



***Feasibility Study for Generation
Interconnection Request
For
GEN-2003-009***

***SPP Coordinated Planning
(#GEN-2003-009)***

October 2003

Executive Summary

<OMITTED TEXT> (Customer) has requested a feasibility study for the purpose of interconnecting 81MW of wind generation in Carson County, Texas within the service territory of Southwestern Public Service Company (SWPS). The proposed point of interconnection is at the Carson County substation served from circuit V60. The proposed in-service date is October 2004.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 81 MW wind farm without significant transmission system reinforcements within the local Xcel Energy transmission system. In order to maintain acceptable bus voltage, the customer may need to install a switched capacitor bank on the wind farm collection system or in the Carson County substation. Dynamic Stability studies performed as part of the impact study will provide guidance as to how much reactive compensation may be needed and whether the reactive compensation can be static or must be dynamic (such as a SVC).

The requirements for interconnection consist of re-constructing the existing Carson County substation tap as a main and transfer bus from circuit V60. Currently, the Carson County substation is a simple tap on circuit V60. The new bus substation would route circuit V60 into the substation and then out of the substation. A separate breaker terminal would be added to the new bus to accommodate the wind farm. One terminal of the new substation would lead to Hutchinson County Interchange to the north, another terminal would lead to the North Pantex substation and the third terminal would lead to the customer facility. If the customer's substation facility will be built close to the new switch station (Carson County Substation) (less than one mile), a Certificate of Convenience and Necessity from the Public Utility Commission of Texas will not be required. The rerouting of the 115 kV line from Hutchinson County Interchange into Carson County Substation may cause a Certificate of Convenience and Necessity from the Public Utility Commission of Texas.

The total cost for this 115kV interconnection facility is estimated at \$3.2 million dollars, which is based on estimates provided by the Southwestern Public Service Company engineering department. The cost includes building 115kV from the customer substation facility into the new switch station, which was estimated at 1/2 mile (this could vary once the customers substation is located) and the cost to construct the switch station including all breakers and metering equipment.

This feasibility study does not take into account static system reinforcements triggered by other generation projects that are positioned ahead in the queue. In the event that these generation projects and the system reinforcements triggered by these projects are built, this feasibility study may have to be revisited, potentially changing the requirements necessary for interconnecting this customer's 81 MW wind farm.

Introduction

The Customer has requested a Feasibility Study for interconnection of a 81MW wind generation facility in Carson County, Texas. The proposed point of interconnection is at the Carson County substation served from circuit V60. Carson County substation is approximately 5 miles west of the town of Panhandle, Texas. A map of the area, Figure 2, is provided at the end of this document. The proposed in-service date of the facility is October 2004.

Interconnection Facilities

The primary objective of this study is to identify the system problems associated with connecting the plant to the area transmission system and estimated costs of system modifications needed to alleviate the system problems.

The Feasibility and other subsequent Interconnection Studies are designed to identify attachment facilities and other direct assignment facilities needed to accept power into the grid at the interconnection receipt point.

The requirements for interconnection consist of re-building the existing Carson County substation as a “real” bus instead of the current tap off of circuit V60. This type of facility would be required in order to accept the output of the customer wind farm onto circuit V60. An additional tap to the current configuration is not possible while maintaining reliability in the area. The new 115kV substation would have terminals to accept an in and out connection to the current circuit V60 with an additional breaker to accept the customer wind farm. (If reactive support is deemed necessary, the breaker scheme may be modified). The new 115 kV transmission line that will interconnect with the wind farm is assumed to be located in close proximity to the new Carson County substation (1/2 mile or less) for the purposes of cost estimation. A Certificate of Convenience and Necessity from the Public Utility Commission of Texas would not be required if this new 115 kV line is less than one mile in length. A one-line diagram of the proposed interconnection facility can be found in Figure 1 at the end of this document. (This one line needs to be changed to show a main and transfer)

The total cost for this 115 kV interconnection facility is estimated at \$3.2 million dollars, which is based on estimates provided by the SWPS engineering department. The cost includes construction of the new Carson County substation, associated breakers and metering, routing of circuit V60 into and out of the substation, 1/2 mile of 115 kV transmission line from the new substation to the wind farm collection substation, and right-of-way. This cost does not include any reactive support costs. Dynamic Stability studies will provide guidance as to whether reactive compensation is necessary and whether it can be static or must be dynamic (such as a SVC).

The costs of interconnecting the facility to the SWPS transmission system are listed in Table 1. **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: Interconnection Facilities

Facility	ESTIMATED COST (2003 DOLLARS)
Re-build Carson County substation	\$2,402,903
Rebuild 1.2 miles of SPS 115 kV line V60 and route it into and out of the substation	\$686,384
½ mile of 115kV line to the customer's wind farm	\$100,000
Right-of-Way	\$30,000
Total	\$3,219,287

Powerflow Analysis

A powerflow analysis was conducted for the facility using a modified version of the 2009 Summer Peak model. The output of the Customer's facility was offset in each model by a reduction in output of existing online SWPS generation. The in-service date of the facility is proposed to be October 2004. However, considering equipment purchase times and construction times for the substation, the October 2004 in-service date was considered non-feasible. The next available seasonal model for use was the 2009 Summer Peak. This is the end of the current SPP planning horizon.

The analysis of the customer's project shows that the proposed location can handle the entire 81MW of output under steady state conditions without system upgrades in all seasons out to the end of SPP's planning horizon.

There are several other proposed wind generation additions in the general area of the Customer's facility. It was assumed in the analysis that not all of these other projects were in service. Those previously queued projects that 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.

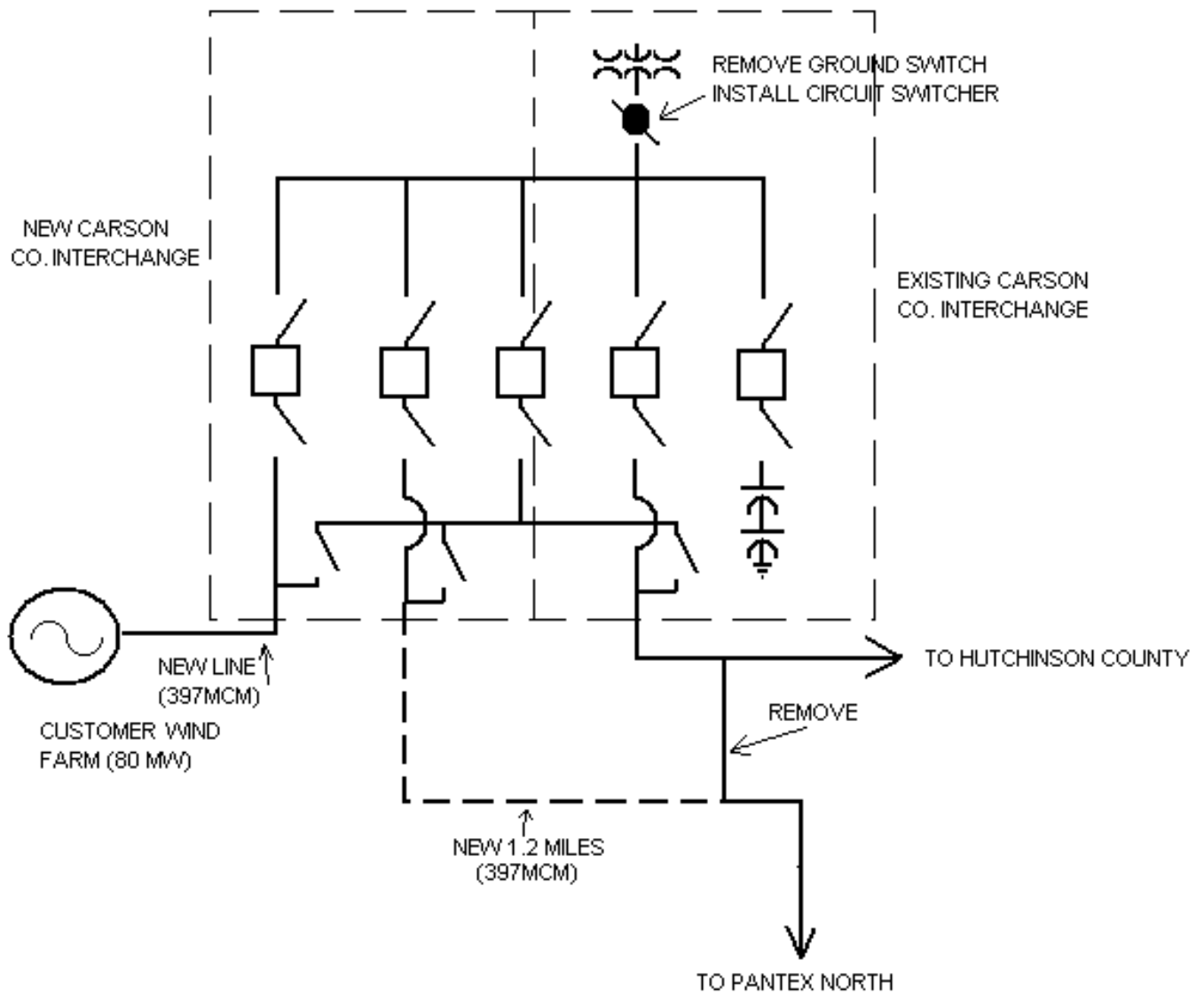
Using the created models and the ACCC function of PSS\E, single contingencies in the SWPS control area were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

Conclusion

The minimum cost of interconnecting the Customer project is estimated at \$3.2 million dollars. However, as stated earlier, previously queued projects were assumed to not be in service in this feasibility study. If any of those projects are constructed, then this feasibility study may have to be revisited to determine the impacts of this customer's project on other SWPS transmission facilities.

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 costs do not include any 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 1: Proposed Interconnection
(Final substation design to be determined)**

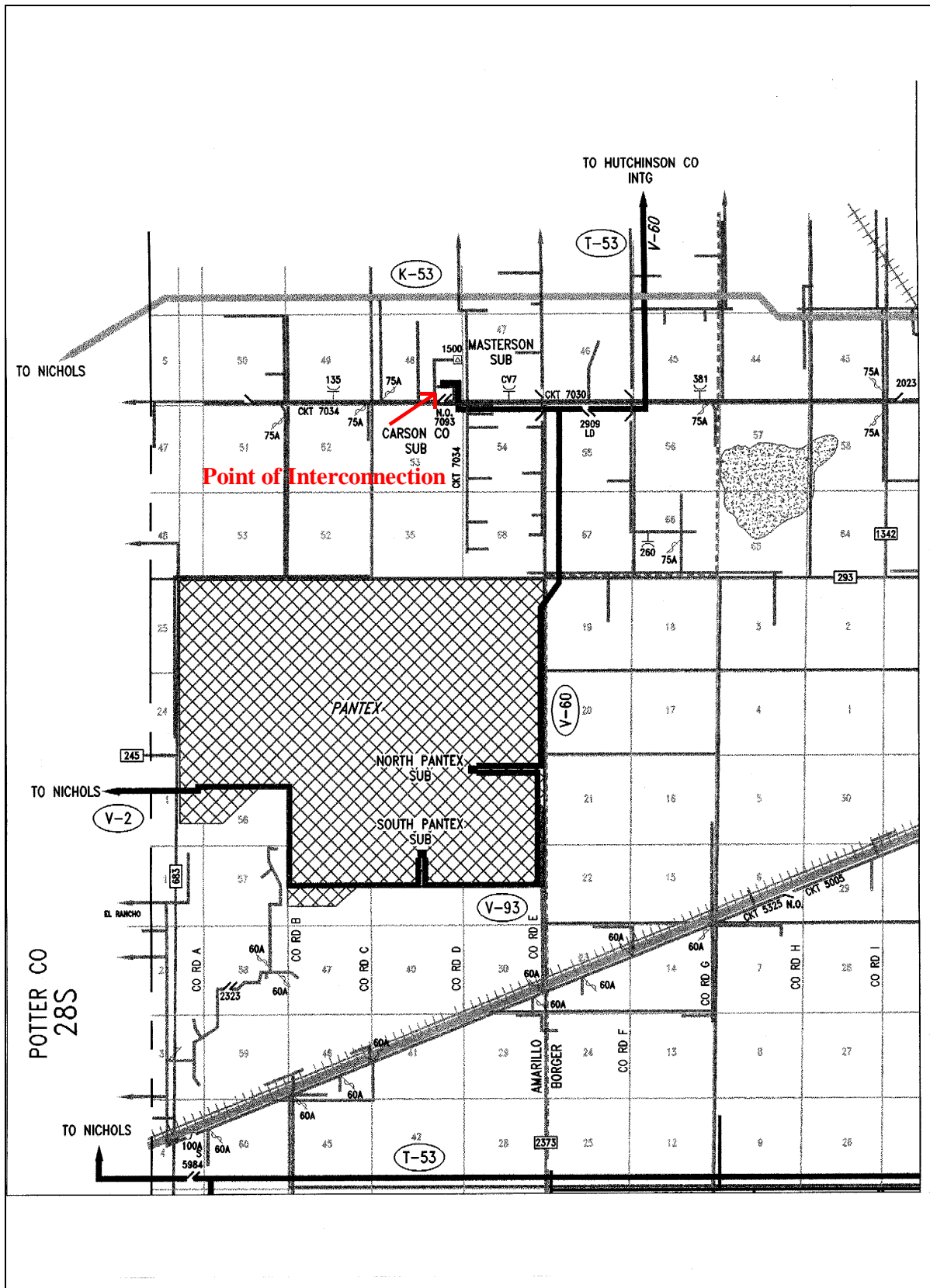


Figure 2: Map of the surrounding area