TRANSMISSION LINE & SUBSTATION PROJECTS

COMPANY: ENTERGY TEXAS, INC.

CUSTOMER: PID 247

FACILITIES STUDY

EJO NO. F4PPTX0064

PID 247 GENERATOR INTERCONNECTION

Revision:
0

Rev	Issue Date	Description of Revision	Prepared By	Approved By
A	11/21/11	Final Draft	MK	CD
B	11/28/11	Incorporates comments from JET	MK	CD
C	11/30/11	Incorporates Planning Input	MK	CD
D	11/30/11	Incorporates additional comments from TPD	MK	CD
E	01/31/2012	Incorporates additional comments from TPD	MK	CD
0	2/13/2012	ICT Review and Upgrade Classification	EC	BR

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1. PROJECT SUMMARY

1.1 Background and Project Need

The purpose of this Facilities Study is to determine the availability to connect a new generation facility and to provide the transfer capability at the point of interconnection. Also to be identified are increased load flows, produced by making this interconnection. This Facilities Study evaluates the PID 247 request for interconnection for a total of 180 MW of wind generation. The customer has requested a 20 percent estimate. Based on available time to complete the Facilities Study and in light of a lack of survey, soil borings, environmental permitting, potential property owner issues, etc, a good faith estimate has been provided. Many assumptions had to be made which could affect the overall accuracy of this estimate.

To evaluate this request, a study was performed on the latest available 2016 summer peak cases, using PSS/E and MUST software by Power Technologies Incorporated (PTI).

The Facilities Study identifies the transmission interconnection requirements, any transmission constraints resulting from the requested power transfer, and provides cost estimates to correct any transmission constraints. The customer has requested 138kV service.

The customer has requested Energy Resource Interconnection Service (ERIS) for 180 MW and Network Resource Interconnection Service (NRIS) for 160 MW. No additional system upgrades were identified for ERIS other than direct interconnection work. Entergy has identified the following constraints in the NRIS study, as well as the associated work which must be completed prior to this interconnection:

A. Upgrade the Stowell 138/69kV, 35 MVA autotransformer

The Stowell 138/69kV, 35 MVA autotransformer overloads for the loss of the Stowell 138/69kV, 50 MVA autotransformer. It is required that the Stowell 138/69kV, 35 MVA autotransformer be upgraded (or replaced) to a handle a capacity of at least 44 MVA. The proposed upgrade rating is 50 MVA.

The amount of capacity created by this upgrade is 15 MW, and the customer's use of the capacity created is 3 MW.

B. Upgrade the Brooks Creek-Bayshore 138kV transmission line

The Brooks Creek-Bayshore 138kV transmission line overloads for the loss of the China-Sabine 230kV transmission line. It is required that the Brooks Creek-Bayshore 138kV transmission line be upgraded from a capacity of 109 MVA to at least 116 MVA. The proposed upgrade rating is 211 MVA.

The amount of capacity created by this upgrade is 102 MW, and the customer's use of the capacity created is 3 MW.

C. Upgrade the Brooks Creek-Shiloh 138kV transmission line

The Brooks Creek-Shiloh 138kV transmission line overloads for the loss of the China-Sabine 230kV transmission line. It is required that the Brooks

Creek-Shiloh 138kV transmission line be upgraded from a capacity of 109 MVA to at least 113 MVA. The proposed upgrade rating is 211 MVA.

The amount of capacity created by this upgrade is 102 MW, and the customer's use of the capacity created is 0 MW.

D. Upgrade the Cedar Hill-Plantation 138kV transmission line

The Cedar Hill-Plantation 138kV transmission line overloads for the loss of the Porter-Oak Ridge 138kV transmission line. The Cedar Hill-Plantation 138kV transmission line needs to have a capacity of 270 MVA or greater on all components.

The equipment at Plantation needs to be upgraded to increase the rating of the transmission line from 243 MVA to 250 MVA. The upgrade of the Plantation equipment (which increases the line rating to 250 MVA) is proposed in the 2011- 2013 Entergy Construction Plan with an anticipated in-service date in 2013.

The Cedar Hill-Plantation 138kV transmission line must be upgraded from a capacity of 250 MVA to at least 270 MVA. The proposed upgrade rating is 468 MVA.

The amount of capacity created by this upgrade is 218 MW, and the customer's use of the capacity created is 5 MW.

E. Upgrade the Conroe-Plantation 138kV transmission line

The Conroe-Plantation 138kV transmission line overloads for the loss of the Porter-Oak Ridge 138kV transmission line. The Conroe-Plantation 138kV transmission line needs to have a capacity of 257 MVA or greater on all components.

The equipment at Plantation needs to be upgraded to increase the rating of the transmission line from 243 MVA to 250 MVA. The upgrade of the Plantation equipment (which increases the line rating to 250 MVA) is proposed in the 2011- 2013 Entergy Construction Plan with an expected 2013 ISD.

The Conroe-Plantation 138kV transmission line must be upgraded from a capacity of 250 MVA to at least 257 MVA. The proposed upgrade rating is 287 MVA.

The amount of capacity created by this upgrade is 37 MW, and the customer's use of the capacity created is 0 MW.

1.2 Customer Facilities

The customer will collect power from approximately 100 wind turbines at their new substation. The requested generation at the new location is approximately 180 MW. It will be located approximately six (6) miles south of ETI's Stowell Substation. Service voltage will be 138kV and delivered via the customer-owned line to be connected at Entergy's Stowell substation.

1.3 Scope Summary

Scope for NRIS:

Entergy will add two (2) new 138kV bays at Stowell substation in Winnie, Texas. Entergy will reconfigure two (2) existing transmission lines to accommodate the new substation bays for this project. The customer will design, build, own, and operate the 138kV substation, as well as the 138kV transmission line to receive transmission service at Stowell substation.

Required System Upgrades for NRIS:

Transmission System Planning conducted a load-flow analysis based on the NRIS amount of 160 MW of generation for the year 2016 and determined the following system upgrades are required:

- **Upgrade the Stowell 138/69kV, 35 MVA autotransformer -** Replace the 35 MVA autotransformer with a 50 MVA auto.
- **Upgrade the Brooks Creek-Bayshore 138kV transmission line -** Rebuild approximately 13.52 miles of 138kV transmission line between Brooks Creek and Bayshore substations situated in Chambers County, Texas, utilizing existing Rights-of-Way (ROW). The existing line L-536 ROW is 100'wide.
- **Upgrade the Brooks Creek-Shiloh 138kV transmission line -** Rebuild approximately 3.33 miles of 138kV transmission line between the Shiloh and Brook Creek substations situated in Chambers County, Texas, utilizing the existing ROW.
- **Upgrade Cedar Hill-Plantation 138kV transmission line -** Upgrade 2.38 miles of 138kV transmission line L-886 from the Cedar Hill GOAB to Plantation Substation, leaving sufficient room on the double circuit structures to construct future 230kV transmission line.
- **Upgrade Conroe-Plantation 138kV transmission line -** The proposed project will upgrade 2.91 miles of 138kV transmission line L-886 from Plantation substation to Conroe Bulk substation, leaving sufficient room on the double circuit structure to construct future 230kV transmission line.

Scope for ERIS:

Entergy will add two (2) new 138kV bays at Stowell substation in Winnie, Texas. Entergy will reconfigure two (2) existing transmission lines to accommodate the new substation bays for this project. The customer will design, build, own, and operate the substation, as well as the 138kV transmission line, and will receive transmission service at Stowell substation.

1.4 Impact of Priors

PID 247 does not depend on other ongoing or planned Entergy projects. As a result, the status of previously identified Entergy projects does not impact the cost or schedule of this interconnection.

1.5 Cost Summary

NRIS:

The estimated total project cost is $30,823,587 full financial. Please note these are 2011 dollars and do not include Tax Gross-Up if and where applicable (the present Tax Gross-Up rate at this time is 25.09%). Also note that the estimates include AFUDC, but that amount will be removed if the agreement to undertake the project includes a prepayment plan.

The ICT has assigned $6,979,570 as Base Plan upgrades and $23,844,017 as Supplemental Upgrades based on Attachment T of Entergy's OATT.

ERIS:

The estimated total project cost is $3,062,792. These are 2011 dollars and do not include Tax Gross-Up if and where applicable (the present Tax Gross-Up rate at this time is 25.09%). Also note that the estimates include AFUDC, but that amount will be removed if the agreement to undertake the project includes a prepayment plan.

The ICT has assigned $3,062,792 as Supplemental upgrades based on Attachment T of Entergy's OATT.

1.6 Schedule Summary (Worst Case)

Based on an assumed start date of May 1, 2012, the estimated completion date of the project is November 30, 2014. Estimated work order completions are shown in the table below.

WO Name	Requested ISD	Estimated ISD
Upgrade Stowell 138/69kV autotransformer	10/30/2012	11/30/2014
Upgrade Brooks Creek-Bayshore 138kV TL	10/30/2012	1/31/2014
Upgrade Brooks Creek-Shiloh 138kV TL	10/30/2012	1/31/2014
Upgrade Cedar Hill-Plantation 138kV TL	10/30/2012	1/31/2014
Upgrade Conroe-Plantation 138kV TL	10/30/2012	1/31/2014
Install two (2) new 138kV bays at Stowell	10/30/2012	1/31/2014
Reconfigure L-151 at Stowell	10/30/2012	1/31/2014
Reconfigure L-89 at Stowell	10/30/2012	1/31/2014

Note that the in-service dates (ISDs) are based on a preliminary, unbaselined project schedule. The dates will vary based on potential changes in schedule assumptions such as timing of funding authorizations, outage approvals, ROW/permitting, land acquisition matters and possibly other unforeseen issues.

1.7 Long Lead and Major Material / Equipment

Quantity	Material Description	Lead Time (Weeks)*
Tline Upgrades: Brook Creek – Bayshore & Cedar Hill-Plantation-Conroe		
167	Steel structures	18-20
7	Socketed piles	18-20
5	Drilled piers	18-20
243,500 #	666.8 kcmil 24/7 ACSR code name “Flamingo” conductor	14-16
132,020’	1272 kcmil 45/7 ACSS code name “Bittern” conductor	14-16
134,000’	DNO-8161 48 Fiber Optic – AlumaCore Cable	16-18
23,000’	7 #7 Alumoweld	13-17
471	161kV Insulators	10-12
165	230kV Insulators	10-12
Stowell Substation: Interconnection and Upgrades		
1	138kV/69kV wye-wye Auto LTC, 30/40/50 MVA 3 PH, 13.8kV delta Tertiary	26 months
6	138kV type CA-45 Columns (masts included)	14
2	138kV type W trusses (no braces required)	14
7	138kV type U trusses (1 with TA-UB brace)	14
7	138kV type N trusses (4 with N-LB and 3 with N-SB braces)	14
6	138kV N truss misc steel hardware for post insulator	14
3	138kV type PA-LA arrester steel	14
1	138kV type PA-CC CCVT steel	14
3	138kV arresters	14
1	138kV CCVT	30
1	69kV GOAB, 2000A, manually operated switch	22
2	138kV GOAB, 2000A, manually operated switches	22
2	138kV GCB, 3000A circuit breaker, 40ka	20
30	138kV polymer insulators for strain bus	12
18	138kV porcelain post insulators(for switches)	14
9	69kV porcelain post insulators(for switch)	14
9	138kV polymer post insulators for strain bus (transition from bays)	12
4	Pull box, 30"x 48"x 48", Fiberglass/Polymer concrete	10
	Fittings and Copper Wire – 750 MCM & 4/0	12-14
1	standard 28” “Wing wall” line/breaker control panel	14
5	Steel structures	18-20
15	161kV Insulators	10-12
1	138kV CCVT	30

*As of 2/3/2012

2. SAFETY

Safety is a priority with Entergy. Safety will be designed into substations and lines. The designs will be done with the utmost safety for personnel in mind for construction, operation, and maintenance of the equipment.

The *National Electric Safety Code* and the *National Electrical Code* will be used as the standards in the design & construction of the identified projects.

Should the work contained within this Facility Study be approved, a detailed Safety Plan will be formulated and incorporated within the project plan.

3. GENERAL ASSUMPTIONS

- Upon receipt of formal approval from customer authorizing design and construction, Entergy will prepare a detailed project execution plan.
- Due to timing and/or funding constraints, surveys and soil borings were not performed in order to develop this facility study.
- The connection of the generator must adhere to the latest Generator Interconnection Customer Requirements Standard PM3901.
- Due to timing constraints, a relay impact analysis was not performed. This study will be performed upon project approval and may identify additional requirements for remote station and/or CT replacements. No contingent dollars were allocated for this risk.
- Assumption was made that all local permits will be filed 60 days before start of construction.
- Assumption was made that no environmental permits are required for this installation.
- The quantities of material listed in this document are approximate and could change with completion of detailed design.
- All costs above represent good faith estimates in today's dollars. Price escalation for work in future years has not been included.

4. SCOPE OF WORK

4.1 Stowell Substation [common to ERIS & NRIS]

General:

- Add two (2) new 138kV bays south and perpendicular to (running east-west) the existing bays (running north-south).
    - The existing Big Hill line (L-151) will be in the new east bay and the new line L-XXX will be in the new west bay.
    - The existing wave trap, CVT, and arresters will also have to be replaced and located south of the new bays.
- The existing 138kV breaker, number 5440, is an extremely old oil filled breaker which cannot be relocated. It will be transported for disposal and replaced with a new gas circuit breaker and transported for disposal.

- The existing 138kV GOAB manually operated switches (5439 & 5441) will be relocated (5441 with the new 5440 breaker);
- Switch 5439 will have to be replaced with a center side break switch to allow for clearances with the relocated wave trap and CVT.
- Existing switch 5439 will be renamed and reused on the substation side of the new PID 247 breaker. (Note: that the wave trap location will be moved to the line side of new switch 5439; currently it is on the breaker side and this has to be changed).
- The wave trap and CVT will be replaced with a combination CVT/line trap combo with both terminals on the top side of the line trap.
- This is required to tap into the incoming Big Hill line. A suspension insulator will be used on the incoming line to accommodate the trap's installation.
- In order to avoid affecting the relaying scheme at the Big Hill facility, the existing relaying scheme and panel for line L-151 will be reused (with modification to use trip coil #2 of the new breaker). This will mean pulling new cables to the new location and using the existing panels in the control house.
- Transmission poles in the substation (with distribution lines under hung) will have to be relocated outside the substation to allow for the 138kV bay expansions.
- Transmission poles in the substation for the 69kV lines will also have to be relocated outside of the substation.
- The new PID 247 line will have to be horizontal when entering the substation so that the proper clearances will be maintained; jumpers from the CTs to the incoming lines dictate this requirement. Secondary suspension insulators will be required on the incoming PID 247 line to accommodate the CTs installations.
- Accessing the control house with the new conduits will be achieved by adding two (2) pull boxes and a section of cable tray externally mounted to the building. One (1) pull box will be installed on the southeast corner of the building with the second pull box being installed near the new 138kV bay for the PID 247 breaker. An entrance hole will be required to facilitate the tray's installation. The carrier rack for L-151 to Big Hill is located in this corner. Since all new cables will be pulled to the panels associated with breaker 5440 and L-151, this rack will be relocated to the position of the existing SEL 2020 rack after the SEL 2020 is removed.
- The existing 138kV suspension bus is 750MCM copper and the new expansion will be the same.
- No soil boring is required since we will be using foundations which are similar to the existing equipment.
- Site work is minimal and will be included as part of the foundation package.

Site:

Site work will consist of developing the south east corner of the substation (approximate area 122'x 90') which includes removing existing vegetation, excavating, and backfilling the affected area to ensure positive drainage and adding limestone to the affected area of construction. The site work will also include rerouting approximately 220'of access road (15'wide) around the perimeter of the new equipment for maintenance/operations.

The site work estimate includes the following approximate quantities:

- Vegetation removal (degrubbing) and disposal - 300 cu yds
- Structural fill material – 600 cu yds
- Limestone surfacing – 350 tons of rock
- Access road – 250 tons of rock

Foundations:

The foundation work will consist of the following:

- Install six (6) - 138kV CA-45 column foundations for three (3) new 138kV bays
- Install three (3) - 138kV arrester foundations using new steel pedestals (PID 247 Bay)
- Install three (3) - 138kV arrester foundations for the type PA-WT steel (Big Hill Bay)
- Install one (1) - 138kV CVT/line trap combo foundation using new steel pedestals
- Install three (3) - 138kV CT foundation using new steel pedestals
- Install four (4) - 138kV CCVT foundations using new steel pedestals
- Install two (2) - 138kV breaker foundations for new gas circuit breakers
- Install one (1) -138kV switch pedestal (low bus) using new steel
- Install two (2) - pull boxes and conduit for conduit bank (one at control house and one near breakers with ~150'of trench for 10-4" PVC conduits)
- Install below ground conduits to relocated and new equipment (~150'of trench for 1500' of the main run of 4" PVC conduits and ~ 200'of trench for 1200' of 2" PVC conduits to the devices)
- Install new ground grid and pigtails for equipment, structures, and bay expansion
- Expand ground grid in new bays and to fence (800' of 4/0 copper ground grid and 500' of 19#9 copperweld pigtails)

Electrical:

The electrical work will consist of the following:

- Install six (6) – 138kV type CA-45 columns (masts included).
- Install four (4) – 138kV type W trusses (w/switch mounting brackets - no braces required).
- Install seven (7) – 138kV type U trusses (three (3) with TA-UB brace).
- Install 12 – 138kV type N trusses (four (4) with N-LB braces and eight (8) with N-SB braces).
- Install six (6) – 138kV N truss miscellaneous hardware for post insulator installation.
- Install three (3) – 138kV arrester type pedestal steel (new steel – PID 247).
- Install three (3) – 138kV arresters on new steel (PID 247).
- Install three (3) – 138kV CT type pedestal steel (new steel – PID 247).
- Install three (3) – 138kV CTs on new steel (PID 247).
- Install four (4) – 138kV CVT type pedestal steel (new steel – one (1) for PID 247 & three (3) by auto #4).
- Install four (4) – 138kV CVT on new steel (one (1) for PID 247 and three (3) by auto #4).
- Remove one (1) – 138kV PT-WT type wave trap and associated structure and junction box (Big Hill).
- Remove one (1) – 138kV PA-CC type CCVT and associated steel and junction box (Big Hill).
- Install one (1) – 138kV CCVT/line trap combo pedestal (new steel – Big Hill).
- Install one (1) – 138kV CCVT/line trap combo and associated junction box (Big Hill) on new steel.
- Relocate three (3) – 138kV PA-LA type arrester and associated steel (Big Hill).
- Relocate one (1) - existing 138kV GOAB vertical break, manually operated switch # 5441 to new steel breaker bay (Big Hill – substation side of breaker).
- Relocate one (1) - existing 138kV GOAB vertical break, manually operated switch # 5439 to new steel breaker bay (PID 247 - substation side of breaker). Rename using new number.
- Remove existing oil circuit breaker (number 5440) and haul for disposal.

- Install two (2) – 138kV GOAB, 2000A, center side break, vertical mount, manually operated switches on line side of both Big Hill and PID 247's breakers. (one (1) is switch #5439 an the other is new).
- Install one (1) – 138kV switch support structure (low bus) new steel (PID 247).
- Install one (1) - 138kV, 2000A, GOAB, vertical break, horizontal mount, manually operated switch/with integral ground switch (PID 247).
- Install 21 – 138kV porcelain post insulators for new switches. (six (6) each for 2-center side break and nine (9) for new vertical break). Existing switches will reuse their post insulators.
- Install two (2) – 138kV GCB, 3000A circuit breakers, 40ka.
- Install new 138kV strain bus consisting of 750 MCM copper in new bays and in transition from existing bays.
- Install 30 – 138kV polymer suspension insulators (rated 25K) for strain bus (in new bays).
- Install nine (9) – 138kV polymer post insulators for strain bus (transition from bays).
- Install four (4) – 138kV polymer suspension insulators rated 50K (three (3) for PID 247 CTs and one (1) for Big Hill wave trap) in line with the transmission line installation. (NOTE: six (6) suspension insulators at bay structure provided by transmission lines or PID 247 and are also rated 50K).
- Install jumpers from equipment to bus using 750 MCM copper for wave trap, CTs, switches and breakers and 4/0 copper to arresters and CCVTs.
- Install above ground conduits to new and relocated equipment.
- Connect ground grid pigtails to new and relocated equipment.
- Cut out entrance in control house for 24" cable tray installation on building exterior.
- Install exterior 24" cable tray w/covers.
- Fabricate shroud/cover to seal cable tray entrance into building and at pull box and wall entrance.
- In addition to replacing the existing trap and CCVT, replace the existing junction boxes and include a new carrier line tuner.

Relay:

- Design, purchase, and install one (1) line/breaker control panel w/POTT and DTT over fiber referencing ETI Standard PM1803, option B2, latest revision. This standard uses the SEL 421 relay as the primary 1 relay and an SEL 311L current differential relay as the primary 2 relay. The

SEL relays will communicate directly via fiber with an identical remote end panel installed at the PID 247 wind facility.

- Replace OCB 5440 with 138kV, 3000A gas circuit breaker (GCB).The existing relays on L-151 will be reused. New cables will be pulled from the new breaker to maintain all circuits and add new alarm points. Two (2) DC circuit breakers will be installed on L-151/breaker 5440 control panel. The existing CT, control, supply, and SCADA circuits will be reused with modification to separate the trip #1 and close circuits, utilize the new circuit breaker knife-blades in the trip and close circuits, and use trip coil #2 that is available in the new high voltage circuit breaker.
- Install one (1) - CVT on the line side of the PID 247 line for hot line indication, breaker sync, and reclosing.
- Install one (1) - CVT junction box for PID 247 line.
- Install one (1) CVT, one (1) line trap, and one (1) line tuner (4CL2AL1S1 CL2) on the line side of Big Hill L-151 for hot line indication, breaker sync, reclosing, and carrier communication. The carrier communication frequency is coupled to B PHASE.
- Install one (1) - CVT junction box for Big Hill L-151.
- Purchase and install one (1) SEL 487B low impedance bus differential relay to replace the 138kV bus CA-16 relays on panel #1. CA-16 relays require the same CT ratio for all CT inputs to the relay. The CT ratio in use is 600:5. The new 3000:5 Siemens breakers do not have a 600:5 tap. A lower ratio is not acceptable. Purchase one (1) aluminum plate and pre-wire the SEL 487B relay and test switches. This plate shall be installed in the top location of panel #1. The SEL 487B shall replace the existing single BFBU timer (TD-5 #5). The breaker failure scheme shall be initiated by trips from all of the 138kV bus breakers or circuit switchers that do not have internal breaker failure function. If the breaker does have a breaker failure function, the 138kV bus shall be tripped upon the breaker's breaker failure timeout. All existing current inputs from bus zone breakers shall be reused. The old type current test switches shall be replaced with the new FT-1 type test switches procured with the aluminum plate. The new bus differential relay shall require one (1) 52a input from each breaker in bus differential scheme. The 52a contact in the bus diff scheme shall be reused.
- Purchase and install three (3) 138kV CCVTs for relaying potential per ETI Standards PN020101 and PN020300. The CCVTs will be installed on the 138kV bus on the AutoXfmr #4 side of bus tie switch #23009. Three (3) winding CCVTs may be required with a dedicated winding for metering.
- Purchase and install one (1) three-phase potential junction box. This box will route bus potential from each set of windings to one of two bus potential distribution boxes in the control house.
- The RTU will be modified to a D400S with removal of the D20 main board. Purchase DNP I/O modules for all existing peripheral cards. Install

one (1) D20 S card kit. Install one (1) auxiliary power supply to handle additional load. There are sufficient spare points on the K card for the new GCB breaker. Cable terminated within the RTU also includes many un-terminated loose conductors. Work within the existing RTU cabinet may be difficult. Spare cables will be removed or bundled together out of the path of new cable or equipment. Install within the RTU cabinet, one (1) SEL 2407 satellite clock with satellite antenna mounted on the exterior of the control house. The D400S will communicate to the host via SCADAnet if available.

- Replace and install one (1) indoor DC wall mounted panel. This panel will also include four (4) 50 amps DC breakers.
- Replace and install one (1) indoor AC wall mounted panel.
- Provide space for new telecom equipment to be mounted on two (2) 19" racks.
- The existing 125 VDC, CC9, 200 amp-hour battery set and 25 amp battery charger appear to be adequate based on DC loading analysis. This must be verified in detailed design.

Relay Settings:

General:

- New RTU configurations or revisions will be necessary.
- Relay settings and RTU configurations details need to be specified during Project Execution Plan (PEP) stage, such as equipment and schemes for pilot protections.
- System changes will be modeled in ASPEN. Relay Impact Analysis will be performed by a settings engineer during PEP stage to identify requirements for relay/CT replacement and settings revisions at the local and remote stations in the area. Some obsolete relays may need to be replaced.
- Facilities Studies are done without the advantage of having Relay Impact Studies. Scope and estimates may change considerably as per relay impact analysis during PEP development.
- Transmission Engineering Services shall coordinate all setting changes in the project with generator interconnection plant as per PRC-001 (power plant protection and related control elements must be set and configured to prevent unnecessarily tripping the generator prior to any transmission protection and related control systems acting first, unless the generator is in jeopardy by exceeding its design limits due to operating conditions, generator system faults, or other adverse potentially damaging conditions.)

Stowell Substation:

- Develop new relay settings for Stowell-PID 247 wind farm line with SEL421 (Pri1)/SEL311L (Pri2) matching with design option.

- Develop new relay settings for Stowell bus differential panel using SEL487B.
- Develop new relay settings for new 138kV/69kV autotransformer at Stowell 138kV.
- Revise settings at Stowell-Big Hill L-151 (new GCB breaker).
- Update Stowell-Shiloh (KD-IRD) settings.

Communications and SCADA:

- Create new TOC edit sheets for new substation.
- Create new SOC edit sheets for new substation.
- Host database changes will be required.
- Develop RTU configuration.

Metering:

- Attachment 1 from ETI standard MI0301 shall be completed and provided to ETI. The anticipated load range must be known so it can be determined if the CTs are sized to ensure the system operates within the required accuracy range. For those systems that have large power flow ranges or power flows that may approach zero, high accuracy CTs may be necessary to meet minimum accuracy requirements over the full range of anticipated flows.
- All metering facilities shall conform to requirements of latest revisions of all applicable ETI standards (MI0301, MI0302), ANSI standards, IEEE standards, and shall be in compliance with all regulations from authorities asserting jurisdiction. All metering facilities shall comply with Good Utility Practice.
- Purchase and install extended range (or high accuracy) revenue class metering (3) CTs
- Design, purchase, and install an indoor metering panel with current and potential inputs from the CT/PT cables and hardwired for the pulse data. The meters will be configured to provide data to ETI's MV-90 interrogation system via a dial-up modem and to the customer via an appropriate output format.
- Customer shall complete and submit to ETI the Transmission Metering Applications Requirements form per Standard M10301 latest revision.
- The new meter panel will be replace transformer meter panel #5 if all transducers in place on panel #5 can be removed from service. If the panel #5 space is not available, the meter panel will be either an outdoor meter panel or a wall mounted meter panel.

4.2 ETI Transmission Line Work for Interconnection [common to ERIS & NRIS]

General:

The interconnection of PID's new 138kV line requires ETI to reconfigure lines L-151 and L-89 going into Stowell substation.

- L-151/1 and L-151/2 will be relocated due to the new bay in the substation. Both structures will be replaced with steel structures. Both the conductor and shield wire will be re-sagged.
- L-89/1 and L-89/2 will be relocated due to the new bay in the substation.
- There is a distribution line that is underbuild on L-151/1 and L-89/1. The distribution underbuild will be relocated to allow for the new substation bay.

Structures and Foundations:

- L-151 Stowell to Big Hill will require two (2) new steel structures.
  - Install (1) single-pole single circuit tangent structure.
  - Install (1) deadend self-supporting single-pole single circuit steel structure.
- L-89 Stowell to Himex will require three (3) new steel structures.
  - Install (1) single-pole single circuit tangent structure.
  - Install (2) deadend self-supporting single-pole single circuit steel structure.

Conductor and Insulators:

- L-151 Stowell to Big Hill
  - Existing conductor, 336 ACSR, will be re-sagged.
  - Six (6) deadend insulators 138kV assembly polymer sized 336 ACAR.
  - Three (3) braced line post 2-1/2" 138kV assembly polymer sized for 336 ACAR.
- L-89 Stowell to Himex
  - 800 lbs of 666.6 kcmil ACSR Flamingo will be installed to meet the current ampacity rating.
  - Six (6) deadend insulators 138kV assembly polymer sized 666.6 kcmil ACSR Flamingo.

Shield Wire:

- L-151 Stowell to Big Hill
  - 900' of 7#7 will be installed on L151/2 going into substation.
- L-89 Stowell to Himex

- 850’ of 64mm 2/.528” 24-fiber OPT-GW shield wire.

Removals:

- L-151 – Remove existing wood structures 1 and 2. Remove all guy wires and anchors.
- L-89 – Remove existing steel structures 1 and 2.

Distribution Lines:

- Construction of the new transmission line will require ETI to relocate the distribution line that currently is in the path of the new line. These facilities will be rerouted and placed underground.

4.3 PID 247’s New Substation Facility [common to ERIS & NRIS]

General:

- The customer will design, build, own and operate a new 138kV substation according to ETI’s specifications. ETI’s involvement will be design review/comment, construction review, and testing and commissioning review.
- This substation will be a customer owned substation. Customer shall perform all work associated with the line relaying package in accordance with ETI’s standards and specifications for the proposed work.
- Customer has requested a 138kV line out of ETI’s 138kV Stowell substation to provide interconnection for a wind power facility.
- Close coordination with ETI's protection personnel is required. Customer will design, build, own, and operate the wind facility. ETI’s involvement will be to review, comment on the design as per ETI standards, and witness testing of all high side equipment.
- The generator step-up transformer’s winding configuration shall be coordinated with ETI, and unless otherwise approved by ETI, the step-up transformer shall be installed with a solidly grounded wye-winding configuration on the transmission side and a delta-winding configuration on the generator side. Refer to Generator Interconnection Customer Requirements Standard PM3901 for full details.
- Customer will install one (1) current differential primary line panel using direct fiber and multiplexed communication circuits for primary relay communication per ETI standard PM1803, option C2, latest revision. The panel incorporates a SEL 421 for primary 1 protection with POTT and DTT. It also includes an SEL model 311L-7 for current differential primary 2 protection with POTT and DTT. These panels will interface with a new line panel to be installed at the Stowell substation. These panels will function together to protect the 138kV transmission line. ETI will supply PID 247 with the latest ETI standards and the standards must be adhered to strictly. Any deviation must be approved by ETI design personnel. Alternate use of relay communication ports and deletion of relay communication circuits will not be approved. (An alternate standard is

available that can provide line relaying protection and breaker control functions.)

- Purchase and install one (1) SEL 2407 satellite synchronized clock and all other miscellaneous material required for relay protection and communications.
- Install one (1) 48-count fiber optic patch panel for communications with Stowell substation. ADSS fiber optic cable will be installed from the final line splice box on the line termination tower to the fiber optic termination panel in the control house. Purchase and install additional communications equipment as dictated by the telecom group.
- The high-side breaker will meet ETI standard SD0202, latest revision. In particular, independent cut's for primary 1 and primary 2 relaying, primary and secondary trip schemes, and the trip coil monitoring system.
- 138kV three-phase potential is required for line relaying. Single-phase 138kV potential is strongly suggested for the opposite side of the 138kV breaker for hot line/bus indication, breaker synchronization, and line relaying.
- ETI's SOC will require 138kV breaker status indication. It is assumed that breaker status will be transmitted via mirror bits to Stowell substation.
- All drawings related to the relaying work must be reviewed and approved by ETI's Transmission Relay Designer prior to ordering any material.
- Customer shall be responsible for coordination and protection of all their equipment beginning with and including the 138kV breaker.

4.4 New 138kV Line (By Customer) [common to ERIS & NRIS]

General:

- A new 138kV transmission line will transition from existing Stowell substation to supply/receive power to the Customer's substation**.**
- The new transmission line will be designed using the new hurricane standards; steel poles.
- The new transmission line will be designed in accordance with the ETI 161kV standards in the Chambers County loading district. The extreme wind load case is 140 mph (50.2 psf). The NESC load case is light. The extreme Ice load case is 0.5 inches.
- OPGW should be installed in the shield position to provide the communications path with will be necessary between Stowell and the new Customer owned station.

4.5 Upgrade Stowell 138/69kV, 35 MVA Autotransformer [NRIS Only]

General:

There are two (2) 138/69kV autos at Stowell substation. One auto is rated for 35 MVA and one auto is rated for 50 MVA. Only the 35 MVA auto needs to be upgraded or replaced with an auto capable of handling at least 44 MVA.

A new three-phase 50 MVA auto will be installed in the same bay as the existing 35 MVA auto to match the other transformer and provide adequate capacity.

No reactive compensation is required for the tertiary; however, the tertiary will be used for station service since the existing auto is providing the station service. The station service transformer will be replaced.

Autotransformer secondary switch may need to be replaced and is included in the estimate.

- Additional conduits (and pull boxes) from the control house to the new autotransformer for relaying and station service will be required.
- Design, purchase, and install one (1) autotransformer protection panel w/SEL487E referencing ETI Standard PM3507, option A, latest revision. This standard uses the SEL 487E relay as the primary 1 relay.
- Design, purchase, and install one (1) autotransformer protection panel w/Erlphase T-Pro and SEL 357-7 referencing ETI Standard PM3507, option B, latest revision. This standard uses the Erlphase T-Pro and SEL 351-7 relays as the primary 2 relays.
- One (1) panel will replace the existing transformer protection panel. Space for the primary 2 panel must be found. It is assumed that the meter panel will be removed.
- Multiple CTs on the low side of the autotransformer must be provided. One (1) set is required for low side bus differential protection. It is preferred to have an additional two sets for primary 1 and primary 2 transformer differential protection.

4.6 Upgrade Brooks Creek-Bayshore 138kV Transmission Line [NRIS Only]

General:

ETI is proposing to upgrade the existing 138kV transmission line L-536 from Brooks Creek to Bayshore substation situated in Liberty and Chamber counties, Texas.

Currently, 138kV transmission line L-536 runs from Brooks Creek to Bayshore substation for 13.52 circuit miles. The existing L-536 ROW is 100’ wide.

Design Criteria:

- ETI Load case: NESC Light Loads, LC-3, 140 MPH Wind, 0.5” Ice.
- 26’ minimum ground clearance.
- 600’ ruling span.
- This 138kV transmission line requiring an upgrade is located in NAD 83 State Plane Coordinate Zone 4204, Texas South Central Zone.

- Structures will be designed to accommodate a single circuit of 666 kcmil 24/7 ACSR Flamingo conductor rated for 882 amps in a vertical and delta configurations spaced for 161kV.
- All design and construction will be completed in accordance with current ETI loading, clearance and construction standards for 161kV transmission line.
- A soil boring for the transmission line portion was NOT performed for this facility study estimate, but will be required for final design.
- A topographic survey for the transmission line portion was NOT performed for this facility study estimate, but will be required for final design.

Transmission Line Details L-536:

Install Materials:

- 83 steel structures
- Three (3) socketed piles
- 202,600 lbs. of 666.6 kcmil 24/7 ACSR Flamingo conductor
- 80,000’ of 48-fiber AlumaCore DNO-8161
- Five (5) splice boxes
- 1,300’ of 7 #7 alumoweld
- 24 bolted dead-end insulators
- 216 braced post insulators
- 24 heavy suspension insulators
- 240 anodes

Removal:

Remove all structures and all hardware that associated with L-536 unless otherwise noted.

Remove Materials:

- 158 wood poles
- 11 concrete poles
- One (1) steel pole
- 317’ ft. of 750 Cu conductor
- 99,008 lbs. 336.4 AA/ACSR conductors
- 142,560’ 5/16” EHS shield wire
- 264 insulators
- 71 conductor cross arms

- Eight (8) shield wire cross arms
- 73 X-braces
- 6,720’ guy wire
- 56 anchors

4.7 Upgrade the Brooks Creek-Shiloh 138kV Transmission Line [NRIS Only]

General:

The existing 138kV transmission lines L-536 and L-435 run for about 3.33 circuit miles between the Shiloh and Brooks Creek substations situated in Chamber County, Texas.

This segment is built on typical double circuit 138kV wooden structures with a typical ruling span average length of 600’. The structures were designed to handle double 336 ACSR/AA conductor rated for 470 amperes at 75 deg. Celsius or 212 deg. Fahrenheit.

Design Criteria:

- Current: NESC Light Loading Districts.
- ETI Load case: NESC Light Loads, LC-3, 140 MPH Wind, 0.5” Ice (new structures).
- 26’ minimum ground clearance.
- 600’ ruling span.
- This 138kV transmission line is located in NAD 83 State Plane Coordinate Zone 4204, Texas South Central Zone.
- Structures will be designed to accommodate a double circuit of 666 kcmil 24/7 ACSR Flamingo conductor rated for 882 amps in a vertical configuration spaced for 161kV.
- All design and construction will be completed in accordance with current ETI loading, clearance and construction standards specifications for 161kV transmission line.
- A soil boring for the transmission line portion was NOT performed for this facility study estimate, but will be required for final design.
- A topographic survey for the transmission line portion was NOT performed for this facility study estimate, but will be required for final design.

Transmission Line Details L-536:

Install Materials:

- 37 steel structures
- Four (4) socketed piles
- 100,000 lbs. of 666.6 kcmil 24/7 ACSR Flamingo conductor

- 21,000’ of 48-fiber AlumaCore DNO-8161
- Three (3) splice boxes
- 20,000’ of 7 #7 alumoweld
- 24 bolted dead-end insulators
- 162 braced post insulators
- 21 heavy suspension insulators
- 35 overhead suspension
- Eight (8) overhead dead-end
- 99 anodes

Removal:

Remove all structures and all hardware that associated with L-536 unless otherwise noted.

Remove Materials:

- 74 wood structures
- Seven (7) steel structures
- 317’ of 750 Cu conductor
- 48,550 lbs. of 336 ACSR/AA conductor
- 35,376’ of 5/16” shield wire
- 225 insulators
- 59 conductor cross arms
- 30 X-braces
- 4,320’ guy wire
- 36 anchors

Relay Settings:

- Update Shiloh-Stowell (KD-IRD) settings
- Revise Z2, Z3 and GOC settings for Raywood-Shiloh (SEL421)
- Revise Z2, Z3 and GOC settings for Big Hill-Stowell (KD-SDG-TD-KRD)

4.8 Upgrade Cedar Hill-Plantation 138kV Transmission Line [NRIS Only]

General:

ETI proposes to eventually upgrade 138kV L-886 to 230kV between Tamina and Conroe Bulk substations in Montgomery County, Texas. This project focuses on the 2.38 mile section between Cedar Hill GOAB and Plantation substation. The project plan calls for rebuilding the existing single circuit structures with a double circuit structure with one (1) circuit left vacant for a future circuit expansion.

The project lies in Montgomery County (TX 339) – NAD 4203 Central Zone in the State Plane Coordinate system.

Design Criteria:

- LC-2A Zone: under extreme wind 110 mph, NESC medium, and .5" inches ice.
- Structures will be designed to accommodate two (2) circuits of 1272 ACSS Bittern conductor in a vertical configuration and two (2) 3' shield wire davit arms per ETI 230kV standards.
- Steel structure – install new double circuit direct-embedded and self-supporting structures.
- Conductor - install single 1272 kcmil 45/7 ACSS Bittern conductor rated for 1957 amperes operating at 347°F maximum.
- Shield wires – two (2) shield wires will be planned for the length of the line. Install one (1) 48-fiber AlumaCore OPGW and one (1) will be a future 7 #7 Alumoweld to be installed at a later date.
- Insulators - install 230kV braced post, polymer suspension, and dead-end insulator assemblies with suspension and dead-end clamps that will be sized for single 1272 kcmil 45/7 ACSS Bittern conductor.
- An aerial LIDAR survey has been conducted and data has been received.
- Soil data has already been collected and borings reports have already been supplied for this project.
- Foundation - all new structures that do not require steel foundations will be embedded 20'. Other structures will utilize drilled piers.

Transmission Line Details Line 886:

Install Materials:

- 20 - 230kV steel structures
- 59,400 lbs. of 1272 kcmil 45/7 ACSS Bittern conductor
- 15,000' OPGW Fiber "AlumaCore"
- 1,000' 7 #7 alumoweld conductor
- Nine (9) deadend insulators
- 57 braced post Insulators
- Three (3) jumper line post insulators
- 57 anodes
- One (1) drilled pier foundations

Removal:

Remove all structures and all hardware that associated with L-886 unless otherwise noted.

Remove Materials:

- 39 wood poles
- Two (2) concrete poles (structure #296)
- 35,350 lbs. of 336 kcmil ACSR conductor
- 460 lbs. 1033 kcmil AA conductor
- 25,502’ of 5/16” EHS shield wire
- 69 insulators
- 21 conductor cross arms
- 10 shield wire cross arms
- 20 X-braces
- 960’ guy wire
- Eight (8) anchors

4.9 Upgrade Conroe-Plantation 138kV Transmission Line [NRIS Only]

General:

ETI proposes to eventually upgrade 138kV L-886 to 230kV between Tamina and Conroe Bulk substations in Montgomery County, Texas. This project focuses on the 2.91 mile section between Plantation and Conroe Bulk substations. The project plan calls for rebuilding the existing single circuit structures with a double circuit structure with one (1) circuit left vacant for a future circuit expansion.

The project lies in Montgomery County (TX 339) – NAD 4203 Central Zone in the State Plane Coordinate system.

Design Criteria:

- LC-2A Zone: under extreme wind 110 mph, NESC medium, and .5” inches ice.
- Structures will be designed to accommodate two (2) circuits of 1272 ACSS Bittern conductor in a vertical configuration and two (2) 3’ shield wire davit arms per ETI 230kV standards.
- Steel structure – install new double circuit direct-embedded and self-supporting structures.
- Conductor - install single 1272 kcmil 45/7 ACSS Bittern conductor rated for 1957 amperes operating at 347°F maximum.
- Shield wires – two (2) shield wires will be planned for the length of the line. Install one (1) 48-fiber AlumaCore OPGW and one (1) will be a future 7 #7 alumoweld to be installed at a later date.
- Insulators - install 230kV braced post, polymer suspension, and dead-end insulator assemblies with suspension and dead-end clamps that will be sized for single 1272 kcmil 45/7 ACSS Bittern conductor.

- An aerial LIDAR survey has been conducted and data has been received.
- Soil data has already been collected and borings reports have already been supplied for this project.
- Foundation - all new structures that do not require steel foundations will be embedded 20'. Other structures will utilize drilled piers.

Transmission Line Details Line 886:

Install Materials:

- 27 - 230kV steel structures
- 72,620 lbs. of 1272 kcmil 45/7 ACSS Bittern conductor
- 18,000' OPGW Fiber AlumaCore
- 1,000' 7 #7 alumoweld conductor
- 18 deadend insulators
- 72 braced post Insulators
- Three (3) jumper line post insulators
- Three (3) heavy suspension insulators
- 72 anodes
- Four (4) drilled pier foundations

Removal:

Remove all structures and hardware associated with L-886 unless otherwise noted.

Remove Materials:

- 57 wood poles
- 42,977 lbs. of 336 kcmil ACSR conductor
- 308 lbs. 1033 kcmil AA conductor
- 30,994' of 5/16" EHS shield wire
- 96 insulators
- 30 conductor cross arms
- Two (2) shield wire cross arms
- 28 X-braces
- 1,680' guy wire
- 14 anchors

Relay Settings:

- Update Conroe-Tamina (SEL321, SEL221) settings
- Revise Z2, Z3 and GOC settings for New Caney-Conroe Bulk

- Revise Z2, Z3 and GOC settings for Grimes-Conroe Bulk (SEL421, SEL311C)
- Revise Z2, Z3 and GOC settings for Goslin-Conroe Bulk (SEL421, SEL311C)
- Revise Z2, Z3 and GOC settings Tamina-Conroe Bulk (SEL321, SEL421)
- Revise Z2, Z3 and GOC settings for Porter-Tamina (SEL421, SEL311L)
- Revise bus diff settings at Tamina (B-Pro)

5. COST

The costs shown in the table include all applicable overheads but do not include tax gross up. Entergy incurs a tax liability proportional to the amount of customer contributions.

Estimated Task Costs

Task	2012	2013	2014	Total
Interconnection				
Stowell Sub	$95,245	$1,684,480	$223,492	$2,003,217
L151/L89 relocation	$31,198	$619,467	$117,149	$767,815
Distribution	$33,593	$209,822	$48,345	$291,760
Subtotal ERIS (without TGU)	$160,036	$2,513,769	$388,986	$3,062,792
System Upgrades				
Stowell 138/69kV autotransformer	$376,430	$84,048	$1,302,289	$1,762,768
Brooks Creek-Bayshore 138kV transmission line	$497,362	$12,320,655	$1,249,367	$14,067,383
Brooks Creek-Shiloh 138kV transmission line	$66,951	$4,352,963	$531,161	$4,951,074
Cedar Hill-Plantation 138kV transmission line	$162,349	$2,335,521	$608,023	$3,105,892
Conroe-Plantation 138kV transmission line	$165,829	$3,035,339	$672,510	$3,873,678
Subtotal NRIS* System Upgrade Cost (without TGU)	$1,268,919	$22,128,526	$4,363,349	$27,760,795
Total ERIS + NRIS (without TGU)	$1,428,955	$24,642,295	$4,752,336	$30,823,587

* ERIS must be completed as part of the NRIS

6. UPGRADE CLASSIFICATION

The ICT has reviewed and determined whether each required upgrade will be considered a Supplemental Upgrade. For more information on cost responsibility for Base Plan and Supplemental Upgrades, see Attachment T to Entergy's OATT.

Task	Total Cost	Base Plan	Supplemental	Reference
Stowell Sub	$2,003,217		$2,003,217	4.1
L151/L89 relocation	$767,815		$767,815	4.2, 4.4
Distribution	$291,760		$291,760	4.3
Stowell 138/69kV autotransformer	$1,762,768		$1,762,768	4.5
Brooks Creek-Bayshore 138kV transmission line	$14,067,383		$14,067,383	4.6
Brooks Creek-Shiloh 138kV transmission line	$4,951,074		$4,951,074	4.7
Cedar Hill-Plantation 138kV transmission line	$3,105,892	$3,105,892		4.7
Conroe-Plantation 138kV transmission line	$3,873,678	$3,873,678		4.8
Total		$6,979,570	$23,844,017	

7. SCHEDULE

A detailed schedule will be prepared subsequent to customer approval to proceed with the project. Based on the task duration schedules listed below, the overall project date ISD is projected to be 11/30/2014. Based on an assumed customer approval date of 5/31/2012, the following are approximate schedule dates:

Task Name	Estimated Start Date	Estimated ISD/Completion
Stowell Sub	May 2012	Jan 2014
L151/L89 relocation	May 2012	Jan 2014
Stowell Distribution	May 2012	Jan 2014
Brooks Creek-Bayshore 138kV transmission line	May 2012	Jan 2014
Brooks Creek-Shiloh 138kV transmission line	May 2012	Jan 2014
Cedar Hill-Plantation 138kV transmission line	May 2012	Jan 2014
Conroe-Plantation 138kV transmission line	May 2012	Jan 2014
Stowell 138/69kV autotransformer	May 2012	Nov. 2014

Notes to Duration Schedules:

- All construction work requiring outages will be performed during acceptable periods of system condition to ensure reliable operation of the system which most often is the off-peak load season. Line outages will be discussed with the SOC and TOC and the assumption is made that line outages will be executed as planned. However, an evolving system condition may result in cancellation of approved outages by the SOC/TOC and may also result in additional schedule delay.
- Substation construction will be coordinated with the transmission line outages when possible.
- Construction resources are available when required.
- Transmission line and substation projects will begin subsequent to Definition phase Project Execution Plan.
- This schedule does not account for non-typical adverse weather conditions.
- Schedule durations are high level estimates at this time. A detailed schedule will be prepared upon project approval.

8. INTERCONNECTION STANDARDS

The interconnection standards are detailed at the link shown below.

http://entergy.com/energydelivery/facility_requirements.aspx

9. RISK ASSESSMENT

Risk	Comment	Impact
Underground site issues (Pipelines, wells, containments)	Unknown underground factors will add mitigation costs and may impact schedule	***
Material transportation could affect cost/schedule	Large transformers(other equipment) may require special transport to substation site	**
Material costs steel & Equipment	Rising steel, copper, fuel and other market conditions could greatly affect estimated cost.	****
Lay-down areas	Cost to be determined during detailed scoping.	*
Storm-water plan implementation	Best guess on SWPPP creation, implementation and monitoring can vary greatly dependant on outcome of environmental study.	**
Weather & Equipment Lead Times (Transformer, Poles)	Unexpected delays on material lead times, unusually inclement weather will impact schedule but might impact AFUDC costs as well.	**
Wetland mitigation	Undetermined until environmental analysis is complete.	***
T-Line Structures Count can change	Scope based on preliminary structure count.	***
Outages Availability	Preliminary schedule only considers general outage constraints. Specific project schedule may be delayed by days, weeks or months dependant on system conditions. Delays of months = increased project costs.	**
Scope based on design assumptions which may change	Varied impact on cost and schedule.	***
Adverse ROW conditions	ROW conditions during construction will vary depending on weather conditions. Cost for some laminated mats have been included, but additional may be needed.	**

*-low impact to cost, ** - moderate impact to cost, ***- high impact to cost, **** - very high impact to cost.

10. CONFIRMED RESERVATIONS

The following modifications were made to the base cases to reflect the latest information available:

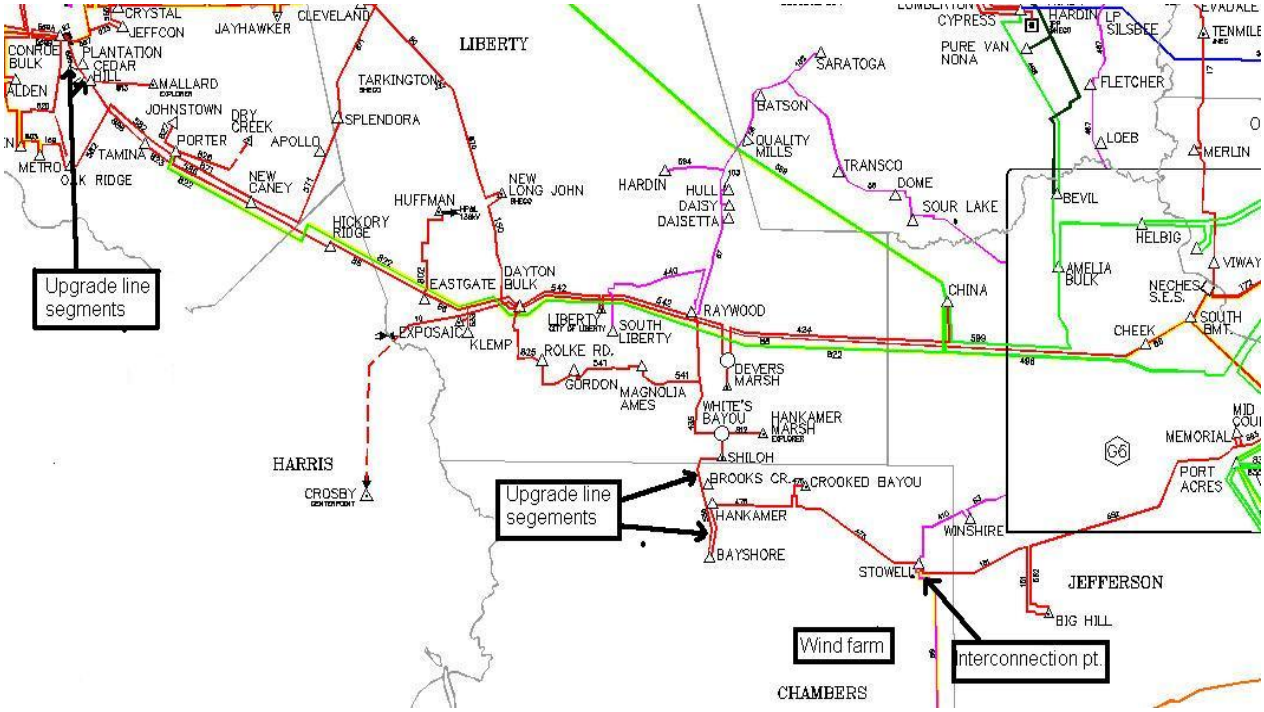
- Non-Firm IPPs within the local region of the study generator were turned off and other non-firm IPPs outside the local area were increased to make up the difference.
- Confirmed firm transmission reservations were modeled for the years 2011 - 2013.
- Approved transmission reliability upgrades for 2011 – 2013 were included in the base case. These upgrades can be found at Entergy's OASIS web page, http://www.oatioasis.com/EES/ under approved future projects.

11. ATTACHMENTS

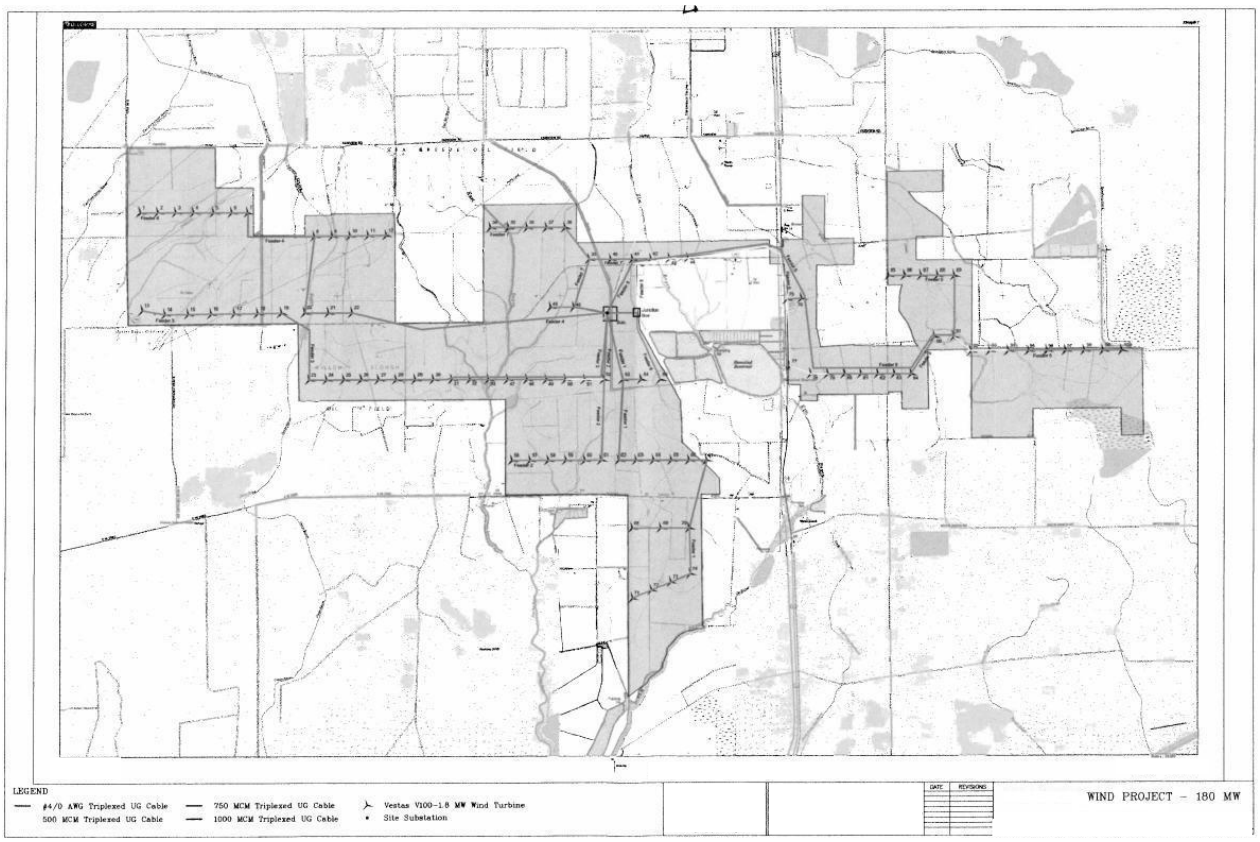
11.1 Table of Acronyms

ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
AFUDC	Allowance for Funds Used During Construction
ATC	Available Transfer Capability
EES	Entergy Control Area
EHV	Extra-High Voltage
ERIS	Energy Resource Interconnection Service
ICT	Independent Coordinator of Transmission
ISD kV	In-Service Date Kilo-Volt
MCM	(M) Thousand Circular Mils
MVA	Mega-Volt Amp
MW	Mega-Watt
NPDES	National Pollution Discharge Elimination System
NOI	Notice of Intent
NRIS	Network Resource Interconnection Service
OASIS	Online Access and Same-time Information System
OATT	Open Access Transmission Tariff
POD	Point of Delivery
POR	Point of Receipt
ROW	Right of Way
SES	Steam Electric Station
SOC	System Operations Center
SHV	Super High Voltage
SW	Switch Station
TOC	Transmission Operations Center

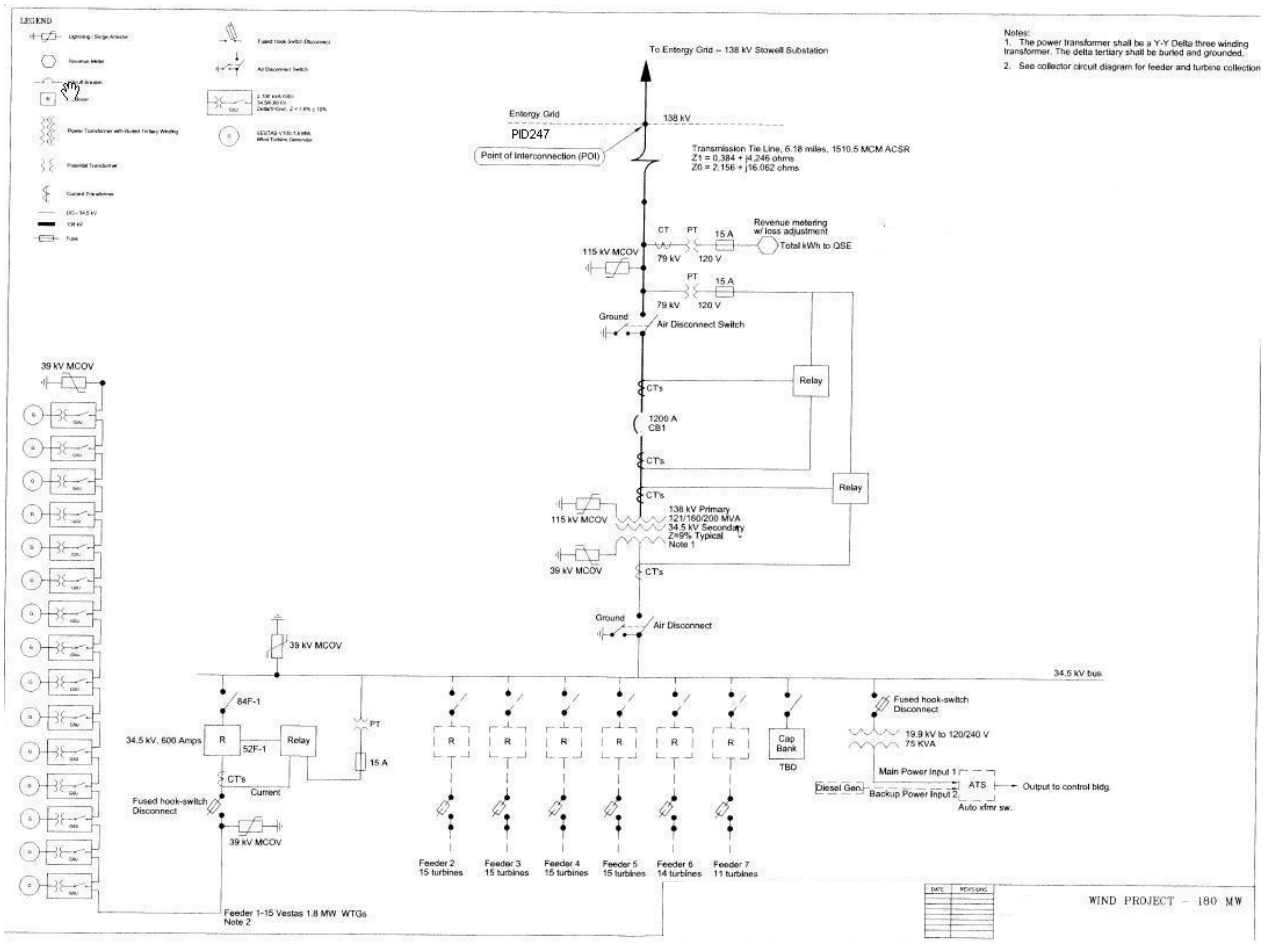
11.2 Scope Summary Diagram / Area Map



11.3 Company Interconnection Facility Location



11.4 Customer Collector Station One Line Drawing



11.5 Entergy's Stowell Substation SO5 One Line Drawing