Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AB2-022

Elizabeth City 34.5kV 13MW Capacity /20MW Energy

August / 2016

Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company (VEPCO).

Preface

The intent of the Feasibility Study is to determine a plan, with high level estimated cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the IC. The IC may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the IC may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the Impact Study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The IC is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by ITO, the costs may be included in the study.

General

The IC has proposed a solar generating facility located in Camden County, NC. The installed facilities will have a total capability of 20 MW with 13 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is 10/31/2017. **This study does not imply an ITO commitment to this in-service date.**

Point of Interconnection

AB2-022 will interconnect with the ITO distribution system on Elizabeth City 34.5kV circuit #410.

Cost Summary

The AB2-022 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrades	$0
Non Direct Connection Network Upgrades	$tbd
Total Costs	**$0**

In addition, the AB2-022 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	$58,155,000
Previously Identified Upgrades	$0
Total Costs	**$58,155,000**

Cost allocations for these upgrades will be provided in the System Impact Study Report.

Note: Queue project AB2-022 is not expected to have cost responsibility for this network upgrade due to cost allocation rules.

Transmission Owner Scope of Work

There is an existing three phase 13.2 kV distribution circuit at the IC's site and the requested POI. The existing 13.2 kV distribution circuit is served from an 84 MVA, 230/34.5 kV transformer in Elizabeth City Substation. AB2-022 will benefit from the distribution circuit upgrades if the previous state queue project moves forward. This would convert the existing 13.2 kV existing circuit into a 34.5kV circuit after the upgrades were installed for the state project.

Attachment facilities and local upgrades (if required) along with terms and conditions to interconnect AB2-022 will be specified in a separate two party Interconnection Agreement (IA) between ITO and the IC as this project is considered FERC non-jurisdictional per the PJM Open Access Transmission Tariff (OATT).

Attachment Facilities

To provide the interconnection the ITO will install approximately 300 feet of overhead three phase primary voltage conductors will be installed to provide an interconnection to the existing primary voltage conductors. A pole mounted electronic recloser, pole mounted primary bi-directional metering equipment, a power quality monitoring relay and a set of disconnects to provide an isolation point will also be provided. The estimated cost of these attachment facilities is $300,000. These costs do not include CIAC Tax Gross-up. The single line is shown below in Attachment 1.

Local Upgrades Cost Estimate

To accept the requested 20 MW there will be approximately 2.5 miles of circuit conversion and reconductoring to connect the previous state project. A standard DG Panel and transfer trip protection scheme will be required for this interconnection

- Standard substation upgrades including but not limited to protection work, SCADA monitoring adjustments and adjusting regulators for reverse power flow will have an anticipated cost of ($107,000).
- A Transfer Trip protection scheme will be required on the Automatic Line recloser to be located at the Elizabeth City POI and at the Elizabeth City Substation Circuit Breaker. ($300,000)

The estimated cost of these required System Upgrades to accommodate the 20 MW request is $707,000. The estimated time to interconnect the IC with the required System Upgrades is 9-12 months.

Non-Direct Connection Cost Estimate

Remote Terminal Work: During the Facilities Study, ITO's System Protection Engineering Department will review transmission line protection as well as anti-islanding required to accommodate the new generation and interconnection substation. System Protection Engineering will determine the minimal acceptable protection requirements to reliably interconnect the proposed generating facility with the transmission system. The review is based on maintaining system reliability by reviewing ITO's protection requirements with the known transmission system configuration which includes generating facilities in the area. This review

may determine that transmission line protection and communication upgrades are required at remote substations.

Cost responsibility for System Upgrades

- Reinforcement: Rebuild of the Elizabeth City-Shawboro 230kV line. It is estimated to take 44-48 months to complete and it is estimated to cost $15,405,000 to resolve this deficiency.

- Reinforcement: Rebuild of the Sunbury-Suffolk 230kV line. It is estimated to take 44-48 months to complete and it is estimated to cost $28,065,000 to resolve this deficiency.

- Reinforcement: Rebuild of the W1-029-Sunbury 230kV line. It is estimated to take 44-48 months to complete and it is estimated to cost $14,685,000 to resolve this deficiency.

Interconnection Customer Requirements

ITO's Facility Connection Requirements as posted on PJM's website
http://www.pjm.com/~/media/planning/plan-standards/private-dominion/facility-connection-requirements1.ashx

The ITO's preferred transformer configuration is wye grounded (primary)/delta (secondary) with provisions for external resistance grounding of the primary with the level of resistance to be determined by the IC and approved by the ITO. If a wye (primary)/wye (secondary) transformer configuration is utilized the IC will apply a ground bank configured transformer [zig-zag or wye (interconnection side) – delta (floated)] at (near) the point where the generation is connected. Additionally, the ITO will require the IC to provide specific inverter information including the model and parameter data required for a short-circuit analysis including Positive, Negative and Zero Sequence Resistance and Reactance for the initial 4 to 6 cycles.

Voltage Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for voltages and times as specified for the Eastern Interconnection in Attachment 1 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low voltage conditions, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Frequency Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for frequencies and times as specified in Attachment 2 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low frequency condition, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Reactive Power - The Generation Interconnection Customer shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging measured at the generator's terminals.

Revenue Metering and SCADA Requirements

PJM Requirements

The IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

Network Impacts

The Queue Project AB2-022 was evaluated as a 20.0 MW (Capacity 13.0 MW) injection at the Elizabeth City 230kV substation in the DVP area. Project AB2-022 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB2-022 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
246T247_A	CONTINGENCY '246T247_A' /* 246T247 @ SUFFOLK OPEN BRANCH FROM BUS 314537 TO BUS 921571 CKT 1 /* SUFFOLK - AA1-138 TAP OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1 /* SUFFOLK - SUNBURY OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1 /* SUNBURY - WINFALL END
LN 269-2087_A	CONTINGENCY 'LN 269-2087_A' OPEN BRANCH FROM BUS 314466 TO BUS 314645 CKT 1 /* 6FENTRES 230.00 - 6SLIGO 230.00 OPEN BRANCH FROM BUS 314645 TO BUS 314647 CKT 1 /* 6SLIGO 230.00 - 6SHAWBRO 230.00 OPEN BUS 314645 /* ISLAND OPEN BRANCH FROM BUS 314466 TO BUS 314550 CKT 1 /* 6FENTRES 230.00 - 6HICKORY 230.00 OPEN BRANCH FROM BUS 314550 TO BUS 921541 CKT 1 /* 6HICKORY 230.00 - AA1-133 TAP 230.00 OPEN BUS 314468 /* ISLAND OPEN BUS 314476 /* ISLAND OPEN BUS 314550 /* ISLAND END
LN 247	CONTINGENCY 'LN 247' OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1 /* 6SUFFOLK 230.00 - 6SUNBURY 230.00 OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1 /* 6SUNBURY 230.00 - W1-029 230.00 OPEN BUS 314648 /* ISLAND END

Contingency Name	Description
LN 2021	CONTINGENCY 'LN 2021' OPEN BRANCH FROM BUS 314638 TO BUS 314647 CKT 1 /* 6ELIZ CT 230.00 - 6SHAWBRO 230.00 OPEN BRANCH FROM BUS 314647 TO BUS 314833 CKT 1 /* 6SHAWBRO 230.00 - 6SHAWB_1 230.00 OPEN BUS 314833 /* ISLAND END

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Contributions to previously identified circuit breakers found to be over-duty:

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

	Contingency		Affected		Bus			Power	Loading %		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Circuit	Flow	Initial	Final	Type	MVA	Contribution
1	LFFB	246T247_A	DVP - DVP	6ELIZ CT-6SHAWBRO 230 kV line	314638	314647	1	DC	119.61	122.15	ER	608	15.45
2	DCTL	LN 269-2087_A	DVP - DVP	6SUNBURY-6SUFFOLK 230 kV line	314648	314537	1	DC	136.98	139.58	ER	478	12.42

#	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution
3	DCTL	LN 269-2087_A	DVP - DVP	W1-029-6SUNBURY 230 kV line	901080	314648	1	DC	141.52	144.12	ER	478	12.42

Note:

- For item #1 please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.
- For item #2 please refer to Appendix 2 for a table containing the generators having contribution to this flowgate.
- For item #3 please refer to Appendix 3 for a table containing the generators having contribution to this flowgate.

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined during Impact Study

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined during Impact Study

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
#1	6ELIZ CT-6SHAWBRO 230 kV line	Rebuild of the Elizabeth City-Shawboro 230kV line	Pending	**$15,405,000**
#2	6SUNBURY-6SUFFOLK 230 kV line	Rebuild of the Sunbury-Suffolk 230kV line	Pending	**$28,065,000**
#3	W1-029-6SUNBURY 230 kV line	Rebuild of the W1-029-Sunbury 230kV line	Pending	**$14,685,000**
			Total New Network Upgrades	**$58,155,000**

Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The IC can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

	Contingency		Affected		Bus			Power	Loading %		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Circuit	Flow	Initial	Final	Type	MVA	Contribution
4	N-1	LN 247	DVP - DVP	6ELIZ CT-6SHAWBRO 230 kV line	314638	314647	1	DC	106.73	109.25	ER	608	15.31
5	N-1	LN 2021	DVP - DVP	6SUNBURY-6SUFFOLK 230 kV line	314648	314537	1	DC	116.54	119.14	ER	478	12.42

#	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution
6	N-1	LN 2021	DVP - DVP	W1-029-6SUNBURY 230 kV line	901080	314648	1	DC	121.08	123.68	ER	478	12.42

Light Load Analysis

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

ITO Analysis

ITO assessed the impact of the proposed Queue Project #AB2-022 interconnection of a 20 MW Energy (13 MW Capacity) injection into the ITO's Transmission System, for compliance with NERC Reliability Criteria on ITO's Transmission System. The system was assessed using the summer 2020 RTEP case provided to ITO by PJM. When performing a generation analysis, ITO's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of ITO's Planning Criteria and interconnection requirements can be found in the ITO's Facility Connection Requirements which are publicly available at: http://www.dom.com.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically NERC Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For ITO's Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

As part of its generation impact analysis, the ITO routinely evaluates the impact that a proposed new generation resource will have under maximum generation conditions, stress system conditions and import/export system conditions. The results of these studies are discussed in more detail below.

Category B Analysis (Single Contingency):

1. System Normal – No deficiencies identified
2. Critical System Condition (No Surry 230 kV Unit) – No deficiencies identified.

Category C Analysis: (Multiple Facility Analysis)

1. Bus Fault - No deficiencies identified
2. Line Stuck Breaker - No deficiencies identified

3. Tower Line – No deficiencies identified

Affected System Analysis & Mitigation

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

Attachment 1.

Flowgate Appendices – Option 1

Appendices

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. When a flowgate is identified in multiple analysis the appendix is presented for only the analysis with the greatest overload.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

Appendix 1

(DVP - DVP) The 6ELIZ CT-6SHAWBRO 230 kV line (from bus 314638 to bus 314647 ckt 1) loads from 119.61% to 122.15% (**DC power flow**) of its emergency rating (608 MVA) for the line fault with failed breaker contingency outage of '246T247_A'. This project contributes approximately 15.45 MW to the thermal violation.

CONTINGENCY '246T247_A' /* 246T247 @ SUFFOLK
OPEN BRANCH FROM BUS 314537 TO BUS 921571 CKT 1 /* SUFFOLK - AA1-138 TAP
OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* NUCOR TAP - EARLEYS
OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1 /* SUFFOLK - SUNBURY
OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1 /* SUNBURY - WINFALL
END

Bus Number	*Bus Name*	*Full Contribution*
315292	*1DOMTR78*	*3.16*
315134	*1ROAVALA*	*3.67*
315135	*1ROAVALB*	*0.98*
314784	*1WEYRHSB*	*4.03*
901081	*W1-029C*	*5.13*
901082	*W1-029E*	*175.14*
902241	*W2-022 C OP1*	*2.72*
902242	*W2-022 E OP1*	*18.2*
913391	*Y1-086 C*	*1.1*
913392	*Y1-086 E*	*9.14*
916041	*Z1-036 C*	*4.57*
916042	*Z1-036 E*	*156.12*
917121	*Z2-027 C*	*2.02*
917122	*Z2-027 E*	*4.42*
917331	*Z2-043 C*	*0.41*
917332	*Z2-043 E*	*0.9*
917511	*Z2-088 C OP1*	*0.81*
917512	*Z2-088 E OP1*	*6.78*
918411	*AA1-050*	*0.69*
LTF	*AA1-058*	*0.37*
918511	*AA1-065 C OP*	*2.13*
918512	*AA1-065 E OP*	*5.34*
921182	*AA1-067 C*	*1.67*
921183	*AA1-067 E*	*0.71*
918561	*AA1-072 C*	*0.06*

918562	*AA1-072 E*	*0.15*
921552	*AA1-134 C*	*37.58*
921553	*AA1-134 E*	*16.11*
921562	*AA1-135 C*	*10.12*
921563	*AA1-135 E*	*4.34*
921752	*AA2-053 C*	*5.63*
921753	*AA2-053 E*	*2.42*
921772	*AA2-059 C*	*7.57*
921773	*AA2-059 E*	*3.48*
921862	*AA2-068 C*	*1.42*
921863	*AA2-068 E*	*0.65*
922512	*AA2-174 C*	*0.26*
922513	*AA2-174 E*	*0.28*
922532	*AA2-178 C*	*25.74*
922533	*AA2-178 E*	*11.03*
922602	*AB1-013 C*	*7.77*
922603	*AB1-013 E*	*51.99*
922882	*AB1-077 C*	*13.09*
922883	*AB1-077 E*	*87.57*
923831	*AB2-022 C*	*10.04*
923832	*AB2-022 E*	*5.41*
923941	*AB2-035 C*	*0.24*
923942	*AB2-035 E*	*0.1*
924381	*AB2-087 C*	*0.58*
924382	*AB2-087 E*	*0.27*
924391	*AB2-088 C*	*0.31*
924392	*AB2-088 E*	*0.15*
924491	*AB2-098 C*	*0.56*
924492	*AB2-098 E*	*0.24*
924501	*AB2-099 C*	*0.54*
924502	*AB2-099 E*	*0.23*
925121	*AB2-169 C OP*	*11.08*
925122	*AB2-169 E OP*	*9.95*
925281	*AB2-186 C*	*1.93*
925282	*AB2-186 E*	*0.83*
925291	*AB2-188 C OP*	*6.34*
925292	*AB2-188 E OP*	*2.85*

Appendix 2

(DVP - DVP) The 6SUNBURY-6SUFFOLK 230 kV line (from bus 314648 to bus 314537 ckt 1) loads from 136.98% to 139.58% (**DC power flow**) of its emergency rating (478 MVA) for the tower line contingency outage of 'LN 269-2087_A'. This project contributes approximately 12.42 MW to the thermal violation.

CONTINGENCY 'LN 269-2087_A'
OPEN BRANCH FROM BUS 314466 TO BUS 314645 CKT 1 /* 6FENTRES 230.00 - 6SLIGO 230.00
OPEN BRANCH FROM BUS 314645 TO BUS 314647 CKT 1 /* 6SLIGO 230.00 - 6SHAWBRO 230.00
OPEN BUS 314645 /* ISLAND
OPEN BRANCH FROM BUS 314466 TO BUS 314550 CKT 1 /* 6FENTRES 230.00 - 6HICKORY 230.00
OPEN BRANCH FROM BUS 314550 TO BUS 921541 CKT 1 /* 6HICKORY 230.00 - AA1-133 TAP 230.00
OPEN BUS 314468 /* ISLAND
OPEN BUS 314476 /* ISLAND
OPEN BUS 314550 /* ISLAND
END

Bus Number	*Bus Name*	*Full Contribution*
315292	*1DOMTR78*	*2.47*
314784	*1WEYRHSB*	*3.16*
314643	*3O INLET*	*1.82*
901081	*W1-029C*	*5.25*
901082	*W1-029E*	*179.32*
902241	*W2-022 C OP1*	*2.07*
902242	*W2-022 E OP1*	*13.84*
903520	*W3-066 C1OP1*	*12.11*
903531	*W3-066 C2OP1*	*12.11*
903522	*W3-066 E1OP1*	*81.01*
903532	*W3-066 E2OP1*	*81.01*
913391	*Y1-086 C*	*0.92*
913392	*Y1-086 E*	*7.7*
916041	*Z1-036 C*	*4.14*
916042	*Z1-036 E*	*141.52*
917121	*Z2-027 C*	*1.7*
917122	*Z2-027 E*	*3.72*
921542	*AA1-133 C*	*34.76*

921543	*AA1-133 E*	*14.9*
921552	*AA1-134 C*	*38.48*
921553	*AA1-134 E*	*16.49*
921582	*AA1-139 C*	*52.15*
921583	*AA1-139 E*	*22.35*
921772	*AA2-059 C*	*6.75*
921773	*AA2-059 E*	*3.11*
922532	*AA2-178 C*	*22.02*
922533	*AA2-178 E*	*9.44*
922602	*AB1-013 C*	*6.65*
922603	*AB1-013 E*	*44.48*
922882	*AB1-077 C*	*13.4*
922883	*AB1-077 E*	*89.66*
923831	*AB2-022 C*	*8.07*
923832	*AB2-022 E*	*4.35*
925121	*AB2-169 C OP*	*8.43*
925122	*AB2-169 E OP*	*7.57*
925281	*AB2-186 C*	*1.73*
925282	*AB2-186 E*	*0.74*
925291	*AB2-188 C OP*	*5.43*
925292	*AB2-188 E OP*	*2.44*

Appendix 3

(DVP - DVP) The W1-029-6SUNBURY 230 kV line (from bus 901080 to bus 314648 ckt 1) loads from 141.52% to 144.12% (**DC power flow**) of its emergency rating (478 MVA) for the tower line contingency outage of 'LN 269-2087_A'. This project contributes approximately 12.42 MW to the thermal violation.

CONTINGENCY 'LN 269-2087_A'
OPEN BRANCH FROM BUS 314466 TO BUS 314645 CKT 1 /* 6FENTRES 230.00 - 6SLIGO 230.00
OPEN BRANCH FROM BUS 314645 TO BUS 314647 CKT 1 /* 6SLIGO 230.00 - 6SHAWBRO 230.00
OPEN BUS 314645 /* ISLAND
OPEN BRANCH FROM BUS 314466 TO BUS 314550 CKT 1 /* 6FENTRES 230.00 - 6HICKORY 230.00
OPEN BRANCH FROM BUS 314550 TO BUS 921541 CKT 1 /* 6HICKORY 230.00 - AA1-133 TAP 230.00
OPEN BUS 314468 /* ISLAND
OPEN BUS 314476 /* ISLAND
OPEN BUS 314550 /* ISLAND
END

Bus Number	*Bus Name*	*Full Contribution*
315292	*1DOMTR78*	*2.47*
314784	*1WEYRHSB*	*3.16*
314643	*3O INLET*	*1.82*
901081	*W1-029C*	*5.25*
901082	*W1-029E*	*179.32*
902241	*W2-022 C OP1*	*2.07*
902242	*W2-022 E OP1*	*13.84*
903520	*W3-066 C1OP1*	*12.11*
903531	*W3-066 C2OP1*	*12.11*
903522	*W3-066 E1OP1*	*81.01*
903532	*W3-066 E2OP1*	*81.01*
913391	*Y1-086 C*	*0.92*
913392	*Y1-086 E*	*7.7*
916041	*Z1-036 C*	*4.14*
916042	*Z1-036 E*	*141.52*
917121	*Z2-027 C*	*1.7*
917122	*Z2-027 E*	*3.72*
921542	*AA1-133 C*	*34.76*

921543	*AA1-133 E*	*14.9*
921552	*AA1-134 C*	*38.48*
921553	*AA1-134 E*	*16.49*
921582	*AA1-139 C*	*52.15*
921583	*AA1-139 E*	*22.35*
921772	*AA2-059 C*	*6.75*
921773	*AA2-059 E*	*3.11*
922532	*AA2-178 C*	*22.02*
922533	*AA2-178 E*	*9.44*
922602	*AB1-013 C*	*6.65*
922603	*AB1-013 E*	*44.48*
922882	*AB1-077 C*	*13.4*
922883	*AB1-077 E*	*89.66*
923831	*AB2-022 C*	*8.07*
923832	*AB2-022 E*	*4.35*
925121	*AB2-169 C OP*	*8.43*
925122	*AB2-169 E OP*	*7.57*
925281	*AB2-186 C*	*1.73*
925282	*AB2-186 E*	*0.74*
925291	*AB2-188 C OP*	*5.43*
925292	*AB2-188 E OP*	*2.44*