOREWOOD - MORWOOD 69KV CKT 1
CONWAY - YARNELL3 115KV CKT 1	16sp	164	114	0	BASE CASE
NICHOLS STATION - YARNELL3 115KV CKT 1	16sp	164	113	0	BASE CASE
ROSWELL (ROSWIN3) 115/69KV TRANSFORMER CKT 1	16sp	40	113	0	GB-KELR2 - MAGIC CITY 69KV CKT 1
CHERRY ST - NICHOLS STATION 115KV CKT 1	16sp	161	103	0	WHITAKER - EAST PLANT 115KV CKT 1
TERRY COUNTY - LG-BRWN2 69KV CKT 1	16sp	54	101	0	GB-KELR2 - MAGIC CITY 69KV CKT 1
HOBART JUNCTION - TAMARAC TAP 138KV CKT 1	16sp	105	114	94	GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1
BOWERS (BOWERS3) 115/69KV TRANSFORMER CKT 1	16sp	97	164	128	NICHOLS STATION - YARNELL 115KV CKT 1
ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	16sp	287	129	141	GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1
GRAPEVINE (GRAPEVN6) 230/115KV TRANSFORMER CKT 1	16sp	129	115	148	GRAPEVINE - NICHOLS STATION 230KV CKT 1
GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1	16sp	351	110	192	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
ELK CITY - GEN-2006-02 TAP 230KV CKT 1	16sp	351	105	207	GRAPEVINE - GEN-2006-02 TAP 230KV CKT 1

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Conclusion

The minimum cost of interconnecting the Customer's interconnection request is estimated at $3,500,000 for AEPW's interconnection Network Upgrade facilities listed in Table 2. If the prior queued request, GEN-2006-002, signs an Interconnection Agreement, then the incremental costs for Interconnection Facilities for this request are $500,000 as listed in Table 3. These costs exclude upgrades of other transmission facilities by AEPW, SPS, and WFEC listed in Table 4 of which are Network Constraints. At this time, the cost estimates for other Direct Assignment facilities including those in Table 1 have not been defined by the Customer. In addition to the Customer's proposed interconnection facilities, the Customer will be responsible for installing 40Mvar of 34.5kV capacitors in the Customer substation for reactive support. Dynamic Stability studies performed as part of the impact study will provide additional guidance as to whether the reactive compensation can be static or a portion must be dynamic (such as a SVC or STATCOM). As stated earlier, the local projects that were previously queued are assumed to be in service in this Feasibility Study.

In Table 5, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. These values may be used by the Customer to determine lower generation capacity levels that may be installed. When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. When a facility is overloaded for more than one contingency, only the highest loading on the facility for each season is included in the table.

These interconnection costs do not include any cost that may be associated with short circuit or transient stability analysis. These studies will be performed if the Customer signs a System Impact Study Agreement.

The required interconnection costs listed in Table 2 and other upgrades associated with Network Constraints listed in Table 4 do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer requests transmission service through Southwest Power Pool's OASIS.

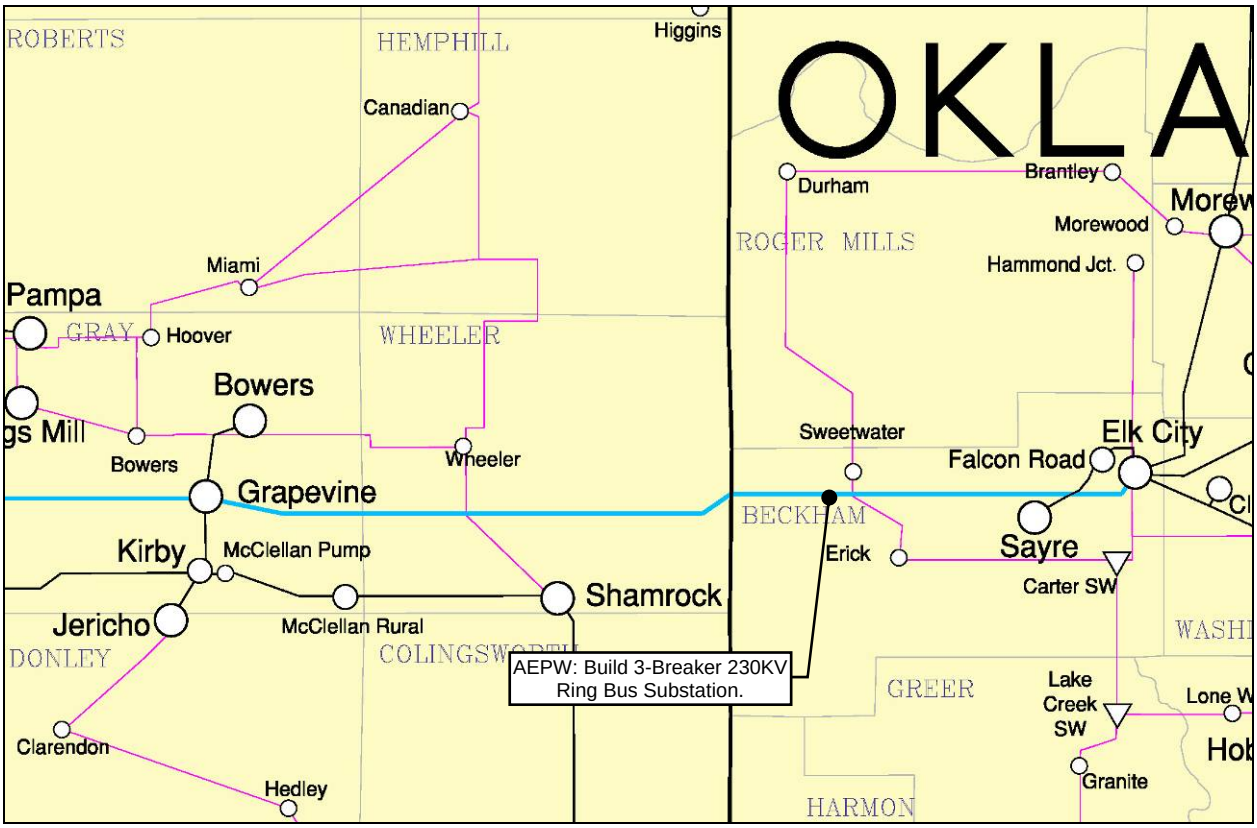

FIGURE 2. MAP OF THE LOCAL AREA