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INTRODUCTION

Georgia Transmission Corporation (GTC) proposes to construct a 500 kV transmission line from Georgia Power Company's (GPC) proposed 500 kV Rockville Switching Station that would be located approximately 3.0 miles southwest of Walton Dam and 0.4 miles east of the intersection of the existing Scherer - Warthen 500 kV and Eatonton Primary – Walton Dam 230 kV Transmission Lines in Putnam County, Georgia to GTC's proposed East Walton 500/230 kV Substation that would be located in the vicinity of Highway 186 and Jones Woods Road in Walton County, Georgia. The Bostwick Switching Station would be located near the intersection of the proposed East Walton-Rockville 500 kV Transmission Line and the existing East Social Circle-East Watkinsville 230 kV Transmission Line. The existing East Social Circle-East Watkinsville 230 kV Transmission Line would be looped into the proposed Bostwick 230 kV Switching Station. Georgia Transmission Corporation also proposes to construct the East Walton to Bostwick 230 kV Transmission Line that would be located adjacent to the northern 3.25 miles of the proposed East Walton-Rockville 500 kV Transmission Line.

As part of the Northeast Georgia System Improvement, a 230 kV transmission line would be built from the proposed East Walton 500/230 kV Substation to the proposed Jack's Creek 230 kV Switching Station that would be located adjacent or in the vicinity of the existing LG&E Monroe Substation. The LG&E Monroe Substation is located on the east side of the City of Monroe in Walton County, between Birch Street (Old Athens Highway) and US 78/SR 10.

In addition, a 230 kV transmission line would be built from the proposed East Walton Substation to the proposed Bethabara Substation. The proposed Bethabara Substation would be built near the intersection of Highway 53 and Highway 78.

The purpose of the proposed transmission lines, substations and switching stations is to meet the electrical energy demand in Northeast Georgia (refer to the Study Area Map on page 2).

Georgia Transmission Corporation is an electric transmission cooperative established under the laws of the State of Georgia in 1996. The not-for-profit cooperative, headquartered in Tucker, Georgia, is engaged in the business of building, owning and maintaining, electric power transmission facilities (substations, switching stations and transmission lines) to serve 39 Electric Membership Cooperatives (EMCs).

The 39 EMC members are local, consumer-owned electric distribution cooperatives that provide retail electric service on a not-for-profit basis. The memberships of the EMCs consist of residential, commercial, and industrial power consumers, generally within specific geographic areas. The 39 EMCs serve more than 1.4 million members.

As of the first quarter of 2005, GTC owns and maintains approximately 2,759 miles of transmission lines and 587 transmission and distribution stations of various voltages. Georgia Transmission Corporation provides transmission capacity to the 39 EMCs through participation in the Georgia Integrated Transmission System (ITS) facilities owned jointly by the City of Dalton Utilities, Georgia Power Company, Georgia Transmission Corporation, and MEAG Power. Parity in ownership of the ITS depends on the load served by each of the owners and varies slightly from year to year requiring periodic financial adjustments

PROJECT DESCRIPTION

There are four Phases in GTC's Transmission Line and Substation Siting Methodology. The Northeast Georgia Improvement Project includes the proposed East Walton-Rockville 500 kV Transmission Line, East Walton 500/230 kV Substation, East Walton-Bostwick 230 kV Transmission Line, Bostwick 230 kV Switching Station, East Walton – Jack's Creek 230 kV Transmission Line and East Walton – Bethabara #1-230 kV Transmission Line. The same methodology is used on each portion of the Northeast Georgia Improvement Project.

A brief description of each phase follows:

Phase I – Electric Alternative Evaluation Study

Phase I tasks include a thorough analysis of the transmission system. This analysis includes identifying the resulting transmission system overloads or operational issues and proposing solutions to these problems. The various solutions become the electric alternatives considered for development and implementation.

Phase II – Corridor Selection Process

Phase II tasks include generation of Macro Corridors, definition of the study area, identification and evaluation of alternative corridors, selection of the preferred route, preparation of the Electric Alternative Evaluation and Macro Corridor Study Report and the Environmental Assessment. The study area defined allows for the development of all feasible routing possibilities and provides adequate opportunities to minimize significant environmental impacts.

Phase III – Survey and Right-of-Way Acquisition

Phase III tasks include acquiring permission to survey and acquisition of the easement for the right-of-way that will be needed to construct the proposed East Walton-Rockville 500 kV Transmission Line, East Walton 500/230 kV Substation Project, East Walton-Bostwick 230 kV Transmission Line and the Bostwick 230 kV Switching Station, East Walton – Jack's Creek 230 kV Transmission Line and East Walton – Bethabara #1 230 kV Transmission Line.

The width of the required rights-of-way will vary based on the voltage of the transmission line and if it is parallel to an existing transmission line. For example, the East Walton-Rockville 500 kV right-of-way would be 180 feet and the adjacent East Walton-Bostwick 230 kV would be 75 feet.

Phase IV – Design and Construction

Phase IV tasks are the design and construction of the proposed 500 kV transmission line from the proposed East Walton 500/230 kV Substation to the proposed Rockville 500 kV Switching Station and the construction of the 230 kV transmission lines from the proposed East Walton

500/230 kV Substation to the-proposed Bostwick 230 kV Switching Station, from the proposed East Walton 500/230 kV Substation to the proposed Jack's Creek 230 kV Switching Station, and from the proposed East Walton 500/230kV Substation to the proposed Bethabara 230/115 kV Substation. GTC anticipates that lattice steel structures, ranging in height from 80 feet to 150 feet, will be used for the 500 kV transmission line project and self supporting and guyed concrete poles, ranging in height from 80 feet to 120 feet for the 230 kV transmission line projects.

This Electric Alternative Evaluation and Macro Corridor Study Report includes Phase I, Electric Alternative Evaluation Study discussed in the Project Justification and Electrical Alternatives sections of this report and Phase II, Tasks 1 – 4 of the Transmission Line Corridor and Substation/Switching Station Site Selection Process.

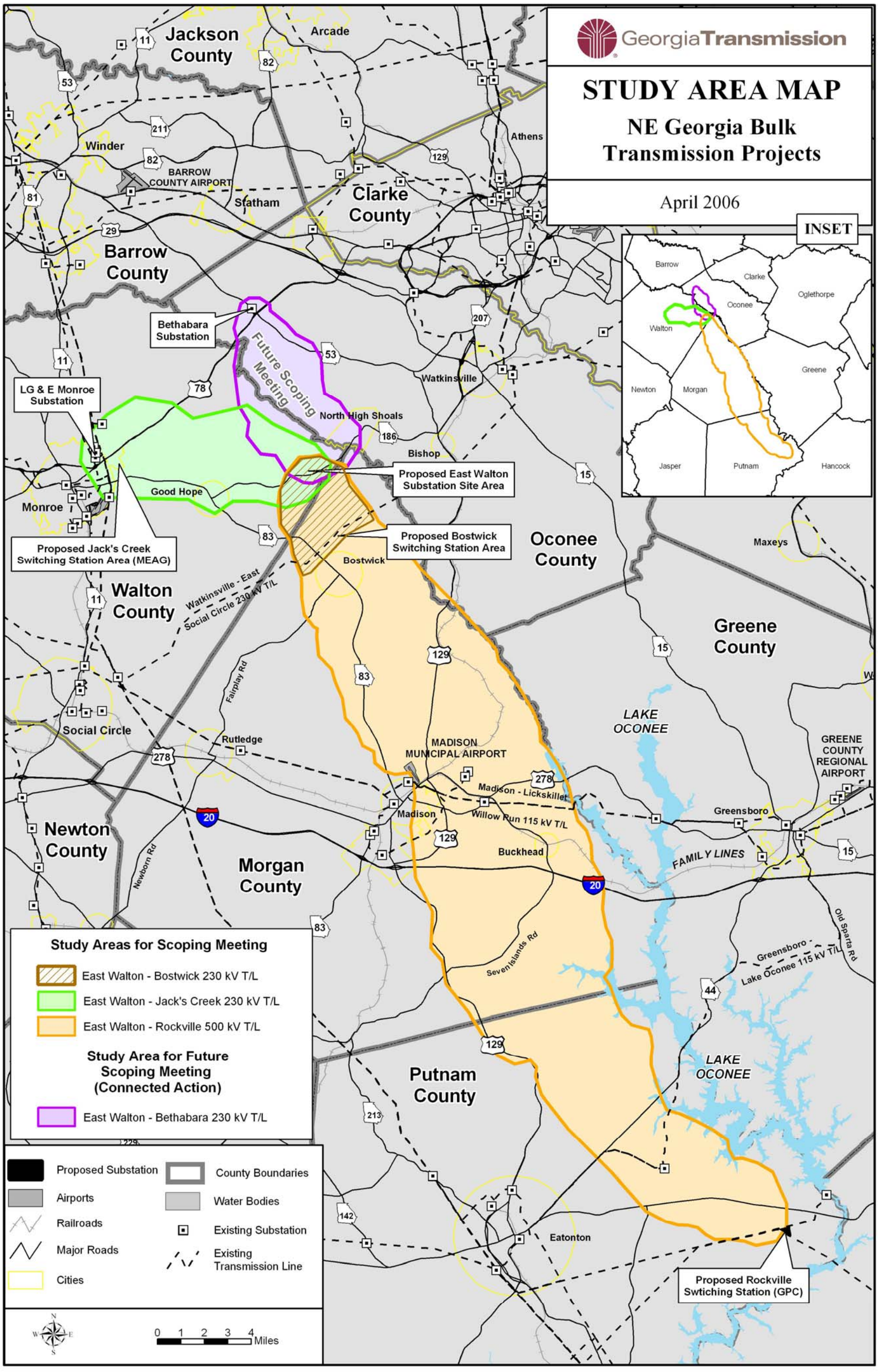
This Electric Alternative Evaluation and Macro Corridor Study Report has three purposes:

1. To identify reasonable electric alternatives and macro corridors that will be used to site the proposed East Walton-Rockville 500 kV Transmission Line, East Walton 500/230 kV Substation; East Walton-Bostwick 230 kV Transmission Line and the Bostwick 230 kV Switching Station. proposed , East Walton – Jack's Creek 230 kV Transmission Line and East Walton – Bethabara #1-230 kV Transmission Line. The same methodology is used on each portion of the Northeast Georgia Improvement Project.

2. To recognize existing land uses and significant environmental constraints from satellite imagery, available mapped information and site surveys of the project area; and,

3. To solicit information and concerns regarding this project from agencies interested stakeholders and the public at the RUS Scoping Meeting.

Study Area Map



East Walton 500/230 kV Plan

Georgia Power Company
Georgia Transmission Corporation
Municipal Electric Authority of Georgia

February 14, 2006

Study Conducted By: ITS Long Lead - Time Transmission Working Group (LTWG)
Report Prepared By: Charles Askey, Mike Bartlett, Borka Milosevic, Girma Moges, Lee Taylor, Rob Wiley

Executive Summary

The electrical energy demand of northeast Georgia has been met largely by importing power over high-voltage transmission facilities from northwest and central Georgia, and from outside Georgia. Recent long-range projections indicate that Atlanta and northeast Georgia will have a load growth (about 500 MW per year) that is significantly higher than any other region in the State of Georgia for the next 10 years.

On the other hand, projections on new generation resource developments in the region indicate uncertainties in magnitude, timing, siting or materialization. Current projections for northeast Georgia indicate less than 2 MW of new generation will be built for every 5 MW of new load growth (see Figure 2 in the Appendix). The remaining power has to be imported in order to meet the required electrical energy demand. This trend is anticipated for to remain over the next 10 years.

In order to address the generation uncertainty issues and provide a robust and flexible transmission solution to serve the projected 4200 MW of new load in northeast Georgia, the following generation scenarios were evaluated:

- Generation Scenario 1: 3000 MW (new generation) in northeast Georgia and 1200 MW (new generation) in south Georgia.
- Generation Scenario 1A: 4200 MW (new generation) in northeast Georgia and Zero (0) MW (new generation) in south Georgia.
- Generation Scenario 2: Zero (0) MW (new generation) in northeast Georgia and 4200 MW (new generation) in south Georgia.
- Generation Scenario 2A[1]: Generation Scenario 2 plus Zero (0) MW from existing Combustion Turbines (CT's) in northeast Georgia (taken off-line), Plant Bowen unit 4 out-of-service (-909 MW), and wide area re-dispatch from other sources.
- Generation Scenario 3: 1200 MW (new generation) in northeast Georgia and 3000 MW (new generation) in south Georgia.

The findings of the power flow evaluations indicate loadings on the following key transmission facilities that are serving northeast Georgia will exceed their existing and/or upgradeable capabilities as early as 2011 for some generation scenarios:

- Klondike – Scherer and O'Hara – Scherer 500 kV Lines
- Klondike 500/230 kV transformer
- Branch – East Social Circle 230 kV lines #1-2
- Austin Drive – Klondike 230 kV line

The conclusions of the generation scenario evaluations are:

- Generation Scenarios 1 & 1A: new high voltage facilities are required after 2014.
- Generation Scenario 2: new high voltage facilities are required by 2011.
- Generation Scenario 3: new high voltage facilities are required by 2014.

[1] Scenario 2A caused a divergent case (unsolvable case) and was not evaluated further.

Evaluated Alternatives:

Initially, at least 12 different transmission solutions involving new construction were considered to address the potential overloads of key transmission facilities. Based on the initial power flow screening, the number of solutions involving new construction to be fully evaluated was reduced to six of which only three were found to be viable.

Types of evaluated alternatives included doing nothing **(Alternative 0)**, upgrades to existing transmission facilities **(Alternative U)** and construction of new transmission facilities **(Alternatives I, III.A and V)**. Other alternatives including underground construction of transmission facilities were considered but not evaluated due to inherent ineffectiveness and/or excessive costs.

Alternative 0 would reduce reliable service in the northeast Georgia, increase the potential for wide-area blackouts in northeast Georgia under contingency situations and result in numerous violations of the transmission planning guidelines of GTC, the ITS, SERC, and NERC.

Alternative U: Initial analysis indicated that upgrades for the overloaded key transmission lines would require complete rebuilds. Rebuilds of these lines would significantly reduce their impedance causing additional overloads at the receiving end of the lines. Also, long duration outages of the existing 500 kV lines to accommodate the rebuilds would significantly reduce the reliability of the northeast Georgia transmission system regardless of the load period. Therefore, Alternative U with only upgrades of the overloaded key transmission lines was not considered to be a viable solution. Additional transmission paths will be required to provide reliable service in the northeast Georgia.

Alternative I: Rockville – South Hall 500 kV Line

- Construct new Rockville 500 kV switching station and loop-in existing Scherer – Warthen 500 kV line.
- Construct 80 miles of 500 kV line from a new 500 kV switching station (Rockville) in the Wallace Dam area to the South Hall 500/230 kV substation.

Total cost = $163,000,000

Alternative III.A: Rockville – East Social Circle 500 kV Line

- Construct new Rockville 500 kV switching station and loop-in existing Scherer – Warthen 500 kV line.
- Construct 40 miles of 500 kV line from a new 500 kV switching station (Rockville) to the existing East Social Circle 230 kV substation and install a new 500/230 kV, 2016 MVA transformer at East Social Circle.
- Construct East Social Circle – Cornish Mountain 230 kV line (10 miles)
- Construct Bethabara – LG&E Monroe 230 kV line (13 miles)
- Re-conductor East Social Circle – Snellville 230 kV line (24.5 miles) and Bay Creek – Bold Springs 230 kV line (5.8 miles)
- Install two 400 MVA, 230/115 kV transformers at East Social Circle.

Total cost = $170,800,000

Alternative V: Rockville – East Walton 500kV Line

- Construct new Rockville 500 kV switching station and loop-in existing Scherer – Warthen 500 kV line.
- Construct new East Walton 500/230 kV substation and install one 500/230 kV, 2016 MVA transformer
- Construct 40 miles of 500 kV line from Rockville to East Walton
- Construct two East Walton – Bethabara 230 kV lines (18 miles total).
- Construct a new 230 kV switching station (Bostwick) and loop-in the existing East Social Circle – East Watkinsville 230 kV line
- Construct East Walton – Bostwick 230 kV line (4.0 miles).
- Construct East Walton – Monroe area (Jack's Creek) 230 kV line (9.0 miles)
- Construct Monroe area (Jack's Creek) – Cornish Mountain 230 kV line (15 miles)
- Re-conductor Klondike – Minola 230 kV line (7.1 miles).

Total cost = $169,900,000

Conclusions:

- Doing nothing would reduce reliable service in the northeast Georgia, increase the potential for wide-area blackouts in northeast Georgia under contingency situations and result in numerous violations of transmission planning guidelines of GTC, the ITS, SERC and NERC.
- It is necessary to closely monitor the load growth in Atlanta and northeast Georgia as well as generation resource development in northeast Georgia.
- The load growth in northeast Georgia will soon exceed the contingency capacities of its existing key facilities, resulting in potential cascading outages and blackouts.
- The Rockville area is a good source to originate a 500 kV transmission line.
- Since a Rockville – South Hall 500 kV line would be approximately 80 miles long, a 500 kV line from Rockville to just an intermediate point (about 40 miles) could be constructed sooner and would be as effective as the Rockville to South Hall 500 kV line in the near-term.
- East Walton is a better location than East Social Circle (as the intermediate point) to distribute the power to northeast Georgia because it is more centrally located to the existing area load centers.
- Longer-term analysis indicates a need to eventually construct a 500 kV line from East Walton to the South Hall 500/230 kV substation in order to reliably serve northeast Georgia under contingency situations (e.g., outage of Rockville - East Walton 500 kV line).
- The Rockville - East Walton 500 kV line improves voltage stability and FIDVR issues.
- The East Walton – South Hall 500 kV Line could be constructed as needed.
- Generation Scenarios 1 & 1A: new high voltage facilities are required after 2014.
- Generation Scenario 2: new high voltage facilities are required by 2011.
- Generation Scenario 3: new high voltage facilities are required by 2014.
- Alternative V (East Walton 500/230 kV Plan) is the best option to resolve the projected service issues in northeast Georgia.

Recommendations:

The ITS Northeast Georgia Long Lead - Time Transmission Planning Work Group (LTWG) recommends and the Georgia ITS agrees that the East Walton 500/230 kV Plan (Alternative V) should be implemented. Acquisition of transmission line ROW and property for substation sites should be timed to support potential in-service dates of 2011 for the various projects. However, construction of transmission facilities can be delayed to 2014 if at least 1200 MW of base load generation is placed in-service in northeast Georgia by 2011. Table A tabulates all of the East Walton 500/230 kV Plan elements (facility, estimated cost, and project sponsor).

Table A: East Walton 500/230 kV Plan Activities (Phase I)

PROJECT[1] CUT-IN DATE	FACILITY DETAIL	OWNER	TPWG APPROVAL DATE	JSTP APPROVAL DATE	COST[2] [COST IN **$M**]	PROJECT SPONSOR/ CONSTRUCTION ASSIGNMENT
06/01/11	East Walton 500/230 kV Substation ▪ Purchase land and construct substation **500 kV Ring Bus** ▪ Initially construct a 2 element 500 kV ring bus at East Walton site with provisions for spare positions to eventually accommodate future terminations of a second transformer, the East Walton–S. Hall 500 kV line and a future 500 kV line. **230 kV Ring Bus** ▪ Construct a five element 230 kV ring bus at East Walton site. (Provide for future expansions). **Transformer** ▪ Install 500/230 kV, 2016 MVA transformer. **500 kV Terminations** ▪ Terminate high side of new 500/230 kV, 2016 MVA transformer. ▪ Terminate[4] new 500 kV line (3-1113 ACSR) from Rockville 500 kV Switching Station. **230 kV Terminations** ▪ Terminate low side of the 500/230 kV transformer. ▪ Terminate[5] Monroe area 230 kV line. ▪ Terminate[5] Bostwick 230 kV line. ▪ Terminate[5] two 230 kV lines (1351 ACSR) from Bethabara.	**GTC**			**25.0**	**GTC/GTC**
06/01/11	**Rockville 500 kV Switching Station** ▪ Purchase land. ▪ Construct a 500 kV ring bus ▪ Terminate[4] each end of the looped-in 500 kV Scherer – Warthen line. ▪ Terminate[4] new 500 kV line from East Walton 500/230 kV substation[4].	**GPC**			**15.0**	**GTC/GPC**

[1] The cut-in date (lead-time) for the East Walton 500/230 kV Plan is driven by the level of new generation in northeast Georgia. If less than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for the transmission projects will be 2011. If greater than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for some of the transmission projects can be delayed until at least 2014.

[2] Preliminary estimate in 2005 dollar.

[4] Terminate with 500 kV breaker, jumpers, line traps, switches, and other required termination devices (at least 4000 A).

[5] Terminate with 230 kV breaker, jumpers, line traps, switches, and other required termination devices (at least 2000 A).

[4] Terminate with 500 kV breaker, jumpers, line traps, switches, and other required termination devices (at least 4000 A).

[5] Terminate with 230 kV breaker, jumpers, line traps, switches, and other required termination devices (at least 2000 A).

Table A: East Walton 500/230 kV Plan Activities (Phase I)

PROJECT[1] CUT-IN DATE	FACILITY DETAIL	OWNER	TPWG APPROVAL DATE	JSTP APPROVAL DATE	COST[2] [COST IN **$M**]	PROJECT SPONSOR/ CONSTRUCTION ASSIGNMENT
06/01/11	East Walton - Rockville 500 kV Line ▪ Acquire ROW – 40.0 miles. ▪ Construct 40 miles of 500 kV line from Rockville to East Walton with 3-1113 ACSR conductor for 100 degree C	**GTC**			**62.2**	**GTC/GTC**
06/01/11	Scherer to Warthen 500 kV Line ▪ Loop-in Scherer – Warthen 500 kV line through new Rockville 500 kV Switching Station.	**GPC**			**2.3**	**GTC/GPC**
06/01/11	**Scherer 500 kV Substation** ▪ Modify relaying on Warthen line	**GPC**			**0.2**	**GTC/GPC**
06/01/11	**Warthen 500 kV Substation** ▪ Modify relaying on Scherer line	**GPC**			**0.2**	**GTC/GPC**
06/01/11	E. Walton - Bethabara 230 kV Line #1 ▪ Acquire ROW and construct "east" 230 kV line (1351 ACSR) for 100 degree C (8 miles)	**GTC**			**5.0**	**GTC/GTC**
06/01/11	E. Walton - Bethabara 230 kV Line #2 ▪ Acquire ROW and construct "west" 230 kV line (1351 ACSR) for 100 degree C (10 miles)	**GPC**			**7.0**	**GTC/GPC**
06/01/11	Bethabara 230/115 kV Substation ▪ Install two 230 kV breakers to terminate[5] two 230 kV lines from East Walton. ▪ Utilize relaying and protection devices as required. If needed, modify relaying.	**GTC**			**1.2**	**GTC/GTC**
06/01/11	**East Walton - Bostwick 230 kV line** ▪ Acquire ROW – 4.0 miles. ▪ Construct 4.0 miles of 230 kV line (1351 ACSR) for 100 degree C.	**GTC**			**5.0**	**GTC/GTC**
06/01/11	**East Watkinsville – East Social Circle 230 kV line** ▪ Loop line into Bostwick 230 kV S/S.	**GTC**			**1.0**	**GTC/GTC**

[1] The cut-in date (lead-time) for the East Walton 500/230 kV Plan is driven by the level of new generation in northeast Georgia. If less than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for the transmission projects will be 2011. If greater than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for some of the transmission projects can be delayed until at least 2014.

[2] Preliminary estimate in 2005 dollar.

Table A: East Walton 500/230 kV Plan Activities (Phase I)

PROJECT[1] CUT-IN DATE	FACILITY DETAIL	OWNER	TPWG APPROVAL DATE	JSTP APPROVAL DATE	COST[2] [COST IN **$M**]	PROJECT SPONSOR/ CONSTRUCTION ASSIGNMENT
06/01/11	**East Watkinsville 230/115 kV S/S** ▪ Modify relaying on E. Social Circle line	**GTC**			**0.05**	**GTC/GTC**
06/01/11	**East Social Circle 230/115 kV S/S** ▪ Modify relaying on E. Watkinsville line	**GTC**			**0.05**	**GTC/GTC**
06/01/11	**Bostwick 230 kV S/S (new)** ▪ Purchase land ▪ Construct a 230 kV switching station ▪ Terminate[5] 230 kV line from East Walton ▪ Loop-in and terminate[5] East Watkinsville – East Social Circle 230 kV line	**GTC**			**7.0**	**GTC/GTC**
06/01/11	East Walton to Monroe area (Jack's Creek) 230 kV Line ▪ Acquire ROW – 9.0 miles. ▪ Construct 9.0 miles 230 kV line with 1351 ACSR conductor for 100 degree C	**GTC**			**8.2**	**GTC/GTC**
06/01/11	Monroe area (Jack's Creek) to Cornish Mountain 230 kV Line ▪ Acquire ROW – 15.0 miles. ▪ Construct 15.0 miles 230 kV line with 1351 ACSR conductor for 100 degree C	**MEAG**			**18.8**	**GTC/MEAG**
06/01/11	Monroe area (Jack's Creek) 230 kV S/S ▪ Purchase land ▪ Construct a 230 kV switching station. ▪ Loop-in and terminate[5] E. Social Circle – Winder 230 kV line (modify relaying) ▪ Terminate[5] two 230 kV lines from East Walton and Cornish Mtn.	**MEAG**			**10.0**	**GTC/MEAG**
06/01/11	**Cornish Mountain 230/115 kV S/S** ▪ Terminate[5] Monroe area 230 kV line	GPC			**0.6**	GTC/GPC
06/01/11	Klondike – Minola 230 kV line • Reconductor Klondike – Minola 230 kV line (7.1 miles)	**MEAG**			**1.1**	**GTC/MEAG**
06/01/11	Total Costs				**169.9**	

[1] The cut-in date (lead-time) for the East Walton 500/230 kV Plan is driven by the level of new generation in northeast Georgia. If less than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for the transmission projects will be 2011. If greater than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for some of the transmission projects can be delayed until at least 2014.

[2] Preliminary estimate in 2005 dollar.

[5] Terminate with 230 kV breaker, jumpers, line traps, switches, and other required termination devices (at least 2000 A).

Table B: East Walton 500/230 kV Plan Activities (Phase II)

PROJECT[1] CUT-IN DATE	FACILITY DETAIL	OWNER	TPWG APPROVAL DATE	JSTP APPROVAL DATE	COST[2] [COST IN **$M**]	PROJECT SPONSOR/ CONSTRUCTION ASSIGNMENT
06/01/14+	East Walton to S. Hall 500 kV Line ▪ Acquire ROW – 40.0 miles ▪ Construct 40.0 miles of 500 kV line.	**GPC**			**80.0**	**GPC/GPC**
06/01/14+	South Hall 500/230 kV S/S ▪ Terminate[5] 500 kV line from East Walton ▪ Replace jumpers on South Hall – Gainesville #2 230kV line. ▪ Modify relaying as required	**GPC**			**3.5**	**GPC/GPC**

[1] The cut-in date (lead-time) for the East Walton 500/230 kV Plan is driven by the level of new generation in northeast Georgia. If less than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for the transmission projects will be 2011. If greater than 1200 MW of new generation is in-service in northeast Georgia by 2011, then the required cut-in for some of the transmission projects can be delayed until at least 2014.

[2] Preliminary estimate in 2005 dollar.

[5] Terminate with 230 kV breaker, jumpers, line traps, switches, and other required termination devices (at least 2000 A).

Figure E1: East Walton 500/230 kV Project (ITS Preferred Plan)

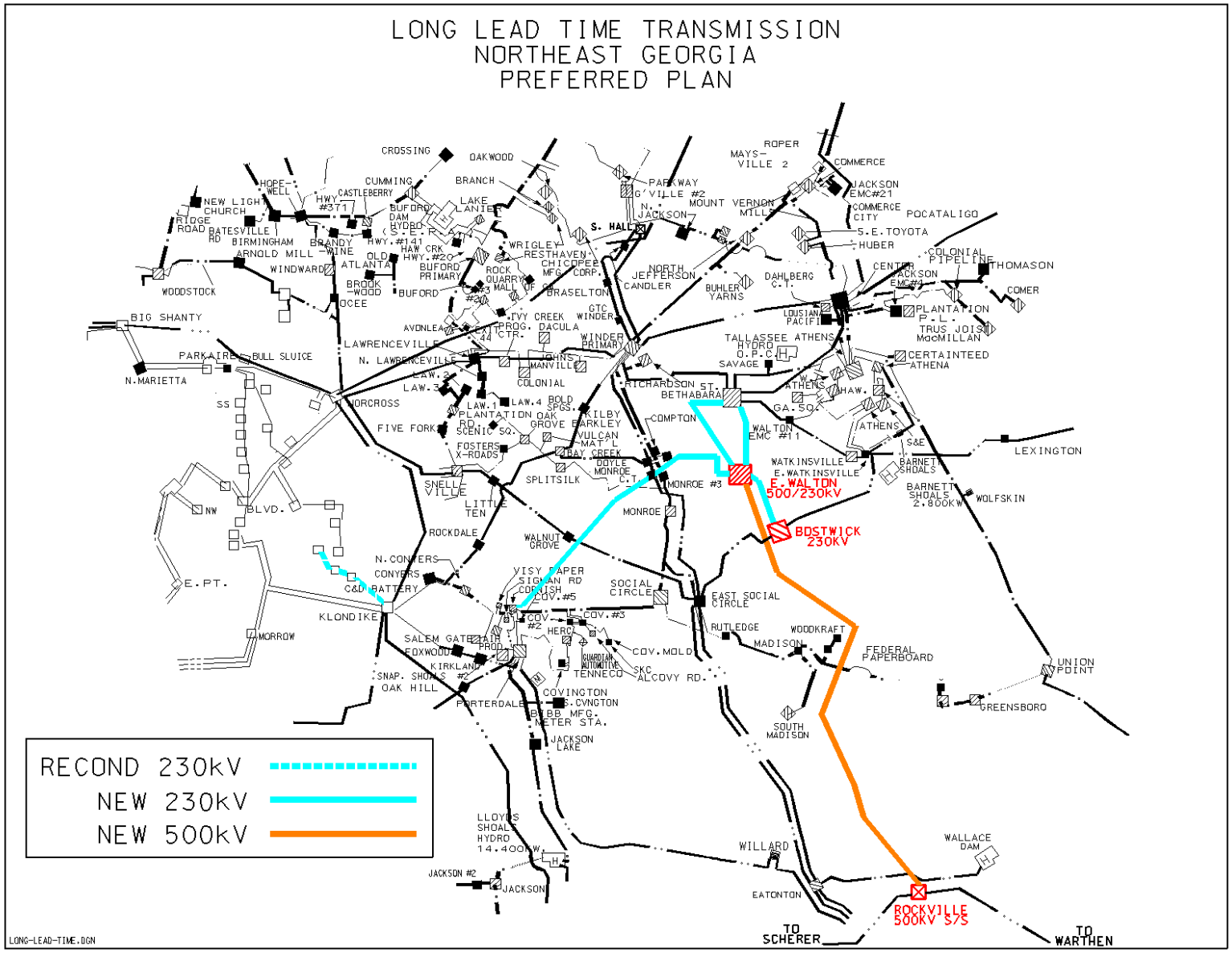


Figure E2: East Walton 500/230 kV Project (ITS Preferred Plan)

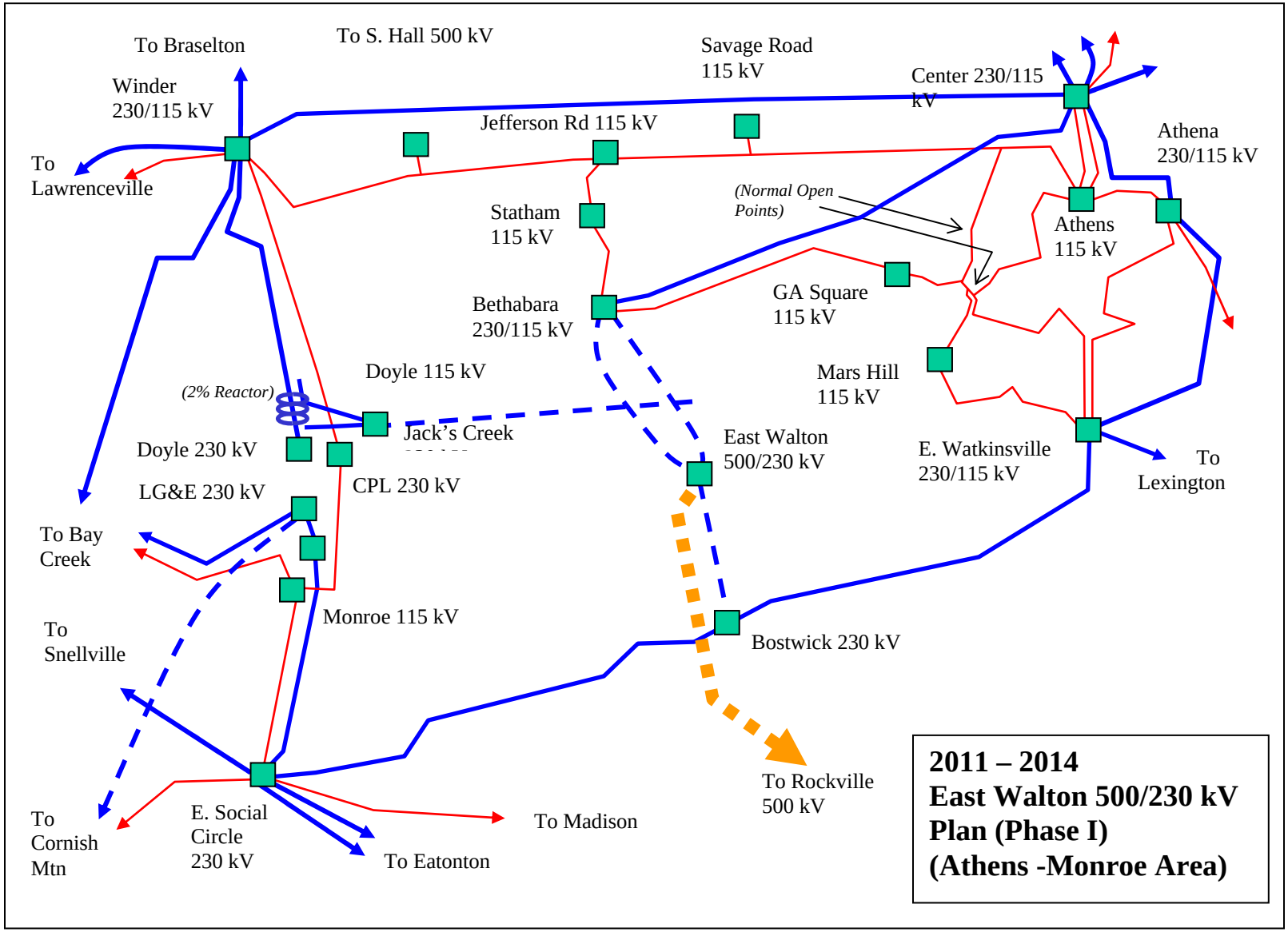
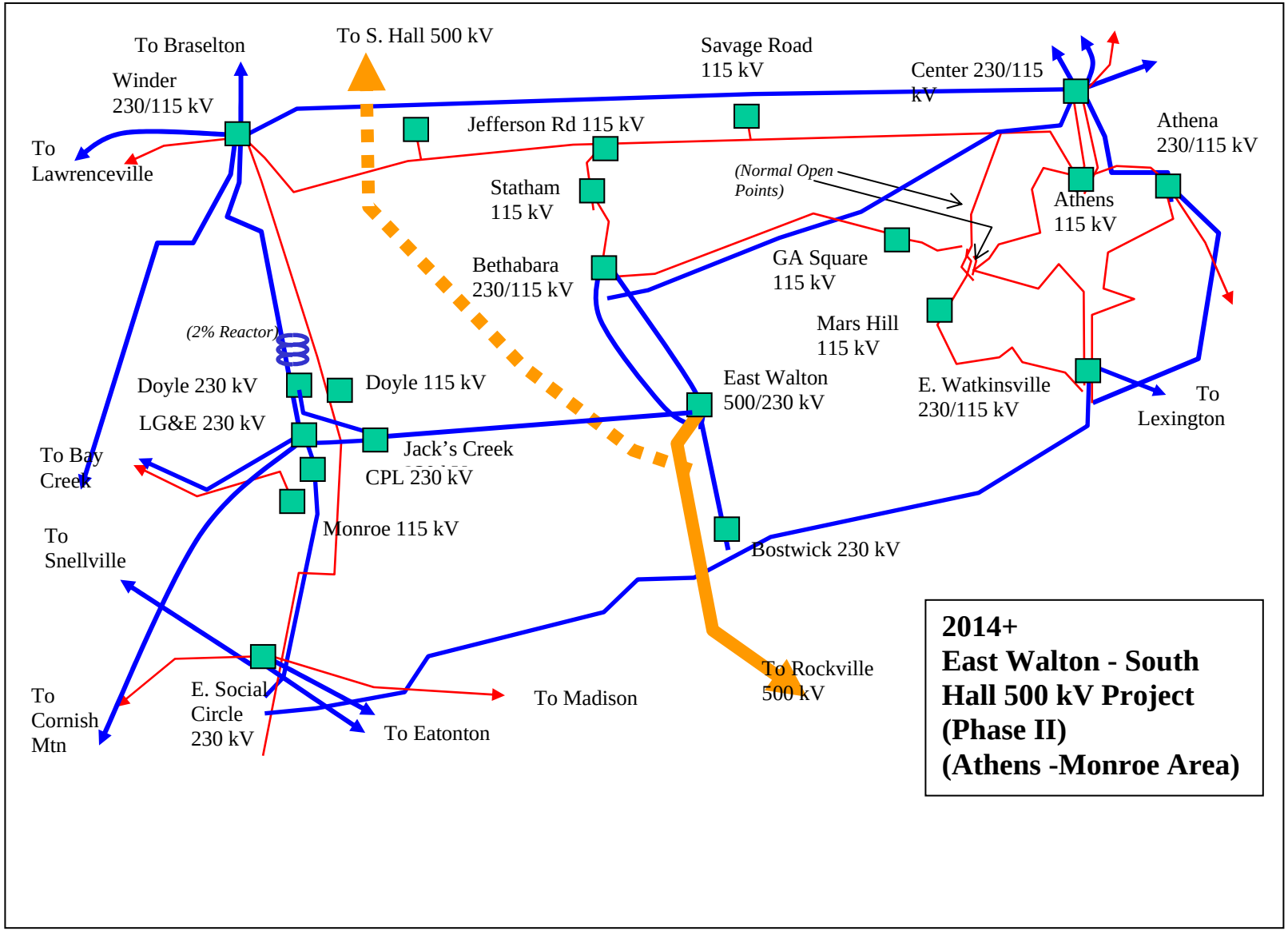


Figure E3: East Walton – South Hall 500 kV Project (2014+)



Background

In January 2004, Georgia Power Company and Southern Company Services approached the Georgia Integrated Transmission System (ITS) participants with a presentation addressing long-range transmission planning concerns in northeast Georgia. The key issues of the presentation were:

Load

Recent long-range projections indicate that Atlanta and northeast Georgia will have a load growth that is significantly higher than any region in the State of Georgia for the next 10 years. This trend is anticipated to remain for over a decade. Preliminary analysis of long-range system projections indicates the following:

- ***Projected growth rate is of approximately 500 MW per year.***

- ***The ratio between load and generation growth within the region will be higher than five to two (see Figure 2 in the Appendix). That is, for every 5 MW new load growth there will be only 2 MW new generation growth within northeast Georgia. The remaining power has to be imported in order to meet the required energy demand over the projected 10 years.***

Generation

- There is uncertainty in magnitude, location, timing, or materialization of generation resource development in northeast Georgia.
- There are substantial needs for real and reactive generation in northeast Georgia.
- Environmental regulations limit the amount of new generation in the northeast Georgia Area. This is especially true of new base load and intermediate generation facilities.
- The time required to construct new combustion turbine or combined cycle generation is four years.

Losses

- The average real power loss in northeast Georgia is about 225 MW per year.
- The average reactive power loss in northeast Georgia is about 3350 MVAr per year. Figure 3 included in the Appendix of this report illustrates losses.

High Voltage Facilities

Northeast Georgia has met its electrical energy demand largely by importing power from Northwest and Central Georgia, and from outside of the State. The key 500 kV and 230 kV sources that serve northeast Georgia are Klondike, Norcross, South Hall, Center, Branch, and East Social Circle.

- Figure 1 included in the Appendix of this report provides the configuration of the transmission lines that are connecting these sources with the load of northeast Georgia. This figure also shows the flow pattern of the imported power into northeast Georgia illustrating the dependency of the region on import and these facilities.
- Figures 2 and 3 included in the Appendix of this report illustrate the growth of load, generation, import, and losses on a year by year basis.

Critical Facilities

Preliminary power flow screens indicated that the key transmission monitor/outage pairs for this evaluation included the following:

1. Klondike – Scherer 500kV Line (with O'Hara – Scherer 500kV out)
2. O'Hara – Scherer 500kV Line (with Klondike – Scherer 500kV out)
3. Branch – E. Social Circle 230kV #1 (w/Branch – E. Social Circle 230kV #2 out)
4. Branch – E. Social Circle 230kV #2 (w/Branch – E. Social Circle 230kV #1 out)
5. Klondike 500/230kV transformer (with Klondike – Norcross 500kV line out)

6. Austin Drive – Klondike 230kV line (with Klondike – Norcross 500kV line out)

Regulations

Assessment of applicable regulatory compliances indicates the following:

- Environmental regulations may limit the amount of new generation in the northeast Georgia.
- Long lead-time (over 4 years) is required to construct new base generation plants
- Long lead-time (over 7 years) is required to construct new high voltage transmission facility due to new State regulations and landowner involvement in acquisition of rights-of-way and substation sites.

The implications of the above projections, regulation compliances, and results of preliminary screens are as follows:

- Environmental regulations may limit the amount of new generation in the northeast Georgia.
- There will be a substantial future need for real and reactive power in northeast Georgia.
- There may be a future generation shortage inside northeast Georgia.
- There will be a future increased need to import into northeast Georgia.
- There will be a risk of exceeding the import capability of existing key 500 and 230 kV facilities that are currently serving northeast Georgia.
- There will be a potential problem to reconcile the need date for new high voltage facilities and the long lead time that is needed to construct high voltage facilities without compromising system reliability and transmission service continuity.

The consequences of doing nothing are potential future blackouts in northeast Georgia under contingency situations. Under this circumstance, it is also a violation of transmission planning guidelines of GTC, ITS, SERC, and NERC. The risks associated with doing nothing are not acceptable. The ITS must proactively plan to address system problems in order to maintain system reliability and service continuity.

The above implications did raise concerns over long lead-time transmission into northeast Georgia. These concerns led to the formation of an ITS Long Lead - Time Transmission Planning Work Group (LTWG) to jointly assess this potential problem.

"Decision Point" Lead Time

The time to construct new combustion turbine or combined cycle generation is much less than the time to construct new high voltage transmission facilities. The decision to construct transmission must be a proactive measure made in anticipation of a generation shortage.

Based on these concerns, the following action plan was recommended:

1. Develop updated cases using new load forecasts and "best guess" generation & transmission expansion plans.
2. Finalize the 500 kV long-range plan and determine sponsors and ownership of facilities.
3. Develop a plan for acquiring right-of-way for new transmission facilities. The acquisition process may need to start as soon as possible.
4. Annually review the in-service dates and timing of the East Walton 500/230 kV Plan (Phase I) for the northeast Georgia Area. The actual in-service dates will be determined by generation siting decisions and transmission import needs.
5. Develop a 230 kV and 115 kV plan to complement the 500 kV plan recommended by the working group.

The benefits of the action plan are:

1. Provides a workable plan to meet the long-term needs of the northeast Georgia area in a reliable and economic manner.
2. Potential for new generation at the load centers.
    a. Increases voltage stability margin by providing stronger dynamic voltage support.
    b. Reduces system power losses

c. Alleviates thermal overloads

3. Maintains adequate transmission import capability into the northeast Georgia

4. Since ROW will eventually be needed, acquiring ROW in advance could make the transmission construction and generation lead-times similar.

Study Purpose and Objectives

Preliminary study results indicated the need for additional 500 kV bulk transmission lines into the northeast Georgia Area. Recognizing the load growth in this area, the associated bulk transmission import requirements, the impact of future generation sites and the long lead time associated with right-of-way acquisition, a bulk transmission study was performed using the 2004 series base cases to determine the location of the next 500/230 kV substation(s) and the associated 500 kV, 230 kV and 115 kV lines. This study provides information for the location and early acquisition of ROW for these critical lines.

1. Develop a transmission plan for addressing the long-term transmission import needs "into" the northeast Georgia Area, currently foreseen to occur as early as 2011.
    a. Evaluate 500 kV line alternatives and provide justification for the next best 500 kV line "into" the northeast Georgia Area that optimizes long-term, load-serving and transmission import needs in the northeast Georgia Area. Provide information to help line routing activities. Investigate underlying 230 and 115 kV issues. Provide supporting documentation.
    b. Develop a ROW acquisition plan, for line identified in item "1.a," for acquisition process to start as soon as possible.

2. Study the need for other "import" 500 kV lines in addition to line in item "1.a."

3. Develop a plan for the improvement of the 230 kV and 115 kV infrastructure to support the 500 kV plan.

Bulk Transmission System Analysis

Based on preliminary screens, year 2014 was determined to be the study year for the evaluation of potential solutions.

Assumptions

2014 Base Case

- **Assumed system[2] load was 56,471 MW. See notes provided with Table 1 included in the Appendix of this report.**
- **Assumed generation growth in northeast Georgia is given in Table 1 included in the Appendix of this report. Table 1 is developed based on the ITS generation projects queue from year 2009 through 2014.**
- **The following new facilities were assumed to exist in northeast Georgia by 2014.**
  - **Bethabara – Statham 115 kV line**
  - **Bethabara – Georgia Square 115 kV line**
  - **Jefferson Road 115 kV Switching Station**
  - **Bethabara 230/115 kV Substation**
  - **Bethabara – Center 230 kV line**

Generation Scenarios

The uncertainty in generation has the potential to mask the exact scope and timing of the problem. Therefore, the generation uncertainty problem for year 2014 was handled by developing the following Generation Scenarios for year 2014. A total of 4200 MW of new generation was evaluated to match the projected load growth in northeast Georgia from 2005 to 2013 (see Figure 2 in the Appendix).

Scenario 1: 3000 MW (new) in northeast Georgia and 1200 MW (new) in south Georgia.

Scenario 1A: 4200 MW (new) in northeast Georgia and Zero (0) MW (new) in south Georgia.

Scenario 2: Zero (0) MW (new) in northeast Georgia and 4200 MW (new) in south Georgia.

Scenario 2A[3]: Generation Scenario 2 plus Zero (0) MW from existing Combustion Turbines (CT's) in northeast Georgia (taken off-line), Plant Bowen unit 4 out-of-service (-909 MW), and Re-dispatch from other sources (Wide Area Re-dispatch).

Scenario 3: 1200 MW (new) in northeast Georgia and 3000 MW (new) in south Georgia.

[2] System is the Southern Control Area (SCA) system.
[3] Scenario 2A caused a divergent case (unsolvable case) and was not evaluated further.

Generation Scenario Discussion

Figure 4 included in the Appendix of this report illustrates the above Generation Scenarios. This section discusses each of the generation scenarios and provides the rationale for keeping or eliminating the scenario in the analysis of transmission options.

Scenario 1: This scenario is a 2014 contract base case that dispatches 3000 MW of new generation in northeast Georgia to meet the load growth. Based on the power flow screening, if this scenario becomes the generation expansion plan for the Georgia ITS, most of the critical facilities would not reach 90 percent thermal loading by 2014. While Scenario 1 reaffirms the need to build generation in northeast Georgia, it provides little insight into the best transmission expansion plan to construct if the generation does not materialize. Scenario 1 was retained as a valid scenario for all transmission screenings.

Scenario 1A: This scenario takes Scenario 1 and re-dispatches generation from Rumble Road to Middle Fork. Thus, this scenario further reduces loading on the critical facilities below those seen while analyzing Scenario 1. Due the uncertainty of all generation locating in the Middlefork area, this scenario was removed from further consideration of transmission option evaluation.

Scenario 2: This scenario is the second worst case scenario because the generation to serve load in northeast Georgia is being "imported" from generation in the middle and southern parts of the state. Scenario 2 has the highest loading on the critical facilities and is the benchmark case for evaluating the effectiveness of the transmission options to relieve critical facility loadings.

Scenario 2A: This scenario is the worst-case scenario. This scenario was an attempt to find a set of generation assumptions that cause higher loading than Scenario 2. Scenario 2A turned off existing CTs in northeast Georgia and further dispatched generation in south Georgia. The result was a base case that would not converge. Thus Scenario 2A confirmed that Scenario 2 is the worst case generation dispatch. Scenario 2A was removed from further consideration.

Scenario 3: This scenario is a "middle-of-the-road" generation dispatch. It splits the new generation to meet the northeast Georgia load growth between north Georgia and south Georgia. As may be expected, the thermal loadings on the critical facilities fell in between those experienced in Scenario 1 and Scenario 2. Scenario 3 was retained as a valid scenario for all transmission screenings.

Rumble Road 500 kV Generation Sensitivity: This scenario was evaluated to determine the impacts of the proposed Rumble Road 500 kV Generation (about 1700 MW) which is the central portion of Georgia. The results were similar to Scenario 2 and therefore no further discussion is included in this report.

Relative Loading Impacts

To determine the scope and timing of overloading problems, load flow screen were conducted to test existing facilities (without new improvements in northeast Georgia) using each of the above Generation Scenarios developed for year 2014. Table 2 and Figure 5 included in the Appendix of this report provide the relative loadings on existing key transmission facilities caused under each Generation Scenarios.

In addition to confirming the risk of blackout associated with the do nothing alternative, the analysis of these relative loadings also establishes the timing of the problem as well as the need for new high voltage facility as discussed below.

If the amount of new generation to materialize in northeast Georgia by 2014 is

- 3000 MW or higher, new high voltage facilities are required after 2014.
- Zero (0) MW, new high voltage facilities are required before 2014.
- 1200 MW, new high voltage facilities are required by 2014.

That is,

- Under Scenario 1, new high voltage facilities are required after 2014.
- Under Scenario 2, new high voltage facilities are required before 2014.
- Under Scenario 3, new high voltage facilities are required by 2014.

Therefore, the timing for new bulk transmission facilities advances to before 2014 if the new generation to materialize in northeast Georgia by 2014 is below 1200 MW.

- Year 2011 appears to be a critical year for most of the key 500 kV and 230 kV existing facilities if no new generation is materializes in northeast Georgia.

500 kV Transmission Alternative Solutions

Alternative 0 ("Do Nothing") would reduce reliable service in the northeast Georgia, increase the potential for wide-area blackouts in northeast Georgia under contingency situations and result in numerous violations of transmission planning guidelines of GTC, the ITS, SERC and NERC.

Alternative U: Upgrade Overloaded Transmission Facilities
Initial analysis indicated that upgrades for some of the overloaded key transmission lines would require complete rebuilds of the lines. Rebuilds of these lines would significantly reduce their impedance resulting in additional overloads at the receiving end of the lines. Also, long duration outages of the 500 kV lines to accommodate the rebuilds would significantly reduce the reliability of the northeast Georgia transmission system regardless of the load period. Therefore, Alternative U with only upgrades of the overloaded key transmission lines was not considered to be a viable solution. Additional transmission paths will be required to provide reliable service in the northeast Georgia.

Twelve alternative[a] solutions for new 500 kV transmission paths were developed . Figure 6 included in the Appendix of this report pictorially shows the complete set of these alternatives. The alternatives developed and tested are as follows.

1. Option I Rockville – South Hall 500 kV
2. Option II Rockville – Klondike 500 kV
3. Option III Rockville – East Social Circle 500 kV
4. Option IV Rockville – East Watkinsville 500 kV
5. Option V Rockville – East Walton 500 kV

[a] Option and Alternative are used as synonymous in this report.

6. Option VI Rockville – North Eatonton 500 kV
7. Option VII [b] South Hall – East Social Circle 500 kV
8. Option VIII South Hall – East Watkinsville 500 kV
9. Option IX South Hall – East Walton 500 kV
10. Option X [c] South Hall – North Eatonton 500 kV
11. Option XI Klondike – North Eatonton 500 kV
12. Option XV Thomson – Middlefork 500 kV

The loading on the following critical facilities were monitored:

1. Klondike – Scherer 500kV Line (with O'Hara – Scherer 500kV out)
2. O'Hara – Scherer 500kV Line (with Klondike – Scherer 500kV out)
3. Branch – E. Social Circle 230kV #1 (w/Branch – E. Social Circle 230kV #2 out)
4. Branch – E. Social Circle 230kV #2 (w/Branch – E. Social Circle 230kV #1 out)
5. Klondike 500/230kV transformer (with Klondike – Norcross 500kV line out)
6. Austin Drive – Klondike 230kV line (with Klondike – Norcross 500kV line out)

500 kV Transmission Alternative Solutions Discussion

The following section discusses these alternatives.

Option I: This option constructs a 500 kV line from Rockville to the South Hall 500/230 kV Substation. Option I reduces the loading on the Klondike 500/230 kV transformer by approximately 12 percent and the loading on the Klondike – Scherer 500 kV Line by approximately 20 percent. The only negatives associated with Option I are that it increases the loading on the South Hall 500/230 kV Transformer and the South Hall – Gainesville 230 kV Line. Additionally, if Option 1 is the recommended plan, about 80 miles of new 500 kV line has to be constructed before any benefit is achieved for "importing" power into northeast Georgia. Based on the LTWG's review of the results, Option I is a viable alternative.

[b] Options VII, VIII, and IX are extensions of Options III, IV, and V respectively.
[c] Option X and XI are extensions of Option VI

Option IIA: This option constructs a 500 kV line from Rockville to the Klondike 500/230 kV Substation. In addition, the following facilities are added or upgraded:

- A 2nd 500/230 kV Transformers at Klondike
- The Panthersville 230 kV Project
- Upgrade or reconductor the Klondike – Conyers 230 kV #2 line
- Convert Conyers – Mystery Valley - Ponce to 230 kV operation.
- Upgrade or reconductor the Minola Road – Austin Drive 230 kV Line

Option IIA reduces the loading on the Union City, Norcross and O'Hara 500/230 kV transformers. It is a good option for reducing the loading on the Klondike – O'Hara 500 kV Line. This option also works well for the Stockbridge – Jonesboro 230 kV Line. However, loss of one Klondike 500/230 kV transformer loads the other transformer to its nameplate rating in 2014. In addition, many of the 230 kV lines and 230/115 kV transformers in the area exceed their maximum thermal rating. For these reason, the LTWG decided that Option IIA should be removed from further consideration as a viable transmission option for this evaluation.

Option IIB: This option constructs a 500 kV line from Rockville to the Norcross 500/230/115 kV Substation. In addition, there would be a need to double circuit the 500 kV Line from Norcross to Klondike. Option IIB significantly reduces the loading on the Big Shanty - Bulls Sluice 500 kV Line and the Klondike – O'Hara 500 kV Line. In addition, it solves the line loading problems associated with the Austin Drive – Klondike 230 kV Line. However, this option significantly increases the 500/230 kV transformer loading at the Norcross 500/230 kV Substation. Also, because a single tower failure can remove two 500 kV lines from service, the LTWG was concerned about double circuiting another 500 kV Line (the Bowen – Big Shanty 500 kV Line is currently double circuited). For these reason, the LTWG decided that Option IIB should be removed from further consideration as a viable transmission option for this evaluation.

Option III: This option constructs a 500 kV Line from Rockville to the East Social Circle 230/115 kV Substation and installs a 500/230 kV transformer. In addition to the 500 kV line and substation the following facilities are modified:

- Upgrade or reconductor the East Social Circle – Snellville 230 kV Line
- Replace the two 230/115 kV transformers at the East Social Circle 230/115 kV Substation.
- Make the necessary improvements to increase the rating of Klondike-Minola 230 kV Line.

Option III reduces the loading on the Norcross 500/230 kV transformer and alleviates loading problems on the Social Circle – Eatonton and the Branch – Eatonton 230 kV Lines. It is the best option for reducing the loading on the Klondike 500/230 kV transformer. Option III also solves the loading problems on the Boggs Road – Purcell, Austin Drive – Klondike, and Stockbridge – Jonesboro 230 kV Lines. However the screening indicated that the Cornish Mountain 230/115 kV transformer exceeded its nameplate rating and the Bay Creek – Bold Springs 230 kV Line exceeded its thermal rating. In addition, the East Social Circle – East Watkinsville 230 kV Line becomes overloaded under contingency conditions because the East Social Circle 500/230 kV Source is a very strong source. The LTWG decided that instead of eliminating this option, it would modify the option to solve the problems. With the modifications made, Option III becomes Option IIIA.

Option IIIA: This option constructs a 500 kV Line from Rockville to the East Social Circle 230/115 kV Substation and installs a 500/230 kV transformer at East Social Circle. In addition to the 500 kV line and substation the following facilities are added and/or modified:

- Upgrade or reconductor the East Social Circle – Snellville 230 kV Line
- Construct the East Social Circle – Cornish Mountain 230 kV Line
- Replace the two East Social Circle 230/115 kV 230/115 kV transformers
- Construct the East Walton – LG&E Monroe 230 kV Line
- Reconductor the Bay Creek – Bold Springs 230 kV Line
- Upgrade the Klondike – Minola 230 kV Line (to increase thermal rating).

Option IIIA reduces the loading on the Norcross 500/230 kV Transformer and alleviates loading problems on the Social Circle – Eatonton and the Branch – Eatonton 230 kV Lines. It is the best option for reducing the loading on the Klondike 500/230 kV Transformer. Option IIIA also solves the loading problems on the Boggs Road – Purcell; Austin Drive – Klondike; and Stockbridge – Jonesboro 230 kV Lines. Based on the LTWG's review of the results, Option IIIA is a viable transmission option to "import" power into northeast Georgia.

Option IV: This option has similar results to Option III but was eliminated from further consideration since it was less effective than Option III for alleviating system problem.

Option V: This option constructs a 500 kV line from Rockville to the proposed East Walton 230/115 kV Substation and installs a 500/230 kV transformer at East Walton. In addition to the new 500 kV line and substation, the following supporting facilities were modeled:

- Construct two East Walton – Bethabara 230 kV lines
- Construct a new 230 kV switching station (Bostwick) and loop-in the existing East Social Circle – East Watkinsville 230 kV line
- Construct East Walton – Bostwick 230 kV line
- Construct East Walton –Monroe area 230 kV line
- Construct Monroe area – Cornish Mountain 230 kV line

Option V alleviates loading problems on the East Social Circle – Eatonton and the Branch – Eatonton 230 kV Lines. It reduces the loading on the Klondike 500/230 kV transformer and solves the loading problems on the Klondike – Scherer and O'Hara – Scherer 500 kV lines and the Boggs Road – Purcell and Stockbridge – Jonesboro 230 kV Lines. Option V does not solve the Austin Drive – Klondike 230 kV Line loading problems. This line will need to be re-conductored if Option V is the preferred solution. Based on the LTWG's review of the results, Option V is a viable transmission option to "import" power into northeast Georgia.

Option VI: This option was ineffective and therefore Options VI, X, and XI were eliminated from further consideration.

Option XV: This option is supplemental to the Thomson 500 kV Project (Warthen – Thomson 500 kV Line and Thomson 500/230 kV Substation) and constructs a 500 kV line from Thomson – Middlefork and installs a 500/230 kV transformer on the Middlefork 230/115 kV Substation. In addition this option included a 500 kV line from Middlefork to the McGrau Ford 500/230 kV Substation. This Option reduces the loading on the Boggs Road – Purcell 230 kV Line, but does not improve any of the following facility overloads:

- Norcross – Klondike 500 kV Line
- Klondike, Norcross or O'Hara 500/230 kV Transformers
- Klondike – Scherer 500 kV Line
- O'Hara – Scherer 500 kV Line

For these reasons, the LTWG decided that Option XV should be removed from further consideration as a viable transmission option for this evaluation.

Based on the review of all transmission screenings and discussions at the meeting, the LTWG decided to push forward with determining a preferred Transmission Option to address the problems identified using Generation Scenario 2.

Viable 500 kV Transmission Alternatives

To select the most viable alternatives, electrical performance comparison was conducted. Based on the initial power flow screening, the number of solutions involving new construction to be fully evaluated was reduced to six. Comparison of the performance for these six alternatives is documented in Tables 3 and 4 in the Appendix of this report. Based on this comparison, only the following three transmission options were selected as viable options.

The three alternatives that were selected as viable alternatives and the approximate total cost of each are as follows. See tables 5, 6, and 7 included in the Appendix of this report for cost breakdown analysis.

(1) **Alternative I:** Rockville – South Hall 500 kV Line

- This alternative constructs 80 miles of 500 kV line from a new 500 kV switching station (Rockville) in the Wallace Dam area to the South Hall 500/230 kV substation.

Total cost = $163,000,000

(2) **Alternative III.A:** Rockville – East Social Circle 500 kV Line

This alternative constructs the following 500 kV facilities.

- Construct 40 miles of 500 kV line from a new 500 kV switching station (Rockville) to the existing East Social Circle 230 kV substation and install a new 500/230 kV, 2016 MVA transformer at East Social Circle.

In addition to the above 500 kV facilities, this alternative requires the construction of the following 230 kV lines.

- Construct East Social Circle – Cornish Mountain 230 kV line (10 miles)
- Construct Bethabara – Monroe area 230 kV line (13 miles)
- Re-conductor East Social Circle – Snellville 230 kV line (24.5 miles) and Bay Creek – Bold Springs 230 kV line (5.8 miles)
- Install two 400 MVA, 230/115 kV transformers at East Social Circle.

Total cost = $170,800,000

(3) **Alternative V:** Rockville – East Walton 500kV Line

This alternative constructs the following 500 kV facilities.

- Construct 40 miles of 500 kV line from a new 500 kV switching station (Rockville) to the proposed East Walton 500/230 kV substation and install one 500/230 kV, 2016 MVA transformer at East Walton.

In addition to the above 500 kV facilities, this alternative requires the construction of the following 230 kV lines.

- Construct two East Walton – Bethabara 230 kV lines (18 miles total).
- Construct a new 230 kV switching station (Bostwick) and loop-in the existing East Social Circle – East Watkinsville 230 kV line
- Construct East Walton – Bostwick 230 kV line (4.0 miles).
- Construct East Walton –Monroe area 230 kV line (9.0 miles)
- Construct Monroe area – Cornish Mountain 230 kV line (15 miles)
- Re-conductor Klondike – Minola 230 kV line (7.1 miles).

Total cost = $169,900,000

The contributions of the above viable alternatives towards voltage stability and enhancement of delayed voltage recovery during the phenomenon known as FIDVR (Fault Induced Delayed Voltage Recovery) in northeast Georgia were tested. The findings indicate that the East Walton – Rockville 500 kV Line is slightly more effective than the East Social Circle - Rockville 500kV Line (alternative III.A). Figures 7 and 8 included in the Appendix of this report provide graphical illustrations.

Conclusion of the Working Group

Based on the above performance results and additional considerations of an overall future system needs, the Long Lead Time Transmission Working Group (LTWG), therefore, made the following conclusion and recommendations.

- Doing nothing would reduce reliable service in the northeast Georgia, increase the potential for wide-area blackouts in northeast Georgia under contingency situations and result in numerous violations of transmission planning guidelines of GTC, the ITS, SERC and NERC.
- It is necessary to closely monitor the load growth in Atlanta and northeast Georgia as well as generation resource development in northeast Georgia.
- The load growth in northeast Georgia will soon exceed the contingency capacities of its existing key facilities, resulting in potential cascading outages and blackouts.
- The Rockville area is a good source to originate a 500 kV transmission line.
- Since a Rockville – South Hall 500 kV line would be approximately 80 miles long, a 500 kV line from Rockville to just an intermediate point (about 40 miles) could be constructed sooner and would be as effective as the Rockville to South Hall 500 kV line in the near-term.
- East Walton is a better location than East Social Circle (as the intermediate point) to distribute the power to northeast Georgia because it is more centrally located to the existing area load centers.
- Longer-term analysis indicates a need to eventually construct a 500 kV line from East Walton to the South Hall 500/230 kV substation in order to reliably serve northeast Georgia under contingency situations (e.g., outage of Rockville - East Walton 500 kV line).
- The Rockville - East Walton 500 kV line improves voltage stability and FIDVR issues.
- The East Walton – South Hall 500 kV Line could be constructed as needed.
- Generation Scenarios 1 & 1A: new high voltage facilities are required after 2014.
- Generation Scenario 2: new high voltage facilities are required by 2011.
- Generation Scenario 3: new high voltage facilities are required by 2014.
- Alternative V (East Walton 500/230 kV Plan) is the best option to resolve the projected service issues in northeast Georgia.

Recommendations:

The ITS Northeast Georgia Long Lead - Time Transmission Planning Work Group (LTWG) recommends and the Georgia ITS agrees that the East Walton 500/230 kV Plan (Alternative V) should be implemented. Acquisition of transmission line ROW and property for substation sites should be timed to support potential in-service dates of 2011 for the various projects. However, construction of transmission facilities can be delayed to 2014 if at least 1200 MW of base load generation is placed in-service in northeast Georgia by 2011. Table A tabulates all of the East Walton 500/230 kV Plan elements (facility, estimated cost, and project sponsor).

Appendix
(Supporting Documents)

Figure 1: Power Flows in northeast Georgia

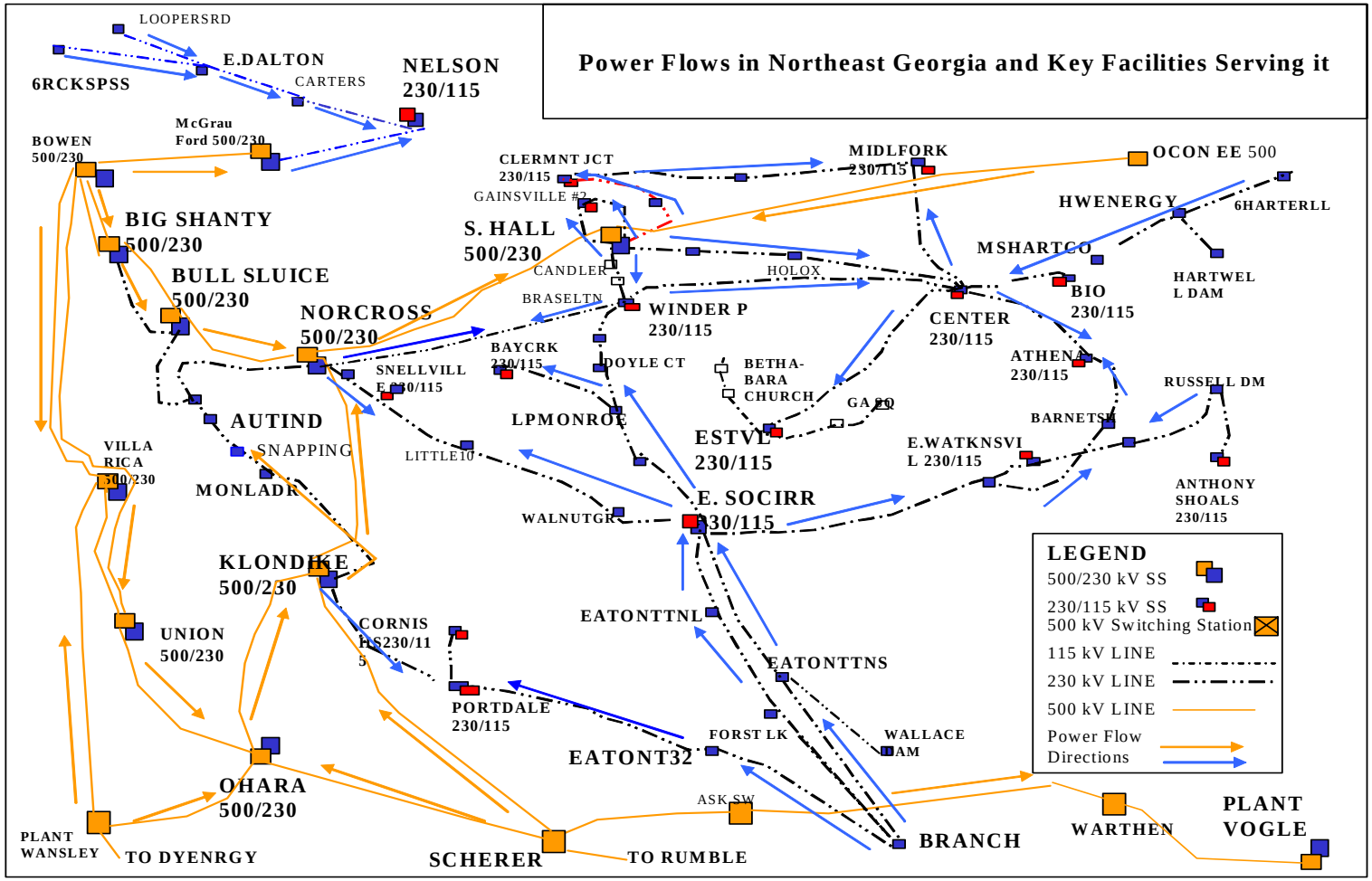


Figure 2: Load plus Loss, Generation, and Import

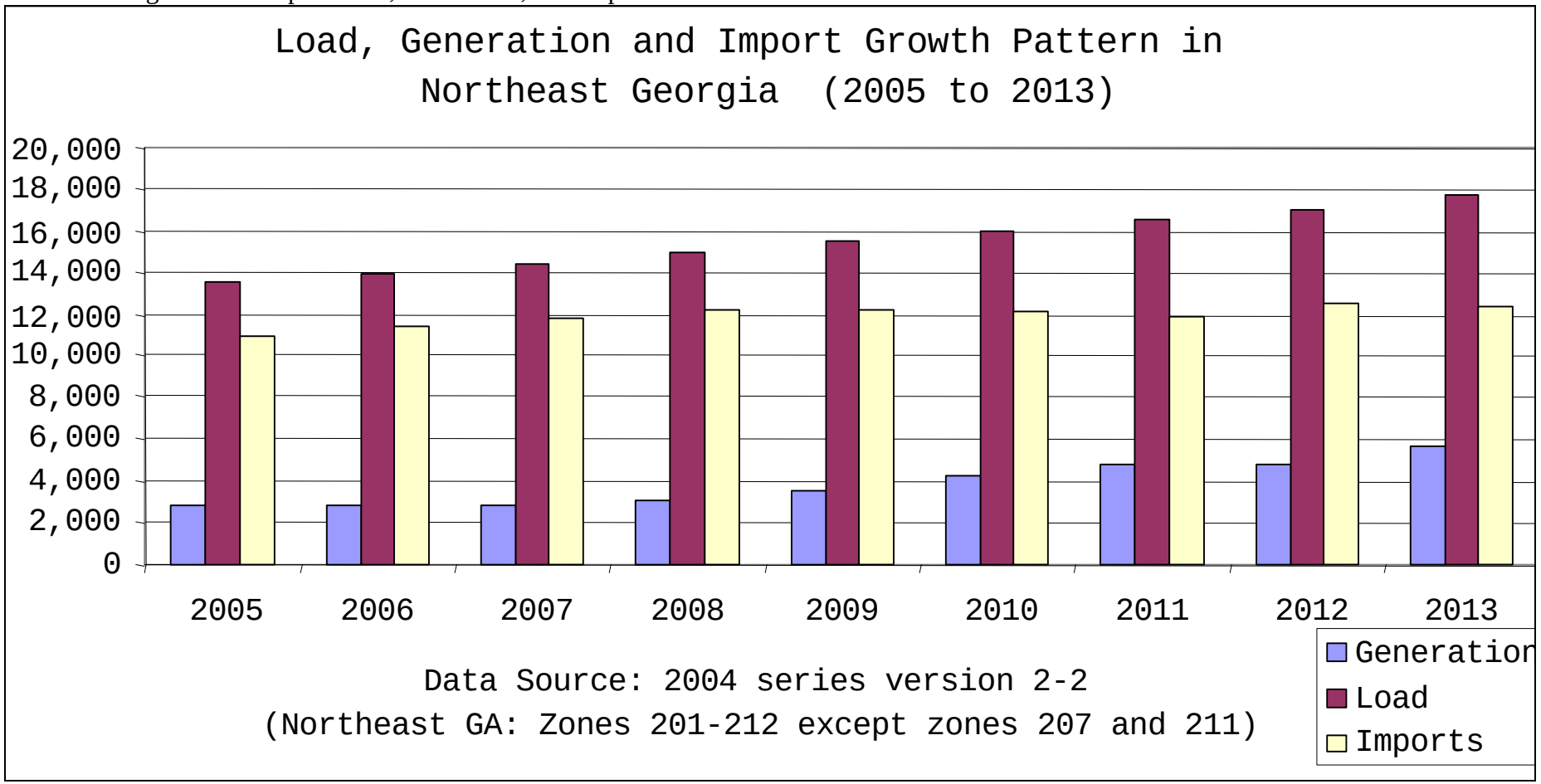


Figure 3: Real and Reactive Power Losses

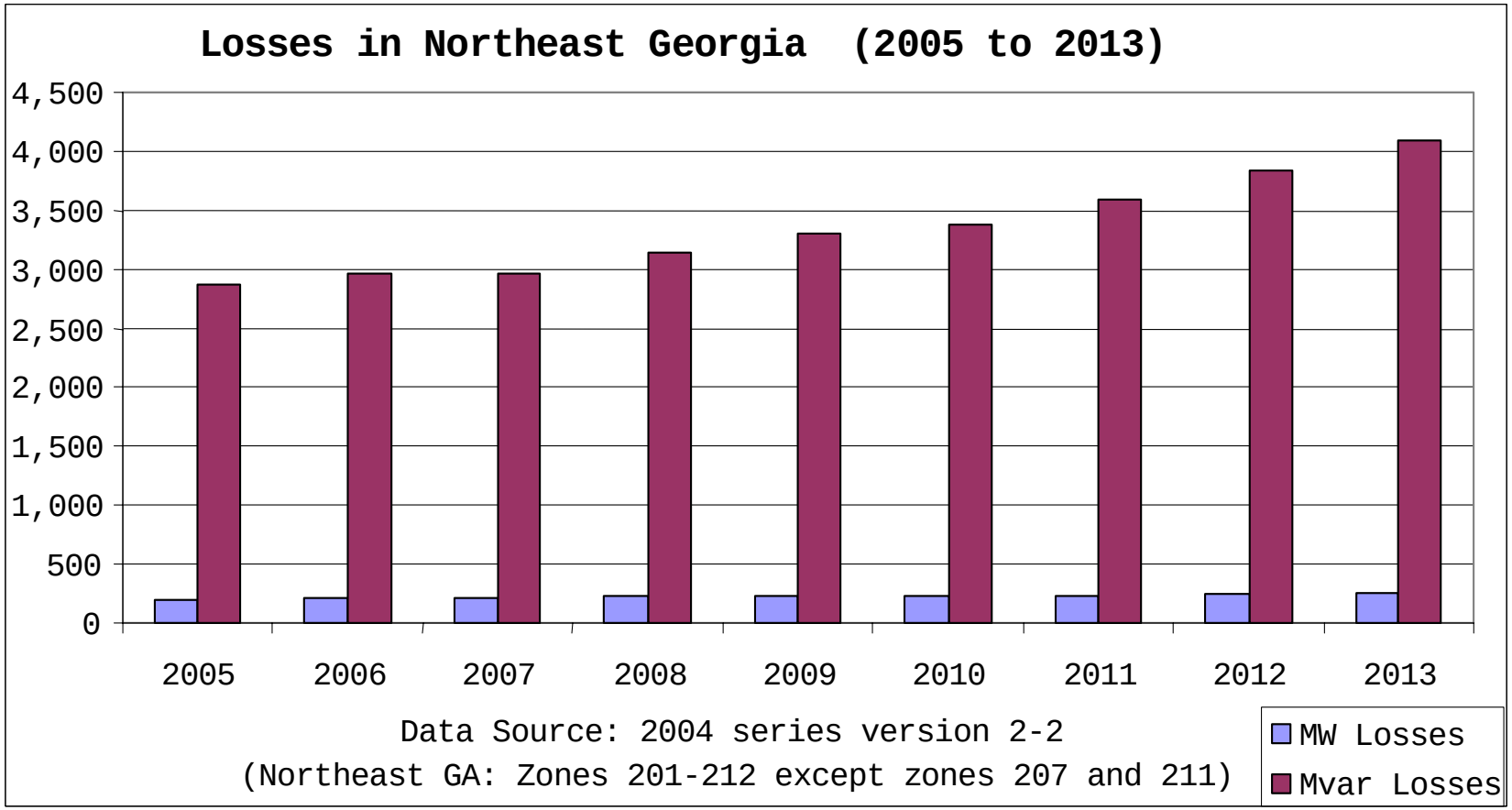


Figure 4: Tested Generation Scenarios

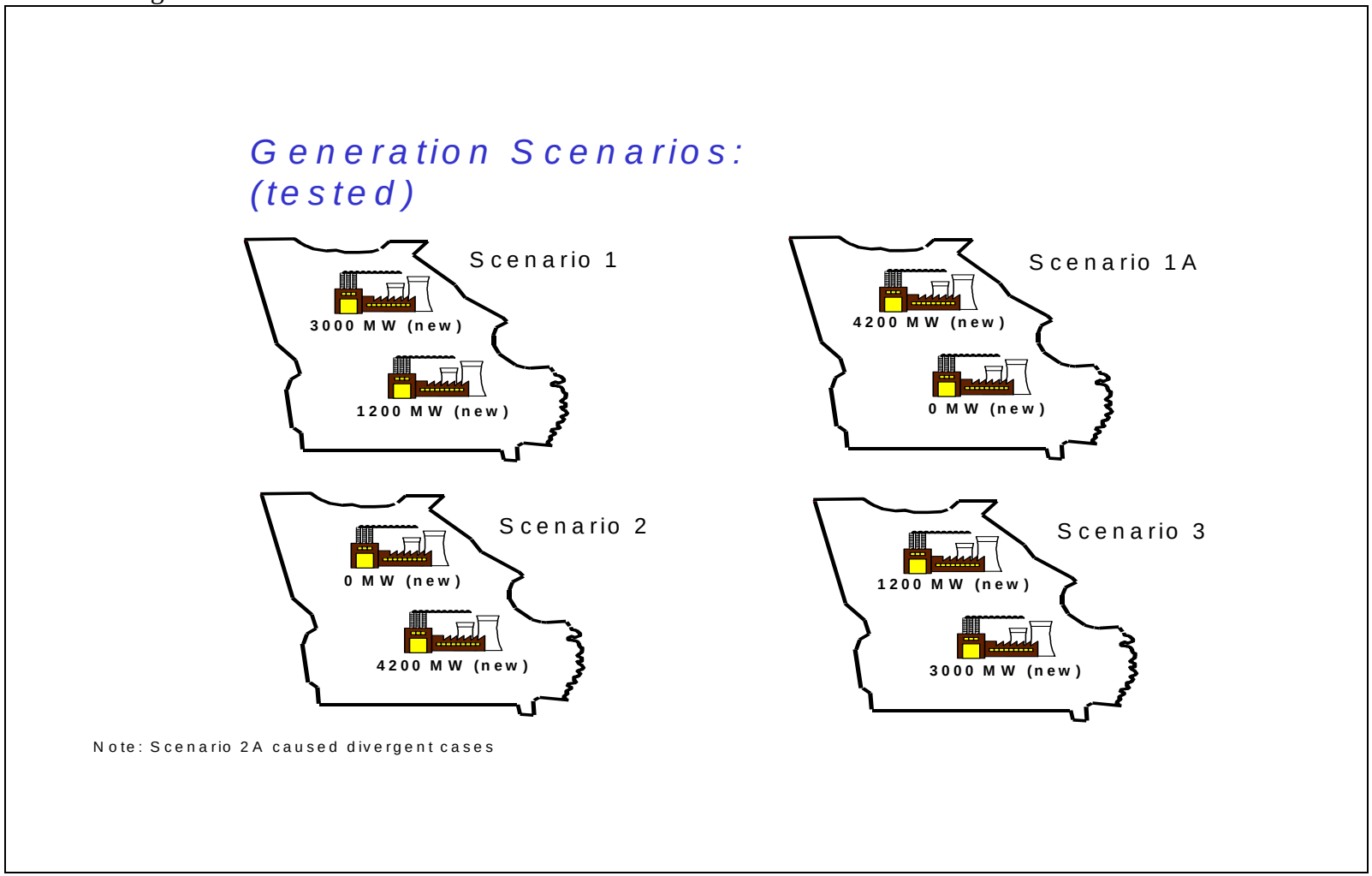


Figure 5: Relative Loadings

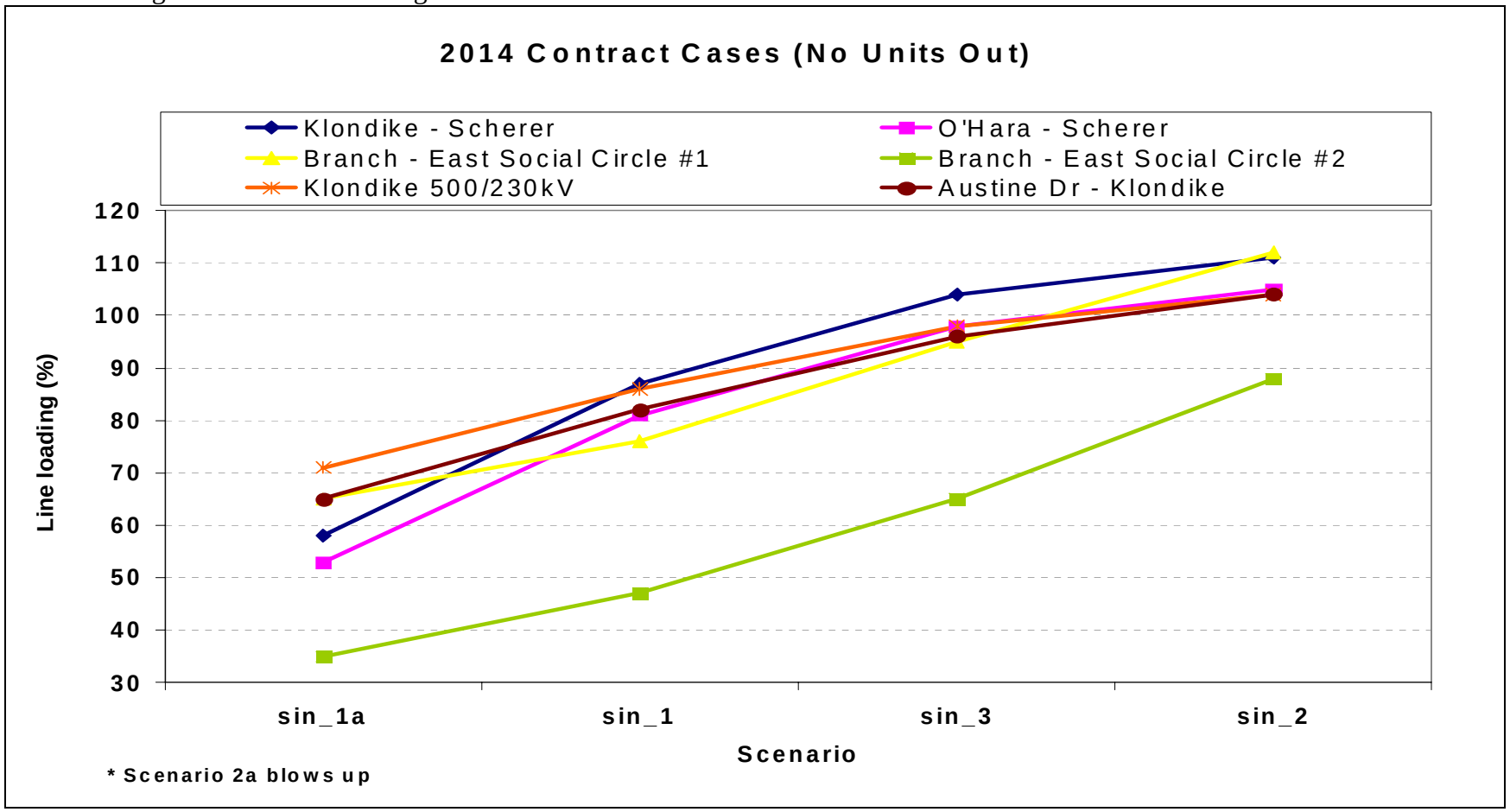


Figure 6: Tested 500 kV Alternatives

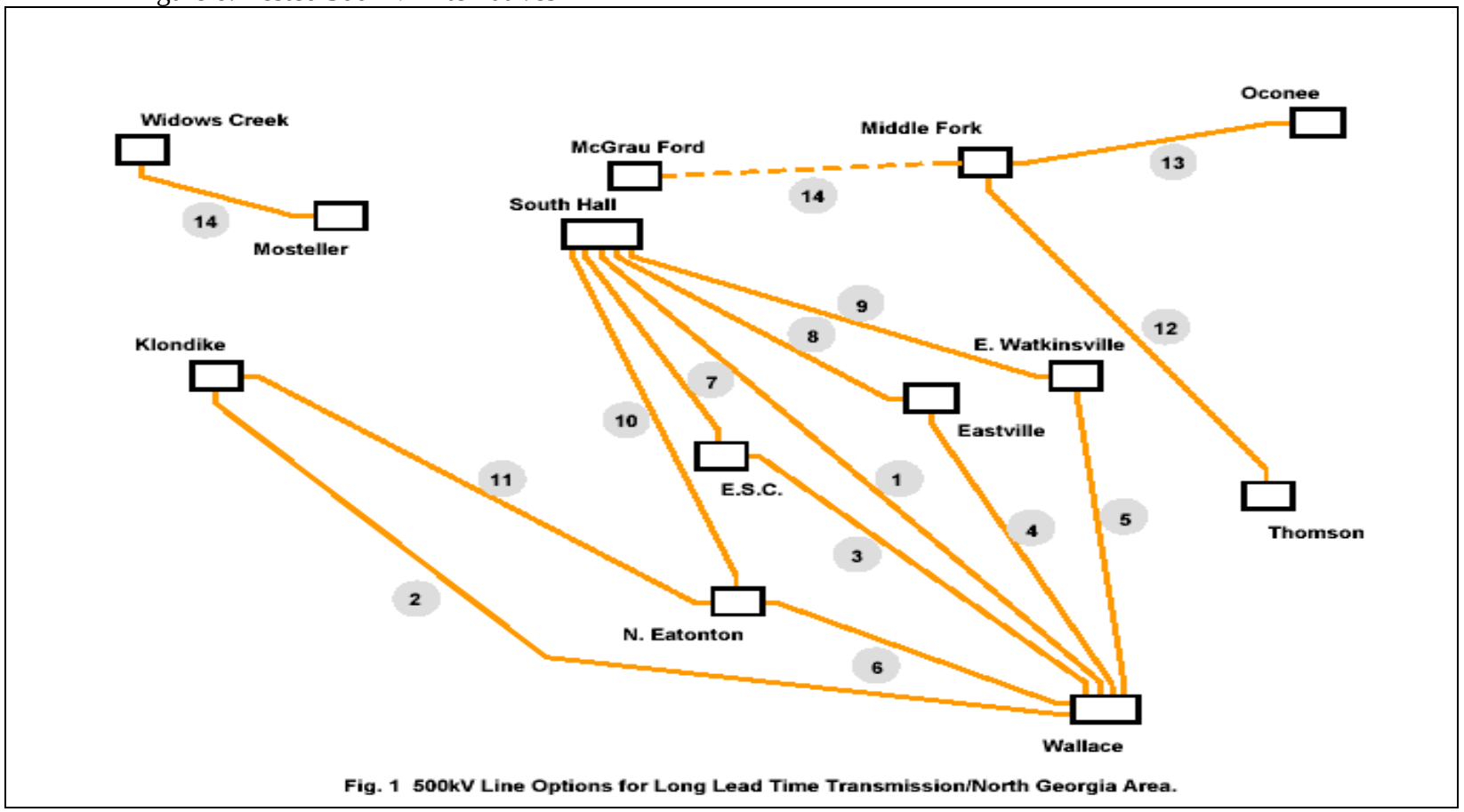
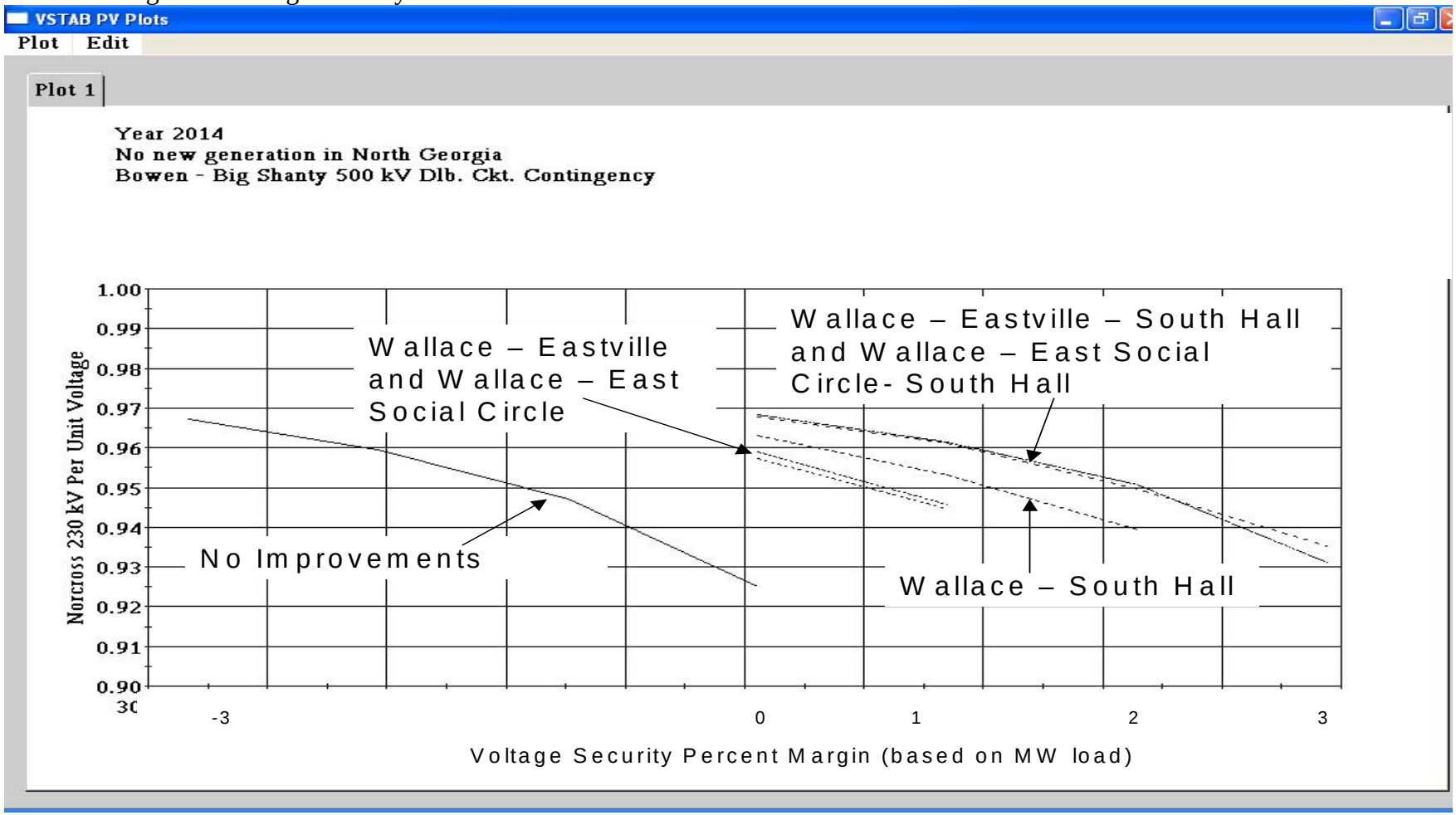


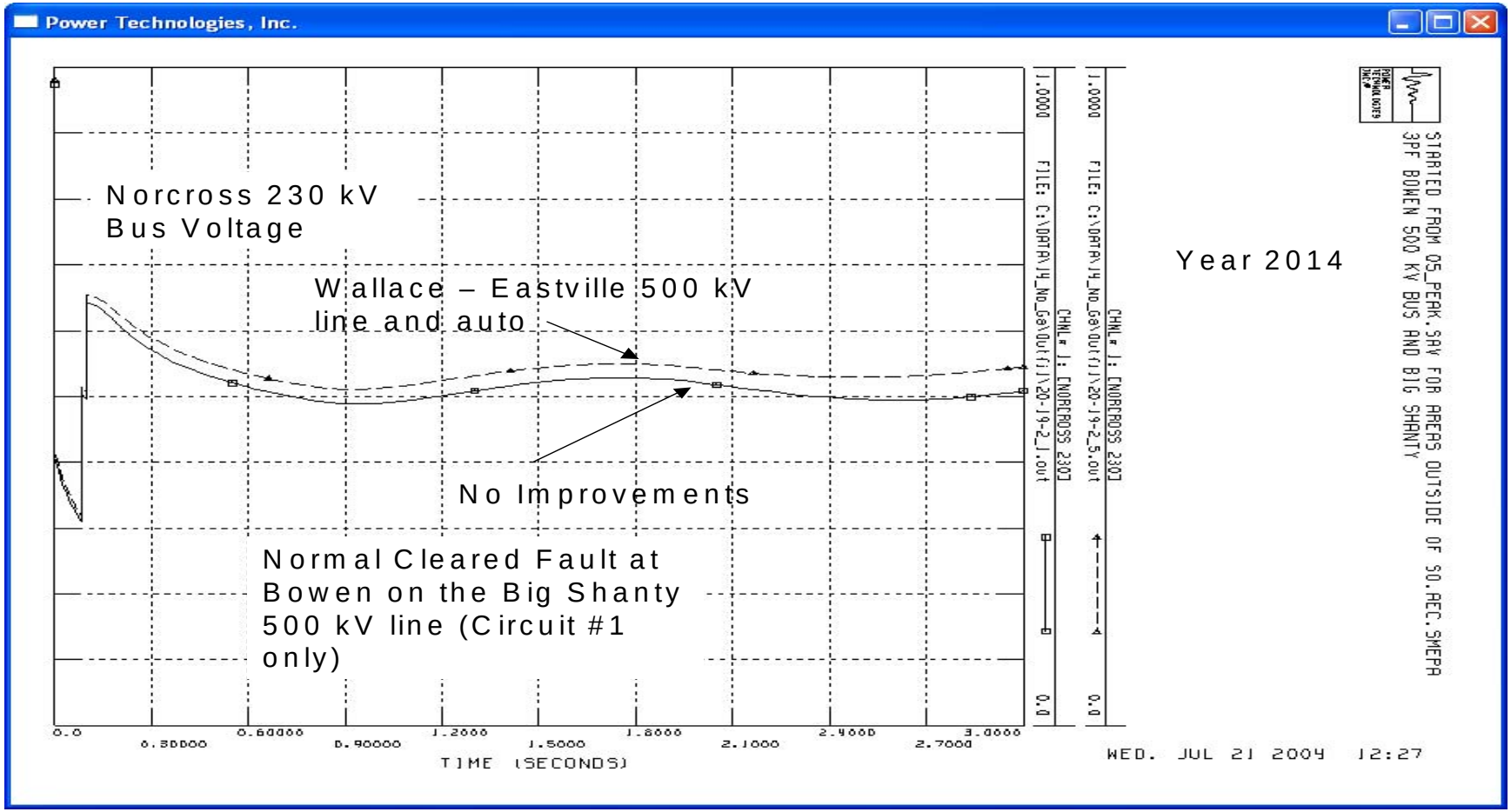
Fig. 1 500kV Line Options for Long Lead Time Transmission/North Georgia Area.

Figure 7: Voltage Stability



Note: Rockville is the new name for the Wallace 500 kV Switching Station
East Walton is the new name for the Eastville 500/230 kV Substation

Figure 8: FIDVR Benefits



Note: Rockville is the new name for the Wallace 500 kV Switching Station
East Walton is the new name for the Eastville 500/230 kV Substation

Table 1: Generation Assumptions (2014)

2014 Base Case:

Southern Control Area (SCA Summer Peak Load) = 56,471 MW

New Generation	MW	Year
Jackson County	620	2009
OPC Rumble Rd	570	2009
MEAG Walker Park	145	2009
Plant McDonough	620	2010
OPC Rumble Rd	570	2011
Plant McDonough	620	2011
OPC Rumble Rd	570	2012
MEAG Walker Park	145	2012
South Hall	620	2013
South Hall	620	2014
GTC Hart County	660	2014

Table 2: Relative Loadings

Table 2: Relative Loading Impact on Existing Key Facilities Due to Generation Scenarios (2014)

#	Monitored (Selected) Critical Facilities	Generation Scenario-1		Generation Scenario-2		Generation Scenario-3		Contingency
		C*	S*	C	S	C	S	
		C = Summer Peak and S = Summer Shoulder (Load levels)						
	500 kV Lines (% loading of Rate B)							
1	KLONDIKE- NORCROSS 1	89.3	**90.7**	**114**	**120**	**104.9**	**109.6**	KLONDIKE 500/230
2	KLONDIKE - OHARA 1	77.1	76.5	**96.2**	**100.8**	89.3	92.7	KLONDIKE - SCHERER5001
3	KLONDIKE - SCHERER 1	87.1	**90.5**	**110**	**113.9**	**104.3**	**106**	OHARA - SHERER 500 1
4	BULLSLUI - BIG SHANTY 1	82.2	74.9	**98.7**	**100.9**	92.3	93.3	KLONDIKE- NORCROSS 500 1
5	OHARA - SCHERER 1	81.5	85	**104.6**	**107**	**98.2**	**99.5**	KLONDIKE - SCHERER 500 1
	230 kV Lines (% loading of Rate B							
1	AUSTIND6 - SNAPFING 1	81.8	82.4	**104.3**	**104.8**	96.1	95.6	KLONDIKE - NORCROSS 500 1
2	SNAPFING - MINOLA DR 1	83.1	83	**103.6**	**103.4**	96.9	95.5	KLONDIKE - NORCROSS 500 1
3	MINOLA DR - KLONDIKE 1	85.8	84.5	**103.7**	**102.4**	**98.7**	96.1	KLONDIKE - NORCROSS 500 1
4	E SOCCIR - EATONTNS 1	74.5	57.7	**110**	**106.2**	93.2	89.1	BRANCH - FORESTLK 230 1
5	E SOCCIR - EATONTNL 1	63.6	55.1	**99**	**103.6**	82.2	86.5	E SOCCIR-EATONTNS 230 1
6	BRANCH - ETONTNS 1	52.5	57.7	66.3	**106.2**	54.1	89.1	BRANCH - FORESTLK 230 1
7	BRANCH - FORESTLK 1	69.4	60.6	**104.9**	**109.1**	86.1	90.1	E SOCCIR-EATONTNS 230 1
8	BRANCH - EATONT32 1	89.6	82.3	91.8	86.2	**105.4**	97	KLONDIKE - SCHERER 500 1
9	EATONTNL - FORESTLK 1	67.4	58.7	**102.9**	**107.2**	86.1	90.1	E SOCCIR-EATONTNS 230 1
10	E DALTON - 6RCKSPSS 1	66.4	82	76.7	**106.5**	73.3	**103**	MOSTELLER - DENA DAL 500 1
11	HWENERGY - MSHARTCO 1	73.2	50.7	**104.5**	94.4	79.7	68.1	SHALL5 - OCONEE 500 1
	500/230 kV Transformers (% loading of Rate B							
1	KLONDIKE 1	87.8	86	**103.8**	**106.1**	**98.3**	**100**	KLONDIKE - NORCROSS 500 1

Table 3: Screening Result of Alternatives

Long Lead Time Transmission/North Georgia Area (2014)

Overloaded line	BC %	I p.u.	IIa p.u.	IIb p.u.	III p.u	V p.u.	XV p.u.
500/230 kV							
13 BONAIRE 500 150 BONAIRE 230 1	116.8	0.98	0.98	0.98	0.98	0.98	0.99
5 UNIONCTY 500 26 UNIONCTY 230 1	110.3	0.96	0.84	0.97	0.94	0.96	0.99
1 KLONDIKE 500 73 KLONDIKE 230 1	105.9	0.88	0.92	0.88	0.86	0.88	0.96
19 BIG SHAN 500 189 BIG SHAN 230 1	102.5	0.97	0.96	0.95	0.97	0.98	0.99
16 OHARA 500 171 OHARA 230 1	98.8	0.97	0.85	0.97	0.94	0.96	0.99
19 BIG SHAN 500 189 BIG SHAN 230 2	98.4	0.97	0.96	0.96	0.97	0.98	0.99
20 BOWEN 500 195 BOWEN 230 1	96.8	0.98	0.98	0.99	0.98	0.97	0.98
22 VILLA RI 500 185 VILLA RI 230 1	90.9	0.98	0.94	0.98	0.97	0.98	0.99
3 NORCROSS 500 65 NORCROS6 230 2	88.3	1.04		1.10	0.93	0.96	0.98
3 NORCROSS 500 65 NORCROS6 230 1	88.3	1.04		1.10	0.93	0.96	0.98
11 SHALL5 500 2035 S.HALL 230 1							
100 E SOCCIR 230 3991 E SOCCIR 500 1							
2055 ESTVL230 230 3992 EASTVILL 500 1							
1 KLONDIKE 500 73 KLONDIKE 230 2							
500 kV							
1 KLONDIKE 500 3 NORCROSS 500 1	119.8	0.83	0.85	0.83	0.88	0.86	0.94
1 KLONDIKE 500 18 SCHERER8 500 1	115	0.77	0.79	0.75	0.79	0.79	0.95
16 OHARA 500 18 SCHERER8 500 1	106.8				0.77	0.78	0.91
22 VILLA RI 500 23 WANSLEY 500 1	104.5	0.98	0.98	0.97	0.98	0.98	0.99
4 BULLSLUI 500 19 BIG SHAN 500 1	100.8	0.84	0.89		0.92	0.90	0.96
1 KLONDIKE 500 16 OHARA 500 1	100.6	0.82			0.85	0.85	0.94
5 UNIONCTY 500 16 OHARA 500 1	95.8	0.84	0.85		0.85	0.84	0.91
16 OHARA 500 23 WANSLEY 500 1	93.5	0.99	0.98	0.98	0.99	0.99	0.99
19 BIG SHAN 500 20 BOWEN 500 2	80.6						
19 BIG SHAN 500 20 BOWEN 500 1	80.6						
20 BOWEN 500 3844 BOWEN 4 18.0 1							
20 BOWEN 500 3841 BOWEN 1 25.0 1							
20 BOWEN 500 3842 BOWEN 2 25.0 1							
20 BOWEN 500 3843 BOWEN 3 18.0 1							

Table 4: Comparison of Alternatives

Summary of 500 kV Results		
Alternative / Solution Option	**Additional Advantages**	**Disadvantages**
Option I **Rockville – South Hall 500 kV Line**		Increases loading on S. Hall 500/230kV (91%) (Re-r South Hall-Gainesville 230kV line loading (limit is j
Option II.a **Rockville – Klondike 500 kV Line**	Reduces loading on Union City 500/230kv Reduces loading on O'Hara 500/230kv Reduces loading on Norcross 500/230kV Best for Klondike – O'Hara 500kv Works for Stockbridge-Jonesboro 230kV	Loss of one Klondike 500/230kV loads the other ban Loads Austin Drive and Scottdale 230/115kV transfo Overloads Klondike-Conyers 230kV Doesn't fix Austin Drive-Klondike 230kV Overloads Bay Creek-Bold Springs 230kV Overloads Conyers - Rockdale and Conyers - Stonec Overloads Klondike-Honey Creek - Stonecrest 230k
II.b **Rockville – Norcross 500 kV Line**	Best for Bull Sluice - Big Shanty 500kV line Best for Klondike – O'Hara 500kv Works well for Austin Dr. - Klondike 230kV	Loads Norcross 500/230kV transformers Reliability issue for double circuit 500kV lines
III **Rockville - East Social Circle 500 kV Line**	Best fix for Klondike Bank loading (91%) Reduces loading on Norcross 500/230kV Reduces loading on Social Circle Eatonton and Branch - Eatonton 230kv Works for Stockbridge-Jonesboro 230kV Works well for Austin Dr. - Klondike 230kV	Need additional 230/115kV capacity at E. Social Cir Cornish mountain 230/115kV overload (re-rate bank Overloads E. Social Circle - E. Watkinsville 230kV Watkinsville with East Walton-LPM Monroe 230kV Overloads Bay Creek-Bold Springs 230kV (re-condu
Option V **Rockville – East Walton 500 kV Line**	Alleviates overloads on all key 500 kV lines and all but one 230 kV lines	Doesn't fix Austin Drive-Klondike 230kV (Need cos
Option XV **Thomson – Middlefork 500 kV Line**		Overloads Middlefork 230/115kV No improvement for area 500/230kV transformers No improvement for any 500kV line loadings Doesn't fix Austin Drive-Klondike 230kV

Table 5: Cost Analysis for Alternative I

	Cost in $Million
I. Rockville – South Hall 500kV Line	
- Rockville – South Hall 500 kV line and ROW (80 miles)	142.2
- Rockville 500 kV Switching station	15.0
- Loop Scherer - Warthen 500 kV line (into Rockville)	2.3
- South Hall 500 /230 kV substation work (includes terminate Rockville – South Hall 500 kV line)	3.45
- Replace jumpers on South Hall – Gainesville #2 230 kV line	0.05
TOTAL	**163.0**

Table 6: Cost Analysis for Alternative III.A

	Cost in $Million
III.A Rockville – East Social Circle 500 kV Line & 500/230kV transformer	
- East Social Circle 500/230 kV transformer with 500 kV and 230 kV terminations	20.7
- East Social Circle – Rockville 500 kV line and ROW (40 miles)	62.2
- Rockville 500 kV Switching station	15.0
- Scherer - Warthen 500 kV line (Loop line into Rockville and modify relaying)	2.7
- Re-conductor Bay Creek – Bold Springs 230 kV line == 5.8 miles	6.0
- Reconductor East Social Circle – Snellville 230 kV line -- 24.5 miles	28.2
- Construct East Social Circle – Cornish Mountain 230 kV line -- 10 miles	10.0
- Two 400 MVA 230/115kV transformers at East Social Circle	9.2
- Bethabara – LG&E Monroe 230 kV -- 13 miles	15.0
- LG&E Monroe 230 kV termination	0.6
- Bethabara 230 kV termination	0.6
- Cornish Mtn 230 kV termination	0.6
TOTAL	**170.8**

Table 7: Cost Analysis for Alternative V

	Cost in $Million
V. Rockville – East Walton 500 kV Line and 500/230 kV transformer	
- East Walton 500/230 kV substation and transformer with 500 kV and 230 kV terminations	25.0
- East Walton - Rockville 500 kV line and ROW (40 miles)	62.2
- Rockville 500 kV Switching station	15.0
- Scherer - Warthen 500 kV line (Loop line into Rockville and modify relaying)	2.7
- Two East Walton – Bethabara 230 kV lines and ROW -- 18 miles total	12.0
- Two Bethabara 230 kV terminations	1.2
- Bostwick 230 kV Switching station with 230 kV terminations	7.0
- East Walton – Bostwick 230 kV line and ROW -- 4 miles	5.0
- East Watkinsville – East Social Circle 230 kV Line (Loop line into Bostwick and modify relaying)	1.1
- East Walton – Monroe area (Jack's Creek) 230 kV Line and ROW -- 9 miles	8.2
- Monroe area (Jack's Creek) – Cornish Mtn 230 kV Line and ROW -- 15 miles	18.8
- Monroe area (Jack's Creek) 230 kV Switching station with 230 kV terminations	10.0
- Cornish Mtn 230 kV termination	0.60
- Re-conductor Klondike – Minola 230 kV line -- 7.1 miles	1.1
TOTAL	**169.9**