# BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 060424-EI
FLORIDA POWER & LIGHT COMPANY

JUNE 26, 2006

IN RE: PETITION FOR DETERMINATION OF NEED FOR THE BOBWHITE-MANATEE PROJECT

DIRECT TESTIMONY OF:

VICENTE ORDAX, JR.
(REDACTED)

**The Bobwhite-Manatee Project**

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## Executive Summary:

This Petition provides the background information concerning the Bobwhite-Manatee 230kV Project (BMP), as well as the need for and benefits resulting from the BMP. The BMP maximizes system reliability, increases power transfer capability and meets local area load requirements by serving proposed future distribution substations east of I-75, south of SR-62 and north of SR-72 in Manatee and Sarasota Counties while minimizing cost to customers. The Project will primarily consist of the construction of approximately 32 miles (subject to final certification under the Transmission Line Siting Act or "TLSA") of a single circuit 230kV transmission line in Manatee and Sarasota Counties. The need for the BMP is based on the following considerations:

- The need to provide additional transmission reinforcement to the existing 230kV transmission network between Manatee and Ringling substations in a reliable manner consistent with North American Electric Reliability Council (NERC), Florida Reliability Coordinating Council (FRCC) and other applicable standards.
- The need to serve the increasing load and customer base in the area south of Manatee and north of Ringling Substations.
- The need for another electrical feed from the Manatee Plant south to the Ringling area via a separate Right-of-Way (ROW) path, thereby reducing the impact of a loss of the existing transmission facilities on a common ROW.

- The opportunity, subject to final corridor siting certification under the TLSA, to efficiently and effectively integrate and serve new distribution substations that are needed to serve projected load growth within Manatee and Sarasota Counties.

Over the past five years (2001-2005), the load in the West Region[1] of FPL has grown by a Compound Annual Average Growth Rate (CAAGR) of 3.8%. FPL is forecasting the load growth in its West Region to continue at a CAAGR of 3.4% over the next five years (2007-2011). Transmission assessment studies conducted by FPL during 2006 have identified regional transmission system limitations in Manatee and Sarasota Counties. These studies show that by 2011, the existing 230kV transmission network which closely parallels the coast between Manatee and Ringling Substations will not have sufficient capacity to provide reliable service to existing and proposed substations. Additionally, some of the projected load to be served by the proposed future distribution substations will be located further east of the existing 230kV transmission network.

A study of transmission improvements for this area evaluated various alternatives which resulted in the selection of the BMP as the most cost-effective and efficient means to both reinforce the existing 230kV network and provide electrical service to the new load areas and substations east of the existing transmission facilities. Current load projections (Attachment 8) indicate that substantial new load growth will occur in Manatee and Sarasota Counties to the east of the existing 230kV transmission facilities between Manatee and Ringling Substations.

[1] FPL's West Region includes Manatee, Sarasota, Desoto, Charlotte, Glades, Lee, Hendry and Collier Counties.

A new transmission line sited to the east of I-75 and south of the Manatee Plant site and the looping of the existing Ringling-Laurelwood 230kV transmission lines located in Sarasota County would provide the most reliable, cost effective means to integrate the new FPL and Peace River Electric Cooperative (PRECO) distribution substations required to serve this growing area.

In summary, the BMP presents the best alternative for satisfying the need for a reliable and cost effective supply of power to FPL's existing and future customers within Manatee and Sarasota Counties.

## I. Description of FPL Electrical Facilities

In order to provide an overview of FPL's existing electrical transmission system, a map of FPL's high voltage transmission network indicating the general location of generating plants, major substations, and transmission lines is shown in Attachment 1. As shown on Attachment 1, the majority of the load in the northern portion of FPL's West Region is presently served by five north-south 230kV circuits, three of which are sited on a common ROW.

A listing of the history and forecast of FPL's peak demand is provided in Schedules 3.1 and 3.2 of Florida Power & Light Company's Ten Year Power Plant Site Plan (2006-2015) submitted on April 1, 2006 to the Florida Public Service Commission (the "Commission"), incorporated herein as Attachment 2. Summer and winter historic and projected peak demand for FPL's West Region is included herein as Attachment 3.

To address these increasing demands and enhance reliability in the Manatee and Sarasota County area, electric service to proposed new distribution substations is required along with the appropriate transmission facilities south of Manatee substation, north of Laurelwood substation and to the east of the existing 230kV transmission network (Project Service Area). The BMP best meets the needs of the Project Service Area, as described more fully in the following section.

## II. The Bobwhite-Manatee Project

The BMP consists of a new 230kV transmission line extending from FPL's existing Manatee Substation to FPL's proposed future Bobwhite Substation (scheduled to be in service by December of 2011) to provide needed reliability and power transfer capability by providing a new parallel 230kV transmission line to reinforce the existing transmission network. In addition, the BMP will provide transmission service to the proposed future Rutland, Bobwhite, Oakford and Dam Road (PRECO) distribution Substations. The new transmission line is estimated to be approximately 32 miles in length (subject to final certification under the TLSA) and will connect FPL's Manatee Substation to FPL's future Bobwhite Substation. The line will be constructed with a single pole design on a new ROW, and will have a design and operating voltage of 230kV. The entire BMP will serve new distribution substations in the Sarasota and Manatee County area and will provide additional capability on the existing 230kV transmission network. This project will also allow FPL to maintain reliability to all customers within the Project Service Area consistent with NERC, FRCC and other applicable standards. The proposed in-service date for the Project is December 2011.

Attachment 4 is a map showing the BMP along with the existing electrical facilities in the area. The line route and future distribution substation sites are conceptual and for illustrative purposes only.

A summary of the major project components is outlined below. Construction costs include design, engineering, ROW preparation and land acquisition, in nominal or year-of-installation dollars.

| **BMP:** | **Estimated Cost** |
|---|---|
| Estimated Transmission Line Costs: | |
| (Manatee – Bobwhite) | $32.5M |
| (Loop Ringling-Laurelwood #1 & #2 into Bobwhite) | $ 1.5M |
| Bobwhite Substation: New substation with 5-line terminals | $12.1M |
| Manatee Substation: New line terminal | $ 0.8M |
| Estimated Total Project Cost | $46.9M |
| Present Value Revenue Requirement | $14.9M |

Estimated transmission line construction costs shown in this report are based on the estimated circuit length shown. Estimated circuit lengths are based on a direct, plausible line routing between substations, but does not reflect all possible constraints. Changes in line length due to constraints imposed on line routing through the certification process of the TLSA will result in variations in construction costs.

## III. Transmission Planning Criteria and Process

Planning for the FPL transmission system employs practices and criteria that are consistent with the reliability standards set by the NERC and contained within the NERC Reliability Standards, which have been adopted by the FRCC, and other applicable standards. The applicable NERC Reliability Standards are included as Attachment 5. The NERC Reliability Standards specify transmission system operating scenarios that should be evaluated, and the levels of system performance that should be attained. FPL's transmission planning process is designed to ensure compliance with the NERC and FRCC Planning Standards, and other applicable standards, and involves three major steps: (1) the preparation of system models, (2) the assessment of the transmission system, and (3) the development and evaluation of alternatives. A more detailed discussion of these steps is provided in Attachment 6.

## IV. Discussion of Need and Benefits

The need for the BMP is based on the following considerations:

- The need to provide additional transmission reinforcement to the existing 230kV transmission network between Manatee and Ringling Substations in a reliable manner consistent with NERC, FRCC and other applicable standards.
- The need to serve the increasing load and customer base in the Project Service Area.
- The need for another electrical feed via a separate ROW path, thereby reducing the impact of a loss of the existing transmission facilities on a common ROW.
- The opportunity, subject to final corridor certification under the TLSA, to efficiently and effectively integrate and serve new FPL and PRECO distribution substations that are needed to serve some of the projected load growth in the Project Service Area.

New load development has been identified to the east of the existing 230kV transmission corridor between the Manatee and Ringling Substations which will require new electrical service within the next 5 to 9 years. Additionally the load served by the existing 230kV transmission network has grown to the point where reinforcement of the network's capability is required to maintain adequate and reliable electric service. The BMP fulfills both the requirement to serve the new load areas to the east as well as the requirement to reinforce the existing 230kV network. A detailed description of these requirements follows.

A. Maintain system reliability

The need for the BMP is based largely on the need to improve transmission reliability and power transfer capability by providing a new parallel 230kV line from the existing Manatee Plant to the proposed future Bobwhite Substation and looping the existing Ringling-Laurelwood 230kV transmission lines into the proposed Bobwhite Substation (see Attachment 4).

B. Serve additional load

In addition to reinforcing the existing 230kV transmission network between Manatee and Ringling Substations, the BMP can facilitate transmission service for the substations that will be serving loads east of I-75. Regional load projections are developed as part of FPL's Distribution Planning Process. Attachment 7 contains a brief description of FPL's Distribution Planning process and methodology.

Future load centers in Manatee and Sarasota Counties, east of the existing 230kV transmission network, primarily south of SR-62, east of I-75, and north of SR-72 have been identified by FPL's West Area Distribution Planning Group. Attachment 8 is a table listing proposed future substations to serve these load areas including proposed in service dates and forecasted peak loadings. Attachment 4 shows approximate substation locations within the projected service Area.

The BMP is needed to provide transmission service to the proposed future Oakford, Bobwhite and Rutland distribution Substations located within the new load centers east of the existing 230kV transmission network. In addition, PRECO may request transmission service for a future distribution station (Dam Road Substation) from the proposed Bobwhite-Manatee Transmission Line.

1. Loadflow Results-Without the BMP

Page A.1 of Appendix A provides a "Load Flow Diagram Key" to assist in interpreting the load flow maps contained in Appendices A and B. Page A.2 shows a loadflow output diagram of the 2011 winter peak load condition without the BMP in-service. The diagram represents what is called the base case scenario or normal condition (i.e., no contingencies) for the year 2011/2012 winter peak load. The diagram shows that all facilities are operating within normal equipment ratings (i.e., no overloads or low voltages).

Page A.3 shows the power flows without the BMP in 2011 assuming the loss of the Beneva-McIntosh 138kV line section of the Beneva-Ringling 138kV line. This results in the [redacted] 230kV line section loading to as high as 103% of its 1625 amp thermal rating (see Attachment 9). This would require interruption of service to approximately [redacted] customers (approximately [redacted] people) in 2011 to reduce loading on this line to acceptable levels.

Page A.4 shows the flows without the BMP in 2011 assuming the loss of the Hyde Park-McIntosh 138kV line section of the Beneva-Ringling 138kV line. This results in the [redacted] 230kV line section loading to as high as 106% of its 1625 amp thermal rating (see Attachment 9). This would require interruption of service to approximately [redacted] customers (approximately [redacted] people) in 2011 to reduce loading on this line to acceptable levels.

In addition, Pages A.5 through A.13 show overloads ranging from 101% to a high of 113% (See Attachment 9) of the thermal MVA facility rating or voltages below 0.95 per unit caused by any of the following contingencies:

| | |
|---|---|
| Granada-Auburn 230kV line section | (Page A.5) |
| Johnson-Rye 230kV line section | (Page A.6) |
| Laurelwood-Ringling #1-230kV line | (Page A.7) |
| Laurelwood-Ringling #2-230kV line | (Page A.8) |
| Manatee-Ringling #3-230kV line | (Page A.9) |
| Manatee-Rye 230kV line section | (Page A.10) |
| Ringling-Parrish 230kV line section | (Page A.11) |
| Buffalo Creek-Manatee 230kV line section | (Page A.12) |
| Buffalo Creek-Parrish 230kV line section | (Page A.13) |

In order to mitigate the overloads and low voltages shown on Pages A.5 through A.13, it would be necessary to interrupt the service of approximately [redacted] to up to [redacted] customers (approximately [redacted] to [redacted] people) depending on the specific outage.

2. Loadflow Results – With the BMP.

Page A.14 is a loadflow output diagram showing 2011 winter peak conditions with the BMP in-service. The construction of the BMP provides a 230kV parallel transmission network path to reinforce the existing 230kV network between Manatee and Ringling Substations. The loading on the existing Manatee-Ringling 230kV network is reduced from 2785MVA down to 2300MVA due to the addition of the BMP.

Page A.15 shows that with the BMP in-service, the loss of the Beneva-McIntosh 138kV line section does not result in the overloading of any transmission facility and an adequate voltage profile is maintained. This is due to the reinforcement of the existing transmission network provided by the BMP.

Page A.16 shows that with the BMP in service, the loss of the Hyde Park-McIntosh 138kV line section does not result in the overloading of any transmission facility and an adequate voltage profile is maintained. Again, this is due to the transmission network reinforcement provided by the BMP.

Pages A.17 through A.25 show that with the Project in service, the same or similar contingencies shown on Pages A.5 through A.13 (See Attachment 9) will not cause overloads or low voltage conditions at any of the transmission facilities in the Project Service Area.

C. Project Benefits

The construction of the BMP provides the following benefits to the Project Service Area:

- Maintains area reliability by providing a parallel path to the existing Manatee – Ringling 230kV transmission network.
- Serves new customer load east of I-75 and east of the existing 230kV transmission network from the northern portion of Sarasota County to the northern portion of Manatee County.
- Increases the reliability of the Project Service Area by providing an alternate transmission path for power to flow from the Manatee Substation via a separate ROW to the proposed Bobwhite Substation.
- Reduces transmission losses by approximately 8 MW.
- Based on the 2006 regional load forecast, the Project Service Area's long term growth requirements will be met for at least the next 10 years.

## V. Discussion of Project Alternatives

In order to meet the additional load requirements and maintain a reliable electric system for the Project Service Area, the following alternatives were considered:

A. Reinforce the existing transmission network and serve the new load with additional transmission facilities closer to the proposed future substations.

B. Relieve the existing transmission network and serve the new load by locating generation within the Project Service Area.

C. Serve the new load by expanding existing substations.

A discussion of these alternatives follows.

A. Transmission Alternatives

In order to reinforce the existing transmission network and continue to serve the load in the Project Service Area beyond December 2011 in a reliable and effective manner consistent with NERC Reliability Standards, three transmission alternatives were investigated. The factors used to evaluate the performance of the alternatives include reliability, cost, feasibility, operational flexibility, and compatibility with long range plans. Those alternatives are discussed and assessed below. Attachment 10 includes a matrix comparing each of the transmission alternatives.

Transmission Alternative I:

This alternative consists of building a new 230kV transmission line on a new ROW from FPL's existing Manatee Substation to a proposed future Bluejay Transmission Substation located approximately 16 miles southeast of the proposed Bobwhite Substation. The portion of the route from the proposed Bobwhite Substation to the Bluejay Substation would be constructed on existing corridor looping the existing Ringling-Charlotte 230kV transmission line between Polo and Charlotte Substations. Under this alternative, the new Manatee-Bluejay 230kV transmission line would be providing transmission service to as many as 2 future FPL substations and one PRECO substation by 2015.

Page B.1 is a load flow map representing this alternative. The estimated capital cost of this alternative is $55.0M ($24.9M PVRR).

This alternative was rejected for the following reasons:

1. This alternative would require additional upgrades to the existing transmission network (6 transmission lines/sections) at a higher cost than the BMP.
2. This alternative will not provide future transmission network flexibility, because only one 230kV transmission line exists on the Ringling-Charlotte 230kV transmission line corridor. If the existing 138kV line were to be looped into Bluejay Substation, 230/138kV transformation would be required, thereby increasing the cost of the alternative.

Transmission Alternative II:

This alternative consists of building a new 230kV transmission line from the existing Manatee substation to the existing Howard Substation. This alternative would provide transmission service to as many as 3 FPL substations and one PRECO substation by 2015.

1. This alternative was not considered a viable option because the Howard Substation property is completely full. and located in a residential area with no possibility for site expansion. Therefore, a new 230kV line terminal could not be built at the Howard Substation.

Transmission Alternative III:

This alternative consists of a new 230kV transmission line extending from FPL's existing Manatee Substation to FPL's proposed future Bobwhite Substation (scheduled to be in service by December of 2011). This alternative is similar to the BMP except that the new transmission line would be constructed within the existing corridor. This alternative includes providing transmission service to as many as 2 FPL substations from existing transmission lines within the existing ROW.

The estimated capital cost of this alternative is $54.6M ($24.6M PVRR).

This alternative was rejected for the following reasons:

1. This alternative would require looping in and out from the existing corridor to the locations of FPL's future distribution substations, thereby increasing the cost of the alternative.
2. This alternative will not provide for corridor diversity. In the event of the loss of this corridor with three major 230kV transmission circuits (and the new Bobwhite-Manatee line), the power transfer from Manatee to Ringling could be seriously jeopardized and customer outages in this area may be required for longer periods of time.
3. This alternative does not provide for the efficient integration of future distribution substations to the east of the existing transmission corridor, thereby increasing future costs FPL's customers.

Attachment 10 shows the decision making analysis which summarizes the points of comparison of the BMP and the two feasible transmission alternatives. The points of comparison are cost, reliability, ROW diversity, system expandability, operational flexibility and construction difficulty.

B. <u>Generation Alternatives</u>

Generation alternatives such as siting a new generator in the Project Service Area were not considered viable for the following reasons:

1. Adding a new generator within the Project Service Area would require additional transmission facilities to interconnect and integrate the new

generation above and beyond what is presently required by the proposed project at a significant increase in cost.

2. The need to provide transmission service to future proposed substations is not solved by adding generation in the Project Service Area.

For these reasons, a generation alternative was not considered further.

C. Distribution Alternatives

Distribution alternatives such as expanding existing substations were not considered viable because expansion of existing distribution substations will not address the primary need for this Project (i.e. reinforcement of existing Manatee-Ringling 230kV transmission network). Accordingly, a distribution alternative was not considered further.

## VI. Adverse Consequences of Not Constructing the Bobwhite-Manatee Project

The purpose and need for the BMP is to serve the projected load growth east of the existing 230kV network in the Project Service Area and to maintain a reliable cost effective supply of power to the loads served by the existing transmission network in a manner that complies with NERC, FRCC and other applicable planning standards. If the BMP is not built by December of 2011, then sufficient transmission capacity would not be available to serve the future and existing customers in the Project Service Area and the level of reliability would be below the level delivered to other FPL customers. The inability to serve additional loads could lead to the implementation of rolling outages to prevent system degradation.

Practically speaking, however, if the BMP is delayed, or if the Commission denies the Petition, FPL would be forced to initiate implementation of Alternative III as discussed in section V in order to serve the area load with an acceptable level of reliability. The result would be that FPL would be required to address its customers' needs with a less reliable, more costly alternative than the BMP, and one that is not in the best long-term interest of FPL's customers when compared to the BMP.

## VII. Conclusion

The BMP is needed by December 2011 to maintain reliable, cost-effective power supply within the Project Service Area and to serve new distribution substations. The alternative to this project is more costly, does not provide for the future expansion of the transmission system in the Project Service Area and does not provide the reliability benefits of a separate electrical path. The Commission, therefore, should grant FPL's Petition for a Determination of Need for the Bobwhite-Manatee Project and determine that the cost and reliability benefits of the Project would be enhanced by construction of the line in a geographically separate ROW.

# VIII. ATTACHMENTS

ATTACHMENT 1 REDACTED

# ATTACHMENT 2



## Schedule 3.2
## History and Forecast of Winter Peak Demand (MW):Base Case

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|
| Year | Total | Firm Wholesale | Retail | Interruptible | Res. Load Management | Residential Conservation | C/I Load Management | C/I Conservation | Net Firm Demand |
| 1996/97 | 16,490 | 626 | 15,864 | 0 | 578 | 311 | 417 | 139 | 15,495 |
| 1997/98 | 13,060 | 239 | 12,821 | 0 | 641 | 369 | 426 | 151 | 11,993 |
| 1998/99 | 16,802 | 149 | 16,653 | 0 | 692 | 404 | 446 | 164 | 15,664 |
| 1999/00 | 17,057 | 142 | 16,915 | 0 | 741 | 434 | 438 | 176 | 15,878 |
| 2000/01 | 18,199 | 150 | 18,049 | 0 | 791 | 459 | 448 | 183 | 16,960 |
| 2001/02 | 17,597 | 145 | 17,452 | 0 | 811 | 500 | 457 | 196 | 16,329 |
| 2002/03 | 20,190 | 246 | 19,944 | 0 | 847 | 546 | 453 | 206 | 18,890 |
| 2003/04 | 14,752 | 211 | 14,541 | 0 | 857 | 570 | 532 | 230 | 13,363 |
| 2004/05 | 18,108 | 225 | 17,883 | 0 | 862 | 583 | 542 | 233 | 16,704 |
| 2005/06 | 19,683 | 225 | 19,458 | 0 | 870 | 600 | 550 | 240 | 17,424 |
| 2006/07 | 22,294 | 228 | 22,066 | 0 | 964 | 58 | 605 | 20 | 20,647 |
| 2007/08 | 22,753 | 231 | 22,522 | 0 | 1,001 | 85 | 631 | 28 | 21,007 |
| 2008/09 | 23,245 | 161 | 23,084 | 0 | 1,042 | 113 | 656 | 38 | 21,395 |
| 2009/10 | 23,714 | 166 | 23,548 | 0 | 1,062 | 139 | 663 | 42 | 21,807 |
| 2010/11 | 24,155 | 171 | 23,984 | 0 | 1,084 | 167 | 669 | 47 | 22,188 |
| 2011/12 | 24,597 | 171 | 24,426 | 0 | 1,107 | 194 | 676 | 52 | 22,568 |
| 2012/13 | 25,061 | 171 | 24,890 | 0 | 1,133 | 222 | 683 | 57 | 22,967 |
| 2013/14 | 25,561 | 171 | 25,390 | 0 | 1,160 | 249 | 690 | 62 | 23,400 |
| 2014/15 | 26,244 | 171 | 26,073 | 0 | 1,189 | 275 | 696 | 67 | 24,017 |

**Historical Values (1996/97 - 2005/06):**

Col. (2) - Col. (4) are actual values for historical winter peaks. As such, they incorporate the effects of conservation (Col. 7 & Col. 9), and may incorporate the effects of load control if load control was operated on these peak days. Therefore, Col. (2) represents the actual Net Firm Demand.

Col. (5) - Col.(9) for 1996/97 through 2005/06 represent actual DSM capabilities starting from January 1988 and are annual (12-month) values. Note that the values for FPL's former Interruptible Rate are incorporated into Col. (8), which also includes Business On Call (BOC) and Commercial/Industrial Demand Reduction (CDR).Col.(5) - Col.(9) for year 2004/05 are "estimated actuals" and are January values.

Col. (10) represents a HYPOTHETICAL "Net Firm Demand" if the load control values had definitely been exercised on the peak. Col. (10) is derived by the formula: Col. (10) = Col. (2) - Col. (6) - Col. (8).

**Projected Values (2006/07- 2014/15):**

Col. (2) - Col.(4) represent FPL's forecasted peak w/o incremental conservation or cumulative load control. The effects of conservation implemented prior to 2004 are incorporated into the load forecast.

Col. (5) - Col.(9) represent all incremental conservation and cumulative load control. These values are projected January values and the conservation values are based on projections with a 1/2004 starting point for use with the 2004 load forecast.

Col. (10) represents a 'Net Firm Demand" which accounts for all of the incremental conservation and assumes all of the load control is implemented on the peak. Col. (10) is derived by using the formula: Col. (10) = Col. (2) - Col. (5) - Col. (6) - Col. (7) - Col. (8) - Col. (9).

# ATTACHMENT 3

## FPL West Region

### Historical and Forecasted Peak Demand (MW)

| Year | West Region FPL | |
|---|---|---|
| | Winter | Summer |
| 2000 | 3892 | 3443 |
| 2001 | 3773 | 3499 |
| 2002 | 4020 | 3485 |
| 2003 | 4789 | 3530 |
| 2004 | 3517 | 3833 |
| 2005 | 4315 | 4147 |
| 2006 | 5292 | 4323 |
| 2007 | 5424 | 4476 |
| 2008 | 5563 | 4659 |
| 2009 | 5690 | 4813 |
| 2010 | 5813 | 4962 |
| 2011 | 5928 | 5104 |
| 2012 | 6045 | 5250 |
| 2013 | 6168 | 5407 |
| 2014 | 6299 | 5553 |
| 2015 | 6474 | 5708 |

ATTACHMENT 4 REDACTED

# ATTACHMENT 5

## The Transmission Planning Criteria

The NERC Reliability Standards under Transmission Planning are divided into categories A, B, C and D. FPL utilizes these Standards for its planning criteria. Category A addresses normal system conditions with all facilities in service. Category B addresses system conditions following the loss of a single facility. Category C addresses system conditions following the loss of two or more facilities. Finally, Category D addresses system conditions following an extreme event where multiple facilities are removed from service.

The need for transmission system upgrades is most frequently based on potential overload conditions associated with the Category B contingencies (single contingency) listed in Table 1 of this Attachment 5. Generally, Category C and D multiple contingency analysis is used to identify potential situations of cascading interruptions and/or instability.

The planned transmission system with its expected loads and transfers must be stable and within applicable ratings for all Category A, B, and C contingency scenarios.

The effect of Category D contingencies on system stability are also evaluated. The design of new transmission connections should take into account and minimize, to the extent practical, the adverse consequences of Category D contingencies. Lower probability Category D contingencies, when they occur in combination with forecasted demand levels and firm interchange transactions, must not result in uncontrolled, cascading interruptions. While controlled interruption of load and/or opening of transmission circuits may be needed, the system should be within its emergency limits and capable of rapid restoration after operation of automatic controls.

## Table I. Transmission System Standards – Normal and Emergency Conditions

| Category | Contingencies | System Limits or Impacts | | |
|---|---|---|---|---|
| | Initiating Event(s) and Contingency Element(s) | System Stable and both Thermal and Voltage Limits within Applicable Rating [a] | Loss of Demand or Curtailed Firm Transfers | Cascading Outages |
| **A**<br>No Contingencies | All Facilities in Service | Yes | No | No |
| **B**<br>Event resulting in the loss of a single element. | Single Line Ground (SLG) or 3-Phase (3Ø) Fault, with Normal Clearing:<br>1. Generator<br>2. Transmission Circuit<br>3. Transformer<br>Loss of an Element without a Fault | Yes<br>Yes<br>Yes<br>Yes | No [b]<br>No [b]<br>No [b]<br>No [b] | No<br>No<br>No<br>No |
| | Single Pole Block, Normal Clearing [e]:<br>4. Single Pole (dc) Line | Yes | No [b] | No |
| **C**<br>Event(s) resulting in the loss of two or more (multiple) elements. | SLG Fault, with Normal Clearing [e]:<br>1. Bus Section<br>2. Breaker (failure or internal Fault) | Yes<br>Yes | Planned/ Controlled [c]<br>Planned/ Controlled [c] | No<br>No |
| | SLG or 3Ø Fault, with Normal Clearing [e], Manual System Adjustments, followed by another SLG or 3Ø Fault, with Normal Clearing [e]:<br>3. Category B (B1, B2, B3, or B4) contingency, manual system adjustments, followed by another Category B (B1, B2, B3, or B4) contingency | Yes | Planned/ Controlled [c] | No |
| | Bipolar Block, with Normal Clearing [e]:<br>4. Bipolar (dc) Line Fault (non 3Ø), with Normal Clearing [e]:<br>5. Any two circuits of a multiple circuit towerline [f] | Yes<br>Yes | Planned/ Controlled [c]<br>Planned/ Controlled [c] | No<br>No |
| | SLG Fault, with Delayed Clearing [e] (stuck breaker or protection system failure):<br>6. Generator<br>7. Transformer<br>8. Transmission Circuit<br>9. Bus Section | Yes<br>Yes<br>Yes<br>Yes | Planned/ Controlled [c]<br>Planned/ Controlled [c]<br>Planned/ Controlled [c]<br>Planned/ Controlled [c] | No<br>No<br>No<br>No |

| | | |
|---|---|---|
| **D** [d]<br><br>Extreme event resulting in two or more (multiple) elements removed or Cascading out of service. | 3Ø Fault, with Delayed Clearing [e] (stuck breaker or protection system failure):<br>1. Generator 3. Transformer<br>2. Transmission Circuit 4. Bus Section<br><br>3Ø Fault, with Normal Clearing [e]:<br>5. Breaker (failure or internal Fault)<br><br>6. Loss of towerline with three or more circuits<br>7. All transmission lines on a common right-of way<br>8. Loss of a substation (one voltage level plus transformers)<br>9. Loss of a switching station (one voltage level plus transformers)<br>10. Loss of all generating units at a station<br>11. Loss of a large Load or major Load center<br>12. Failure of a fully redundant Special Protection System (or remedial action scheme) to operate when required<br>13. Operation, partial operation, or misoperation of a fully redundant Special Protection System (or Remedial Action Scheme) in response to an event or abnormal system condition for which it was not intended to operate<br>14. Impact of severe power swings or oscillations from Disturbances in another Regional Reliability Organization. | Evaluate for risks and consequences.<br>▪ May involve substantial loss of customer Demand and generation in a widespread area or areas.<br>▪ Portions or all of the interconnected systems may or may not achieve a new, stable operating point.<br>▪ Evaluation of these events may require joint studies with neighboring systems. |

a) Applicable rating refers to the applicable Normal and Emergency facility thermal Rating or system voltage limit as determined and consistently applied by the system or facility owner. Applicable Ratings may include Emergency Ratings applicable for short durations as required to permit operating steps necessary to maintain system control. All Ratings must be established consistent with applicable NERC Reliability Standards addressing Facility Ratings.

b) Planned or controlled interruption of electric supply to radial customers or some local Network customers, connected to or supplied by the Faulted element or by the affected area, may occur in certain areas without impacting the overall reliability of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted Firm (non-recallable reserved) electric power Transfers.

c) Depending on system design and expected system impacts, the controlled interruption of electric supply to customers (load shedding), the planned removal from service of certain generators, and/or the curtailment of contracted Firm (non-recallable reserved) electric power Transfers may be necessary to maintain the overall reliability of the interconnected transmission systems.

d) A number of extreme contingencies that are listed under Category D and judged to be critical by the transmission planning entity(ies) will be selected for evaluation. It is not expected that all possible facility outages under each listed contingency of Category D will be evaluated.

e) Normal clearing is when the protection system operates as designed and the Fault is cleared in the time normally expected with proper functioning of the installed protection systems. Delayed clearing of a Fault is due to failure of any protection system component such as a relay, circuit breaker, or current transformer, and not because of an intentional design delay.

f) System assessments may exclude these events where multiple circuit towers are used over short distances (e.g., station entrance, river crossings) in accordance with Regional exemption criteria.

**ATTACHMENT 6**

## The Transmission Planning Process

### Step 1: Preparation of System Models

To prepare system models[1], regional load profiles must be developed for the current year and for representative years of the ten-year planning horizon. These profiles incorporate the most recent substation load information available. Thus, the distribution planning groups in each region are asked to provide Transmission Planning with historical and projected substation loads and future distribution substation data.

Once the load profiles have been developed, they are used as input into the load flow, fault analysis and stability programs, which simulate and study the behavior of the transmission system. Other major inputs into these programs are the generation dispatch and the base transmission system representation including expected line and equipment performance data. Firm long-term transmission service obligations are incorporated into the programs. The base transmission system representation incorporates existing and planned facilities. In addition, appropriate operating criteria involving voltage limits, generator reactive limits, and transformer taps are observed. All major utilities to which FPL is interconnected are also represented.

### Step 2: Transmission System Assessment

Using the system models developed in Step 1, outage contingencies are simulated using load flow and stability programs. These outage contingencies consist of two types as discussed in Attachment 5: (1) single events with a higher probability of occurrence such as the loss of one transmission line section or autotransformer and (2) multiple events such as the loss of all

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[1] The models used for this analysis are the Florida Reliability Coordinating Council's year 2005 winter load flow databank cases modeling expected system conditions in the winter of 2011/2012. These models are run on Power

transmission lines in a common transmission ROW. Generally, the latter event has a lower probability of occurrence but can result in consequences that are more severe. All single and credible multiple contingencies are analyzed. For each of these contingencies, the response of the power system is analyzed and violations of the planning criteria are evaluated.

**Step 3: Development and Evaluation of Alternatives**

This step addresses potential criteria violations. First, switching techniques and other operational procedures are tested to determine if such actions resolve the problems. If satisfactory operational procedures cannot be implemented, several alternatives for transmission system reinforcements are developed. Cost estimates for the viable alternatives are then determined. Subsequently these alternatives are evaluated (See Attachment 10). After evaluating the transmission system project alternatives, the project that best meets the requirements and other considerations is selected.

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Technologies Incorporated (PTI) load flow programs which are commonly used and accepted in the electric industry.

## ATTACHMENT 7

## The Distribution Planning Process and Methodology

**Step 1: Distribution Forecast**

Historically, the long-term growth in peak demand has been largely a function of population growth. Annual summer and winter peak demands are forecast by an analysis of both FPL system-wide summer and winter peak forecasts and a separate forecast for each of the five FPL regions. The system-wide summer and winter peak forecast takes into consideration the forecasted number of FPL customers (derived from population projections produced by the University of Florida's population forecast) historical trends for load growth and capacity added, and the increase in customer electric usage.

FPL's West Area Distribution Planning Group is responsible for forecasting regional substation loads for the distribution system for nine West Florida counties, including Manatee and Sarasota. Based on historical load demand at each substation, customers' requests for service, expected major real-estate developments, and other customer-driven variables, a specific load forecast down to the individual substation is developed.

**Step2: Distribution System Assessment**

The West Area Distribution Planning Group uses up-to-date proposed land-use plans for the appropriate counties. Planning and zoning maps developed by respective county planning departments provide the residential dwelling, commercial, industrial and agricultural units per acre requirements for various land densities (e.g. Rural, Estates, etc.). The land density is translated to load density using field measurement data as to average connected kVA per dwelling unit. Load projections are developed for a 10 year horizon. New substation sites are identified to relieve existing substations the year when their respective capacity is projected to be exceeded. Determination of the ultimate substation service area is then made according to load density requirements, geographical restrictions and maximum substation capacity.

**Step 3: Development and Evaluation of Alternatives**

Once a new substation site has been determined to be needed in an area, a cross-functional team of employees representing land acquisition, environmental, transmission engineering, transmission planning, and distribution planning is formed to evaluate properties for possible purchase. Cost estimates for viable alternatives are then determined. Finally, a decision for purchase is made after considering all pertinent factors.

# ATTACHMENT 8

## PROPOSED FUTURE SUBSTATIONS AND LOADS IN PROJECT SERVICE AREA

| In-service | Substation | County | Long Term Load (MW) |
|---|---|---|---|
| 2015 | Rutland | Manatee | 35 |
| 2015 | Dam Road (PRECO) | Manatee | 14 |
| 2011 | Bobwhite | Sarasota | 54 |
| 2015 | Oakford | Sarasota | 37 |

# ATTACHMENT 9

## Load Flow Project Summary Table

Outside Limits= Red Font

| Contingency | Line Overload/Substation | Base Case Overload (%) | Base Case Low Voltage (P.U.) | Project Overload (%) | Project Low Voltage (P.U.) | Alt. I Overload (%) | Alt. I Low Voltage (P.U.) | NOT Feasible! Alt. II Overload (%) | NOT Feasible! Alt. II Low Voltage (P.U.) |
|---|---|---|---|---|---|---|---|---|---|
| Beneva-McIntosh 138kV | [redacted] | 103 | ... | ... | ... | 101 | ... | ... | ... |
| Hyde Park-McIntosh 138kV | [redacted] | 106 | ... | ... | ... | 103 | ... | ... | ... |
| Granada-Auburn 230kV | [redacted] | ... | 0.944 | ... | ... | ... | ... | ... | ... |
| | [redacted] | ... | 0.945 | ... | ... | ... | ... | ... | ... |
| | [redacted] | ... | 0.946 | ... | ... | ... | ... | ... | ... |
| Johnson-Rye 230kV | [redacted] | 108 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | ... | 0.940 | ... | ... | ... | ... | ... | ... |
| | [redacted] | ... | 0.948 | ... | ... | ... | ... | ... | ... |
| Laurelwood-Ringling #1-230kV | [redacted] | 110 | ... | Note 1 | Note 1 | 108 | ... | ... | ... |
| | [redacted] | 102 | ... | Note 1 | Note 1 | ... | ... | ... | ... |
| Laurelwood-Ringling #2-230kV | [redacted] | 113 | ... | Note 2 | Note 2 | 110 | ... | ... | ... |
| | [redacted] | 104 | ... | Note 2 | Note 2 | 102 | ... | ... | ... |
| Manatee-Ringling #3-230kV | [redacted] | 107 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | 108 | ... | ... | ... | ... | ... | ... | ... |
| Manatee-Rye 230kV | [redacted] | 108 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | ... | 0.947 | ... | ... | ... | ... | ... | ... |
| | [redacted] | ... | 0.950 | ... | ... | ... | ... | ... | ... |
| | [redacted] | ... | 0.939 | ... | ... | ... | ... | ... | ... |
| Ringling-Parrish 230kV | [redacted] | 103 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | 101 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | 103 | ... | ... | ... | ... | ... | ... | ... |
| Buffalo Creek-Manatee 230kV | [redacted] | 105 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | 104 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | 106 | ... | ... | ... | ... | ... | ... | ... |
| Buffalo Creek-Parrish 230kV | [redacted] | 104 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | 103 | ... | ... | ... | ... | ... | ... | ... |
| | [redacted] | 105 | ... | ... | ... | ... | ... | ... | ... |

Note 1 : With the BMP this contingency is replaced by Bobwhite-Laurelwood #1-230kV
Note 2 : With the BMP this contingency is replaced by Bobwhite-Laurelwood #2-230kV
P.U. = Per Unit

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DECISION STATEMENT** | | **Provide adequate and reliable service in an economical manner to the Manatee-North Sarasota area.** | | | | | | | | | | | |
| **OBJECTIVES** | | **ALTERNATIVES: All in service dates are based on the Regional Load forecast** | | | | | | | | | | | |
| | | **I/S YEAR** | | **Project** | **I/S YEAR** | | **Alternative I** | **I/S YEAR** | | **Alternative II** | **I/S YEAR** | | **Alternative III** |
| | | 2011 | | The BMP consists of a new 230kV transmission line (approximately 32 miles in length) extending from FPL's existing Manatee Substation to FPL's proposed future Bobwhite Substation. The line will be constructed with a single pole design on a new ROW, and will have a design and operating voltage of 230kV. | 2011 | | This alternative consists of building a new 230kV transmission line on a new ROW from FPL's existing Manatee Substation to a proposed future Bluejay Transmission Substation located approximately 16 miles southeast of the proposed Bobwhite Substation. The portion of the route from the proposed Bobwhite Substation to the Bluejay Substation would be constructed on existing corridor looping the existing Ringling-Charlotte 230kV transmission line between Polo and Charlotte Substations. | 2011 | | This alternative consists of building a new 230kV transmission line from the existing Manatee substation to the existing Howard Substation. | 2011 | | This alternative consists of a new 230kV transmission line extending from FPL's existing Manatee Substation to FPL's proposed future Bobwhite Substation. This alternative is similar to the BMP except that the new transmission line would be constructed within the existing corridor. |
| **REQUIREMENTS** | | **Yes** | **No** | | **Yes** | **No** | **Information** | **Yes** | **No** | **Information** | **Yes** | **No** | **Information** |
| **Alternative must provide for reliable service to area customers** | | X | | | X | | | X | | | X | | |
| **Alternative Plan is feasible to construct** | | X | | | X | | | | X | Not feasible. Existing Howard Substation cannot be expanded. | X | | |
| **DESIRES** | **VL** | **Score** | **VL*S** | **Information** | **Score** | **VL*S** | **Information** | **core** | **VL*S** | **Information** | **Score** | **VL*S** | **Information** |
| **Minimize Price (Present value of revenue requirements)** | 10.0 | 10.0 | 100 | **$14,853,738 PVRR** | 1.0 | 10 | **$24,921,504 PVRR** | | | **Not feasible.** | 1.2 | 12 | **$24,645,832 PVRR** |
| **Maximize reliability of service to customers** | 9.2 | 10.0 | 92 | Project mitigates single contingency problems. | 8.0 | 74 | Mitigates most single contingency problems. Additional facility improvements are required. | | | | 10.0 | 92 | Project mitigates single contingency problems. |
| **Right-of-Way Diversity** | 7.6 | 10.0 | 76 | Reduces restoration time for the loss of the right-of-way south of Manatee Plant. | 6.6 | 50 | Reduces restoration time for the loss of the right-of-way south of Manatee Plant. | | | | 1.0 | 8 | Does not improve restoration time for the loss of the right-of-way south of Manatee Plant. |
| **Maximize compatibility with Long range plans. (Expandability)** | 6.1 | 10.0 | 61 | Allows for the opportunity to efficiently serve future distribution substations. | 10.0 | 61 | Allows for the opportunity to efficiently serve future distribution substations. | | | | 6.0 | 37 | Allows for the opportunity to serve future distribution substations. |
| **Provides operational flexibility** | 5.3 | 10.0 | 53 | Provides maximum operational flexibility. | 10.0 | 53 | Provides maximum operational flexibility. | | | | 8.0 | 42 | Provides maximum operational flexibility. |
| **Minimize construction difficulties** | 4.9 | 9.0 | 44 | Requires minimum line clearances on two existing lines. | 10.0 | 49 | Requires minimum line clearances on one existing line. | | | | 5.0 | 25 | Requires minimum line clearances on existing lines and rebuilding of some existing transmission facilities. |
| **TOTAL VALUE SCORE** | | | 426 | ** PREFERED ALTERNATIVE ** | | 297 | | | | Not feasible. | | 215 | |

ATTACHMENT 10

# APPENDIX A

## Load Flow Diagrams- With and Without Project

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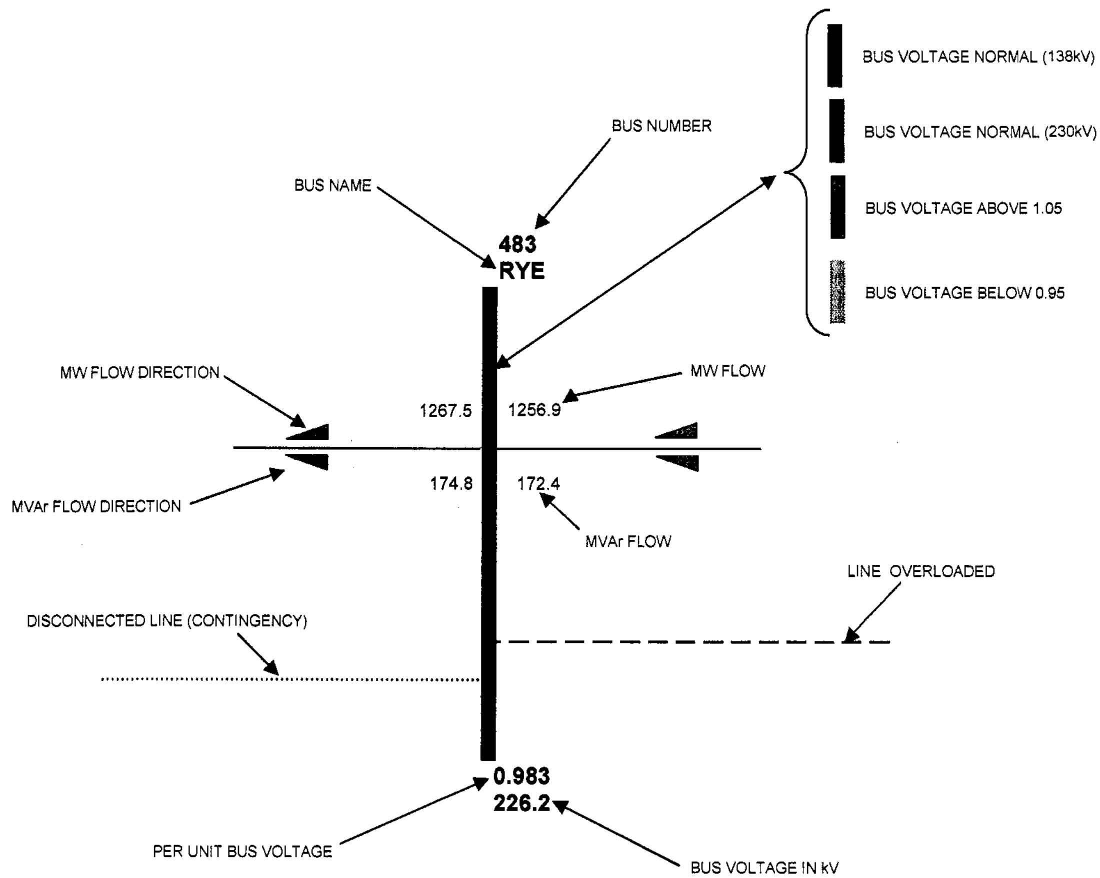
**Load Flow Maps with the Project**

# Load Flow Diagram Key



PAGES A.2 – A.25 REDACTED

## APPENDIX B

### Load Flow Diagrams- Alternatives

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**PAGES B.1 – B.12 REDACTED**