



***Feasibility Study  
For  
Generation Interconnection  
Request  
GEN-2007-010***

***SPP Tariff Studies  
(#GEN-2007-010)***

**August, 2007**

## **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 (SPS) located in Castro County, Texas. The proposed method of interconnection is to add a new 230 kV breaker and line terminal at a previously proposed switching station to be constructed on the existing Potter County Interchange – Plant X Station 230 kV transmission line, owned by SPS. The proposed in-service date is September 20, 2010.

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. In order to maintain acceptable reactive power compensation, the customer will be required to pay for the installation of a combined total of at least 34 Mvar of 34.5 kV capacitor bank(s) to be installed in the Customer's collector substation. 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 onto the existing Potter County Interchange – Plant X Station 230 kV transmission line consists of adding a new 230 kV breaker and line terminal into a previously proposed 230kV four-breaker ring-bus switching station to be built for generation interconnection request #GEN-2006-045. The Customer did not propose a specific route for the 230 kV line extending to serve its 230/34.5 kV 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 \$500,000. These costs are shown in Table 2. Network constraints in the American Electric Power West (AEPW), SPS, and Western Farmers Electric Cooperative (WFEC) transmission systems that were identified are shown in Table 4. 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. 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 34.5 kV, 34 Mvar capacitor bank(s).

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.

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 AEPW and 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.

## **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 (SPS) located in Castro County, Texas. The proposed method of interconnection is to add a new 230 kV breaker and line terminal at a previously proposed switching station to be constructed on the existing Potter County Interchange – Plant X Station 230 kV transmission line, owned by SPS. The proposed in-service date is September 20, 2010.

## **Interconnection Facilities**

The primary objective of this study is to identify the system problems associated with connecting the plant 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 requirements for interconnection of the 200 MW consist of adding a new 230 kV breaker and line terminal into a previously proposed four-breaker ring-bus station on the existing Potter County Interchange – Plant X Station 230 kV transmission line owned by SPS. This ring-bus substation shall be constructed and maintained by SPS. This substation was originally proposed to be built for generation interconnection request #GEN-2006-039. A subsequent request for interconnection at this location was made by generation interconnection request #GEN-2006-045. If both prior requests, #GEN-2006-039 and #GEN-2006-045, withdraw from the queue, the Customer will be entirely responsible for cost of constructing the original three-breaker 230 kV ring-bus substation. The Customer did not propose a specific route of its 230 kV line to serve its 230/34.5 kV collection system facilities. It is assumed that obtaining all necessary right-of-way for construction of the Customer 230 kV transmission line and the 230/34.5 kV collector substation will not be a significant expense.

The minimum cost for adding a new breaker and terminating the transmission line serving GEN-2007-010 facilities is estimated at \$500,000. This cost is listed in Table 2. If both prior requests, #GEN-2006-039 and #GEN-2006-045, withdraw from the queue, the Customer will be responsible for building a new 230 kV three-breaker ring-bus switching station and the required interconnection facilities, which is estimated at \$3,000,000 and is listed in Table 3. 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 the 34 Mvar of capacitor bank(s), all of which should be determined by the Customer. The Customer is responsible for these 230 – 34.5 kV facilities up to the point of interconnection. Network constraints in the American Electric Power West (AEPW), SPS, and Western Farmers Electric Cooperative (WFEC) transmission systems that were identified are shown in Table 4.

**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 facilities are shown in Figure 1.

### Interconnection Estimated Costs

**TABLE 1: Direct Assignment Facilities**

| FACILITY  | ESTIMATED COST<br>(2007 DOLLARS) |
|---|----------------------------------|
| Customer – (1) 230/34.5 kV Customer collector substation facilities.  | *                                |
| Customer – (1) 230 kV transmission line from Customer collector substation to the new SPS ring-bus.             | *                                |
| Customer – 34.5 kV, 34 Mvar capacitor bank(s) to be installed in the Customer 230/34.5 kV collector substation. | *                                |
| 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<br>(2007 DOLLARS) |
|--|----------------------------------|
| SPS – (1) 230 kV breaker and line terminal for GEN-2007-010 at the new SPS ring-bus. | \$500,000                        |
| <b>TOTAL</b>   | <b>*</b>                         |

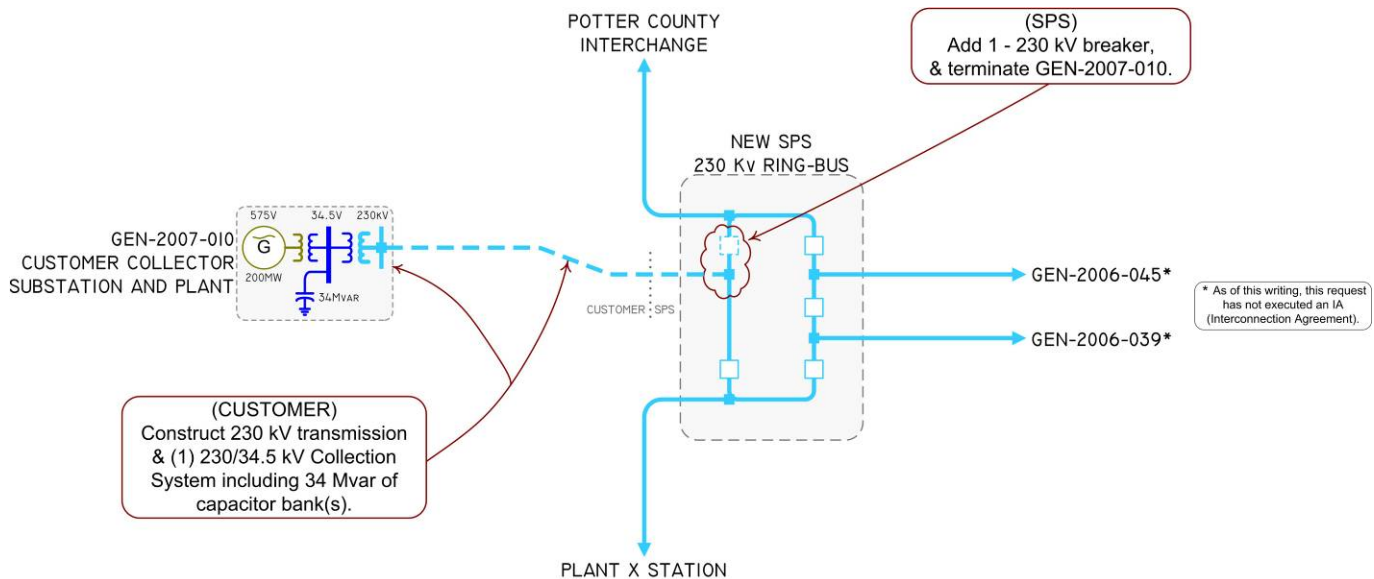
\* Estimates of cost to be determined.

**TABLE 3: Required Interconnection Network Upgrade Facilities  
(If #GEN2006-039 & #GEN-2006-045 withdraw from queue)**

| FACILITY   | ESTIMATED COST<br>(2007 DOLLARS) |
|--|----------------------------------|
| SPS – Build 230 kV, 3-breaker ring-bus switching station. Station to include breakers, switches, control relaying, high speed communications, metering and related equipment and all structures. | \$3,000,000                      |
| <b>TOTAL</b>   | <b>*</b>                         |

\* Estimates of cost to be determined.

## Interconnection Method



**FIGURE 1: Proposed Method of Interconnection  
(Final design to be determined)**

## Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2009 winter peak model, the 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 September 20, 2010. The available seasonal models used were through the 2017 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 200 MW 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. Table 4 lists these overloaded facilities. Including this request (#GEN-2007-010) and the two prior requests (#GEN-2006-039 and #GEN-2006-045), the Potter County Interchange – Plant X Station 230 kV transmission line currently has a total of 840 MW of generation interconnect requests. Additionally, the emergency rating for the Potter County Interchange – Plant X Station 230 kV transmission line is only 606 MVA.

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.

Numerous voltage violations for load serving buses within the SPP footprint were also observed for the some of the contingencies listed in Table 4. These voltage violations have not been listed in this report.

In order to maintain a zero reactive power flow exchanged at the point of interconnection, additional reactive compensation is required. The Customer will be required to install a combined total of 34 Mvar of capacitor bank(s) in the Customer's 230/34.5 kV collector substation on the 34.5 kV bus. 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 (WESTAR), 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 4: Network Constraints**

| <b>AREA</b> | <b>OVERLOADED ELEMENT</b>  |
|-------------|--|
| AEPW        | CLINTON JUNCTION - ELK CITY 138KV CKT 1  |
| AEPW        | ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1                       |
| AEPW        | JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1                               |
| AEPW        | SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1                              |
| AEPW        | SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1                              |
| AEPW/SPS    | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1                               |
| AEPW/SPS    | MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1  |
| AEPW/WFEC   | LAKE PAULINE - RUSSELL 138KV CKT 1   |
| SPS         | BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1                                 |
| SPS         | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1           |
| SPS         | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1 |
| SPS         | GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1                              |
| SPS         | HEREFORD INTERCHANGE - PNDAHFD3 115.00 115KV CKT 1                               |
| SPS         | KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1                              |
| SPS         | LAMB COUNTY REC-SOUTH OLTON - LAMTON INTERCHANGE 115KV CKT 1                     |
| SPS         | LAMB COUNTY REC-SOUTH OLTON - PLANT X STATION 115KV CKT 1                        |
| SPS         | MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1                                     |
| SPS         | PLANT X STATION 230/115KV TRANSFORMER CKT 1                                      |
| SPS         | POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1            |
| SPS         | TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1                                 |
| SPS         | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1                     |
| AEPW        | American Electric Power West   |
| SPS         | Southwestern Public Service  |
| WFEC        | Western Farmers Electric Cooperative   |



**TABLE 5: Contingency Analysis**

| SEASON | OVERLOADED ELEMENT   | RATING (MVA) | LOADING (%) | ATC (MW) | CONTINGENCY  |
|--------|--|--------------|-------------|----------|--|
| 09WP   | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1           | 606          | 146         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1   |
| 09WP   | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1 | 606          | 138         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1   |
| 09WP   | ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1                       | 287          | 179         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 09WP   | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1                               | 351          | 169         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 09WP   | SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1                              | 69           | 146         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 09WP   | BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1                                 | 187          | 137         | 0        | BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1   |
| 09WP   | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1                     | 560          | 136         | 0        | (SPP-SWPS-04A): FINNEY SWITCHING STATION - LAMAR 345KV CKT 1, FINNEY SWITCHING STATION - POTTER COUNTY INTERCHANGE 345KV CKT 1 |
| 09WP   | SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1                              | 69           | 135         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 09WP   | CLINTON JUNCTION - ELK CITY 138KV CKT 1  | 143          | 129         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 09WP   | POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1            | 560          | 125         | 0        | OKLAUNION - TUCO INTERCHANGE 345KV CKT 1   |
| 09WP   | JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1                                | 46           | 120         | 0        | KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1  |
| 09WP   | LAKE PAULINE - RUSSELL 138KV CKT 1   | 72           | 115         | 58       | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1   |
| 09WP   | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1 | 551          | 114         | 86       | BASE CASE  |
| 09WP   | KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1                              | 107          | 104         | 142      | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1   |
| 09WP   | HEREFORD INTERCHANGE - PNDAHFD3 115.00 115KV CKT 1                               | 118          | 104         | 152      | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1   |
| 09WP   | MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1                                     | 107          | 103         | 163      | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1   |
| 09WP   | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1                               | 319          | 102         | 176      | BASE CASE  |
| 09WP   | GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1                              | 606          | 102         | 181      | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12SP   | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1           | 606          | 147         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1   |
| 12SP   | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1 | 606          | 138         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1   |
| 12SP   | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1                               | 351          | 137         | 0        | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1   |

**TABLE 5: Contingency Analysis (continued)**

| SEASON | OVERLOADED ELEMENT   | RATING (MVA) | LOADING (%) | ATC (MW) | CONTINGENCY  |
|--------|--|--------------|-------------|----------|--|
| 12SP   | GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1                                | 129          | 118         | 0        | ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1   |
| 12SP   | KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1                              | 90           | 118         | 0        | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1   |
| 12SP   | MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1                                     | 90           | 116         | 0        | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1   |
| 12SP   | CLINTON JUNCTION - ELK CITY 138KV CKT 1  | 143          | 116         | 41       | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1   |
| 12SP   | ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1                       | 287          | 108         | 92       | CLARENDON REC - HEDLEY 69KV CKT 1  |
| 12SP   | MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1  | 90           | 106         | 104      | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1   |
| 12SP   | TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1                                 | 497          | 105         | 110      | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1   |
| 12SP   | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1                     | 560          | 108         | 133      | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1   |
| 12SP   | GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1                              | 497          | 103         | 155      | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1   |
| 12WP   | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1           | 606          | 145         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1   |
| 12WP   | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1 | 606          | 138         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1   |
| 12WP   | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1                               | 351          | 180         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12WP   | ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1                       | 287          | 172         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12WP   | CLINTON JUNCTION - ELK CITY 138KV CKT 1  | 143          | 152         | 0        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12WP   | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1                     | 560          | 139         | 0        | (SPP-SWPS-04A): FINNEY SWITCHING STATION - LAMAR 345KV CKT 1, FINNEY SWITCHING STATION - POTTER COUNTY INTERCHANGE 345KV CKT 1 |
| 12WP   | LAKE PAULINE - RUSSELL 138KV CKT 1   | 72           | 122         | 5        | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12WP   | KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1                              | 107          | 114         | 49       | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12WP   | MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1                                     | 107          | 112         | 67       | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12WP   | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1                               | 319          | 108         | 81       | BASE CASE  |
| 12WP   | MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1  | 107          | 106         | 133      | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1   |
| 12WP   | GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1                                | 140          | 101         | 180      | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1   |
| 17SP   | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1           | 606          | 147         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1   |
| 17SP   | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1 | 606          | 138         | 0        | NEW SPS STATION (G06-39, G06-45, G07-10) - PLANT X STATION 230KV CKT 1   |

**TABLE 5: Contingency Analysis (continued)**

| SEASON | OVERLOADED ELEMENT   | RATING (MVA) | LOADING (%) | ATC (MW) | CONTINGENCY  |
|--------|--|--------------|-------------|----------|--|
| 17SP   | ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1                       | 287          | 147         | 0        | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1     |
| 17SP   | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1                               | 351          | 138         | 0        | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1     |
| 17SP   | GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1                                | 129          | 124         | 0        | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1 |
| 17SP   | TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1                                 | 497          | 116         | 0        | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1     |
| 17SP   | KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1                              | 90           | 116         | 0        | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1 |
| 17SP   | MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1                                     | 90           | 114         | 0        | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1 |
| 17SP   | LAMB COUNTY REC-SOUTH OLTON - PLANT X STATION 115KV CKT 1                        | 161          | 108         | 0        | TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1   |
| 17SP   | CLINTON JUNCTION - ELK CITY 138KV CKT 1  | 143          | 117         | 32       | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1     |
| 17SP   | PLANT X STATION 230/115KV TRANSFORMER CKT 1                                      | 252          | 106         | 48       | TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1   |
| 17SP   | TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1                     | 560          | 110         | 122      | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1     |
| 17SP   | GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1                              | 497          | 105         | 125      | FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1     |
| 17SP   | MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1  | 90           | 103         | 154      | ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1 |
| 17SP   | NEW SPS STATION (G06-39, G06-45, G07-10) - POTTER COUNTY INTERCHANGE 230KV CKT 1 | 551          | 104         | 165      | BASE CASE  |
| 17SP   | TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1                                 | 452          | 100         | 197      | BASE CASE  |
| 17SP   | LAMB COUNTY REC-SOUTH OLTON - LAMTON INTERCHANGE 115KV CKT 1                     | 161          | 100         | 198      | TOLK STATION EAST - TUCO INTERCHANGE 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 \$500,000 for Direct Assignment Facilities and Network Upgrades listed in Tables 1 and 2. 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 a total of 34 Mvar of capacitor bank(s) 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 4 of which are Network Constraints.

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. 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.

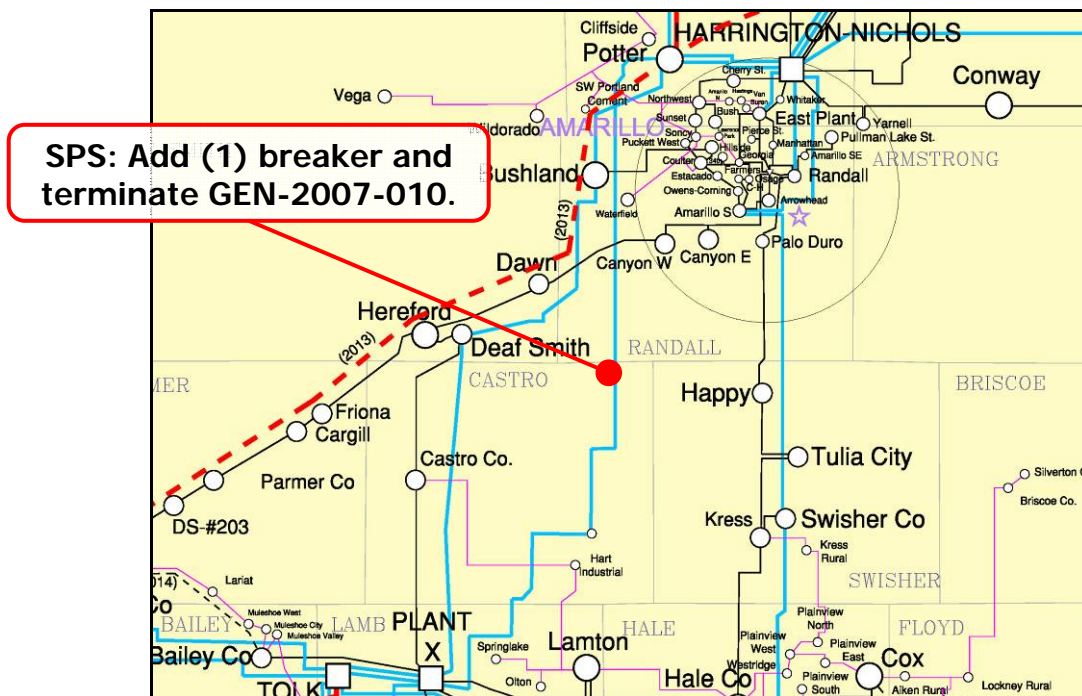


FIGURE 2. Point of Interconnection Area Map