



***Feasibility Study
For
Generation Interconnection
Request
GEN-2006-002***

***SPP Tariff Studies
(#GEN-2006-002)***

August, 2006

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 150MW of generation within the service territory of American Electric Power (AEP) in Beckham County Oklahoma. The proposed point of interconnection is a new switching station in the existing Grapevine-Elk City 230kV transmission line. The proposed in-service date is December 31, 2006. This study assumed the facility could be placed into operation no earlier than June 1, 2007.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 150MW of generation with transmission system reinforcements within the local transmission systems. In order to maintain acceptable bus voltages in the local area, the customer will need to install a 30MVar capacitor bank 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 for interconnection consist of building a new 230kV 3-breaker ring bus substation in the Grapevine-Elk City 230kV transmission line. The portion of the line being interconnected is owned by AEP. This 230kV substation shall be constructed and maintained by AEP. The Customer did not propose a specific 230kV line extending to serve its 230-34.5kV facilities. It is assumed that obtaining all necessary right-of-way for the new switching station will not be a significant expense.

The total cost for building the new 230kV 3-breaker ring bus substation, the required interconnection facility, is estimated at \$3,500,000. Other Network Constraints in the American Electric Power West (AEPW), Southwestern Public Service Company (SPS) (d/b/a Xcel Energy, Inc.), and Western Farmers Electric Cooperative (WFEC) 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 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 34.5kV, 30Mvar capacitor bank.

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. With higher queued generation projects in the local area modeled in this case, there were a number of contingencies involving some SPS tie lines in which no power flow solution was obtained. This result indicates the need for new facilities that can be determined in a transmission service request. The ATC associated with this interconnection request is

0MW. These contingency analyses will have to be re-evaluated as part of a TSR with additional transmission facilities between AEP and the remainder of SPP.

There are several other proposed generation additions in the general area of the Customer's facility. It was assumed in this preliminary analysis that these other projects within the AEPW, SPS and WFEC service territories 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 150MW of generation within the service territory of American Electric Power (AEP) in Beckham County Oklahoma. The proposed method of interconnection is to build a new 230kV ring bus switching station in the existing Grapevine-Elk City 230kV line. The proposed in-service date is December 31, 2006. Due to time constraints of the interconnection process and construction time frames, this study assumed the facility could not be in service before June 1, 2007.

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 consist of building a new 230kV 3 breaker ring bus switching station in the existing Grapevine-Elk City 230kV transmission line. This transmission line is jointly owned by AEP and Southwestern Public Service (SPS) d/b/a Xcel Energy. 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, the required interconnection facility, is estimated at \$3,500,000. Other Network Constraints in the AEPW, SPS and 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 AEP 230kV switching station. The Customer is responsible for these 230kV facilities, whether the facilities are transmission line or substation bus, 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 AEP 230kV switching station	*
Customer - Right-of-Way for Customer facilities.	*
Customer – 34.5kV, 30MVAR capacitor bank in Customer substation	
Total	*

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

Table 2: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2006 DOLLARS)
AEP – 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

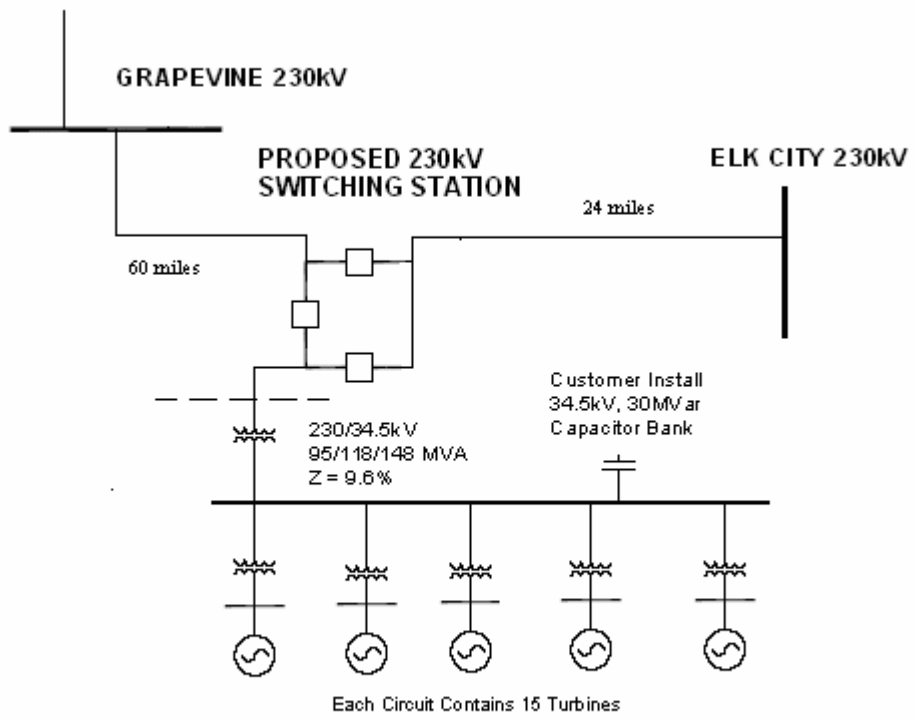


Figure 1: Proposed Interconnection
(Final substation design to be determined)

Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2007, 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 31, 2006. It is assumed the facility cannot be placed in service before June 1, 2007. 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 150MW 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. Power flow solutions were not obtained for a number of contingencies that involved some of SPS's tie lines to the rest of SPP. Therefore, the ATC associated with this interconnection is 0MW. These contingency analyses will have to be re-evaluated as part of a TSR with additional transmission facilities between AEP and the remainder of SPP.

There are several other proposed generation additions in the general area of the Customer's facility. 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.

In order to maintain adequate voltage in the area of the interconnection and 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 30MVAR of capacitor banks in their substation on the 34.5kV bus 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.

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 American Electric Power West, Southwestern Public Service Company (d/b/a Xcel Energy, Inc.), Oklahoma Gas & Electric (OKGE), and Western Farmers Electric Cooperative 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

Facility
AEP -54153 ELKCITY6 230 99967 2006-02T 230 1
SPS- 50914 NICHOL3 115 50922 WHITAKR3 115 1
SPS- 50922 WHITAKR3 115 50956 EASTPL3 115 1
SPS- 50956 EASTPL3 115 50964 PIERCT3 115 1
SPS- 50956 EASTPL3 115 50978 MANHATT3 115 1
SPS- 50964 PIERCT3 115 51014 OSAGE 3 115 1
SPS- 50978 MANHATT3 115 51018 MANHTP3 115 1
SPS- 51014 OSAGE 3 115 51080 CANYNE3 115 1
SPS- 51020 RANDALL3 115 51021 RANDALL6 230 1
SPS- 51020 RANDALL3 115 51082 PALODU 3 115 1
SPS- 51078 CANYNW3 115 51080 CANYNE3 115 1
SPS- 51082 PALODU 3 115 51302 HAPPY3 115 1
SPS- 51302 HAPPY3 115 51310 TULIAT3 115 1
SPS- 51310 TULIAT3 115 51316 KRESS3 115 1
SPS- 51402 HALECO3 115 51532 TUCO3 115 1
AEP - 54119 O.K.U.-7 345 59991 OKLAUN 7 345 1
AEP - 54121 ELKCTY-4 138 54148 CLINTJC4 138 1
AEP - 54121 ELKCTY-4 138 WND 1 ELKCTY-6 1
AEP - 54121 ELKCTY-4 138 WND 2 ELKCTY-4 1
AEP -54122 ELKCTY-269.0 55897 ELKCITY269.0 1
AEP -54122 ELKCTY-269.0 WND 1 ELKCTY-4 1
AEP -54153 ELKCITY6 230 99967 2006-02T 230 1
AEP -54153 ELKCITY6 230 WND 2 ELKCTY-6 1
AEP -54294 SHAM 2WT69.0 WND 1 SHAMRCK1 1
AEP -54295 SHAM 3WT 115 WND 2 SHAMRCK1 1
AEP-WFEC -54296 LAKEP4WT 138 56043 RUSSELL4 138 1
SPS - 51320 SWISHER3 115 51321 SWISHER6 230 1
WFEC - 55942 HM-BTTP269.0 56000 MORWODS269.0 1
AEP - 54122 ELKCTY-269.0 WND 1 ELKCTY-4 1
SPS -50838 MCLELLN3 115 50932 KIRBY3 115 1
AEP -54110 CL-CITY269.0 54185 FOSSTAP269.0 1
SPS -50887 POTTRC6 230 50907 HARRNG6 230 1
SPS -50838 MCLELLN3 115 50840 MCLEAR3 115 1
AEP - 54121 ELKCTY-4 138 WND 2 ELKCTY-4 1
AEP-SPS 50840 MCLEAR3 115 54295 SHAM 3WT 115 1
WFEC 55876 DILL JT269.0 55897 ELKCITY269.0 1
AEP 54293 SHAM 4WT 138 WND 2 SHAMRCK2 1

Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
54153 ELKCITY6 230 99967 2006-02T 230 1	07sp	107	319 (Rate A)	0	BASE CASE
50914 NICHOL3 115 50922 WHITAKR3 115 1	16sp	122.1	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50914 NICHOL3 115 50922 WHITAKR3 115 1	11sp	115.3	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50914 NICHOL3 115 50922 WHITAKR3 115 1	08sp	113.2	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50914 NICHOL3 115 50922 WHITAKR3 115 1	07sp	112.6	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50922 WHITAKR3 115 50956 EASTPL3 115 1	16sp	114.2	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50922 WHITAKR3 115 50956 EASTPL3 115 1	11sp	108.1	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50922 WHITAKR3 115 50956 EASTPL3 115 1	08sp	106.4	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50922 WHITAKR3 115 50956 EASTPL3 115 1	07sp	105.9	249	0	: OPEN LINE FROM BUS 50908 [CHERRY3 115.00] TO BUS 50914 [NICHOL3 115.00] CKT 1
50956 EASTPL3 115 50964 PIERCT3 115 1	07sp	119	161	0	: OPEN LINE FROM BUS 50956 [EASTPL3 115.00] TO BUS 50978 [MANHATT3115.00] CKT 1
50956 EASTPL3 115 50978 MANHATT3 115 1	07sp	118.2	161	0	: OPEN LINE FROM BUS 50956 [EASTPL3 115.00] TO BUS 50964 [PIERCT3 115.00] CKT 1
50964 PIERCT3 115 51014 OSAGE 3 115 1	07sp	107.2	161	0	: OPEN LINE FROM BUS 50956 [EASTPL3 115.00] TO BUS 50978 [MANHATT3115.00] CKT 1

50978 MANHATT3 115 51018 MANHTP3 115 1	07sp	104.3	161	0	: OPEN LINE FROM BUS 50956 [EASTPL3 115.00] TO BUS 50964 [PIERCT3 115.00] CKT1
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Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
51014 OSAGE 3 115 51080 CANYNE3 115 1	07sp	132.8	99	0	: OPEN LINE FROM BUS 50993 [BUSHLND6230.00] TO BUS 51111 [DFSMTH6 230.00] CKT 1
51020 RANDALL3 115 51021 RANDALL6 230 1	11sp	105.9	258.8	0	: OPEN LINE FROM BUS 50915 [NICHOL6 230.00] TO BUS 51041 [AMARLS6 230.00] CKT 1
51020 RANDALL3 115 51082 PALODU 3 115 1	08sp	148.3	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51020 RANDALL3 115 51082 PALODU 3 115 1	11sp	146.6	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51020 RANDALL3 115 51082 PALODU 3 115 1	07sp	145.4	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51078 CANYNW3 115 51080 CANYNE3 115 1	07sp	119.9	99	0	: OPEN LINE FROM BUS 50993 [BUSHLND6230.00] TO BUS 51111 [DFSMTH6 230.00] CKT 1
51082 PALODU 3 115 51302 HAPPY3 115 1	08sp	146.3	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51082 PALODU 3 115 51302 HAPPY3 115 1	11sp	144.4	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51082 PALODU 3 115 51302 HAPPY3 115 1	07sp	143.4	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51302 HAPPY3 115 51310 TULIAT3 115 1	08sp	122	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51302 HAPPY3 115 51310 TULIAT3 115 1	11sp	119.6	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51302 HAPPY3 115 51310 TULIAT3 115 1	07sp	119.4	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1

Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
51310 TULIAT3 115 51316 KRESS3 115 1	08sp	116.5	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51310 TULIAT3 115 51316 KRESS3 115 1	07sp	113.9	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51310 TULIAT3 115 51316 KRESS3 115 1	11sp	113.8	99	0	: OPEN LINE FROM BUS 51041 [AMARLS6 230.00] TO BUS 51321 [SWISHER6230.00] CKT 1
51402 HALECO3 115 51532 TUCO3 115 1	07sp	109.3	99	0	: OPEN LINE FROM BUS 51321 [SWISHER6230.00] TO BUS 51533 [TUCO6 230.00] CKT 1
54119 O.K.U.-7 345 59991 OKLAUN 7 345 1	07wp	102	250	0	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
54121 ELKCTY-4 138 54148 CLINTJC4 138 1	08wp	146.2	143	0	: OPEN LINE FROM BUS 54109 [CL-AFTP4138.00] TO BUS 54121 [ELKCTY-4138.00] CKT 1
54121 ELKCTY-4 138 54148 CLINTJC4 138 1	07wp	145.9	143	0	: OPEN LINE FROM BUS 54109 [CL-AFTP4138.00] TO BUS 54121 [ELKCTY-4138.00] CKT 1
54121 ELKCTY-4 138 54148 CLINTJC4 138 1	11wp	141.6	143	0	: OPEN LINE FROM BUS 54109 [CL-AFTP4138.00] TO BUS 54121 [ELKCTY-4138.00] CKT 1
54121 ELKCTY-4 138 54148 CLINTJC4 138 1	08sp	135.8	143	0	: OPEN LINE FROM BUS 54109 [CL-AFTP4138.00] TO BUS 54121 [ELKCTY-4138.00] CKT 1
54121 ELKCTY-4 138 WND 1 ELKCTY-6 1	07wp	133.4	287	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1
54121 ELKCTY-4 138 WND 1 ELKCTY-6 1	08wp	131.6	287	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1
54121 ELKCTY-4 138 WND 1 ELKCTY-6 1	11wp	130.3	287	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1

Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
54121 ELKCTY-4 138 WND 1 ELKCTY-6 1	08sp	128.3	287	0	: OPEN LINE FROM BUS 51533 [TUCO6 230.00] TO BUS 51534 [TUCO7 345.00] TO BU
54121 ELKCTY-4 138 WND 1 ELKCTY-6 1	07sp	127	287	0	: OPEN LINE FROM BUS 51533 [TUCO6 230.00] TO BUS 51534 [TUCO7 345.00] TO BU
54121 ELKCTY-4 138 WND 2 ELKCTY-4 1	11sp	116.8	72	0	: OPEN LINE FROM BUS 56000 [MORWODS269.000] TO BUS 56002 [MORWOOD469.000] CKT 1
54121 ELKCTY-4 138 WND 2 ELKCTY-4 1	16sp	116.7	72	0	: OPEN LINE FROM BUS 56000 [MORWODS269.000] TO BUS 56002 [MORWOOD469.000] CKT 1
54122 ELKCTY-269.0 55897 ELKCITY269.0 1	11wp	180.2	39	0	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1
54122 ELKCTY-269.0 55897 ELKCITY269.0 1	11sp	175.4	39	0	: OPEN LINE FROM BUS 56000 [MORWODS269.000] TO BUS 56002 [MORWOOD469.000] CKT 1
54122 ELKCTY-269.0 55897 ELKCITY269.0 1	07wp	173.1	39	0	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1
54122 ELKCTY-269.0 55897 ELKCITY269.0 1	08wp	171.7	39	0	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1
54122 ELKCTY-269.0 55897 ELKCITY269.0 1	08sp	168.9	39	0	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1
54122 ELKCTY-269.0 55897 ELKCITY269.0 1	07sp	168.5	39	0	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1
54122 ELKCTY-269.0 55897 ELKCITY269.0 1	16sp	163.2	39	0	: OPEN LINE FROM BUS 56000 [MORWODS269.000] TO BUS 56002 [MORWOOD469.000] CKT 1

54122 ELKCTY-269.0 WND 1 ELKCTY-4 1	11sp	116.9	72	0	: OPEN LINE FROM BUS 56000 [MORWODS269.000] TO BUS 56002 [MORWOOD469.000] CKT 1
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Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
54122 ELKCTY-269.0 WND 1 ELKCTY-4 1	16sp	116.6	72	0	: OPEN LINE FROM BUS 56000 [MORWODS269.000] TO BUS 56002 [MORWOOD469.000] CKT 1
54122 ELKCTY-269.0 WND 1 ELKCTY-4 1	08sp	110.1	72	0	: OPEN LINE FROM BUS 54121 [ELKCTY- 4138.00] TO BUS 54148 [CLINTJC4138.00] CKT 1
54153 ELKCITY6 230 99967 2006-02T 230 1	08sp	122.0	351	0	: OPEN LINE FROM BUS 51534 [TUCO7 345.00] TO BUS 54119 [O.K.U.-7345.00] CKT 1
54153 ELKCITY6 230 99967 2006-02T 230 1	07sp	121.0	351	0	: OPEN LINE FROM BUS 51534 [TUCO7 345.00] TO BUS 54119 [O.K.U.-7345.00] CKT 1
54153 ELKCITY6 230 99967 2006-02T 230 1	11sp	108.7	351	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1
54153 ELKCITY6 230 WND 2 ELKCTY-6 1	07wp	127.4	287	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1
54153 ELKCITY6 230 WND 2 ELKCTY-6 1	08wp	126.1	287	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1
54153 ELKCITY6 230 WND 2 ELKCTY-6 1	11wp	125.1	287	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1
54153 ELKCITY6 230 WND 2 ELKCTY-6 1	08sp	123	287	0	: OPEN LINE FROM BUS 51533 [TUCO6 230.00] TO BUS 51534 [TUCO7 345.00] TO BU
54153 ELKCITY6 230 WND 2 ELKCTY-6 1	07sp	121.9	287	0	: OPEN LINE FROM BUS 51533 [TUCO6 230.00] TO BUS 51534 [TUCO7 345.00] TO BU
54294 SHAM 2WT69.0 WND 1 SHAMRCK1 1	11sp	112.6	69	0	: OPEN LINE FROM BUS 54121 [ELKCTY- 4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU

54295 SHAM 3WT 115 WND 2 SHAMRCK1 1	11sp	111.8	69	0	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU
54296 LAKEP4WT 138 56043 RUSSELL4 138 1	07wp	126.2	72	0	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU

Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
54296 LAKEP4WT 138 56043 RUSSELL4 138 1	08wp	122.7	72	0	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU
54296 LAKEP4WT 138 56043 RUSSELL4 138 1	11wp	119.2	72	0	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU
54296 LAKEP4WT 138 56043 RUSSELL4 138 1	07sp	113.3	72	0	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU
No Solution	All Seasons	n/a	n/a	0	: OPEN LINE FROM BUS 50914 [NICHOL3 115.00] TO BUS 50926 [YARNELL3115.00] CKT 1
No Solution	All Seasons	n/a	n/a	0	: OPEN LINE FROM BUS 50926 [YARNELL3115.00] TO BUS 50928 [CONWAY3 115.00] CKT 1
No Solution	All Seasons	n/a	n/a	0	: OPEN LINE FROM BUS 50858 [FINNEY7 345.00] TO BUS 56449 [HOLCOMB7345.00] CKT 1
54122 ELKCTY-269.0 WND 1 ELKCTY-4 1	11wp	109.6	72	5	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54148 [CLINTJC4138.00] CKT 1
51320 SWISHER3 115 51321 SWISHER6 230 1	07sp	103.1	150	5	: OPEN LINE FROM BUS 51321 [SWISHER6230.00] TO BUS 51533 [TUCO6 230.00] CKT 1
54121 ELKCTY-4 138 WND 2 ELKCTY-4 1	11wp	107.6	72	8	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54148 [CLINTJC4138.00] CKT 1
55942 HM-BTTP269.0 56000 MORWODS269.0 1	07sp	117.7	26	13	: OPEN LINE FROM BUS 55999 [MOORLND4138.00] TO BUS 56001 [MORWODS4138.00] CKT 1

54110 CL-CITY269.0 54185 FOSSTAP269.0 1	08sp	113.4	53	14	: OPEN LINE FROM BUS 54148 [CLINTJC4138.00] TO BUS 54197 [CL-NGTP4138.00] CKT 1
54121 ELKCTY-4 138 WND 2 ELKCTY-4 1	08sp	108.1	72	15	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54148 [CLINTJC4138.00] CKT 1

Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
54122 ELKCTY-269.0 WND 1 ELKCTY-4 1	07sp	107.6	72	22	: OPEN LINE FROM BUS 54109 [CL-AFTP4138.00] TO BUS 54121 [ELKCTY-4138.00] CKT 1
55942 HM-BTTP269.0 56000 MORWODS269.0 1	07wp	132.1	26	25	: OPEN LINE FROM BUS 55999 [MOORLND4138.00] TO BUS 56001 [MORWODS4138.00] CKT 1
50838 MCLELLN3 115 50932 KIRBY3 115 1	07wp	110.8	107	25	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
54110 CL-CITY269.0 54185 FOSSTAP269.0 1	07sp	112.5	53	27	: OPEN LINE FROM BUS 54148 [CLINTJC4138.00] TO BUS 54197 [CL-NGTP4138.00] CKT 1
50887 POTTRC6 230 50907 HARRNG6 230 1	08sp	100.3	497	29	: OPEN LINE FROM BUS 50887 [POTTRC6 230.00] TO BUS 50907 [HARRNG6 230.00] CKT 2
50838 MCLELLN3 115 50840 MCLEAR3 115 1	07wp	109.6	107	40	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
50838 MCLELLN3 115 50932 KIRBY3 115 1	11sp	109.4	90	44	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
50838 MCLELLN3 115 50932 KIRBY3 115 1	08wp	108.7	107	46	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
54121 ELKCTY-4 138 WND 1 ELKCTY-6 1	11sp	120.6	287	50	: OPEN LINE FROM BUS 54119 [O.K.U.-7345.00] TO BUS 54131 [L.E.S.-7345.00] CKT 1
55942 HM-BTTP269.0 56000 MORWODS269.0 1	08wp	123.9	26	51	: OPEN LINE FROM BUS 55999 [MOORLND4138.00] TO BUS 56001 [MORWODS4138.00] CKT 1

54121 ELKCTY-4 138 WND 2 ELKCTY-4 1	07sp	105.7	72	52	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54148 [CLINTJC4138.00] CKT 1
50838 MCLELLN3 115 50840 MCLEAR3 115 1	08wp	107.5	107	59	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1

Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
55942 HM-BTTP269.0 56000 MORWODS269.0 1	08sp	110.4	26	62	: OPEN LINE FROM BUS 55999 [MOORLND4138.00] TO BUS 56001 [MORWODS4138.00] CKT 1
54121 ELKCTY-4 138 54148 CLINTJC4 138 1	11sp	116.8	143	63	: OPEN LINE FROM BUS 54119 [O.K.U.-7345.00] TO BUS 54131 [L.E.S.-7345.00] CKT 1
54153 ELKCITY6 230 WND 2 ELKCTY-6 1	11sp	116.5	287	64	: OPEN LINE FROM BUS 54119 [O.K.U.-7345.00] TO BUS 54131 [L.E.S.-7345.00] CKT 1
50840 MCLEAR3 115 54295 SHAM 3WT 115 1	07wp	106.7	107	68	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
50838 MCLELLN3 115 50840 MCLEAR3 115 1	11sp	107.5	90	69	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
50838 MCLELLN3 115 50932 KIRBY3 115 1	11wp	106	107	72	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
55942 HM-BTTP269.0 56000 MORWODS269.0 1	11wp	117.6	26	78	: OPEN LINE FROM BUS 55999 [MOORLND4138.00] TO BUS 56001 [MORWODS4138.00] CKT 1
50838 MCLELLN3 115 50840 MCLEAR3 115 1	11wp	104.6	107	88	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
50840 MCLEAR3 115 54295 SHAM 3WT 115 1	08wp	104.6	107	90	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
55876 DILL JT269.0 55897 ELKCITY269.0 1	11wp	104.8	61	101	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1

54122 ELKCTY-269.0 WND 1 ELKCTY-4 1	08wp	103.9	72	105	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1
54293 SHAM 4WT 138 WND 2 SHAMRCK2 1	11sp	102.1	69	109	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU
54122 ELKCTY-269.0 WND 1 ELKCTY-4 1	07wp	103.8	72	109	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1

Table 4: Contingency Analysis

Facility (Highest loading in bold)	Season	Study Case Loading %	Seasonal Element Rating (MVA)	ATC (MW)	Contingency with Worst Case Overload
54110 CL-CITY269.0 54185 FOSSTAP269.0 1	11sp	102.7	53	121	: OPEN LINE FROM BUS 54148 [CLINTJC4138.00] TO BUS 54197 [CL-NGTP4138.00] CKT 1
50840 MCLEAR3 115 54295 SHAM 3WT 115 1	11wp	101.4	107	124	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
54121 ELKCTY-4 138 WND 2 ELKCTY-4 1	08wp	101.7	72	129	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54148 [CLINTJC4138.00] CKT 1
50840 MCLEAR3 115 54295 SHAM 3WT 115 1	11sp	102.4	90	135	: OPEN LINE FROM BUS 54153 [ELKCITY6230.00] TO BUS 99967 [2006-02T230.00] CKT 1
54121 ELKCTY-4 138 WND 2 ELKCTY-4 1	07wp	101	72	138	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] CKT 1
54294 SHAM 2WT69.0 WND 1 SHAMRCK2 1	11sp	100.5	69	140	: OPEN LINE FROM BUS 54121 [ELKCTY-4138.00] TO BUS 54153 [ELKCITY6230.00] TO BU
55876 DILL JT269.0 55897 ELKCITY269.0 1	07wp	100.9	61	142	: OPEN LINE FROM BUS 56001 [MORWODS4138.00] TO BUS 99940 [2002-05T138.00] 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 project is estimated at \$3,500,000 for AEP's Transmission Owner interconnection facilities listed in Table 2 excluding upgrades of other transmission facilities by AEP, SPS and WFEA listed in Table 3 of which are Network Constraints. At this time, the cost estimates for Direct Assignment facilities including those in Table 1 have not all been defined by the Customer. In addition to the Customer's proposed interconnection facilities, the Customer will be responsible for installing a 34.5kV, 30Mvar capacitor bank in the Customer substation for reactive support. As stated earlier, 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. These contingency analyses will have to be re-evaluated as part of a TSR with additional transmission facilities between AEP and the remainder of SPP.

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.

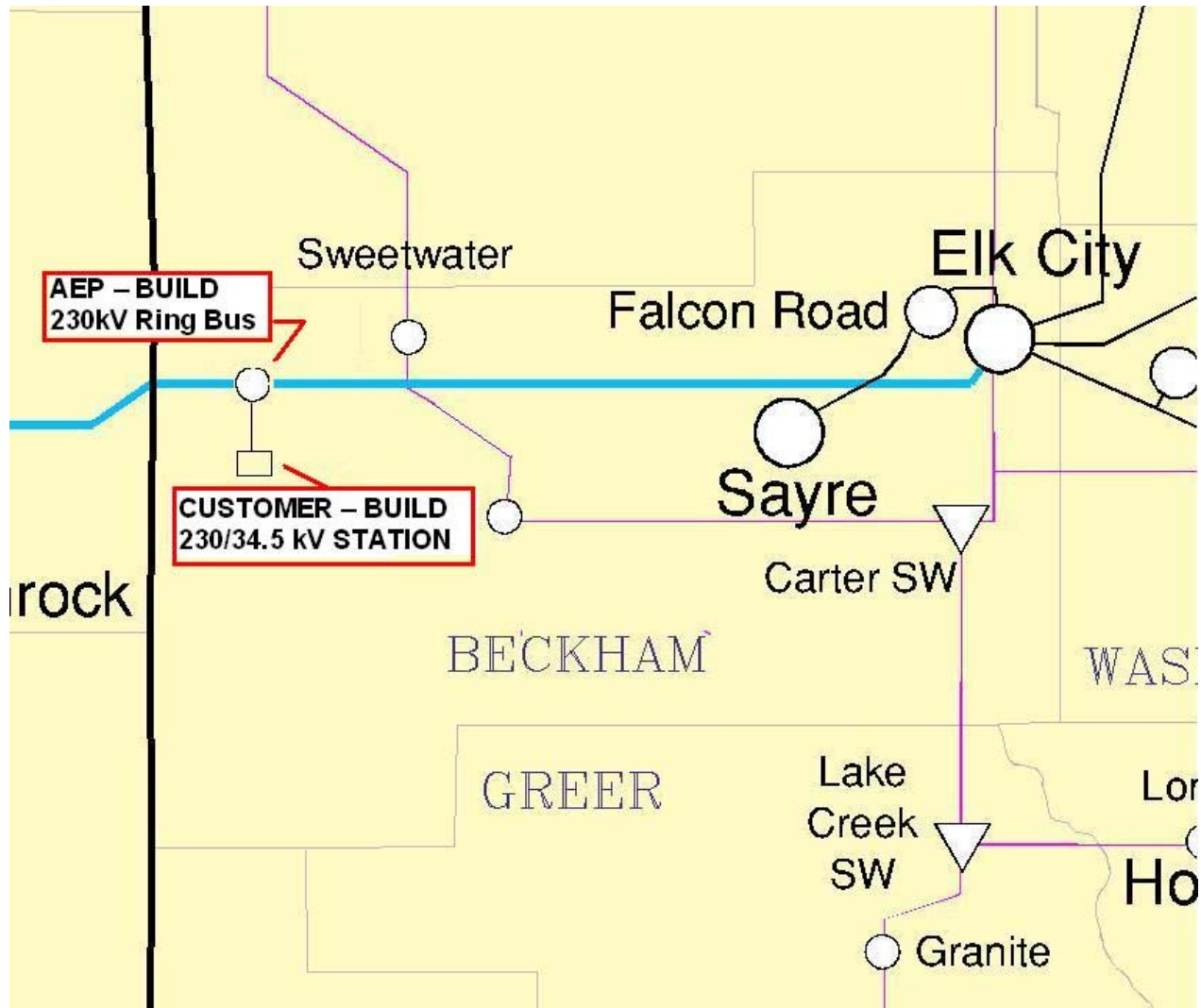


Figure 2: Map Of The Surrounding Area