



**Generation Interconnection  
Feasibility Study Report  
for  
Queue Project AF1-029  
HAVILAND-N VAN WERT 69 KV  
15 MW Capacity / 25 MW Energy**

January, 2020

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## 1 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer.

The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer 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. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. 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 Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

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 project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

## 2 General

The Interconnection Customer (IC), has proposed an uprate (Solar generating facility) to an existing Solar generating facility (AE2-298) located in Van Wert County, OH. This projects requests an increase to the install capability of 25 uprate MW with 15 of uprate MW of this output being recognized by PJM as Capacity. The installed facilities will have a total capability of 75 MW with 45 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 12/31/21. This study does not imply a TO commitment to this in-service date.

|                            |                           |
|----------------------------|---------------------------|
| <b>Queue Number</b>        | <b>AF1-029</b>            |
| <b>Project Name</b>        | HAVILAND-N VAN WERT 69 KV |
| <b>State</b>               | Ohio                      |
| <b>County</b>              | Van Wert                  |
| <b>Transmission Owner</b>  | AEP                       |
| <b>MFO</b>                 | 75                        |
| <b>MWE</b>                 | 25                        |
| <b>MWC</b>                 | 15                        |
| <b>Fuel</b>                | Solar                     |
| <b>Basecase Study Year</b> | 2023                      |

## 2.1 Point of Interconnection

AF1-029 will interconnect with the AEP transmission system as an uprate to AE2-298 tapping the North Van Wert to Haviland 69 kV line.

## 2.2 Cost Summary

This project will be responsible for the following costs:

| Description                            | Total Cost |
|----------------------------------------|------------|
| Attachment Facilities                  | \$0        |
| Direct Connection Network Upgrade      | \$0        |
| Non Direct Connection Network Upgrades | \$0        |
| Total Costs                            | \$0        |

Note: These cost estimates assume that no relaying upgrades are required to accommodate this project. During later study phases, AEP/PJM may determine that relaying upgrades may be required depending on final project schedules for the existing project and this uprate project.

In addition, this project may be responsible for a contribution to the following costs

| Description     | Total Cost |
|-----------------|------------|
| System Upgrades | \$0        |

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

### 3 Transmission Owner Scope of Work

#### 4 Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

| Description                            | Total Cost |
|----------------------------------------|------------|
|                                        | \$0        |
| <b>Total Attachment Facility Costs</b> | <b>\$0</b> |

#### 5 Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

| Description                                   | Total Cost |
|-----------------------------------------------|------------|
|                                               | \$0        |
| <b>Total Direct Connection Facility Costs</b> | <b>\$0</b> |

#### 6 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

| Description                                       | Total Cost |
|---------------------------------------------------|------------|
|                                                   | \$0        |
| <b>Total Non-Direct Connection Facility Costs</b> | <b>\$0</b> |

## 7 Incremental Capacity Transfer Rights (ICTRs)

Will be determined at a later study phase

## 8 Interconnection Customer Requirements

It is understood that the Interconnection Customer is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of the Interconnection Customer's generating plant and the costs for the line connecting the generating plant to the AEP Transmission circuit are not included in this report; these are assumed to be the Interconnection Customer's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.
2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

## 9 Revenue Metering and SCADA Requirements

### 9.1 PJM Requirements

The Interconnection Customer 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 Section 8 of Attachment O.

### 9.2 AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link: <http://www.pjm.com/~media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx>

## 10 Network Impacts

The Queue Project AF1-029 was evaluated as a 25.0 MW (Capacity 15.0 MW) injection as an uprate to AE2-298 tapping the North Van Wert to Haviland 69 kV line in the AEP area. Project AF1-029 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-029 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

## Summer Peak Load Flow

## 11 Generation Deliverability

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

None

## 12 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

## 13 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)

| ID       | FROM BUS# | FROM BUS | kV    | FROM BUS AREA | TO BUS# | TO BUS   | kV    | TO BUS AREA | CK T ID | CONT NAME                     | Type    | Rating MVA | PRE PROJECT LOADIN G % | POST PROJECT LOADIN G % | AC/D C | MW IMPACT |
|----------|-----------|----------|-------|---------------|---------|----------|-------|-------------|---------|-------------------------------|---------|------------|------------------------|-------------------------|--------|-----------|
| 43678970 | 246950    | 05TIMBSS | 138.0 | AEP           | 243383  | 05TILLMA | 138.0 | AEP         | 1       | AEP_P2-2_#10084_05HAVILN138_1 | bus     | 332.0      | 112.31                 | 114.3                   | DC     | 6.61      |
| 43679297 | 246950    | 05TIMBSS | 138.0 | AEP           | 243383  | 05TILLMA | 138.0 | AEP         | 1       | AEP_P4_#10084_05HAVILN138_1   | breaker | 332.0      | 112.31                 | 114.3                   | DC     | 6.61      |

## 14 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 developer 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.

| ID       | FROM BUS# | FROM BUS | kV    | FROM BUS AREA | TO BUS# | TO BUS   | kV    | TO BUS AREA | CK T ID | CONT NAME      | Type      | Rating MVA | PRE PROJECT LOADIN G % | POST PROJECT LOADIN G % | AC/D C | MW IMPACT |
|----------|-----------|----------|-------|---------------|---------|----------|-------|-------------|---------|----------------|-----------|------------|------------------------|-------------------------|--------|-----------|
| 43679594 | 243017    | 05HAVILN | 138.0 | AEP           | 242989  | 05E LIMA | 138.0 | AEP         | 1       | AEP_P1-2_#7501 | operation | 220.0      | 137.45                 | 142.3                   | DC     | 10.69     |
| 43679786 | 246950    | 05TIMBSS | 138.0 | AEP           | 243383  | 05TILLMA | 138.0 | AEP         | 1       | AEP_P1-1_#7096 | operation | 332.0      | 110.71                 | 111.96                  | DC     | 4.17      |

## 15 System Reinforcements

| ID                | Index | Facility                                       | Upgrade Description                                                                                                                                          | Cost      |
|-------------------|-------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 43678970,43679297 | 1     | 05TIMBSS 138.0 kV -<br>05TILLMA 138.0 kV Ckt 1 | AEPO0011a : Upgrade "Sub Cond 1-1233.6 KCM ACSR/TW (38/19)" riser at Timber Switch<br>Project Type : FAC<br>Cost : \$100,000<br>Time Estimate : 12-18 Months | \$100,000 |
|                   |       |                                                | TOTAL COST                                                                                                                                                   | \$100,000 |

## 16 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, 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. 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.

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## 16.1 Index 1

| ID           | FROM BUS#  | FROM BUS     | FROM BUS AREA | TO BUS# | TO BUS       | TO BUS AREA | CKT ID | CONT NAME                        | Type    | Rating MVA | PRE PROJECT LOADING % | POST PROJECT LOADING % | AC DC | MW IMPACT |
|--------------|------------|--------------|---------------|---------|--------------|-------------|--------|----------------------------------|---------|------------|-----------------------|------------------------|-------|-----------|
| 4367929<br>7 | 24695<br>0 | 05TIMBS<br>S | AEP           | 243383  | 05TILLM<br>A | AEP         | 1      | AEP_P4_#10084_05HAVIL<br>N 138_I | breaker | 332.0      | 112.31                | 114.3                  | DC    | 6.61      |

| Bus #      | Bus          | MW Impact |
|------------|--------------|-----------|
| 246953     | 05TIMB G C   | 3.6342    |
| 247607     | V1-011 C     | 10.2922   |
| 247911     | 05TIMB G E   | 104.8375  |
| 247959     | V1-011 E     | 68.8788   |
| 926811     | AC1-167 C O1 | 7.6403    |
| 926812     | AC1-167 E O1 | 3.7065    |
| 926901     | AC1-176 C    | 6.5957    |
| 926902     | AC1-176 E    | 44.3476   |
| 934741     | AD1-101 C O1 | 2.0435    |
| 934742     | AD1-101 E O1 | 3.3347    |
| 934901     | AD1-119 C O1 | 3.7364    |
| 934902     | AD1-119 E O1 | 6.0973    |
| 940031     | AE1-245 C O1 | 15.4383   |
| 940032     | AE1-245 E O1 | 103.3182  |
| 942801     | AE2-298 C O1 | 7.9284    |
| 942802     | AE2-298 E O1 | 5.2856    |
| 943181     | AE2-322 C    | 9.1638    |
| 943182     | AE2-322 E    | 4.4796    |
| 943581     | AF1-029 C O1 | 3.9642    |
| 943582     | AF1-029 E O1 | 2.6428    |
| 943791     | AF1-047 C    | 4.7479    |
| 943792     | AF1-047 E    | 3.1653    |
| DUCKCREEK  | DUCKCREEK    | 0.1670    |
| NEWTON     | NEWTON       | 0.1332    |
| FARMERCITY | FARMERCITY   | 0.0071    |
| G-007A     | G-007A       | 0.0503    |
| VFT        | VFT          | 0.1354    |
| PRAIRIE    | PRAIRIE      | 0.2996    |
| COFFEEN    | COFFEEN      | 0.0682    |
| EDWARDS    | EDWARDS      | 0.0518    |
| CHEOAH     | CHEOAH       | 0.0265    |
| TILTON     | TILTON       | 0.0888    |
| GIBSON     | GIBSON       | 0.0655    |
| CALDERWOOD | CALDERWOOD   | 0.0268    |
| BLUEG      | BLUEG        | 0.1510    |
| TRIMBLE    | TRIMBLE      | 0.0479    |
| CATAWBA    | CATAWBA      | 0.0116    |

## Affected Systems

## **17 Affected Systems**

### **17.1 LG&E**

LG&E Impacts to be determined during later study phases (as applicable).

### **17.2 MISO**

MISO Impacts to be determined during later study phases (as applicable).

### **17.3 TVA**

TVA Impacts to be determined during later study phases (as applicable).

### **17.4 Duke Energy Progress**

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

### **17.5 NYISO**

NYISO Impacts to be determined during later study phases (as applicable).

## 18 Contingency Descriptions

| Contingency Name                      | Contingency Definition                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AEP_P1-2_#7501</b>                 | CONTINGENCY 'AEP_P1-2_#7501'<br>OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383<br>05TILLMA 138 1<br>OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950<br>05TIMBSS 138 1<br>OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265<br>05TILLMAN 34.5 1<br>OPEN BRANCH FROM BUS 246264 TO BUS 247877 CKT 1 / 246264 05ST R14 8 34.5 247877<br>05ST.RD14 SS34.5 1<br>END |
| <b>AEP_P4_#10084_05HAVILN 138_I</b>   | CONTINGENCY 'AEP_P4_#10084_05HAVILN 138_I'<br>OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017<br>05HAVILN 138 1<br>OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168<br>05HAVILND1 69.0 1<br>END                                                                                                                                                                                            |
| <b>AEP_P2-2_#10084_05HAVILN 138_1</b> | CONTINGENCY 'AEP_P2-2_#10084_05HAVILN 138_1'<br>OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017<br>05HAVILN 138 1<br>OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168<br>05HAVILND1 69.0 1<br>END                                                                                                                                                                                          |
| <b>AEP_P1-1_#7096</b>                 | CONTINGENCY 'AEP_P1-1_#7096'<br>OPEN BRANCH FROM BUS 243017 TO BUS 246352 CKT 1 / 243017 05HAVILAND2 138 247564<br>V1-012 138 1<br>END                                                                                                                                                                                                                                                                                                              |

## Short Circuit

## 19 Short Circuit

The following Breakers are overduty

| Bus Number | Bus Name | BREAKER | Type | Capacity<br>(Amps) | Duty<br>Percentage<br>Post Queue | Duty<br>Percentage Pre<br>Queue |
|------------|----------|---------|------|--------------------|----------------------------------|---------------------------------|
|            |          |         |      |                    |                                  |                                 |

## Secondary Point of Interconnection

## 20 Network Impacts – Secondary POI

The Queue Project AF1-029 was evaluated as a 25.0 MW (Capacity 15.0 MW) injection as an uprate to AE2-298 tapping the North Van Wert to Haviland 69 kV line in the AEP area. Project AF1-029 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-029 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

## Summer Peak Load Flow

## 21 Generation Deliverability

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

None

## 22 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

## 23 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)

| ID       | FROM BUS# | FROM BUS | kV    | FROM BUS AREA | TO BUS# | TO BUS   | kV    | TO BUS AREA | CK T ID | CONT NAME                     | Type    | Rating MVA | PRE PROJECT LOADIN G % | POST PROJECT LOADIN G % | AC/D C | MW IMPACT |
|----------|-----------|----------|-------|---------------|---------|----------|-------|-------------|---------|-------------------------------|---------|------------|------------------------|-------------------------|--------|-----------|
| 43678970 | 246950    | 05TIMBSS | 138.0 | AEP           | 243383  | 05TILLMA | 138.0 | AEP         | 1       | AEP_P2-2_#10084_05HAVILN138_1 | bus     | 332.0      | 112.31                 | 116.09                  | DC     | 12.56     |
| 43679297 | 246950    | 05TIMBSS | 138.0 | AEP           | 243383  | 05TILLMA | 138.0 | AEP         | 1       | AEP_P4_#10084_05HAVILN138_1   | breaker | 332.0      | 112.31                 | 116.09                  | DC     | 12.56     |

## 24 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 developer 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.

| ID       | FROM BUS# | FROM BUS | kV    | FROM BUS AREA | TO BUS# | TO BUS   | kV    | TO BUS AREA | CK T ID | CONT NAME      | Type      | Rating MVA | PRE PROJECT LOADIN G % | POST PROJECT LOADIN G % | AC/D C | MW IMPACT |
|----------|-----------|----------|-------|---------------|---------|----------|-------|-------------|---------|----------------|-----------|------------|------------------------|-------------------------|--------|-----------|
| 43679594 | 243017    | 05HAVILN | 138.0 | AEP           | 242989  | 05E LIMA | 138.0 | AEP         | 1       | AEP_P1-2_#7501 | operation | 220.0      | 137.45                 | 142.86                  | DC     | 11.92     |
| 43679786 | 246950    | 05TIMBSS | 138.0 | AEP           | 243383  | 05TILLMA | 138.0 | AEP         | 1       | AEP_P1-1_#7096 | operation | 332.0      | 110.71                 | 114.13                  | DC     | 11.37     |

## 25 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, 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. 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.

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## 25.1 Index 1

| ID           | FROM BUS#  | FROM BUS     | FROM BUS AREA | TO BUS# | TO BUS       | TO BUS AREA | CKT ID | CONT NAME                        | Type    | Rating MVA | PRE PROJECT LOADING % | POST PROJECT LOADING % | AC DC | MW IMPACT |
|--------------|------------|--------------|---------------|---------|--------------|-------------|--------|----------------------------------|---------|------------|-----------------------|------------------------|-------|-----------|
| 4367929<br>7 | 24695<br>0 | 05TIMBS<br>S | AEP           | 243383  | 05TILLM<br>A | AEP         | 1      | AEP_P4_#10084_05HAVIL<br>N 138_I | breaker | 332.0      | 112.31                | 116.09                 | DC    | 12.56     |

| Bus #      | Bus          | MW Impact |
|------------|--------------|-----------|
| 246953     | 05TIMB G C   | 3.6342    |
| 247607     | V1-011 C     | 10.2922   |
| 247911     | 05TIMB G E   | 104.8375  |
| 247959     | V1-011 E     | 68.8788   |
| 926811     | AC1-167 C O1 | 7.6403    |
| 926812     | AC1-167 E O1 | 3.7065    |
| 926901     | AC1-176 C    | 6.5957    |
| 926902     | AC1-176 E    | 44.3476   |
| 934741     | AD1-101 C O1 | 2.0435    |
| 934742     | AD1-101 E O1 | 3.3347    |
| 934901     | AD1-119 C O1 | 3.7364    |
| 934902     | AD1-119 E O1 | 6.0973    |
| 940031     | AE1-245 C O1 | 15.4383   |
| 940032     | AE1-245 E O1 | 103.3182  |
| 942801     | AE2-298 C O1 | 7.9284    |
| 942802     | AE2-298 E O1 | 5.2856    |
| 943181     | AE2-322 C    | 9.1638    |
| 943182     | AE2-322 E    | 4.4796    |
| 943581     | AF1-029 C O2 | 7.5354    |
| 943582     | AF1-029 E O2 | 5.0236    |
| 943791     | AF1-047 C    | 4.7479    |
| 943792     | AF1-047 E    | 3.1653    |
| DUCKCREEK  | DUCKCREEK    | 0.1670    |
| NEWTON     | NEWTON       | 0.1332    |
| FARMERCITY | FARMERCITY   | 0.0071    |
| G-007A     | G-007A       | 0.0503    |
| VFT        | VFT          | 0.1354    |
| PRAIRIE    | PRAIRIE      | 0.2996    |
| COFFEEN    | COFFEEN      | 0.0682    |
| EDWARDS    | EDWARDS      | 0.0518    |
| CHEOAH     | CHEOAH       | 0.0265    |
| TILTON     | TILTON       | 0.0888    |
| GIBSON     | GIBSON       | 0.0655    |
| CALDERWOOD | CALDERWOOD   | 0.0268    |
| BLUEG      | BLUEG        | 0.1510    |
| TRIMBLE    | TRIMBLE      | 0.0479    |
| CATAWBA    | CATAWBA      | 0.0116    |

## Affected Systems

## **26 Affected Systems**

### **26.1 LG&E**

LG&E Impacts to be determined during later study phases (as applicable).

### **26.2 MISO**

MISO Impacts to be determined during later study phases (as applicable).

### **26.3 TVA**

TVA Impacts to be determined during later study phases (as applicable).

### **26.4 Duke Energy Progress**

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

### **26.5 NYISO**

NYISO Impacts to be determined during later study phases (as applicable).

## 27 Contingency Descriptions

| Contingency Name                      | Contingency Definition                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AEP_P1-2_#7501</b>                 | CONTINGENCY 'AEP_P1-2_#7501'<br>OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383<br>05TILLMA 138 1<br>OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950<br>05TIMBSS 138 1<br>OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265<br>05TILLMAN 34.5 1<br>OPEN BRANCH FROM BUS 246264 TO BUS 247877 CKT 1 / 246264 05ST R14 8 34.5 247877<br>05ST.RD14 SS34.5 1<br>END |
| <b>AEP_P4_#10084_05HAVILN 138_I</b>   | CONTINGENCY 'AEP_P4_#10084_05HAVILN 138_I'<br>OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017<br>05HAVILN 138 1<br>OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168<br>05HAVILND1 69.0 1<br>END                                                                                                                                                                                            |
| <b>AEP_P2-2_#10084_05HAVILN 138_1</b> | CONTINGENCY 'AEP_P2-2_#10084_05HAVILN 138_1'<br>OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017<br>05HAVILN 138 1<br>OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168<br>05HAVILND1 69.0 1<br>END                                                                                                                                                                                          |
| <b>AEP_P1-1_#7096</b>                 | CONTINGENCY 'AEP_P1-1_#7096'<br>OPEN BRANCH FROM BUS 243017 TO BUS 246352 CKT 1 / 243017 05HAVILAND2 138 247564<br>V1-012 138 1<br>END                                                                                                                                                                                                                                                                                                              |

## Short Circuit

## 28 Short Circuit

The following Breakers are overduty

| Bus Number | Bus Name | BREAKER | Type | Capacity<br>(Amps) | Duty<br>Percentage<br>Post Queue | Duty<br>Percentage Pre<br>Queue |
|------------|----------|---------|------|--------------------|----------------------------------|---------------------------------|
|            |          |         |      |                    |                                  |                                 |

