



***Facility Study
For
Generation Interconnection
Request
GEN-2006-017***

SPP Tariff Studies

(#GEN-2006-017)

February 2008

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Aquila performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting Customer and SPP for SPP Generation Interconnection request #GEN-2006-017.

Capacitor Banks

In addition to the 161kV, 32Mvar capacitor bank specified in the following Facility Study, the Interconnection Customer is required to install two (2) 34.5kV capacitor banks in their 161/34.5kV substation. These banks are sized at 18Mvar and 20 Mvar.



Facility Study
SPP #GEN-2006-017

October 12, 2007
Aquila, Inc
Transmission Planning

General:

The Customer is proposing a 300 MW wind farm near Maryville, MO. There is no transmission in the immediate area that would have sufficient capacity for the output of this wind farm, so the Customer is proposing to build a 161 KV transmission line from the wind farm to a proposed Interconnection Substation to be located to the south of Aquila's existing Maryville 161 KV substation. The Interconnection Substation was a requirement of the facility study for the previously queued generation interconnection request GEN-2006-014 for a proposed generation project to be located near Tarkio, Missouri. The exact location of the proposed Interconnection Substation has yet to be determined.

Currently there is a 161 KV line from Aquila's Maryville Substation to the Clarinda Substation in near Clarinda, Iowa. The GEN-2006-17 Impact Study determined that in order to maintain a stable system with this additional wind farm capacity, it will be necessary to move the line termination of the Clarinda line from the Maryville Substation to the proposed Interconnection Substation. The termination of the AEC line in the existing Maryville Substation will then need to be rerouted to the terminal that was formerly occupied by the Clarinda line. (See Figure 1)

In addition, installation of a total of 70 MVAR of capacitors are required for voltage and power factor support.

Location:

The point of interconnection will be at the proposed Interconnection Substation to be located near the existing Maryville to Midway 161 KV line south of the existing Aquila Maryville Substation. The exact location will be somewhat dependent on the routing of the proposed GEN-2006-014 project transmission line and where it will intersect the existing Maryville to Midway 161 KV transmission line.

System Additions:

The proposed Interconnection Substation is scheduled to be constructed pursuant to SPP interconnection request GEN-2006-014 wind farm project. The substation will consist of a 161 KV ring bus with three line terminals to accommodate the 161 KV line to the existing Maryville Substation, the existing 161 KV line to Midway, and the proposed new 161 KV transmission line to the GEN-2006-014 project. This substation will be rated for 2,000 Amps continuous and will have a nominal interrupting capability of 40,000 Amps.

Under this interconnection request (GEN-2006-017), the Customer will be responsible for constructing a 161 KV transmission line from the proposed wind farm to the Interconnection Substation. The ring bus in the Interconnection

Substation will need to be expanded, and a 161 kV circuit breaker and associated equipment will need to be added in order to terminate this line.

In order to insure system stability, it will be necessary to move the Maryville termination of the Maryville to Clarinda 161 kV transmission line from the existing Maryville Substation to the Interconnection Substation. The line will have to be extended several miles to the south from the existing Maryville substation to the Interconnection Substation and a 161 kV circuit breaker and associated equipment will need to be added to the ring bus in the Interconnection Substation for termination of the line. See Figure 1.

Pursuant to Impact Study GEN-2006-017, a 32 MVAR capacitor bank and associated 161 KV circuit breaker will be required on the Interconnection Substation 161 KV bus. Also, two capacitor banks will be required on the wind farm 34.5 KV bus. These capacitor banks will be rated at 18 MVAR and 20 MVAR respectively.

If the proposed GEN-2006-014 project is removed from the queue, then the Customer's project (GEN-2006-017) will require the initial installation of the Interconnection Substation that was initially proposed for the GEN-2006-014 project. As described in the Facilities Study for the GEN-2006-014 project, the Interconnection Substation will consist of a 161 KV ring bus with three line terminals to accommodate the 161 KV line to the existing Maryville Substation, the 161 KV line to Midway, and the proposed new 161 KV Customer owned line to the proposed Customer wind farm. The substation will be rated for 2,000 Amps continuous and will have a nominal interrupting capability of 40,000 Amps. The installation of this substation will include land, circuit breakers, switches bus, structures, foundations, grounding, fence, control building, and associated control and protective equipment. A 32 MVAR capacitor bank and associated 161 KV circuit breaker will also need to be installed in the substation. See Figure 2.

Responsibilities of the Customer:

The Customer will be responsible for the design and construction of the 161 KV transmission line from the wind farm to the Interconnection Substation including the 34.5 – 161 KV step-up facilities at the wind farm. The Customer will be responsible for terminating the Customer's 161 KV line on the dead end structure that will be provided in the Interconnection Substation. Relaying and control equipment for Customer facilities are to be provided by the Customer but will be subject to approval by the Aquila Substation Engineering Department to insure that they are coordinated with Aquila relaying and control facilities at the Interconnection Substation, and conform to Aquila relaying and control standards. Customer communications to the Interconnection Substation will be the responsibility of the Customer.

Responsibilities of Aquila:

In accordance with the provisions of the LGIA, Aquila may elect to perform the following steps, or may agree to allow the Customer to perform these steps subject to Aquila approval.

Aquila will be responsible for the design and construction of the required additional terminal facilities at the Interconnection Substation consisting of the addition of two 161 kV circuit breakers and associated switches, structures, foundations, bus, grounding, relaying and control. Aquila will construct the 161 kV transmission line extension of the Clarinda line from the Maryville substation to the Interconnection Substation. Aquila will provide the 161 kV dead end structure for termination of the Customers 161 kV line from the wind farm.

If GEN-2006-014 project is removed from the queue, then Aquila will be responsible for the design and construction of the Interconnection Substation which is needed to accommodate the Customer’s project (GEN-2006-017). Construction of the substation will consist of installing a 161 KV three position ring bus complete with three 161 KV circuit breakers, nine 161 KV switches, bus, structures, foundations, grounding, control building, relaying, control, metering, fence and land. Aquila will provide a dead end structure in the substation for the termination of the Customer’s 161 KV transmission line from the wind farm.

Metering:

Revenue Metering of the wind farm will be accomplished with metering accuracy CTs and PTs and associated billing metering in the Interconnection Substation near the point where the Customer’s 161 KV transmission line is terminated on the substation dead end structure. A dual port RTU and associated communications equipment will be installed in the substation to transmit the MW, MVAR, voltage, and other information to the system operations center. Communications equipment to transmit data to the Customer control center will be the responsibility of the Customer.

Fault Current:

The three phase and line-to-ground fault current levels are shown in the table below.

Location	3-Phase Fault Amperes	Single Line-to Ground Amperes
Interconnection Substation 161 KV Bus	10,155	10,522

The proposed fault current levels are below the rated fault current capability of all the existing equipment in the area.

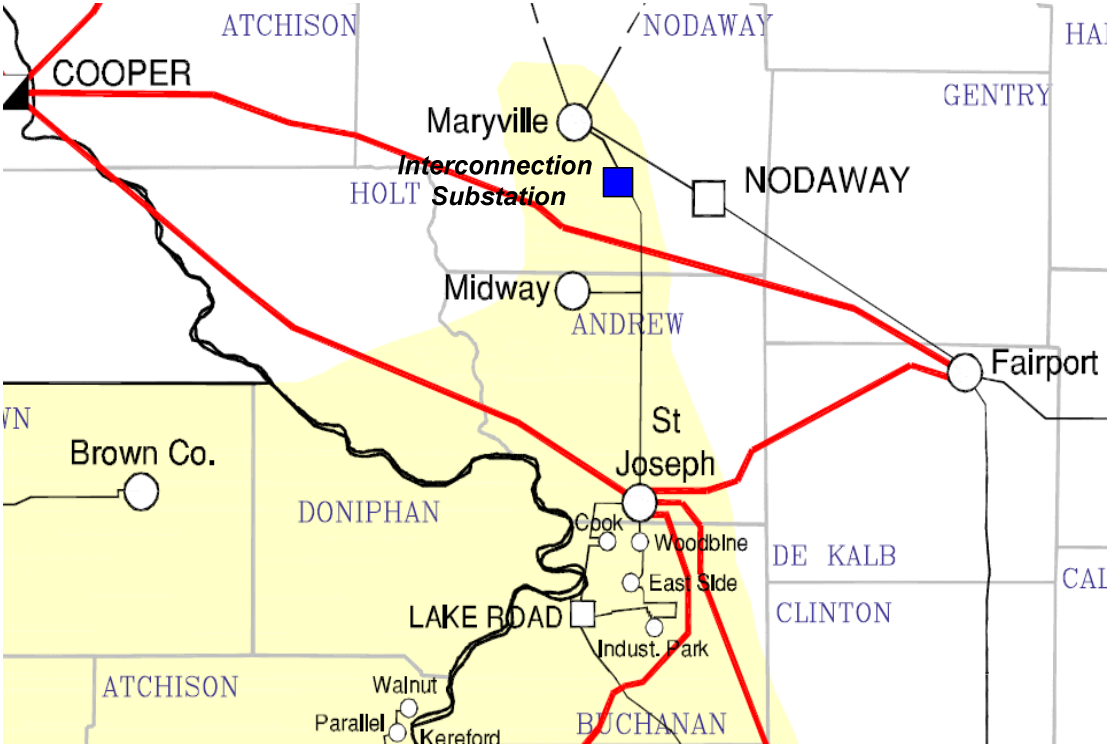
Estimated Cost:

If the GEN-2006-014 project remains in the queue and the Interconnection Substation is constructed to support that facility, then the network upgrade cost for the interconnection facilities to support the Nodaway wind farm (GEN-2006-017) is shown in the following table:

Project	Estimated Cost (Dollars)
Extend Clarinda line to Interconnection Substation	3,500,000
Additional line terminals at Interconnection Substation	700,000
Capacitor Bank	500,000
Relocate AEC line terminal at Maryville	300,000
Total Network Upgrade cost	5,000,000

The cost for metering and customer Interconnection Facilities provided by the transmission owner is estimated to be \$300,000. The cost of such facilities will be the sole responsibility of the customer. The total cost of the Network Upgrades and the interconnection facilities is estimated to be \$5,300,000.

If the GEN-2006-014 project does not remain in the queue, then the Customer will be required to pay the total cost of the Interconnection Substation which is estimated to be \$3,500,000. Of this total cost, the Network Upgrade cost is estimated to be \$2,900,000, and the cost of the Interconnection Facilities installed by the transmission owner is estimated to be \$600,000. Such Interconnection Facilities costs will be the sole responsibility of the customer.



Location of Interconnection Substation

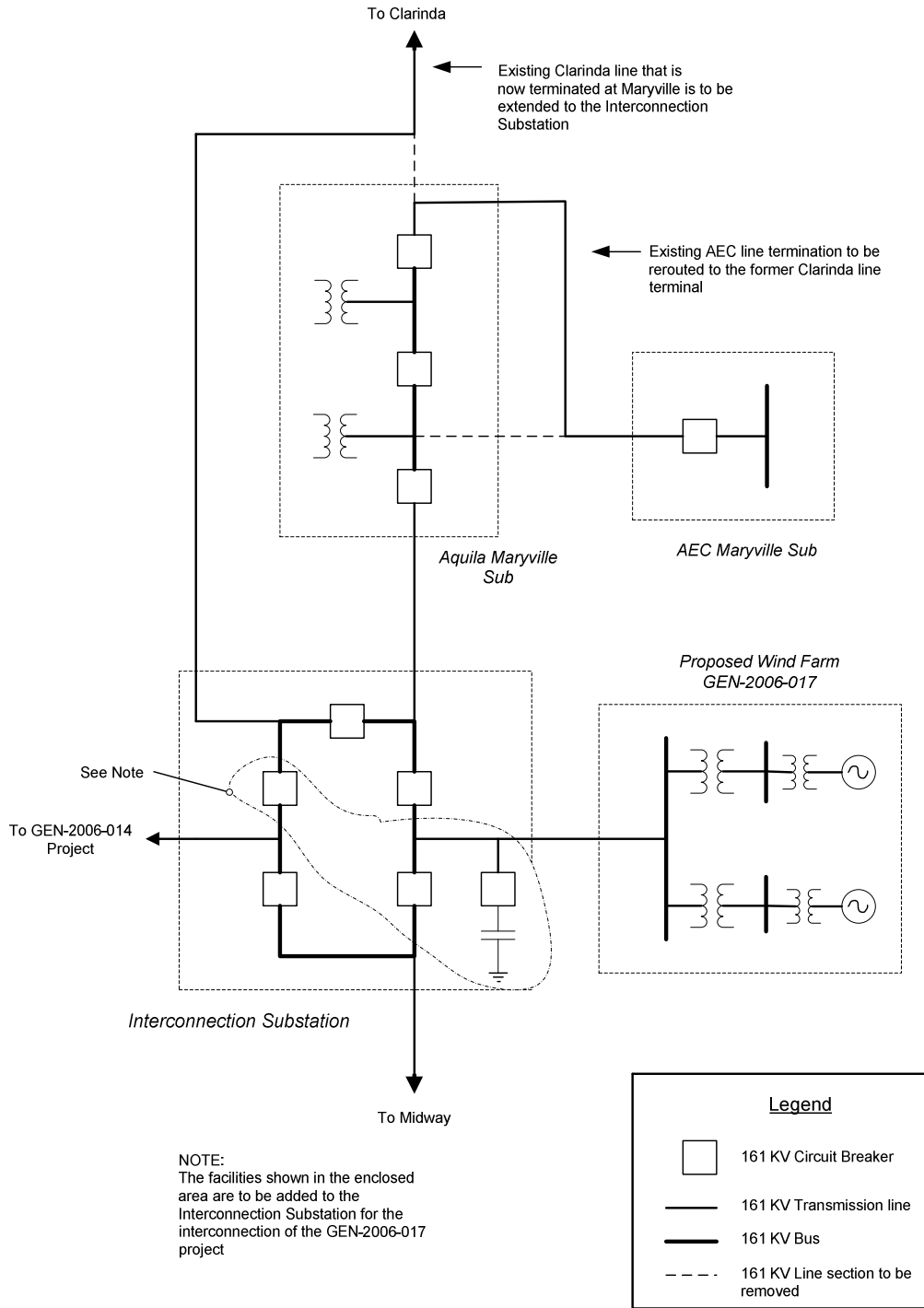
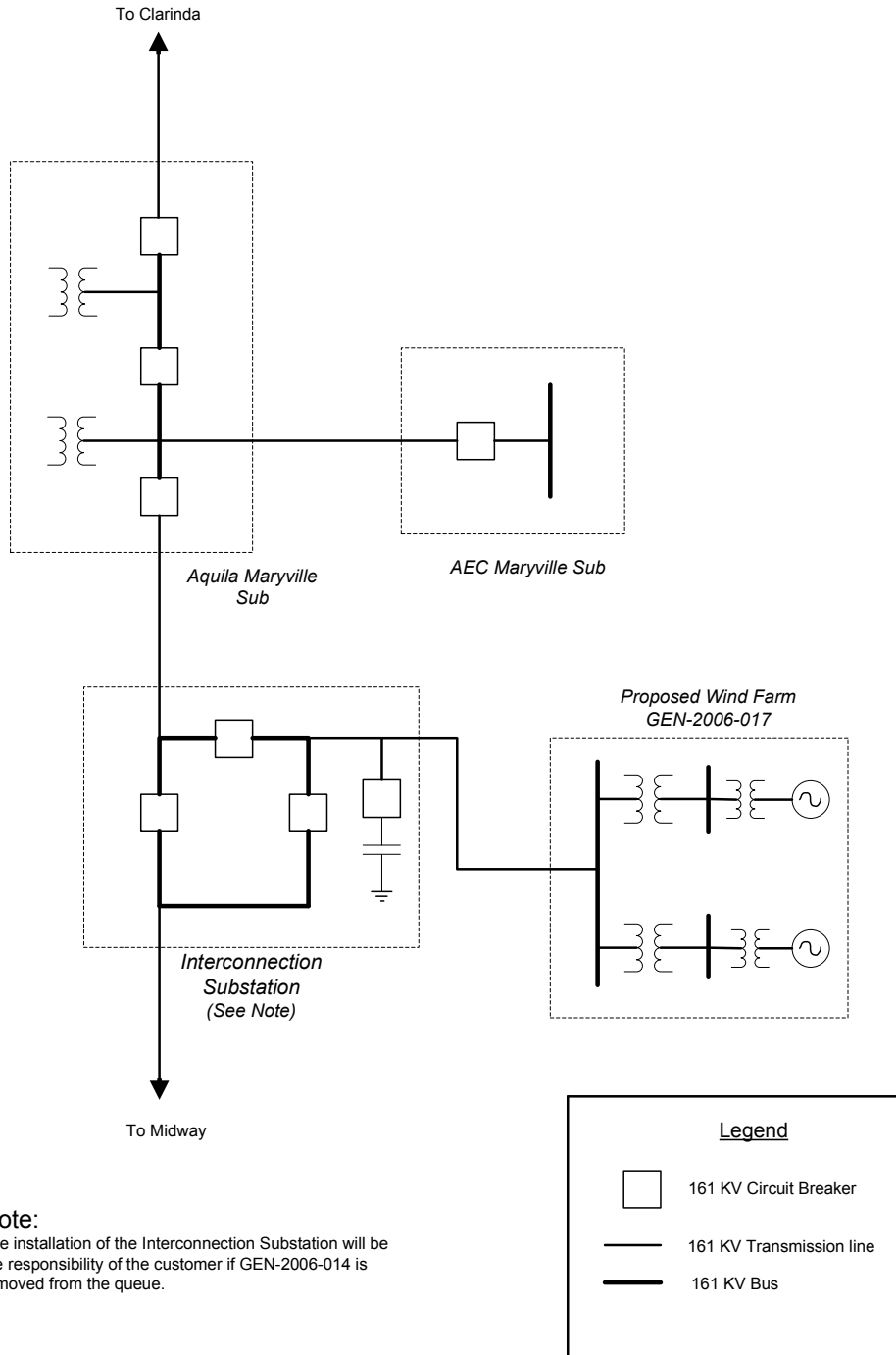


Figure 1 – One Line Diagram



Note:
The installation of the Interconnection Substation will be the responsibility of the customer if GEN-2006-014 is removed from the queue.

Figure 2 – One Line Diagram
Alternate if GEN-2006-014 is removed from queue