Feasibility Study
For
Generation Interconnection Request
GEN-2007-035

SPP Tariff Studies
(#GEN-2007-035)

March, 2008

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 American Electric Power West (AEPW) located in Harmon County, Oklahoma. The proposed interconnection point is on the existing Hollis (AEPW) 138 kV substation, owned by AEPW. The proposed in-service date is December, 2009.

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. 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 100 MW of wind generation on the existing Hollis (AEPW) 138 kV substation consists of adding a new 138 kV three-breaker ring-bus switching station at Hollis Tap (AEPW) 138 kV switching station and a new line terminal and breaker on the Hollis (AEPW) 138 kV substation. These facilities will be constructed and maintained by AEPW. The Customer did not propose a specific route for the 138 kV line extending to serve its 138/34.5 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 100 MW of generation is $4,100,000. These costs are shown in Tables 1 and 2. This cost does not include building the 138 kV line from the Customer 138/34.5 kV collector substation into the point of interconnection. This cost also does not include the Customer's 138/34.5 kV collector substation or possible need for reactive compensation. Network constraints in the American Electric Power West (AEPW) 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 100 MW of wind generation within the control area of American Electric Power West (AEPW) located in Harmon County, Oklahoma. The proposed interconnection point is on the existing Hollis (AEPW) 138 kV substation, owned by AEPW. The proposed in-service date is December, 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 100 MW of wind generation on the existing Hollis (AEPW) 138 kV substation consists of adding a new 138 kV three-breaker ring-bus switching station at Hollis Tap (AEPW) 138 kV switching station and a new line terminal and breaker on the Hollis (AEPW) 138 kV substation. These facilities will be constructed and maintained by AEPW. The Customer did not propose a specific route for the 138 kV line extending to serve its 138/34.5 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 American Electric Power West (AEPW) 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.

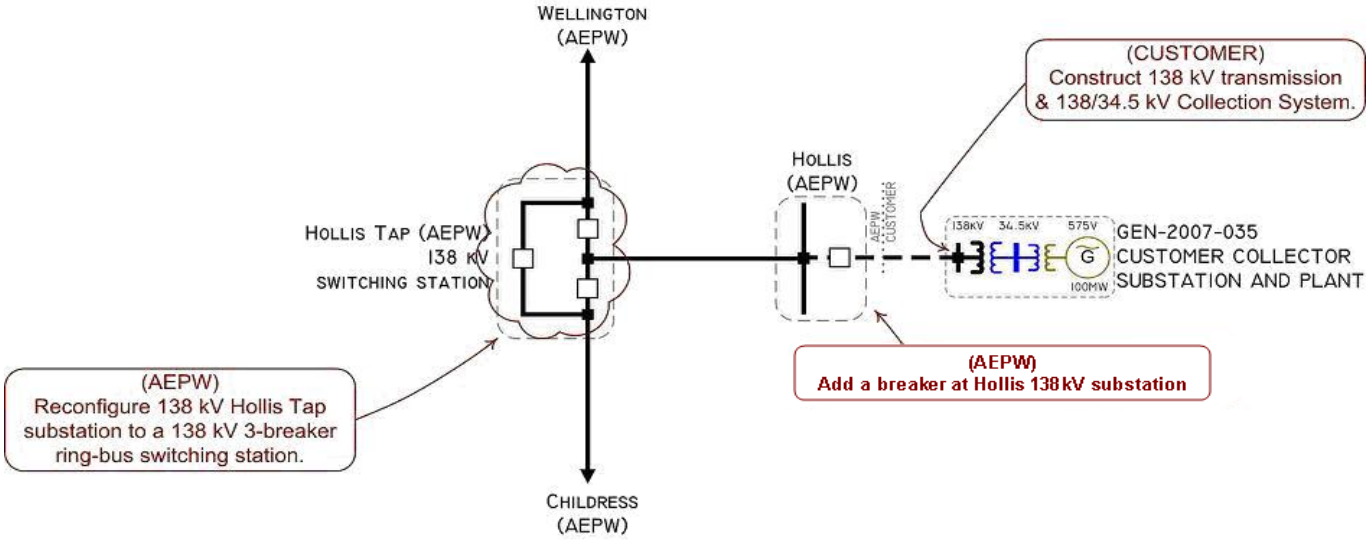

Figure 1: Proposed Method of Interconnection

(Final design to be determined)

Interconnection Estimated Costs

The minimum cost for adding a new 138 kV three-breaker ring-bus switching station at Hollis Tap (AEPW) 138 kV switching station and a new 138kV line terminal at Hollis to serve GEN-2007-035 facilities is estimated at $4,100,000. 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 138 kV transmission line extending from the point of interconnection to serve its 138/34.5 kV collection facilities. This cost also does not include the Customer's 138/34.5 kV collector substation or the possible need for reactive compensation, all of which should be determined by the Customer. The Customer is responsible for these 138 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 – 138/34.5 kV substation facilities.	*
AEPW – Add 138 kV transmission line terminal including one circuit breaker and a miscellaneous line at Hollis 138 kV substation.	$600,000
CUSTOMER – Possible reactive compensation to be determined during Impact Study	*
CUSTOMER – Right-of-Way for all Customer facilities.	*
TOTAL	**$600,000**

** Estimates of cost to be determined.*

Table 2: Required Interconnection Network Upgrade Facilities

FACILITY	ESTIMATED COST (2007 DOLLARS)
AEPW – 138 kV three-breaker ring-bus switching station to be built for generation request #GEN-2007-035 on the Hollis Tap 138 kV switching station. Work to include associated switches, control relaying, high speed communications, metering and related equipment and all related structures.	$3,500,000
TOTAL	**$3,500,000**

** Estimates of cost to be determined.*

Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2009 winter peak model, 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 December, 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 100 MW and location, additional criteria violations will occur on the existing 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 l hereafter referred to as NERC Table l) and its applicable standards and measurements”.

Using the created models and the ACCC function of PSS\E, single contingencies in portions or all of the modeled control areas of 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
AEPW	2006-02T - ELK CITY 230KV CKT 1
AEPW	CARNEGIE - FORT COBB 138KV CKT 1
AEPW	CARNEGIE - HOBART JUNCTION 138KV CKT 1
AEPW	CHILDRESS - HOLLIS TAP 138KV CKT 1
AEPW	CHILDRESS - LAKE PAULINE 138KV CKT 1
AEPW	CLINTON JUNCTION - CLINTON NATURAL GAS TAP 138KV CKT 1
AEPW	CLINTON JUNCTION - ELK CITY 138KV CKT 1
AEPW	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
AEPW	FORT COBB - SOUTHWESTERN STATION 138KV CKT 1
AEPW	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
AEPW	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1
AEPW	WILKES 138/21.0KV TRANSFORMER CKT 1
AEPW	WILKES 138/21.0KV TRANSFORMER CKT 2
AEPW/WFEC	ALTUS JCT TAP - RUSSELL 138KV CKT 1
AEPW/WFEC	ELK CITY - MOREWOOD SW 138KV CKT 1
AEPW/WFEC	LAKE PAULINE - RUSSELL 138KV CKT 1
SPS	BOWERS INTERCHANGE 115/69KV TRANSFORMER CKT 1
SPS	EAST PLANT INTERCHANGE - MANHATTAN SUB 115KV CKT 1
SPS	EAST PLANT INTERCHANGE - PIERCE STREET TAP 115KV CKT 1
SPS	EXELL TAP - FAIN SUB 115KV CKT 1
SPS	GRAPEVINE - BOWERS INTERCHANGE 115KV CKT 1
SPS	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
SPS	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1
WFEC	ELDORADO - ELDORADO JCT 69KV CKT 1
WFEC	ELDORADO JCT - GYPSUM 69KV CKT 1
WFEC	GYPSUM - RUSSELL 69KV CKT 1
WFEC	RUSSELL 138/69KV TRANSFORMER CKT 1
WFEC/AEPW	ELDORADO - LAKE PAULINE 69KV CKT 1
AEPW	American Electric Power West
SPS	Southwestern Public Service Company
WFEC	Western Farmers Electric Cooperative

Table 4: Contingency Analysis

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09WP	ELDORADO - LAKE PAULINE 69KV CKT 1	20	336	0	LAKE PAULINE - RUSSELL 138KV CKT 1
09WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	272	0	LAMAR - FINNEY SWITCHING STATION 345KV CKT 1; FINNEY SWITCHING STATION - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	ELDORADO - ELDORADO JCT 69KV CKT 1	26	251	0	LAKE PAULINE - RUSSELL 138KV CKT 1
09WP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	244	0	2006-02T - ELK CITY 230KV CKT 1
09WP	ELDORADO JCT - GYPSUM 69KV CKT 1	26	242	0	LAKE PAULINE - RUSSELL 138KV CKT 1
09WP	GYPSUM - RUSSELL 69KV CKT 1	26	234	0	LAKE PAULINE - RUSSELL 138KV CKT 1
09WP	2006-02T - ELK CITY 230KV CKT 1	351	232	0	LAMAR - FINNEY SWITCHING STATION 345KV CKT 1; FINNEY SWITCHING STATION - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	229	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
09WP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	183	0	2006-02T - ELK CITY 230KV CKT 1
09WP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	606	145	0	2006-02T - ELK CITY 230KV CKT 1
09WP	ELK CITY - MOREWOOD SW 138KV CKT 1	158	132	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
09WP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	124	0	CHILDRESS - HOLLIS TAP 138KV CKT 1
09WP	CARNEGIE - HOBART JUNCTION 138KV CKT 1	143	122	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
09WP	BOWERS INTERCHANGE 115/69KV TRANSFORMER CKT 1	84	122	0	BASE CASE
09WP	CLINTON JUNCTION - CLINTON NATURAL GAS TAP 138KV CKT 1	143	107	0	CLINTON - CLINTON JUNCTION 138KV CKT 1
09WP	CHILDRESS - LAKE PAULINE 138KV CKT 1	141	151	4	2006-02T - ELK CITY 230KV CKT 1
09WP	CHILDRESS - HOLLIS TAP 138KV CKT 1	158	122	55	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
09WP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	123	80	CHILDRESS - HOLLIS TAP 138KV CKT 1
09WP	RUSSELL 138/69KV TRANSFORMER CKT 1	70	104	91	ALTUS JUNCTION (ALTUSJCT) 138/69/13.8KV TRANSFORMER CKT 1; ALTUS JUNCTION - ALTUS JUNCTION TAP 138KV CKT 1; ALTUS JUNCTION TAP - TAMARAC TAP 138KV CKT 1; ALTUS JUNCTION TAP - RUSSEL 138KV CKT 1; TAMARAC TAP - HOBART JUNCTION 138KV CKT 1; TAMARAC TAP - OMPA-ALTUS TAMARACK 138KV CKT 1
12SP	ELDORADO - LAKE PAULINE 69KV CKT 1	20	277	0	LAKE PAULINE - RUSSELL 138KV CKT 1
12SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	256	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	2006-02T - ELK CITY 230KV CKT 1	351	217	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	207	0	2006-02T - ELK CITY 230KV CKT 1
12SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	199	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
12SP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	497	176	0	2006-02T - ELK CITY 230KV CKT 1
12SP	BOWERS INTERCHANGE 115/69KV TRANSFORMER CKT 1	84	167	0	BASE CASE
12SP	ELK CITY - MOREWOOD SW 138KV CKT 1	158	108	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12SP	GRAPEVINE - BOWERS INTERCHANGE 115KV CKT 1	161	106	0	2006-02T - ELK CITY 230KV CKT 1
12SP	ELDORADO - ELDORADO JCT 69KV CKT 1	26	207	8	LAKE PAULINE - RUSSELL 138KV CKT 1
12SP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	112	16	CHILDRESS - HOLLIS TAP 138KV CKT 1
12SP	ELDORADO JCT - GYPSUM 69KV CKT 1	26	196	18	LAKE PAULINE - RUSSELL 138KV CKT 1
12SP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	156	27	2006-02T - ELK CITY 230KV CKT 1
12SP	GYPSUM - RUSSELL 69KV CKT 1	26	186	27	LAKE PAULINE - RUSSELL 138KV CKT 1
12SP	CHILDRESS - LAKE PAULINE 138KV CKT 1	141	129	40	2006-02T - ELK CITY 230KV CKT 1
12SP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	123	78	CHILDRESS - HOLLIS TAP 138KV CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12SP	CHILDRESS - HOLLIS TAP 138KV CKT 1	158	103	93	2006-02T - ELK CITY 230KV CKT 1
12WP	ELDORADO - LAKE PAULINE 69KV CKT 1	20	334	0	LAKE PAULINE - RUSSELL 138KV CKT 1
12WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	272	0	LAMAR - FINNEY SWITCHING STATION 345KV CKT 1; FINNEY SWITCHING STATION - POTTER COUNTY INTERCHANGE 345KV CKT 1
12WP	ELDORADO - ELDORADO JCT 69KV CKT 1	26	248	0	LAKE PAULINE - RUSSELL 138KV CKT 1
12WP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	241	0	2006-02T - ELK CITY 230KV CKT 1
12WP	ELDORADO JCT - GYPSUM 69KV CKT 1	26	239	0	LAKE PAULINE - RUSSELL 138KV CKT 1
12WP	GYPSUM - RUSSELL 69KV CKT 1	26	232	0	LAKE PAULINE - RUSSELL 138KV CKT 1
12WP	2006-02T - ELK CITY 230KV CKT 1	351	231	0	LAMAR - FINNEY SWITCHING STATION 345KV CKT 1; FINNEY SWITCHING STATION - POTTER COUNTY INTERCHANGE 345KV CKT 1
12WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	229	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
12WP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	606	145	0	2006-02T - ELK CITY 230KV CKT 1
12WP	ELK CITY - MOREWOOD SW 138KV CKT 1	158	126	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12WP	BOWERS INTERCHANGE 115/69KV TRANSFORMER CKT 1	84	126	0	BASE CASE
12WP	CARNEGIE - HOBART JUNCTION 138KV CKT 1	143	125	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12WP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	125	0	CHILDRESS - HOLLIS TAP 138KV CKT 1
12WP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	179	3	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
12WP	CHILDRESS - LAKE PAULINE 138KV CKT 1	141	150	6	2006-02T - ELK CITY 230KV CKT 1
12WP	CLINTON JUNCTION - CLINTON NATURAL GAS TAP 138KV CKT 1	143	102	41	CLINTON - CLINTON JUNCTION 138KV CKT 1
12WP	CHILDRESS - HOLLIS TAP 138KV CKT 1	158	121	57	2006-02T - ELK CITY 230KV CKT 1
12WP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	126	76	CHILDRESS - HOLLIS TAP 138KV CKT 1
12WP	CARNEGIE - FORT COBB 138KV CKT 1	171	102	81	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12WP	FORT COBB - SOUTHWESTERN STATION 138KV CKT 1	171	101	85	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12WP	RUSSELL 138/69KV TRANSFORMER CKT 1	70	104	92	ALTUS JUNCTION (ALTUSJCT) 138/69/13.8KV TRANSFORMER CKT 1; ALTUS JUNCTION - ALTUS JUNCTION TAP 138KV CKT 1; ALTUS JUNCTION TAP - TAMARAC TAP 138KV CKT 1; ALTUS JUNCTION TAP - RUSSEL 138KV CKT 1; TAMARAC TAP - HOBART JUNCTION 138KV CKT 1; TAMARAC TAP - OMPA-ALTUS TAMARACK 138KV CKT 1
12WP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	100	100	2006-02T - ELK CITY 230KV CKT 1
17SP	ELDORADO - LAKE PAULINE 69KV CKT 1	20	272	0	LAKE PAULINE - RUSSELL 138KV CKT 1
17SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	260	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	2006-02T - ELK CITY 230KV CKT 1	351	220	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	203	0	2006-02T - ELK CITY 230KV CKT 1
17SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	197	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
17SP	BOWERS INTERCHANGE 115/69KV TRANSFORMER CKT 1	84	181	0	BASE CASE
17SP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	497	174	0	2006-02T - ELK CITY 230KV CKT 1
17SP	GRAPEVINE - BOWERS INTERCHANGE 115KV CKT 1	161	113	0	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
17SP	WILKES 138/21.0KV TRANSFORMER CKT 1	216	105	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	WILKES 138/21.0KV TRANSFORMER CKT 2	216	105	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	EAST PLANT INTERCHANGE - PIERCE STREET TAP 115KV CKT 1	161	103	0	EAST PLANT INTERCHANGE - MANHATTAN SUB 115KV CKT 1
17SP	EAST PLANT INTERCHANGE - MANHATTAN SUB 115KV CKT 1	161	102	3	EAST PLANT INTERCHANGE - PIERCE STREET TAP 115KV CKT 1
17SP	ELDORADO - ELDORADO JCT 69KV CKT 1	26	203	12	LAKE PAULINE - RUSSELL 138KV CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
17SP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	112	14	CHILDRESS - HOLLIS TAP 138KV CKT 1
17SP	ELDORADO JCT - GYPSUM 69KV CKT 1	26	192	22	LAKE PAULINE - RUSSELL 138KV CKT 1
17SP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	152	30	2006-02T - ELK CITY 230KV CKT 1
17SP	GYPSUM - RUSSELL 69KV CKT 1	26	181	32	LAKE PAULINE - RUSSELL 138KV CKT 1
17SP	ELK CITY - MOREWOOD SW 138KV CKT 1	158	103	44	CLINTON JUNCTION - ELK CITY 138KV CKT 1
17SP	CHILDRESS - LAKE PAULINE 138KV CKT 1	141	127	45	2006-02T - ELK CITY 230KV CKT 1
17SP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	119	81	CHILDRESS - HOLLIS TAP 138KV CKT 1
17SP	CHILDRESS - HOLLIS TAP 138KV CKT 1	158	102	97	2006-02T - ELK CITY 230KV CKT 1
17SP	EXELL TAP - FAIN SUB 115KV CKT 1	161	101	99	MOORE COUNTY INTERCHANGE 230/115KV TRANSFORMER 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 $4,100,000 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

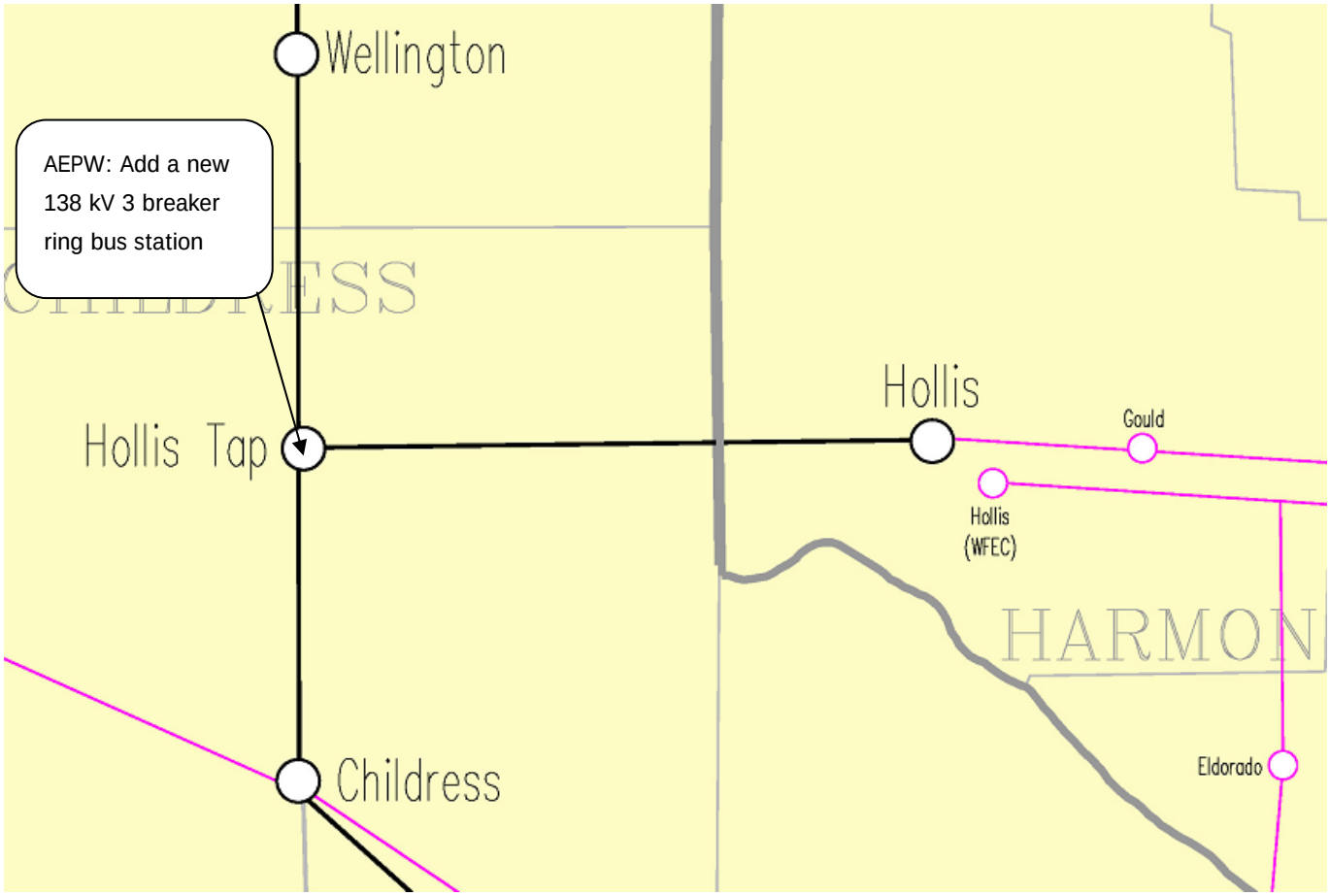

Figure 2: Point of Interconnection Area Map