Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-351

HARRISON-GOOD HOPE 138 KV

34.8 MW Capacity / 58 MW Energy

October 2021

Table of Contents

1 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 AEP.

2 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.

An Interconnection Customer 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.

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.

The conduct of light load analysis as required under the PJM planning process is not performed during the Generation Interconnection Feasibility Study phase of the PJM study process. Additional reinforcement requirements for this Interconnection Request may be defined during the conduct of the light load analysis which shall be performed following execution of the System Impact Study agreement.

3 General

The Interconnection Customer (IC) has proposed an uprate to a planned/existing Solar generating facility located in Fairfield, Ohio. This project is an increase to the Interconnection Customer's AF2-371 project, which will share the same point of interconnection. The AG1-351 queue position is a 58 MW uprate (34.8 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 142 MW with 85.2 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this uprate project is December 31, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-351
Project Name	HARRISON-GOOD HOPE 138 KV
State	Ohio
County	Fairfield
Transmission Owner	AEP
MFO	142
MWE	58
MWC	34.8
Fuel	Solar
Basecase Study Year	2024

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

AG1-351 will interconnect with the AEP on transmission system as an uprate to AF2-371 tapping the Harrison to Good Hope 138 kV line.

Note: It is assumed that the existing 138 kV revenue metering system, generation lead and Protection & Control Equipment that will be installed for AF2-371 will be adequate for the increased generation of AG1-351. Depending on the timing of the completion of the AG1-351 interconnection construction relative to the AF2-371 completion, there may (or may not) be a need to review and revise the relay settings for the increased generation of AG1-351.

5 Cost Summary

The AG1-351 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$50,000
Total System Network Upgrade Costs	$11,150,000
Total Costs	**$11,200,000**

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes. Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

6 Transmission Owner Scope of Work

The total physical interconnection costs is given in the table below:

Description	Total Cost
Review and revise protection & control settings for the additional generation	$50,000
Total Physical Interconnection Costs	**$50,000**

The estimates provided in this report are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements. In addition, Stability analysis will be completed during the Facilities Study stage. It is possible that a need for additional upgrades could be identified by these studies.

7 Schedule

It is anticipated that the time between receipt of executed Agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would generally be between 24 to 36 months after signing Agreement execution.

8 Interconnection Customer Requirements

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

The Generation Interconnection Agreement does not in or by itself establish a requirement for the Transmission Owner 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.

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 Meteorological Data Reporting Requirements

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter2) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) - (Accepted, not required)
- Wind direction (decimal degrees from true north) - (Accepted, not required)

9.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

http://www.pjm.com/planning/design-engineering/to-tech-standards/

10 Summer Peak Analysis

The Queue Project AG1-351 was evaluated as a 58.0 MW (Capacity 34.80 MW) injection as an uprate to AF2-371 tapping the Harrison to Good Hope 138 kV line in the AEP area. Project AG1-351 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-351 was studied with a commercial probability of 53.0%. Potential network impacts were as follows:

10.1 Generation Deliverability

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

None.

10.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
174064752	243593	05ZUBER	138.0	AEP	243469	05BEATTY	138.0	ATSI	1	AEP_P4_#9679_05HARRISON 138_2E	breaker	212.0	96.88	109.22	AC	26.74

10.3 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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
161737719	243522	05HARRISON	138.0	AEP	243593	05ZUBER	138.0	AEP	1	AEP_P7-1_#10921	tower	167.0	121.96	137.21	AC	25.89
173876821	243522	05HARRISON	138.0	AEP	243593	05ZUBER	138.0	AEP	1	AEP_P4_#9679_05HARRISON 138_2E	breaker	167.0	134.55	150.29	AC	26.74

10.4 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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
16820162 5	243522	05HARRISON	138.0	AEP	243593	05ZUBER	138.0	AEP	1	AEP_P2-1_243522 05HARRISON 138 243550 05OBETZ 138 1	operation	167.0	121.25	136.52	AC	25.91
16820165 6	243522	05HARRISON	138.0	AEP	243550	05OBETZ	138.0	AEP	1	AEP_P1-2_#9672_308 77	operation	180.0	119.49	131.93	AC	22.59
16820167 8	243550	05OBETZ	138.0	AEP	243539	05MARION	138.0	AEP	1	AEP_P1-2_#9672_308 77	operation	180.0	113.1	125.53	AC	22.59

10.5 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost
161737719,173 876821	2	05HARRIS 138.0 kV - 05ZUBER 138.0 kV Ckt 1	**AEP** **AEPO0015a-d (205) : Current Station Rating: S/N: 136, S/E: 167** **1) Replace six 300 Cu jumpers at Harrison. $0.6M** **2) Replace Switch 600 Amp Sw at Harrison. $0.2M** **3) Reconductor 5.5 miles of ACSR ~ 336.4 ~ 30/7 ~ ORIOLE Harrison - Zuber conductor with 795 ACSR or equivalent. $8.25M** **4) Replace 800 Amp wavetrap at Harrison. $0.1M** **Project Type : FAC** **Cost : $9,150,000** **Time Estimate : 24-36 Months**	$9,150,000
174064752	1	05ZUBER 138.0 kV - 05BEATTY 138.0 kV Ckt 1	**AEP** **AEPO0046a (205) : Current Station Rating: S/N: 150, S/E: 212** **1) String 3.19 miles of 336.4 ACSR or equivalent conductor on the open side of the existing double circuit structures (6-wire). $2M** **Project Type : FAC** **Cost : $2,000,000** **Time Estimate : 18-24 Months**	$2,000,000
			TOTAL COST	**$11,150,000**

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

10.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

10.6.1 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
1740647 52	24359 3	05ZUBE R	AEP	24346 9	05BEATT Y	ATSI	1	AEP_P4_#9679_05HARRISO N 138_2E	breake r	212.0	96.88	109.22	AC	26.74

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925345	AC1-001 C	9.59	80|50	9.59
925346	AC1-001 E	4.51	80|50	4.51
927061	AC1-194 C O1	3.11	Adder	3.66
927062	AC1-194 E O1	5.07	Adder	5.96
932201	AC2-029 C	10.55	80|50	10.55
932202	AC2-029 E	17.21	80|50	17.21
932411	AC2-059 C	15.56	80|50	15.56
932412	AC2-059 E	16.06	80|50	16.06
934481	AD1-072 C	3.42	80|50	3.42
934482	AD1-072 E	1.56	80|50	1.56
936111	AD2-016 C	15.56	80|50	15.56
936112	AD2-016 E	16.06	80|50	16.06
937231	AD2-162 C	21.73	80|50	21.73
937232	AD2-162 E	10.65	80|50	10.65
938711	AE1-093	2.75	Adder	3.24
960801	AF2-371 C	23.23	80|50	23.23
960802	AF2-371 E	15.49	80|50	15.49
964871	AG1-351 C	16.04	80|50	16.04
964872	AG1-351 E	10.69	80|50	10.69
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.1052	Confirmed LTF	0.1052
LTFEXP_AC1-056	LTFEXP_AC1-056->LTFIMP_AC1-056	0.0347	Confirmed LTF	0.0347
LTFEXP_CBM-N	LTFEXP_CBM-N->LTFIMP_CBM-N	0.0128	LTF/CBM	0.0128
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0497	LTF/CBM	0.0497
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	2.484	LTF/CBM	2.484
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.4388	LTF/CBM	0.4388
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.1558	Confirmed LTF	0.1558
LTFEXP_G-007A	LTFEXP_G-007A->LTFIMP_G-007A	0.0301	LTF/CMTX	0.0301
LTFEXP_GIBSON	LTFEXP_GIBSON->LTFIMP_GIBSON	0.0051	Confirmed LTF	0.0051
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.179	Confirmed LTF	0.179
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.037	Confirmed LTF	0.037
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0462	Confirmed LTF	0.0462

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.0032	Confirmed LTF	0.0032
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0019	Confirmed LTF	0.0019
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.2009	Confirmed LTF	0.2009
LTFEXP_VFT	LTFEXP_VFT->LTFIMP_VFT	0.0772	Confirmed LTF	0.0772

10.6.2 Index 2

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
173876821	243522	05HARRISON	AEP	243593	05ZUBER	AEP	1	AEP_P4_#9679_05HARRISON 138_2E	breaker	167.0	134.55	150.29	AC	26.74

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925345	AC1-001 C	9.59	80|50	9.59
925346	AC1-001 E	4.51	80|50	4.51
927061	AC1-194 C O1	3.11	Adder	3.66
927062	AC1-194 E O1	5.07	Adder	5.96
932201	AC2-029 C	10.55	80|50	10.55
932202	AC2-029 E	17.21	80|50	17.21
932411	AC2-059 C	15.56	80|50	15.56
932412	AC2-059 E	16.06	80|50	16.06
934481	AD1-072 C	3.42	80|50	3.42
934482	AD1-072 E	1.56	80|50	1.56
936111	AD2-016 C	15.56	80|50	15.56
936112	AD2-016 E	16.06	80|50	16.06
937231	AD2-162 C	21.73	80|50	21.73
937232	AD2-162 E	10.65	80|50	10.65
938711	AE1-093	2.75	Adder	3.24
960801	AF2-371 C	23.23	80|50	23.23
960802	AF2-371 E	15.49	80|50	15.49
964871	AG1-351 C	16.04	80|50	16.04
964872	AG1-351 E	10.69	80|50	10.69
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.1052	Confirmed LTF	0.1052
LTFEXP_AC1-056	LTFEXP_AC1-056->LTFIMP_AC1-056	0.0347	Confirmed LTF	0.0347
LTFEXP_CBM-N	LTFEXP_CBM-N->LTFIMP_CBM-N	0.0128	LTF/CBM	0.0128
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0497	LTF/CBM	0.0497
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	2.484	LTF/CBM	2.484
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.4388	LTF/CBM	0.4388
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.1558	Confirmed LTF	0.1558
LTFEXP_G-007A	LTFEXP_G-007A->LTFIMP_G-007A	0.0301	LTF/CMTX	0.0301
LTFEXP_GIBSON	LTFEXP_GIBSON->LTFIMP_GIBSON	0.0051	Confirmed LTF	0.0051
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.179	Confirmed LTF	0.179
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.037	Confirmed LTF	0.037
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0462	Confirmed LTF	0.0462

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.0032	Confirmed LTF	0.0032
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0019	Confirmed LTF	0.0019
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.2009	Confirmed LTF	0.2009
LTFEXP_VFT	LTFEXP_VFT->LTFIMP_VFT	0.0772	Confirmed LTF	0.0772

10.6.3 Index 3

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
17406481 9	24353 9	05MARIO N	AEP	24348 1	05CANA L	AEP	1	AEP_P5_#11273_05BEAT_05BE AT	breake r	167.0	102.54	110.3	AC	13.34

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
294740	P44	-0.2	Adder	-0.24
925345	AC1-001 C	4.21	Adder	4.95
925346	AC1-001 E	1.98	Adder	2.33
932201	AC2-029 C	5.28	80|50	5.28
932202	AC2-029 E	8.61	80|50	8.61
932411	AC2-059 C	7.93	80|50	7.93
932412	AC2-059 E	8.18	80|50	8.18
934481	AD1-072 C	1.74	80|50	1.74
934482	AD1-072 E	0.8	80|50	0.8
936111	AD2-016 C	7.93	80|50	7.93
936112	AD2-016 E	8.18	80|50	8.18
937231	AD2-162 C	10.99	80|50	10.99
937232	AD2-162 E	5.39	80|50	5.39
960801	AF2-371 C	11.59	80|50	11.59
960802	AF2-371 E	7.73	80|50	7.73
964871	AG1-351 C	8.0	80|50	8.0
964872	AG1-351 E	5.34	80|50	5.34
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.0627	Confirmed LTF	0.0627
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0476	LTF/CBM	0.0476
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	1.54	LTF/CBM	1.54
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.5639	LTF/CBM	0.5639
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.0922	Confirmed LTF	0.0922
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	0.0151	LTF/CMTX NF	0.0151
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.1529	Confirmed LTF	0.1529
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.0245	Confirmed LTF	0.0245
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0979	Confirmed LTF	0.0979
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.0135	Confirmed LTF	0.0135
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	0.1001	LTF/CMTX NF	0.1001
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0088	Confirmed LTF	0.0088
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.1658	Confirmed LTF	0.1658

10.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

Queue Number	Project Name	Status
AA2-074	CPLE-PJM	Confirmed
AC1-001	Delano 138kV	Active
AC1-056	PJM-AMIL	Confirmed
AC1-194	Elk 138kV	Active
AC2-029	Circleville 138kV	Active
AC2-059	Biers Run-Circleville 138kV	Active
AD1-072	Biers Run-Circleville 138 kV	Active
AD2-016	Biers Run-Circleville 138 kV	Active
AD2-162	Biers Run-Circleville 138kV	Active
AE1-093	Elk 138 kV	Active
AF2-371	Harrison-Good Hope 138 kV	Active
AG1-351	Harrison-Good Hope 138 kV	Active

10.8 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P4_#9679_05HARRISON 138_2E	CONTINGENCY 'AEP_P4_#9679_05HARRISON 138_2E' OPEN BRANCH FROM BUS 243522 TO BUS 243550 CKT 1 / 243522 05HARRISON 138 243550 05OBETZ 138 1 OPEN BRANCH FROM BUS 243539 TO BUS 243550 CKT 1 / 243539 05MARION 138 243550 05OBETZ 138 1 OPEN BRANCH FROM BUS 243522 TO BUS 247688 CKT 1 / 243522 05HARRISON 138 247688 05HARRIS 1EQ 999 1 END
AEP_P1-2_#9672_30877	CONTINGENCY 'AEP_P1-2_#9672_30877' OPEN BRANCH FROM BUS 243469 TO BUS 243593 CKT 1 / 243469 05BEATTY 138 243593 05ZUBER 138 1 OPEN BRANCH FROM BUS 243522 TO BUS 243593 CKT 1 / 243522 05HARRISON 138 243593 05ZUBER 138 1 OPEN BRANCH FROM BUS 243522 TO BUS 244419 CKT 1 / 243522 05HARRISON 138 244419 05HARRISON 39.4 1 END
AEP_P2-1_243522 05HARRISON 138 243550 05OBETZ 138 1	CONTINGENCY 'AEP_P2-1_243522 05HARRISON 138 243550 05OBETZ 138 1' OPEN BRANCH FROM BUS 243522 TO BUS 243550 CKT 1 END
AEP_P7-1_#10921	CONTINGENCY 'AEP_P7-1_#10921' OPEN BRANCH FROM BUS 243522 TO BUS 243550 CKT 1 / 243522 05HARRISON 138 243550 05OBETZ 138 1 OPEN BRANCH FROM BUS 243536 TO BUS 243539 CKT 1 / 243536 05LS-II 138 243539 05MARION 138 1 OPEN BRANCH FROM BUS 243539 TO BUS 243550 CKT 1 / 243539 05MARION 138 243550 05OBETZ 138 1 END

Contingency Name	Contingency Definition
AEP_P5_#11273_05BEAT_05BEAT	CONTINGENCY 'AEP_P5_#11273_05BEAT_05BEAT' OPEN BRANCH FROM BUS 243469 TO BUS 246648 CKT 1 / 243469 05BEATTY 138 246648 05BEATTY 69.0 1 OPEN BRANCH FROM BUS 243453 TO BUS 243469 CKT 3 / 243453 05BEATTY 345 243469 05BEATTY 138 3 OPEN BRANCH FROM BUS 243453 TO BUS 243469 CKT 4 / 243453 05BEATTY 345 243469 05BEATTY 138 4 OPEN BRANCH FROM BUS 243469 TO BUS 247896 CKT 1 / 243469 05BEATTY 138 247896 05BOLTON 138 1 OPEN BRANCH FROM BUS 243469 TO BUS 243540 CKT 1 / 243469 05BEATTY 138 243540 05MCOMBS 138 1 OPEN BRANCH FROM BUS 243469 TO BUS 243586 CKT 1 / 243469 05BEATTY 138 243586 05WHITER 138 1 OPEN BRANCH FROM BUS 243481 TO BUS 243586 CKT 1 / 243586 05WHITER 138 243481 05CANAL 138 1 OPEN BRANCH FROM BUS 243469 TO BUS 243588 CKT 1 / 243469 05BEATTY 138 243588 05WILSON 138 1 OPEN BRANCH FROM BUS 243469 TO BUS 243593 CKT 1 / 243469 05BEATTY 138 243593 05ZUBER 138 1 OPEN BRANCH FROM BUS 243469 TO BUS 926010 CKT 1 / 243469 05BEATTY 138 926010 AC1-078 TAP 138 1 OPEN BRANCH FROM BUS 926010 TO BUS 238908 CKT 1 / 926010 AC1-078 TAP 138 238908 02LONDON 138 1 OPEN BRANCH FROM BUS 243522 TO BUS 243593 CKT 1 / 243522 05HARRISON 138 243593 05ZUBER 138 1 REMOVE SWSHUNT FROM BUS 243540 / 243540 05MCOMBS REMOVE LOAD D5 FROM BUS 243469 / 243469 05BEATTY 138 REMOVE LOAD D6 FROM BUS 243469 / 243469 05BEATTY 138 REMOVE LOAD D1 FROM BUS 243593 / 243593 05ZUBER 138 REMOVE LOAD D2 FROM BUS 243593 / 243593 05ZUBER 138 OPEN BRANCH FROM BUS 244692 TO BUS 246648 CKT 1 / 244692 05BALLAHSS 69.0 246648 05BEATTY 69.0 1 OPEN BRANCH FROM BUS 246648 TO BUS 246657 CKT 1 / 246648 05BEATTY 69.0 246657 05GALLOWAY 69.0 1 END

11 Short Circuit Analysis

The following Breakers are overdutied

None

12 Affected Systems

12.1 TVA

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

12.2 Duke Energy Progress

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

12.3 MISO

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

12.4 LG&E

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