



**Feasibility Study  
For  
Generation Interconnection  
Request  
GEN-2007-033**

SPP Tariff Studies  
(#GEN-2007-033)

February, 2008

## **Executive Summary**

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 200 MW of wind generation within the control area of Southwestern Public Service Company (SPS) located in Hutchinson County, Texas. The proposed interconnection point is on the existing Pringle (SPS) – Harrington-Nichols (SPS) 230 kV transmission line, owned by SPS. The proposed in-service date is August, 2009.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 200 MW of generation with transmission system reinforcements within the local transmission system. The need for reactive compensation for this interconnection request will be evaluated in the Impact Study based on the wind turbine manufacturer and type requested by the Customer. Dynamic Stability studies performed as part of the System 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 requirement to interconnect the 200 MW of wind generation on the existing Pringle (SPS) – Harrington-Nichols (SPS) 230 kV transmission line consists of adding a new 230 kV three-breaker ring-bus switching station. The new station will be constructed and maintained by SPS. The Customer did not propose a specific route for the 230 kV line extending to serve its 230/34.5 kV collection facilities. It is assumed that obtaining all necessary right-of-way for the new transmission line to serve its facilities will not be a significant expense.

The total minimum cost for building the required facilities for this 200 MW of generation is \$3,221,000. These costs are shown in Tables 1 and 2. This cost does not include building the 230 kV line from the Customer 230/34.5 kV collector substation into the point of interconnection. This cost also does not include the Customer's 230/34.5 kV collector substation or the possible need for reactive compensation. Network constraints in the Oklahoma gas and Electric (OKGE), Sunflower Electric Power Corporation (SUNC), West Plains (WEPL), Western Farmers Electric Cooperative (WFEC) and SPS transmission systems that were identified are shown in Table 3. These Network constraints will have to be verified with a Transmission Service Request (TSR) and associated studies. 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, this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements.

In Table 4, 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.

There are several other proposed generation additions in the general area of the Customer's facility. It was assumed in this preliminary analysis that not all of these other projects within the SPS control areas will be in service. Those previously queued projects that have advanced to nearly complete phases were included in this Feasibility Study. In the event that another request for a generation interconnection with

a higher priority withdraws, then this request may have to be re-evaluated to determine the local Network Constraints.

The required interconnection costs listed in Tables 1 and 2 and other upgrades associated with Network Constraints 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 submits a Transmission Service Request through Southwest Power Pool's OASIS.

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## **Introduction**

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 200 MW of wind generation within the control area of Southwestern Public Service Company (SPS) located in Hutchinson County, Texas. The proposed interconnection point is on the existing Pringle (SPS) – Harrington-Nichols (SPS) 230 kV transmission line, owned by SPS. The proposed in-service date is August, 2009.

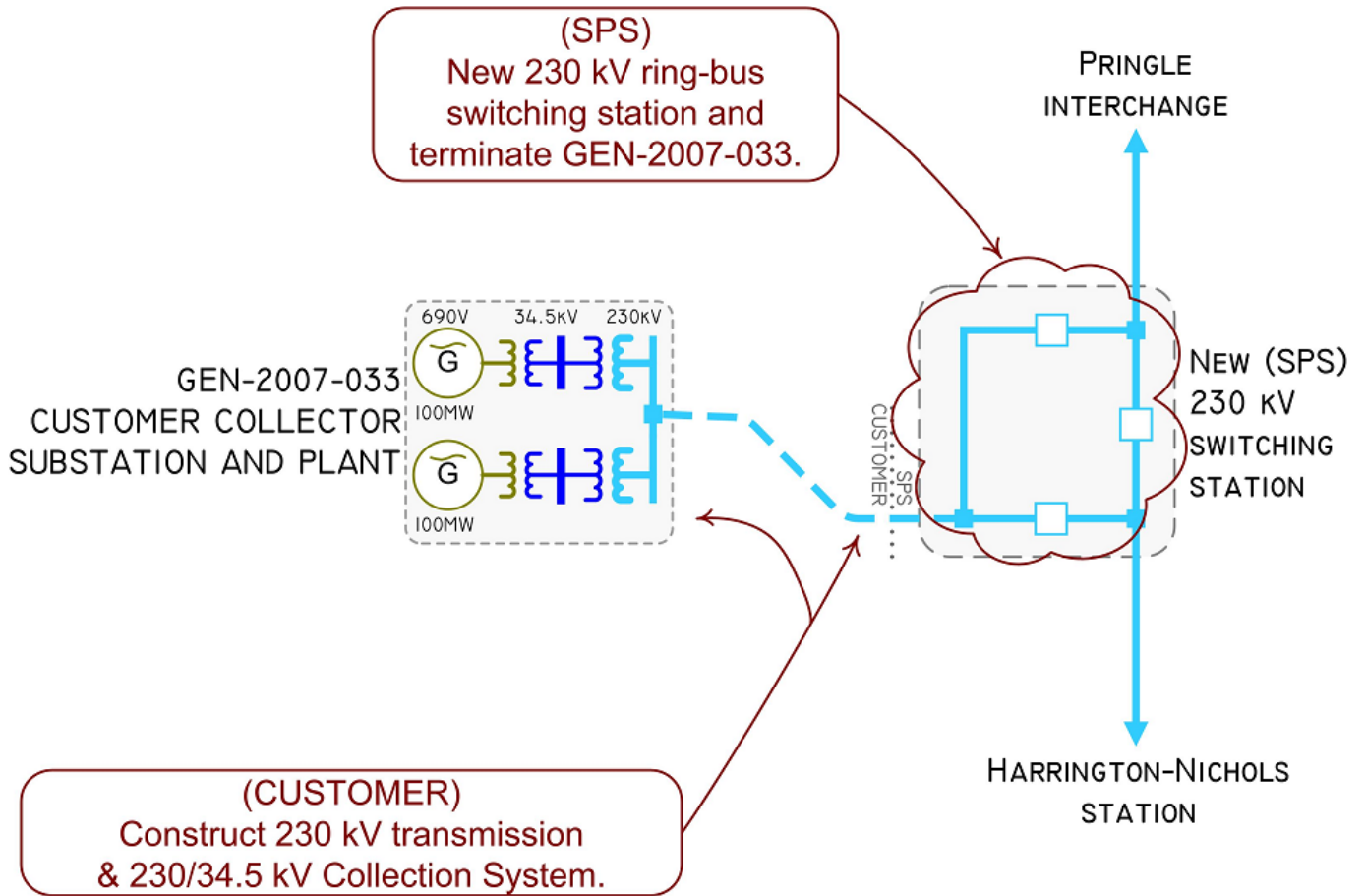
### **Interconnection Facilities**

The primary objective of this study is to identify the system problems associated with connecting the generation to 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 requirement to interconnect the 200 MW of wind generation on the existing Pringle (SPS) – Harrington-Nichols (SPS) 230 kV transmission line consists of adding a new 230 kV three-breaker ring-bus switching station. The new station will be constructed and maintained by SPS. The Customer did not propose a specific route for the 230 kV line extending to serve its 230/34.5 kV collection facilities. It is assumed that obtaining all necessary right-of-way for the new transmission line to serve its facilities will not be a significant expense.

Other Network Constraints in the Oklahoma gas and Electric (OKGE), Sunflower Electric Power Corporation (SUNC), West Plains (WEPL), Western Farmers Electric Cooperative (WFEC) and SPS transmission systems that were identified are shown in Table 3. 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.

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



**Figure 1: Proposed Method of Interconnection**

(Final design to be determined)

## Interconnection Estimated Costs

The minimum cost for adding a new 230 kV three-breaker ring-bus switching station serving GEN-2007-033 facilities is estimated at \$3,221,000. These costs are listed in Tables 1 and 2. These estimates will be refined during the development of the System Impact Study based on the final designs. This cost does not include building the Customer's 230 kV transmission line extending from the point of interconnection to serve its 230/34.5 kV collection facilities. This cost also does not include the Customer's 230/34.5 kV collector substation or possible need for reactive compensation, all of which should be determined by the Customer. The Customer is responsible for these 230 kV – 34.5 kV facilities up to the point of interconnection.

The costs of interconnecting the facility to the SPS 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.

**Table 1: Direct Assignment Facilities**

FACILITY	ESTIMATED COST (2008 DOLLARS)
CUSTOMER – 230/34.5 kV substation facilities.	*
CUSTOMER – 230 kV line between Customer substation and new SPS 230 kV three-breaker ring-bus switching station.	*
CUSTOMER – Possible reactive compensation to be determined during Impact Study	*
CUSTOMER – Right-of-Way for all Customer facilities.	*
<b>TOTAL</b>	<b>*</b>

\* Estimates of cost to be determined.

**Table 2: Required Interconnection Network Upgrade Facilities**

FACILITY	ESTIMATED COST (2007 DOLLARS)
SPS – 230 kV three-breaker ring-bus switching station to be built for generation request #GEN-2007-033 on the Pringle (SPS) – Harrington-Nichols (SPS) 230 kV transmission line. Work to include associated switches, control relaying, high speed communications, metering and related equipment and all related structures.	\$3,221,000
<b>TOTAL</b>	<b>\$3,221,000</b>

\* Estimates of cost to be determined.

## Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2009 summer and winter peak models, 2012 summer and winter peak models and the 2017 summer peak model. 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 August, 2009. The available seasonal models used were through the 2017 Summer Peak of which is the end of the current SPP planning horizon.

Following current practice, this analysis was conducted assuming that previous queued requests in the immediate area of this interconnect request were in service. The analysis of the Customer's project indicates that, given the requested generation level of 200 MW and location, additional criteria violations will occur on the existing OKGE, SUNC, WEPL, WFEC and SPS transmission systems under steady state and contingency conditions in the peak seasons. Table 3 lists these overloaded facilities.

In Table 4, 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.

The need for reactive compensation will be determined during the Impact Study. The need for reactive compensation will be based on the Customer's choice of wind turbine make and manufacturer. Dynamic Stability studies performed as part of the System 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. Some of the local projects that were previously queued were assumed to be in service in this Feasibility Study. Not all 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 I hereafter referred to as NERC Table I) 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 Sunflower Electric Power Corporation (SUNC), Missouri Public Service (MIPU), Westar Energy (WERE), Kansas City Power & Light (KCPL), West Plains (WEPL), Midwest Energy (MIDW), Oklahoma Gas and Electric (OKGE), American Electric Power West (AEPW), Grand River Dam Authority (GRDA), Southwestern Public Service Company (SPS), 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.

## Powerflow Results

**Table 3: Network Constraints**

AREA	OVERLOADED ELEMENT
OKGE	MUSKOGEE - PECAN CREEK 345KV CKT 1
OKGE/WFEC	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
SPS	2005-02 - RIVERVIEW INTERCHANGE 115KV CKT 1
SPS	AMARILLO SOUTH INTERCHANGE - ARROWHEAD SUB 115KV CKT 1
SPS	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
SPS	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
SPS	ARROWHEAD SUB - OSAGE SWITCHING STATION 115KV CKT 1
SPS	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
SPS	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
SPS	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	CANYON EAST SUB - OSAGE SWITCHING STATION 115KV CKT 1
SPS	CANYON WEST SUB - CANYON EAST SUB 115KV CKT 1
SPS	CANYON WEST SUB - DAWN SUB 115KV CKT 1
SPS	DAWN SUB - CANYON WEST SUB 115KV CKT 1
SPS	DAWN SUB - PNDAHFD3 115KV CKT 1
SPS	FRIONA SUB - HEREFORD INTERCHANGE 115KV CKT 1
SPS	HALE CO INTERCHANGE - KRESS INTERCHANGE 115KV CKT 1
SPS	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1
SPS	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1
SPS	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1
SPS	HARRNG_EST6 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
SPS	HEREFORD INTERCHANGE - PNDAHFD3 115.00 115KV CKT 1
SPS	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
SPS	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1
SPS	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1
SPS	OSAGE SWITCHING STATION – CANYON EAST SUB 115KV CKT 1
SPS	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1
SPS	PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1
SPS	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SUNC	HOLCOMB - PLYMELL 115KV CKT 1
SUNC	PIONEER TAP - PLYMELL 115KV CKT 1
SUNC/WEPL	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
WEPL/SUNC	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1
OKGE	Oklahoma Gas and Electric
SPS	Southwestern Public Services Company
SUNC	Sunflower Electric Power Corporation
WEPL	West Plains
WFEC	Western Farmers Electric Cooperative

**Table 4: Contingency Analysis**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09SP	OSAGE SWITCHING STATION - CANYON EAST SUB 115KV CKT 1	99	251	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
09SP	CANYON WEST SUB - CANYON EAST SUB 115KV CKT 1	99	235	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
09SP	DAWN SUB - CANYON WEST SUB 115KV CKT 1	99	220	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
09SP	DAWN SUB - PNDAHFD3 115KV CKT 1	99	217	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
09SP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	99	215	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	99	214	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	PNDAHFD3 - HEREFORD INTERCHANGE 115KV CKT 1	99	209	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
09SP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	99	197	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	99	192	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1	497	147	0	GEN525561 1
09SP	HALE CO INTERCHANGE - KRESS INTERCHANGE 115KV CKT 1	161	142	0	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
09SP	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	138	0	GEN525561 1
09SP	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1	173	135	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
09SP	ARROWHEAD SUB - OSAGE SWITCHING STATION 115KV CKT 1	161	128	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	AMARILLO SOUTH INTERCHANGE - ARROWHEAD SUB 115KV CKT 1	161	121	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1	497	119	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
09SP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	112	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1	497	111	0	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1; TUCO INTERCHANGE (TUCO) 345/230/13.2KV TRANSFORMER CKT 1
09SP	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	225	108	0	BASE CASE
09SP	PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	106	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
09SP	2005-02 - RIVERVIEW INTERCHANGE 115KV CKT 1	161	119	1	2007-33T 230.00 - HARRNG_EST6 230.00 230KV CKT 1
09SP	HARRNG_EST6 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	111	64	HARRNG_EST6 230.00 - HARRNG_MID6 230.00 230KV CKT 1
09SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	103	136	GEN532751 1
09SP	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	101	180	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1	99	100	190	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1

**TABLE 4: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	107	13	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1
09WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	104	80	GEN532751 1
12SP	OSAGE SWITCHING STATION - CANYON EAST SUB 115KV CKT 1	99	230	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
12SP	CANYON WEST SUB - CANYON EAST SUB 115KV CKT 1	99	214	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
12SP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	99	201	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	99	200	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	DAWN SUB - CANYON WEST SUB 115KV CKT 1	99	199	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
12SP	DAWN SUB - PNDAHFD3 115KV CKT 1	99	196	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
12SP	PNDAHFD3 - HERFORD INTERCHANGE 115KV CKT 1	99	188	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
12SP	SPSNORTH_STH	800	185	0	BASE CASE
12SP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	99	183	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	99	178	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1	497	139	0	GEN525562 1
12SP	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	132	0	GEN525562 1
12SP	HALE CO INTERCHANGE - KRESS INTERCHANGE 115KV CKT 1	161	132	0	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
12SP	ARROWHEAD SUB - OSAGE SWITCHING STATION 115KV CKT 1	161	126	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1	173	122	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
12SP	AMARILLO SOUTH INTERCHANGE - ARROWHEAD SUB 115KV CKT 1	161	118	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1	497	115	0	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1; TUCO INTERCHANGE (TUCO) 345/230/13.2KV TRANSFORMER CKT 1
12SP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	111	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	225	108	0	BASE CASE
12SP	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1	497	105	0	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1; TUCO INTERCHANGE (TUCO) 345/230/13.2KV TRANSFORMER CKT 1
12SP	2005-02 - RIVERVIEW INTERCHANGE 115KV CKT 1	161	119	9	2007-33T 230.00 - HARRNG_EST6 230.00 230KV CKT 1
12SP	HARRNG_EST6 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	109	88	HARRNG_EST6 230.00 - HARRNG_MID6 230.00 230KV CKT 1
12SP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	90	103	124	GRAPEVINE INTERCHANGE - ELK CITY 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	90	101	180	GRAPEVINE INTERCHANGE - ELK CITY 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
SEASON	OVERLOADED ELEMENT	RATING	LOADING	ATC	CONTINGENCY

**TABLE 4: Contingency Analysis (continued)**

		(MVA)	(%)	(MW)	
12WP	MUSKOGEE - PECAN CREEK 345KV CKT 1	478	127	0	MUSKOGEE - PECAN CREEK 345KV CKT 2
12WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	105	61	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1
17SP	CANYON EAST SUB - OSAGE SWITCHING STATION 115KV CKT 1	99	214	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
17SP	CANYON EAST SUB - CANYON WEST SUB 115KV CKT 1	99	198	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
17SP	CANYON WEST SUB - DAWN SUB 115KV CKT 1	99	182	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
17SP	DAWN SUB - PNDAHFD3 115.00 115KV CKT 1	99	179	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
17SP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	99	178	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	99	177	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	HEREFORD INTERCHANGE - PNDAHFD3 115.00 115KV CKT 1	99	170	0	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
17SP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	99	160	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	99	154	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1	497	135	0	GEN525562 1
17SP	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	130	0	GEN525562 1
17SP	HOLCOMB - PLYMELL 115KV CKT 1	143	124	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
17SP	ARROWHEAD SUB - OSAGE SWITCHING STATION 115KV CKT 1	161	121	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	PIIONEER TAP - PLYMELL 115KV CKT 1	143	120	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
17SP	2005-02 - RIVERVIEW INTERCHANGE 115KV CKT 1	161	119	0	2007-33T 230.00 - HARRNG_EST6 230.00 230KV CKT 1
17SP	HALE CO INTERCHANGE - KRESS INTERCHANGE 115KV CKT 1	161	113	0	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
17SP	AMARILLO SOUTH INTERCHANGE - ARROWHEAD SUB 115KV CKT 1	161	113	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1	173	105	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	FRIONA SUB - HEREFORD INTERCHANGE 115KV CKT 1	99	107	19	GEN525562 1
17SP	HARRNG_EST6 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	107	119	HARRNG_EST6 230.00 - HARRNG_MID6 230.00 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**

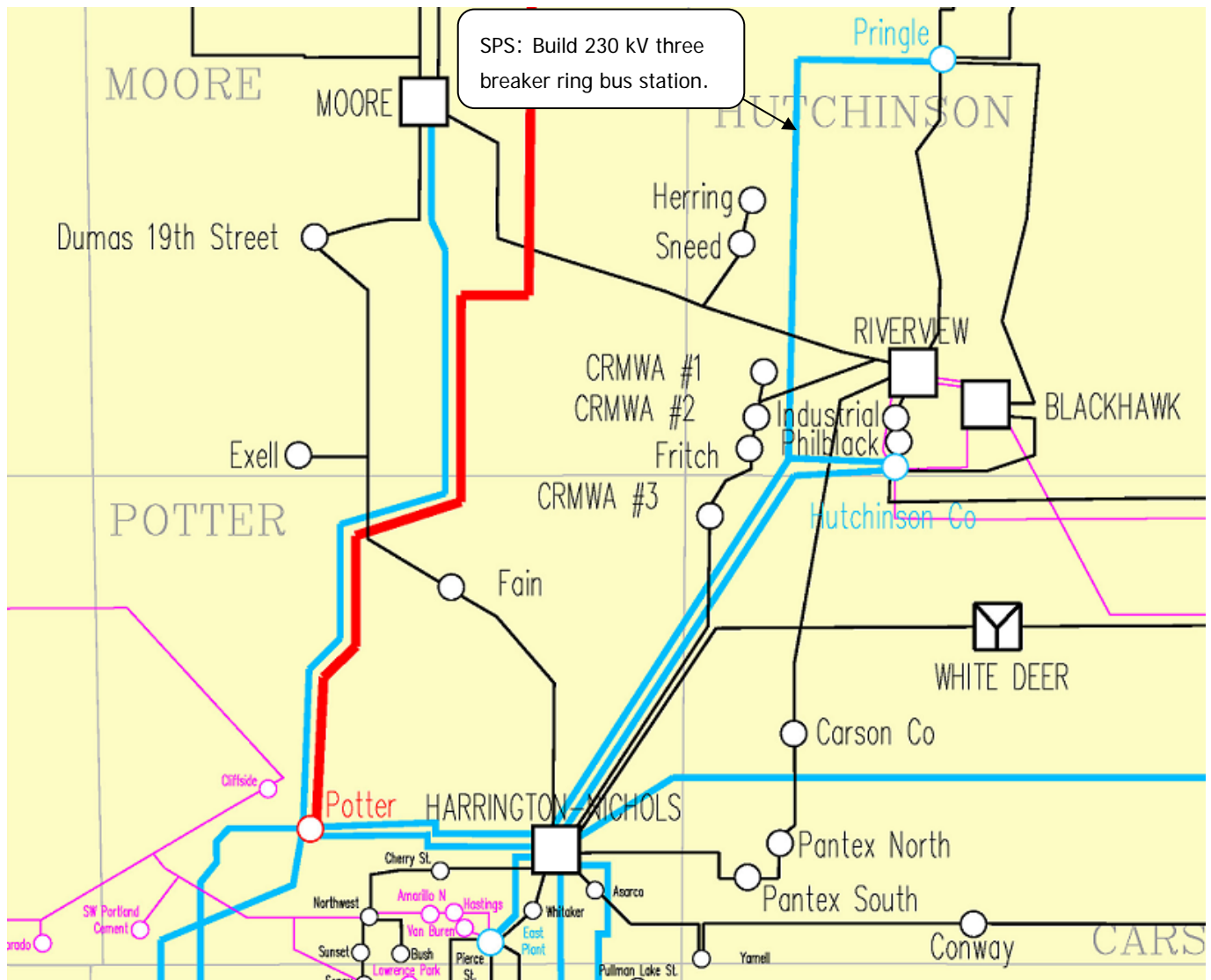
The minimum cost of interconnecting the Customer's interconnection request is estimated at \$3,221,000 for Direct Assignment Facilities and Network Upgrades. At this time, the cost estimates for other Direct Assignment facilities including those in Tables 1 and 2 have not been defined by the Customer. In addition to the Customer's proposed interconnection facilities, the Customer may be responsible for installing reactive compensation in the Customer's substation for reactive support. As stated earlier, some but not all of the local projects that were previously queued are assumed to be in service in this Feasibility Study. These costs exclude upgrades of other transmission facilities that were listed in Table 3 of which are Network Constraints.

In Table 4, 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. At the time of the System Impact Study, a better determination of the interconnection facilities may be available.

The required interconnection costs listed in Tables 1 and 2 and other upgrades associated with Network Constraints 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 submits a Transmission Service Request through Southwest Power Pool's OASIS.

**Appendix A: Point of Interconnection Area Map**



**Figure 2: Point of Interconnection Area Map**