Appendix C

Collaborative Transmission Plan Major Project Descriptions

January 16, 2008

Table of Contents

Note: The estimated cost for each of the projects described in Appendix C is in nominal dollars which reflects the sum of the estimated annual cash flows over the expected development period for the specific project (typically 2 – 5 years), including direct costs, loadings and overheads; but not including AFUDC. Each year's cash flow is escalated to the year of the expenditures. The sum of the expected cash flows is the estimated cost.

Project ID and Name: **0001 - Marion-Whiteville 230 kV Line, Operate at 115 kV**

Project Description
This project consists of constructing approximately 21 miles of new 230 kV line and tied to an existing line currently operated at 115 kV but built for 230 kV. The line will be initially operated at 115 kV until 6/1/2009 when it will be then operated at 230 kV.

Status	In-service on 6/7/2007
Transmission Owner	Progress
Planned In-Service Date	6/1/2007
Estimated Time to Complete	N/A
Estimated Cost	$10 M

Narrative Description of the Need for this Project
With a Brunswick unit down an outage of the Cumberland terminal of the Cumberland-Whiteville 230 kV line will cause the Marion-Whiteville 115 kV line to exceed its rating.

Other Transmission Solutions Considered
Rebuild, reconductor existing line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0002 - Lee Sub-Wommack 230 kV South Line

Project Description
This project consists of re-conductring approximately 30 miles of the existing Lee-Wommack 230 kV South line.

Status	Underway: Project is on schedule. Construction is approximately 60% complete.
Transmission Owner	Progress
Planned In-Service Date	6/1/2008
Estimated Time to Complete	0.5 years
Estimated Cost	$13 M

Narrative Description of the Need for this Project
With a Brunswick unit down an outage of the Lee-Wommack 230 kV North line will cause the Lee-Wommack 230 kV South line to exceed its rating.

Other Transmission Solutions Considered
Construct new line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0003 - Durham 500 kV Substation

Project Description
This project consists of establishing 500 kV at the existing Durham 230 kV Substation by looping in the Mayo-Wake 500 kV line and installing 1-500/230 kV transformer bank at Durham.

Status	Underway: Project is on schedule. Substation construction and relay construction are underway.
Transmission Owner	Progress
Planned In-Service Date	6/1/2008
Estimated Time to Complete	0.5 years
Estimated Cost	$29 M

Narrative Description of the Need for this Project
With the Harris unit down an outage of either of the Wake 500/230 kV banks at Wake 500 kV Substation will cause the remaining bank to exceed its rating.

Other Transmission Solutions Considered
Replace Wake 500/230 kV banks with higher rated banks.

Why this Project was Selected as the Preferred Solution
Cost, feasibility and improved area voltage.

Project ID and Name: 0004 - Clinton-Lee 230 kV Line

Project Description
This project consists of construction 29 miles of new 230 kV line between Lee and Clinton.

Status	Underway: Contingency loading in recent studies has been lower than in previous studies allowing for this project to be delayed one year to 2010.
Transmission Owner	Progress
Planned In-Service Date	6/1/2010
Estimated Time to Complete	2.5 years
Estimated Cost	$21 M

Narrative Description of the Need for this Project
With an outage of the Erwin terminal of the Erwin-Clinton 230 kV line or an outage of the Clinton terminal of the Clinton-Wallace 230 kV line will cause several area 115 kV line to exceed their rating.

Other Transmission Solutions Considered
Rebuild, reconductor existing line.

Why this Project was Selected as the Preferred Solution
Cost, feasibility and improved area voltage.

Project ID and Name: 0005 - Rockingham-West End 230 kV Line, Wadesboro Bowman School Tap

Project Description
This project consist of construction 12 miles of new 230 kV to establish a new tap off of the Rockingham-West End 230 kV Line to serve two 115 kV deliveries to be converted to 230 kV. Also a section of the Rockingham-West End 230 kV Line will be uprated to its full conductor rating between Rockingham and the new tap.

Status	Underway: Project is on schedule. Right-of-way acquisition is complete. Clearing has begun.
Transmission Owner	Progress
Planned In-Service Date	6/1/2009
Estimated Time to Complete	1.5 years
Estimated Cost	$11 M

Narrative Description of the Need for this Project
With the Harris unit down an outage of the Rockingham terminal of the Rockingham-Biscoe 230 kV line will cause the Rockingham-Blewett-Tillery 115 kV corridor to exceed its rating.

Other Transmission Solutions Considered
Rebuild, reconductor existing line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0007 - Richmond 500 kV Series Reactor

Project Description
This project consists of installing a 500 kV series reactor at the Richmond 500 kV Substation. The reactor will be in series with the Richmond-Newport 500 kV line.

Status	Underway: Conceptual design is nearing completion.
Transmission Owner	Progress
Planned In-Service Date	12/1/2009
Estimated Time to Complete	1.5 years
Estimated Cost	$10 M

Narrative Description of the Need for this Project
This project is needed to permit closing of the Newport-Richmond 500 kV line at times of high import flow mitigating issues with large post contingency phase angle.

Other Transmission Solutions Considered
Intermediate 500 kV substation. Additional 500 kV transmission line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0008 - Greenville-Kinston DuPont 230 kV Line

Project Description
This project consists of constructing 30 miles of 230 kV line between Greenville and Kinston DuPont 230 kV Substations.

Status	Underway: All right-of-way has been acquired.
Transmission Owner	Progress
Planned In-Service Date	6/1/2011
Estimated Time to Complete	3.5 years
Estimated Cost	$19 M

Narrative Description of the Need for this Project
With a Brunswick unit down an outage of the Wilson-Greenville 230 kV line will cause the Greenville-(DVP) Everetts 230 kV line to exceed its rating.

Other Transmission Solutions Considered
Rebuild, reconductor existing line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0010 - Rockingham-West End 230 kV East Line

Project Description
This project consists of constructing 38 miles of new 230 kV line between Rockingham and West End 230 kV Substations.

Status	Underway: Project is on schedule. Public communication is underway. Route has been selected and announced. Surveying has begun.
Transmission Owner	Progress
Planned In-Service Date	6/1/2011
Estimated Time to Complete	3.5 years
Estimated Cost	$32 M

Narrative Description of the Need for this Project
With the Harris unit down an outage of the Richmond-Cumberland 500 kV line will cause the existing Rockingham-West End 230 kV line to exceed its rating.

Other Transmission Solutions Considered
Rebuild, reconductor existing line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: **0010A - Harris-RTP 230 kV Line**

Project Description
Construct the Harris-RTP 230 kV Line. Develop RTP 230 kV Switching Substation at or near the existing Amberly 230 kV tap on the Cary Regency Park-Durham 230 kV line. Construct 7 miles of new 230 kV line between Amberly 230/23 kV and Green Level 115/23 kV using 6-1590 MCM ACSR and convert Green Level 115 kV Substation to 230/23 kV. Convert the existing Apex US 1– Green Level 115 kV Feeder (approximately 7 miles) to 230 kV using 6-1590 MCM ACSR and remove the termination at Apex US #1. From the termination point removed at Apex US #1, continue with 4 miles of new 230 kV construction to the Harris 230 kV Switchyard using 6-1590 MCM ACSR.

Status	Underway: Project plan under development.
Transmission Owner	Progress
Planned In-Service Date	6/1/2011
Estimated Time to Complete	3.5
Estimated Cost	$46 M

Narrative Description of the Need for this Project
This project is needed to serve rapidly growing load in the western Wake County area.

Other Transmission Solutions Considered
Construct Harris-Durham 230 kV line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: **0010B - Asheboro (PEC)-Pleasant Garden (DE) 230kV Line, Replace Asheboro 230/115 kV Transformers**

Project Description
Construct the (PEC)Asheboro-(DE)Pleasant Garden 230 kV tie line between Progress Energy and Duke Energy. Construct 20 miles of new 230 kV line using 6-1590 MCM ACSR. At Asheboro 230 kV Substation replace 2-200MVA 230/115 kV transformers with 2-300 MVA 230/115 kV transformers.

Status	Underway: Memorandum of understanding is in place.
Transmission Owner	Progress & Duke
Planned In-Service Date	6/1/2011
Estimated Time to Complete	3.5 years
Estimated Cost	$40 M

Narrative Description of the Need for this Project
This project is needed to address contingency voltage issues in the Asheboro area, relieve loadings on the Biscoe/Asheboro and Tillery/Badin corridors and loading in the Raleigh/Durham area lines.

Other Transmission Solutions Considered
Construct Parkwood-Durham 500 kV line, Harris-Durham 230 kV line, Cape Fear-Siler City 230 kV line, and/or Buck-Asheboro 230 kV line.

Why this Project was Selected as the Preferred Solution
Defers the Cape Fear-Siler City 230 kV line beyond the 10 year planning horizon. Addresses several transmission issues including some that the Cape Fear-Siler City 230 kV line did not address. Cost same as Cape Fear-Siler City 230 kV line.

Project ID and Name: 0011 - Asheville-Enka

Project Description
First phase of project will convert the Asheville-Enka 115 kV West Line to 230 kV operation and establish Enka 230kV Substation by installing 1-300MVA, 230/115kV transformer at the Enka 115kV Switching Station site. The second phase of the project consists of constructing approximately 10 miles of 3-1590 MCM ACSR for 115 kV operation between Asheville Plant and Enka 230 kV Substations.

Status	Planned: Project is on schedule. No activities taking place at this time.
Transmission Owner	Progress
Planned In-Service Date	12/1/2010, conversion of existing line 12/1/2012, construction of new line
Estimated Time to Complete	3 years for conversion, 5 years for new line
Estimated Cost	$28 M

Narrative Description of the Need for this Project
With an Asheville unit down an outage of one 230/115 kV transformer at Asheville 230 kV will cause the remaining transformer to exceed its rating.

Other Transmission Solutions Considered
Replace Asheville 230/115 kV transformers with higher rated transformers.

Why this Project was Selected as the Preferred Solution
More effective solution.

Project ID and Name: 0013 - Antioch 500/230 kV Transformers

Project Description
The project consists of replacing the existing 840 MVA 500/230 kV transformers with 1680 MVA transformers.

Status	Planned: No activities taking place at this time. Recent studies confirm that the in-service date of 2013 remains accurate. Timing of the need for the upgrade will continue to be monitored and action taken considering appropriate lead time required.
Transmission Owner	Duke
Planned In-Service Date	2013
Estimated Time to Complete	5.0 years
Estimated Cost	$51.9 M for replacement

Narrative Description of the Need for this Project
The Antioch banks will achieve 100% of their present rating (840 MVA) in the 2011-2015 timeframe. Loss of the parallel bank when there is a generation deficiency in Duke's northern region causes the highest loading. North to south transfers into the Duke control area increase bank loading and further decrease import capability. Operating experience indicates a potential earlier need for additional capacity.

Other Transmission Solutions Considered
Perform testing/analysis to eliminate the stray flux heating concern and allow re-rating of the banks closer to their original design. Based on outcome of testing/analysis, replace the banks with higher capacity banks, if necessary.

Why this Project was Selected as the Preferred Solution
The banks have an ~ 7% Outage Transfer Distribution Factor ("OTDF"). For each incremental increase in the rating by 7 MVA, there will be an increase in transfer capability of ~ 100 MW. Evaluation of the stray flux issue may lead to a significant delay in when replacement of the banks may be necessary.

Project ID and Name: 0016 - Wake 500/230 kV Bank #3

Project Description
This project consists of installing a third 500/230 kV 1000MVA transformer bank at Wake 500 kV Substation.

Status	Planned: No activities taking place at this time.
Transmission Owner	Progress
Planned In-Service Date	6/1/2013
Estimated Time to Complete	4.0 years
Estimated Cost	$23 M

Narrative Description of the Need for this Project
With the Harris unit down an outage of one of the existing two Wake 500/230 kV banks causes the remaining bank to exceed its rating.

Other Transmission Solutions Considered
Replace existing two Wake 500/230 kV banks with higher rated banks.

Why this Project was Selected as the Preferred Solution
Cost, feasibility and provides benefits to transfer capability.

Project ID and Name: 0017 - Durham-Falls 230 kV Line

Project Description
This project consists of removing the Raleigh Honeycutt 230 kV Tap Line from the Method-DPC East Durham 230 kV Line and completing the Durham-Falls 230 kV Line.

Status	Underway: Project is 60% complete.
Transmission Owner	Progress
Planned In-Service Date	6/1/2008
Estimated Time to Complete	0.5 years
Estimated Cost	$10 M

Narrative Description of the Need for this Project
Once the Mayo Plant-Wake 500kV line is looped into the Durham Switching Station, a loss of the Durham terminal of the Durham-Method 230kV line will cause the Cary Regency Park-Durham 230kV line to load to capacity under times of high import. This project will relieve this situation.

Other Transmission Solutions Considered
Construct 2nd Durham-Method 230kV Line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0018 - Rockingham-Lilesville 230 kV Line

Project Description
Construct approximately 14 miles of 3-1590 MCM ACSR between Rockingham 230kV Sub and Lilesville 230kV Sub.

Status	Underway: Route selection is in progress.
Transmission Owner	Progress
Planned In-Service Date	6/1/2011
Estimated Time to Complete	3.5 years
Estimated Cost	$16 M

Narrative Description of the Need for this Project
By the summer of 2011, with the Harris unit down, the outage of the Richmond-Newport 500kV Line will cause an overload on the Rockingham-Lilesville Black and White 230kV Lines.

Other Transmission Solutions Considered
Reconductor the Rockingham-Lilesville Black and White 230kV Lines.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0019 - Cape Fear-West End 230 kV Line, Series Reactor

Project Description
Install 230kV series reactor at or near the West End terminal of the Cape Fear Plant-West End 230kV Line.

Status	Planned: No activities taking place at this time.
Transmission Owner	Progress
Planned In-Service Date	6/1/2016
Estimated Time to Complete	4 years
Estimated Cost	$12 M

Narrative Description of the Need for this Project
By the summer of 2016, with the Harris unit down, the loss of the Richmond-Cumberland 500kV Line will cause the Cape Fear-West End 230kV Line to overload.

Other Transmission Solutions Considered
Reconductor the Cape Fear-West End 230kV Line.

Why this Project was Selected as the Preferred Solution
Cost and feasibility.

Project ID and Name: 0020 - Fisher 230 kV Lines

Project Description
The project consists of reconductoring 18 miles of the existing 954 ACSR conductor with bundled 954 ACSR conductor.

Status	Planned: No activities taking place at this time. Recent internal studies indicate an in-service date of 2018. Timing of the need for the upgrade will continue to be monitored and action taken considering appropriate lead time required.
Transmission Owner	Duke
Planned In-Service Date	2016
Estimated Time to Complete	3 years
Estimated Cost	$28.5 M

Narrative Description of the Need for this Project
Flow on the 230 kV backbone through the south and central region of the Duke system continues to increase due to load growth and loop flow impacts from SOCO. Loss of one circuit of this double circuit line causes the remaining line to overload. The line is sensitive to south to north transfers. Increased import from SOCO increases loading on the Fisher lines and can accelerate the need for upgrade. Duke will continue to monitor the timing of this upgrade.

Other Transmission Solutions Considered
Reactors.

Why this Project was Selected as the Preferred Solution
Duke does not routinely use reactors to redistribute flows on the system. Reactors would increase losses and cause increased flow on the underlying 100 kV system. Bundling of the line will alleviate the loading concern and reduce system losses.