



***Feasibility Study
For
Generation Interconnection
Request
GEN-2006-040***

***SPP Tariff Studies
(#GEN-2006-040)***

April, 2007

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 100 MW of wind generation within the control area of Sunflower Electric Power Corporation (SUNC) in Thomas County, Kansas. The proposed point of interconnection is at the existing Mingo substation, owned by SUNC. The proposed in-service date is August 31, 2008.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 100 MW of generation with transmission system reinforcements within the local transmission system. In order to maintain acceptable reactive power compensation, the customer will need to install 20 Mvars of 34.5 kV capacitor banks in the Customer's collector substation on the 34.5 kV 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 requirement to interconnect the 100 MW of generation at the existing Mingo substation consists of adding a new 115 kV terminal, including one circuit breaker and associated equipment. Customer did not propose a specific 115 kV line extending to serve its 115 – 34.5 kV facilities. 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 required facilities for this 100 MW of generation is \$304,000. These costs are shown in Table 2. Other Network Constraints in the Midwest Energy (MIDW), Southwestern Public Service (SPS), SUNC, and West Plains (WEPL) transmission systems that may be verified with a transmission service request and associated studies are listed in Table 3. 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 115 kV line from the Customer 115/34.5 kV substation to the Mingo Substation. This cost does not include the Customer's 115/34.5 kV substation or the 34.5 kV, 20 Mvar capacitor bank(s).

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.

A list of voltage violations occurring in transmission systems near the generation facility is included in Table 5.

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 MIDW, SUNC, SPS, and WEPL control area 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.

Introduction

<OMITTED TEXT> (Customer) has requested a feasibility study for the purpose of interconnecting 100 MW of wind generation within the control area of Sunflower Electric Power Corporation (SUNC) in Thomas County, Kansas. The proposed method of interconnection is to add a 115 kV terminal at the existing Mingo substation, which is owned by SUNC. The proposed in-service date is August 31, 2008.

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 100 MW consist of adding a new 115 kV terminal, including one 115 kV circuit breaker and associated equipment, at the existing Mingo substation owned by SUNC. The Customer did not propose a route of its 115 kV line to serve its 115/34.5 kV facilities. It is assumed that obtaining all necessary right-of-way for the substation construction will not be a significant expense.

The total cost for adding a new 115 kV terminal and reconfiguring the required interconnection facilities, is estimated at \$304,000. Other Network Constraints in the Midwest Energy (MIDW), Southwestern Public Service (SPS), SUNC, and West Plains (WEPL) transmission 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 115 kV facilities from the Customer substation into the existing Mingo Substation. The Customer is responsible for these 115 kV facilities up to the point of interconnection. This cost also does not include the Customer's 115/34.5 kV substation, which should be determined by the Customer.

The costs of interconnecting the facility to the SUNC transmission system are listed in Tables 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 (2007 DOLLARS)
Customer – 115/34.5 kV Substation facilities.	*
Customer – 115 kV transmission line facilities between Customer facilities and Mingo Substation.	*
Customer – Right-of-Way for Customer facilities.	
Customer – 34.5 kV, 20 Mvar capacitor bank(s) in Customer substation.	*
Total	*

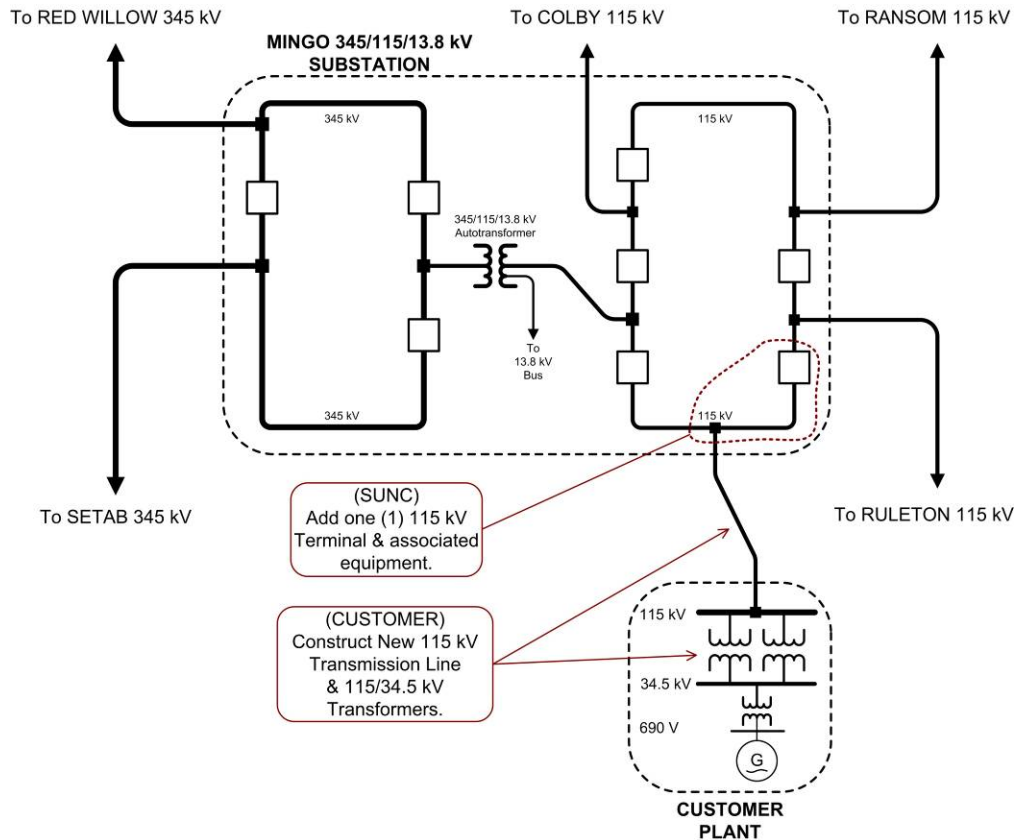
NOTES: * Estimates of cost to be determined by Customer.

Table 2: Required Interconnection Network Upgrade Facilities

FACILITY	ESTIMATED COST (2007 DOLLARS)
SUNC – Add one 115 kV terminal including one 115 kV circuit breaker, associated switches, buswork, relaying and all miscellaneous equipment at Mingo Substation.	\$304,000 ¹
Total	*

NOTES: * Estimates of cost to be determined.

¹ Requires that Customer line enter Mingo Substation from the South. Estimate will be slightly higher if Customer line enters Mingo substation from any other direction.



**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 and 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 August 31, 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 100 MW and location, additional criteria violations will occur on the existing MIDW, SPS, SUNC, and WEPL transmission systems under steady state and contingency conditions in the peak seasons.

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.

A list of voltage violations occurring in transmission systems near the generation facility is included in Table 5. When a facility is affected by more than one contingency, only the worst violation for the facility is included in the table.

In order to maintain a zero reactive power flow exchanged at the point of interconnection, additional reactive compensation is required at the point of interconnection. The Customer will be required to install 20 Mvar of capacitor banks in their substation on the 34.5 kV 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. Some of the 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 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 (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.

Table 3: Network Constraints

AREA	ELEMENT
MIDW	2006-32 - SOUTH HAYS 230KV CKT 1
MIDW	ALEXANDER - NEKOMA 115KV CKT 1
MIDW	ALEXANDER - NESS CITY 115KV CKT 1
MIDW	COLBY - HOXIE
MIDW	HAYS PLANT - SOUTH HAYS 115KV CKT 1
MIDW	HAYS PLANT - VINE STREET 115KV CKT 1
MIDW	KNOLL - VINE STREET 115KV CKT 1
MIDW-WEPL	ST JOHN (MIDW-WEPL TIE) 115KV CKT 1
SPS	ELKHART (TC REC) - EVA (TC REC) 69KV CKT 1
SPS	PRAIRIE - PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER 115KV CKT 1
SPS	PRAIRIE - TEXAS COUNTY INTERCHANGE 115KV CKT 1
SPS-WEPL	PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER - EAST LIBERAL 115KV CKT 1
SUNC	BEEELER - DIGHTON TAP 115KV CKT 1
SUNC	BEEELER - NESS CITY 115KV CKT 1
SUNC	DIGHTON TAP - MANNING TAP 115KV CKT 1
SUNC	PLYMELL - HOLCOMB 115KV CKT 1
SUNC-WEPL	NORTH CIMARRON - CIMARRON RIVER PLANT 115KV CKT 1
SUNC-WEPL	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
WEPL	CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1
WEPL	CIMARRON RIVER TAP - EAST LIBERAL 115KV CKT 1
WEPL	CUDAHY - JUDSON LARGE 115KV CKT 1
WEPL	E. HALL TAP - MULLERGRENN 115KV CKT 1
WEPL	EAST LIBERAL - NORTH LIBERAL TAP 115KV CKT 1
WEPL	GREAT BEND TAP - SEWARD 115KV CKT 1
WEPL	GREENSBURG - JUDSON LARGE 115KV CKT 1
WEPL	GREENSBURG - SUN CITY 115KV CKT 1
WEPL	HARPER - MEDICINE LODGE 138KV CKT 1
WEPL	HARPER - MILAN TAP 138KV CKT 1
WEPL	MEDICINE LODGE - SUN CITY 115KV CKT 1
WEPL	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1
WEPL	MULLERGRENN - SPEARVILLE 230KV CKT 1
WEPL	PRATT - ST JOHN 115KV CKT 1
WEPL	SEWARD - ST JOHN 115KV CKT 1
WEPL	SMITH CENTER - WALDO 115KV CKT 1
MIDW	Midwest Energy
SPS	Southwestern Public Service Company
SUNC	Sunflower Electric Power Corporation
WEPL	West Plains

Table 4: Contingency Analysis

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
2008 Summer Peak Model					
GREENSBURG - JUDSON LARGE 115KV CKT 1	08SP	80	239	0	MULLERGREN - SPEARVILLE 230KV CKT 1
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	08SP	65	202	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
MEDICINE LODGE - SUN CITY 115KV CKT 1	08SP	80	190	0	MULLERGREN - SPEARVILLE 230KV CKT 1
HAYS PLANT - SOUTH HAYS 115KV CKT 1	08SP	88	189	0	KNOLL - SOUTH HAYS 230KV CKT 1
HARPER - MEDICINE LODGE 138KV CKT 1	08SP	72	183	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
HAYS PLANT - VINE STREET 115KV CKT 1	08SP	88	163	0	KNOLL - SOUTH HAYS 230KV CKT 1
MULLERGREN - SPEARVILLE 230KV CKT 1	08SP	355	163	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
SEWARD - ST JOHN 115KV CKT 1	08SP	80	157	0	CIRCLE - MULLERGREN 230KV CKT 1
KNOLL - VINE STREET 115KV CKT 1	08SP	88	156	0	KNOLL - SOUTH HAYS 230KV CKT 1
SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	08SP	336	146	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRAIRIE - TEXAS COUNTY INTERCHANGE 115KV CKT 1	08SP	119	126	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER - EAST LIBERAL 115KV CKT 1	08SP	119	126	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
ALEXANDER - NESS CITY 115KV CKT 1	08SP	101	126	0	MULLERGREN - SPEARVILLE 230KV CKT 1
GREAT BEND TAP - SEWARD 115KV CKT 1	08SP	90	125	0	CIRCLE - MULLERGREN 230KV CKT 1
HARPER - MILAN TAP 138KV CKT 1	08SP	96	121	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
GREENSBURG - SUN CITY 115KV CKT 1	08SP	130	121	0	MULLERGREN - SPEARVILLE 230KV CKT 1
DIGHTON TAP - MANNING TAP 115KV CKT 1	08SP	98	120	0	MULLERGREN - SPEARVILLE 230KV CKT 1
ALEXANDER - NEKOMA 115KV CKT 1	08SP	101	119	0	MULLERGREN - SPEARVILLE 230KV CKT 1
MULLERGREN - SPEARVILLE 230KV CKT 1	08SP	330	114	0	BASE CASE
BEELER - DIGHTON TAP 115KV CKT 1	08SP	98	112	0	MULLERGREN - SPEARVILLE 230KV CKT 1
PRATT - ST JOHN 115KV CKT 1	08SP	80	111	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
2006-32 - SOUTH HAYS 230KV CKT 1	08SP	250	110	0	MINGO - SETAB 345KV CKT 1
BEELER - NESS CITY 115KV CKT 1	08SP	98	108	0	MULLERGREN - SPEARVILLE 230KV CKT 1
PLYMELL - HOLCOMB 115KV CKT 1	08SP	143	105	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
E. HALL TAP - MULLERGREN 115KV CKT 1	08SP	90	104	12	KNOLL - SALINE RIVER 115KV CKT 1
CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1	08SP	115	108	18	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
ST JOHN (MIDW-WEPL TIE) 115KV CKT 1	08SP	88	104	21	CIRCLE - MULLERGREN 230KV CKT 1
PRAIRIE - PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER 115KV CKT 1	08SP	146	103	74	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
SMITH CENTER - WALDO 115KV CKT 1	08SP	60	102	90	KNOLL - SALINE RIVER 115KV CKT 1
COLBY - HOXIE	08SP	101	100	97	MULLERGREN - SPEARVILLE 230KV CKT 1
2008 Winter Peak Model					
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	08WP	65	178	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
GREENSBURG - JUDSON LARGE 115KV CKT 1	08WP	80	172	0	MULLERGREN - SPEARVILLE 230KV CKT 1
HARPER - MEDICINE LODGE 138KV CKT 1	08WP	72	161	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
MEDICINE LODGE - SUN CITY 115KV CKT 1	08WP	80	157	0	MULLERGREN - SPEARVILLE 230KV CKT 1
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	08WP	56	152	0	BASE CASE
SEWARD - ST JOHN 115KV CKT 1	08WP	80	151	0	CIRCLE - MULLERGREN 230KV CKT 1
HAYS PLANT - SOUTH HAYS 115KV CKT 1	08WP	88	119	0	KNOLL - SOUTH HAYS 230KV CKT 1
SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	08WP	336	118	0	HOLCOMB - SPEARVILLE 345KV CKT 1
HARPER - MILAN TAP 138KV CKT 1	08WP	96	109	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
HAYS PLANT - VINE STREET 115KV CKT 1	08WP	88	102	37	KNOLL - SOUTH HAYS 230KV CKT 1
ST JOHN (MIDW-WEPL TIE) 115KV CKT 1	08WP	88	102	71	CIRCLE - MULLERGREN 230KV CKT 1

Table 4: Contingency Analysis (continued)

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
2011 Summer Peak Model					
GREENSBURG - JUDSON LARGE 115KV CKT 1	11SP	80	197	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	11SP	65	192	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
HARPER - MEDICINE LODGE 138KV CKT 1	11SP	72	174	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
MEDICINE LODGE - SUN CITY 115KV CKT 1	11SP	80	155	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	11SP	56	146	0	BASE CASE
PRAIRIE - TEXAS COUNTY INTERCHANGE 115KV CKT 1	11SP	119	139	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER - EAST LIBERAL 115KV CKT 1	11SP	119	139	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
SEWARD - ST JOHN 115KV CKT 1	11SP	80	130	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
MULLERGREIN - SPEARVILLE 230KV CKT 1	11SP	355	129	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	11SP	336	121	0	HOLCOMB - SPEARVILLE 345KV CKT 1
CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1	11SP	115	116	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRAIRIE - PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER 115KV CKT 1	11SP	146	114	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRATT - ST JOHN 115KV CKT 1	11SP	80	113	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
HARPER - MILAN TAP 138KV CKT 1	11SP	96	103	59	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
2011 Winter Peak Model					
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	11WP	65	174	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
GREENSBURG - JUDSON LARGE 115KV CKT 1	11WP	80	165	0	MULLERGREIN - SPEARVILLE 230KV CKT 1
HARPER - MEDICINE LODGE 138KV CKT 1	11WP	72	158	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
MEDICINE LODGE - SUN CITY 115KV CKT 1	11WP	80	150	0	MULLERGREIN - SPEARVILLE 230KV CKT 1
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	11WP	56	149	0	BASE CASE
SEWARD - ST JOHN 115KV CKT 1	11WP	80	139	0	CIRCLE - MULLERGREIN 230KV CKT 1
SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	11WP	336	118	0	HOLCOMB - SPEARVILLE 345KV CKT 1
HARPER - MILAN TAP 138KV CKT 1	11WP	96	101	87	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
2016 Summer Peak Model					
GREENSBURG - JUDSON LARGE 115KV CKT 1	16SP	80	206	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	16SP	65	195	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER - EAST LIBERAL 115KV CKT 1	11SP	119	190	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRAIRIE - TEXAS COUNTY INTERCHANGE 115KV CKT 1	11SP	119	190	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
HARPER - MEDICINE LODGE 138KV CKT 1	16SP	72	177	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
HAYS PLANT - SOUTH HAYS 115KV CKT 1	16SP	88	163	0	KNOLL - SOUTH HAYS 230KV CKT 1
MEDICINE LODGE - SUN CITY 115KV CKT 1	16SP	80	159	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
PRAIRIE - PRAIRIE (PRAI-XFR) PHASE SHIFTING TRANSFORMER 115KV CKT 1	16SP	146	155	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1	16SP	115	151	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
HAYS PLANT - VINE STREET 115KV CKT 1	16SP	88	133	0	KNOLL - SOUTH HAYS 230KV CKT 1
MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	16SP	56	133	0	BASE CASE
MULLERGREIN - SPEARVILLE 230KV CKT 1	16SP	355	131	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
KNOLL - VINE STREET 115KV CKT 1	16SP	88	124	0	KNOLL - SOUTH HAYS 230KV CKT 1
SEWARD - ST JOHN 115KV CKT 1	16SP	80	124	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	16SP	336	121	0	HOLCOMB - SPEARVILLE 345KV CKT 1
NORTH CIMARRON - CIMARRON RIVER PLANT 115KV CKT 1	16SP	143	121	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
CIMARRON RIVER TAP - EAST LIBERAL 115KV CKT 1	16SP	120	115	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
EAST LIBERAL - NORTH LIBERAL TAP 115KV CKT 1	16SP	115	108	0	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1

Table 4: Contingency Analysis (continued)

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
2016 Summer Peak Model (continued)					
PRATT - ST JOHN 115KV CKT 1	16SP	80	108	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
CUDAHY - JUDSON LARGE 115KV CKT 1	16SP	130	107	0	HOLCOMB - SPEARVILLE 345KV CKT 1
GREAT BEND TAP - SEWARD 115KV CKT 1	16SP	90	105	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
HARPER - MILAN TAP 138KV CKT 1	16SP	96	105	44	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
GREENSBURG - SUN CITY 115KV CKT 1	16SP	130	102	63	2003-13 - POTTER COUNTY INTERCHANGE 345KV CKT 1
ELKHART (TC REC) - EVA (TC REC) 69KV CKT 1	16SP	20	109	81	2003-13 - POTTER COUNTY INTERCHANGE 345KV 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.

Table 5: Voltage Violations

AREA	ELEMENT	P/U VOLTAGE	CONTINGENCY
MIDW	BAZINE 69KV	0.799	NEKOMA 115/69KV TRANSFORMER CKT 1
MIDW	PAWNEE 115KV	0.800	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
MIDW	PAWNEE VALLEY 69KV	0.800	NEKOMA 115/69KV TRANSFORMER CKT 1
MIDW	JETMORE 69KV	0.801	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
MIDW	KINSLEY 115KV	0.802	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
SUNC	OBERLIN 115KV	0.803	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
MIDW	HANSTON 69KV	0.804	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
MIDW	COLBY 115KV	0.804	COLBY - MINGO 115KV CKT 1
SUNC	JOHNSON 115KV	0.804	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
WEPL	RUSSELL 115KV	0.805	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
MIDW	HOXIE 115KV	0.806	COLBY - MINGO 115KV CKT 1
SUNC	NORCATUR 115KV	0.806	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
SUNC	HERNDON 115KV	0.807	COLBY - MINGO 115KV CKT 1
MIDW	EDWARDS 115KV	0.808	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
SUNC	RHOADES 115KV	0.809	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
WEPL	WALDO 115KV	0.809	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
WEPL	EAST HALL TAP 115KV	0.809	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
SUNC	NORTH ATWOOD 115KV	0.811	COLBY - MINGO 115KV CKT 1
MIDW	ATWOOD 115KV	0.817	COLBY - MINGO 115KV CKT 1
SUNC	CITY OF HILL CITY 115KV	0.823	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
SUNC	GRAHAM SUBSTATION 115KV	0.823	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
MIDW	HUNTSVILLE 115KV	0.823	HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1
MIDW	KINSLEY 69KV	0.824	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
WEPL	PRATT 115KV	0.824	ST JOHN - ST JOHN 115KV CKT 1
MIDW	BEACH STATION 115KV	0.826	HERNDON - JOHNSON 115KV CKT 1
MIDW	ST JOHN 115KV	0.827	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
SUNC	BIRD CITY 115KV	0.834	COLBY - MINGO 115KV CKT 1
MIDW	REDLINE 115KV	0.843	COLBY - MINGO 115KV CKT 1
MIDW	LACROSSE 115KV	0.847	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
SUNC	ST.FRANCIS 115KV	0.848	COLBY - MINGO 115KV CKT 1
MIDW	ZOOK 69KV	0.851	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
SUNC	CITY OF ST.FRANCIS 115KV	0.852	COLBY - MINGO 115KV CKT 1
MIDW	PHEASANT RUN 115KV	0.853	MINGO - PHEASANT RUN 115KV CKT 1
MIDW	BUNKER HILL 69KV	0.854	ST JOHN - ST JOHN 115KV CKT 1
MIDW	HITSCHMANN 69KV	0.854	ST JOHN - ST JOHN 115KV CKT 1
MIDW	BARTON CO. JUNIOR COLLEGE 69KV	0.856	MULLERGREN UNIT 3 (GEN:58777 3)
SUNC	MANNING 115KV	0.861	MANNING TAP - SCOTT CITY 115KV CKT 1
MIDW	SUSANK 69KV	0.861	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
MIDW	SEWARD 69KV	0.862	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1

Table 5: Voltage Violations (continued)

AREA	ELEMENT	P/U VOLTAGE	CONTINGENCY
MIDW	SOUTH ELLINWOOD 69KV	0.862	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
SUNC	GRINNELL 115KV	0.864	MINGO - PHEASANT RUN 115KV CKT 1
SUNC	DIGHTON 115KV	0.864	MANNING TAP - SCOTT CITY 115KV CKT 1
SUNC	GOVE 115KV	0.870	MINGO - PHEASANT RUN 115KV CKT 1
MIDW	HUDSON 69KV	0.870	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
SUNC	ELLIS 69KV	0.870	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
SUNC	BEELER 115KV	0.874	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
SUNC	LAWN RIDGE 115KV	0.876	COLBY - MINGO 115KV CKT 1
SUNC	ARNOLD 115KV	0.878	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
MIDW	GREAT BEND SOUTH 69KV	0.878	SPP-WERE-78: HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1 AND HUNTSVILLE - ST JOHN 115KV CKT 1
MIDW	NEKOMA 69KV	0.887	NEKOMA 115/69KV TRANSFORMER CKT 1
WEPL	JEWELL 115KV	0.888	CONCORDIA - JEWELL 115KV CKT 1
MIDW	WAKEENEY 115KV	0.893	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
MIDW	BEMIS 115KV	0.895	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
MIDW	GORHAM 115KV	0.897	SPP-SWPS-03: GRAPEVINE - ELK CITY 230KV CKT 1 AND ELK CITY (ELKCITY6) 230/138/13.8KV TRANSFORMER CKT 1
MIDW	Midwest Energy		
SPS	Southwestern Public Service		
SUNC	Sunflower Electric Power Corporation		
WEPL	West Plains		

Conclusion

The minimum cost of interconnecting the Customer's interconnection request is estimated at \$304,000 for Direct Assignment facilities and Network Upgrades listed in Tables 1 and 2. These costs exclude upgrades of other transmission facilities that were listed in Table 3 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 20 Mvar of 34.5 kV capacitors in the Customer substation for reactive support. Dynamic stability analysis will determine if a portion of this should be dynamic (SVC). 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.

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.

A list of voltage violations occurring in transmission systems near the generation facility is included in Table 5. When a facility is affected by more than one contingency, only the worst violation for the facility 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 3 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.

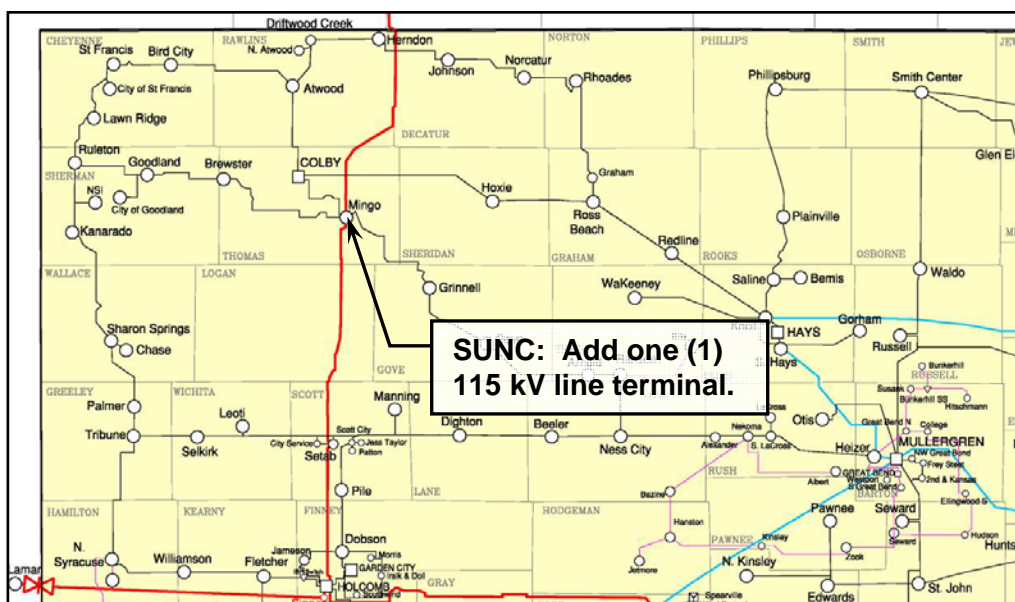


FIGURE 2. MAP OF THE LOCAL AREA