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TEP
Tucson Electric Power
88 East Broadway Blvd., P.O. Box 711,
Tucson, AZ 85702

Arizona Corporation Commission
DOCKETED

JAN 30 2017

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January 30, 2017

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Re: Notice of Filing -Tucson Electric Power Company's Ten-Year Plan Transmission Projects 2017-2026
Docket No. E-00000D-17-0001

Pursuant to A.R.S § 40-360.02, attached is an original and thirteen copies of Tucson Electric Power Company's ("TEP") Ten-Year Plan Transmission Projects for years 2017-2026. As required by Decision No. 74785 (October 24, 2014), this plan includes a study report on the effects of distributed generation and energy efficiency on TEP's future transmission needs.

If you have any questions, please contact me at (520) 884-3680.

Sincerely,

Melissa Morales
Regulatory Services Coordinator

cc: Compliance Section, ACC

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AZ CORP COMMISSION
DOCKET CONTROL
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Tucson Electric Power

TEN-YEAR PLAN TRANSMISSION PROJECTS FOR YEARS 2017-2026

JANUARY 31, 2017

DOCKET NO:

E-00000D-17-0001

Tucson Electric Power

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TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS
2017-2026

Introduction

General Overview

Pursuant to A.R.S. § 40-360.02, Tucson Electric Power Company ("TEP") hereby submits its 2017-2026 Ten-Year Transmission Projects Plan ("TYP") to the Arizona Corporation Commission ("Commission"). This TYP describes the transmission facility projects of 115 kilovolt ("kV") or higher that TEP may construct between the years 2017-2026. The plan also describes conceptual projects that either may have a Certificate of Environmental Compatibility ("CEC") in place or were included in previous ten-year plans but are not scheduled in-service within the current ten-year plan period.

The TYP was prepared consistent with in-service dates for new distribution substations as determined by TEP distribution planning process. The study was conducted in 2016 and the results of the study are represented in the TYP. Estimated in-service dates may vary depending upon changes in regulatory requirements, underlying assumptions, other utilities' plans and economic conditions.

Load Forecasting

The TYP was developed based on a forecast that takes into account renewable distributed generation ("DG") and energy efficiency ("EE") programs, as well as TEP's retail customer load.

Project Status Definitions

Planned Projects:

The TYP includes projects for TEP's 500-kV and 345-kV extra high voltage ("EHV") transmission system, as well as planned projects for TEP's 138-kV high voltage ("HV") transmission System. Previously reported planned projects that have been canceled are not included.

Conceptual Projects:

For informational purposes, TEP has also included "conceptual" projects for both the EHV and HV transmission systems. Because these conceptual projects are not expected to be built within the ten-year planning horizon, their in-service date is shown as "to be determined" ("TBD"). These conceptual projects may become planned projects as they move into the ten-year planning horizon in subsequent studies.

Completed Projects:

Projects submitted in previous TYPs that have been completed are designated as such in the TYP for tracking purposes. See **Table 1** for a summary of completed projects. These projects will be removed from future TYPs.

Table 1, Completed Projects

Project	In-Service Date
Canoa Ranch 138-kV Capacitor Bank #1 Addition (24.4 MVAC)	10/21/2016
North Loop 138-kV Capacitor Banks #1 and #2 Upgrade (48.9MVAC)	4/28/2016

Biennial Transmission Assessment Orders ("BTA")

In the First BTA Decision (Decision No. 63876, July 25, 2001), the Commission ordered utilities to file, with their TYPs, internal planning criteria and system ratings with limiting elements identified. Upon request from the Commission, TEP can provide this information under separate cover with confidential treatment[1]. TEP's transmission systems are planned to meet the North American Electric Reliability Corporation ("NERC") Transmission Planning ("TPL") Standards effective at the time the study was conducted. TEP's internal planning criteria is consistent with these standards.

Consistent with the Sixth BTA Decision (Decision No. 72031, December 10, 2010), the Commission ordered that the Ten-Year Plan contain planned transmission re-conductor projects, substation transformer replacements, reactive compensation projects, and an evaluation of DG and EE programs that will affect TEP's retail customer load and future transmission needs. These items have been included, however, the evaluation of the effects of DG and EE are consistent with the requirements as set forth in the Eighth BTA Decision (Decision No. 74785, Oct 24. 2014).

In the Seventh BTA Decision (Decision No. 73625, December 12, 2012), the Commission ordered suspension of the requirement for Reliability Must Run ("RMR") studies and implemented criteria for re-starting RMR studies based on a biennial review of the factors set forth in Seventh BTA Decision. Criteria that would trigger re-starting the RMR studies include:

- An increase of more than 2.5% in the load forecast since the previous BTA (e.g., relative to the final RMR study year for which the RMR studies were last filed, 2880MW for TEP load pocket per 7th BTA, table 11, page 51).

[1] Consistent with securing and sharing confidential treatment of Critical Energy Infrastructure Information under FERC Order No. 833 (November 17, 2016, Docket RM16-15-000).

- Planned retirement (or an unexpected long-term outage during the summer months of June, July or August) of a transmission or substation facility required to serve an RMR load pocket, unless a facility being retired will be replaced with a comparable facility before the next summer season.
- Planned retirement (or an unexpected long-term outage during the summer months of June, July or August) of a generating unit in an RMR load pocket that has been utilized in the past for RMR purposes, unless a generator being retired will be replaced with a comparable unit before the next summer season.
- A significant customer outage in an RMR load pocket during summer months.

Upon review of these factors, TEP is not required to conduct RMR studies for the Tucson RMR load pocket.

In the Eighth BTA Decision (Decision No. 74785, Oct 24. 2014), the Commission ordered utilities with retail load to file a study with the Commission as part of the Ninth BTA docket identifying the effects of DG and EE installation and/or programs on future transmission needs. This Study Report ("Study Report") is included as Attachment A. As set forth in the Study Report, there were no additional transmission system needs identified and therefore no additional projects were required due to the effects of DG and EE. All EHV and HV projects included in the Ten-Year Plan would be required with or without the effects of DG and EE programs. The impact of DG and EE programs did not result in a delay or cancellation of any projects identified for the 2021 study year when DG and EE were included, nor were any additional projects required if the effects of DG and EE are not considered. Impacts of the DG & EE programs to the TEP distribution system were not a part of the scope of this study. Additional cost and construction

requirements throughout the system would result if the distribution system were included in any study.

In the Ninth BTA Decision (Decision No. 75817, November 21, 2016), the Commission confirmed that each study required for the Ninth BTA demonstrated that the Arizona transmission system is reasonably prepared to reliably serve load in the ten year timeframe. The Commission confirmed the continued suspension of the requirement to perform RMR studies in every BTA. The Commission also confirmed the suspension of the requirement for TEP to file the Southwest Area Transmission Planning Group ("SWAT") Coal Reduction Assessment Task Force ("CRATF") report on behalf of the Arizona utilities within 30 days of completion as directed in Decision No. 74785. Utilities shall participate in the WestConnect Regional Planning process and coordinate Arizona reliability studies with WestConnect study and scenario results, and TEP will report the Endings on behalf of the utilities in future BTA Proceedings.

Transmission Planning Process

TEP conducted a power flow analysis to identify thermal overloads under normal and contingency conditions in compliance with the NERC Reliability Standards and Western Electricity Coordinating Council ("WECC") Transmission System Planning Performance Criteria. Proposed projects were determined such that the performance measures of the NERC Reliability Standards and WECC Transmission System Planning Performance Criteria are met for Category P0 and P1-P7 conditions as defined in NERC Standard TPL-001-4 and WECC TPL-001-WECC-CRT-3.

EHV Projects

TEP is a member of the WestConnect Planning Area[2] and SWAT. TEP actively participates in various WestConnect committees and SWAT workgroups to ensure that its EHV system is properly studied and that EHV and HV systems are accurately modeled in Regional or Sub-Regional evaluations.

TEP has both 345-kV and 500-kV facilities on its EHV system. The EHV project summaries have been divided into categories that define each of the projects. See **Table 2** for a description of categories. See ***Figures 1, 2*** and ***3*** for maps depicting approximate routing and project locations for the EHV projects.

Table 2, EHV Project Categories

Projects	Description
Planned EHV Transmission	Those planned EHV projects with projected in-service dates between 2017-2026 as needed to support the EHV transmission system
Planned Reactive EHV	Those planned EHV projects with projected in-service dates between 2017-2026 that will provide voltage support for the EHV transmission system
Conceptual EHV Transmission	Those planned EHV projects that either may have a Certificate of Environmental Compatibility ("CEC") in place or have been included within previous ten-year plans but are not scheduled to be in-service between 2017-2026

HV Projects

TEP conducts an annual review of its HV transmission system performance over a ten-year planning period. This results in the identification of upgrades to existing facilities as well as the

[2] see http://regplanning.westconnect.com

need for new facilities to meet system performance requirements over the period along with associated in-service dates to ensure adequate transmission capacity within TEP's service territory. Capital improvements are proposed for the TEP 138-kV system to accommodate the addition of new 138/13.8 kV substations to address increased transmission facility loading and mitigate localized stability issues.

The HV project summaries have been divided into categories that define the placement of the project. See **Table 3** for summary of project categories. See ***Figure 4*** for a map depicting approximate routing and locations for the HV projects.

Table 3 HV Project Categories

Projects	Description
Planned HV Transmission	Those planned HV projects with projected in-service dates between 2017-2026 as needed to support the local TEP 138-kV transmission system
Planned Reactive HV	Those planned HV projects with projected in-service dates between 2017-2026 that will provide voltage support for the local TEP 138-kV transmission system
Conceptual HV Transmission	Those planned HV projects that that may have a CEC in place or have been included within previous ten-year plans but are not scheduled in-service between 2017-2026

Transmission System Maps

The Ten-Year Plan includes system maps depicting the existing transmission networks along with the addition of planned or conceptual projects, followed by individual project descriptions for both the EHV and HV transmission systems. The maps and related descriptions are intended to be general planning-level documents to describe projects conceptually. The maps and descriptions are not intended to represent specific routes or geographic project locations.

Transmission System Maps

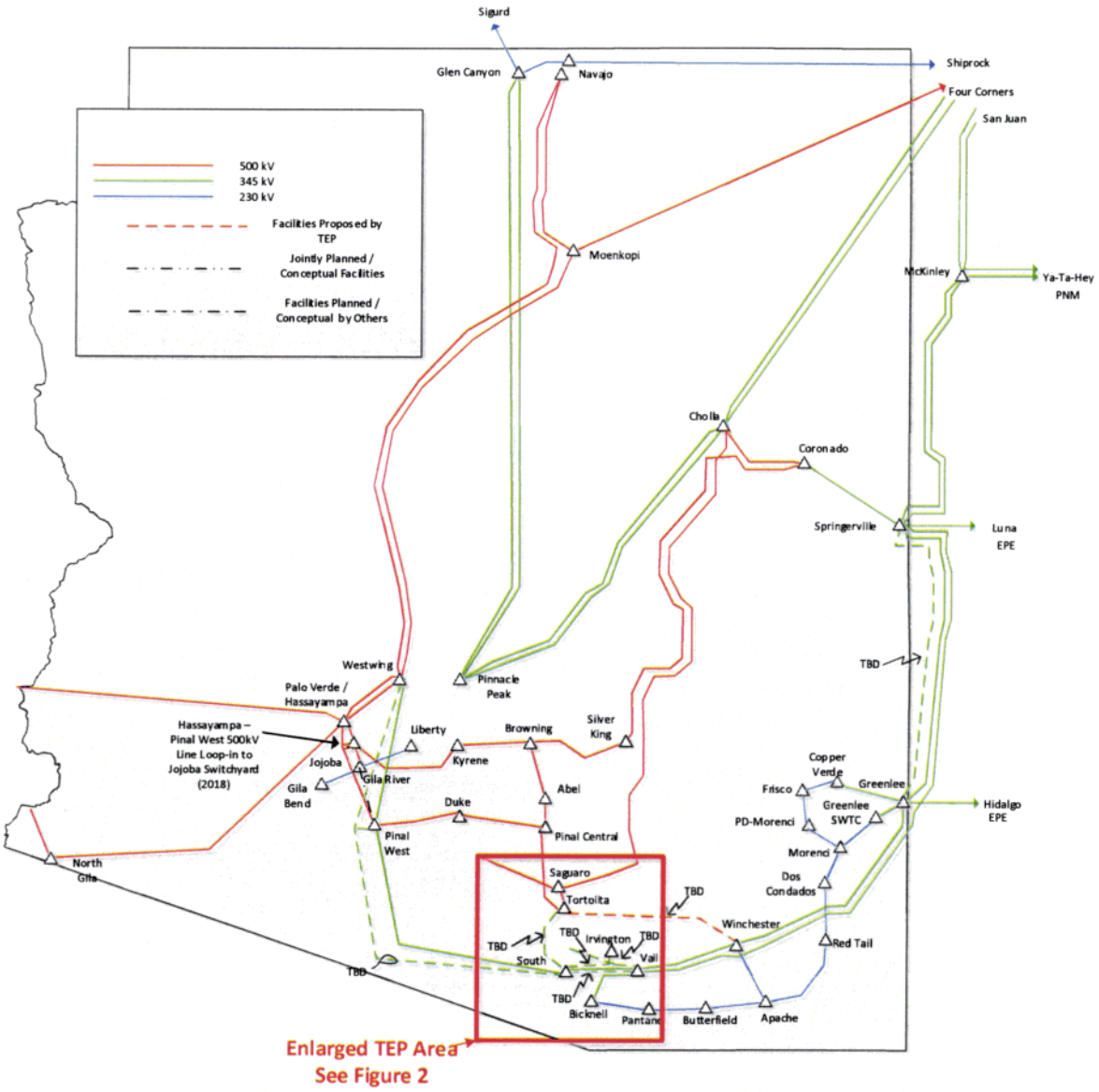

Figure 1 Existing and Planned / Conceptual EHV Transmission Facilities Map

Tucson Electric Power

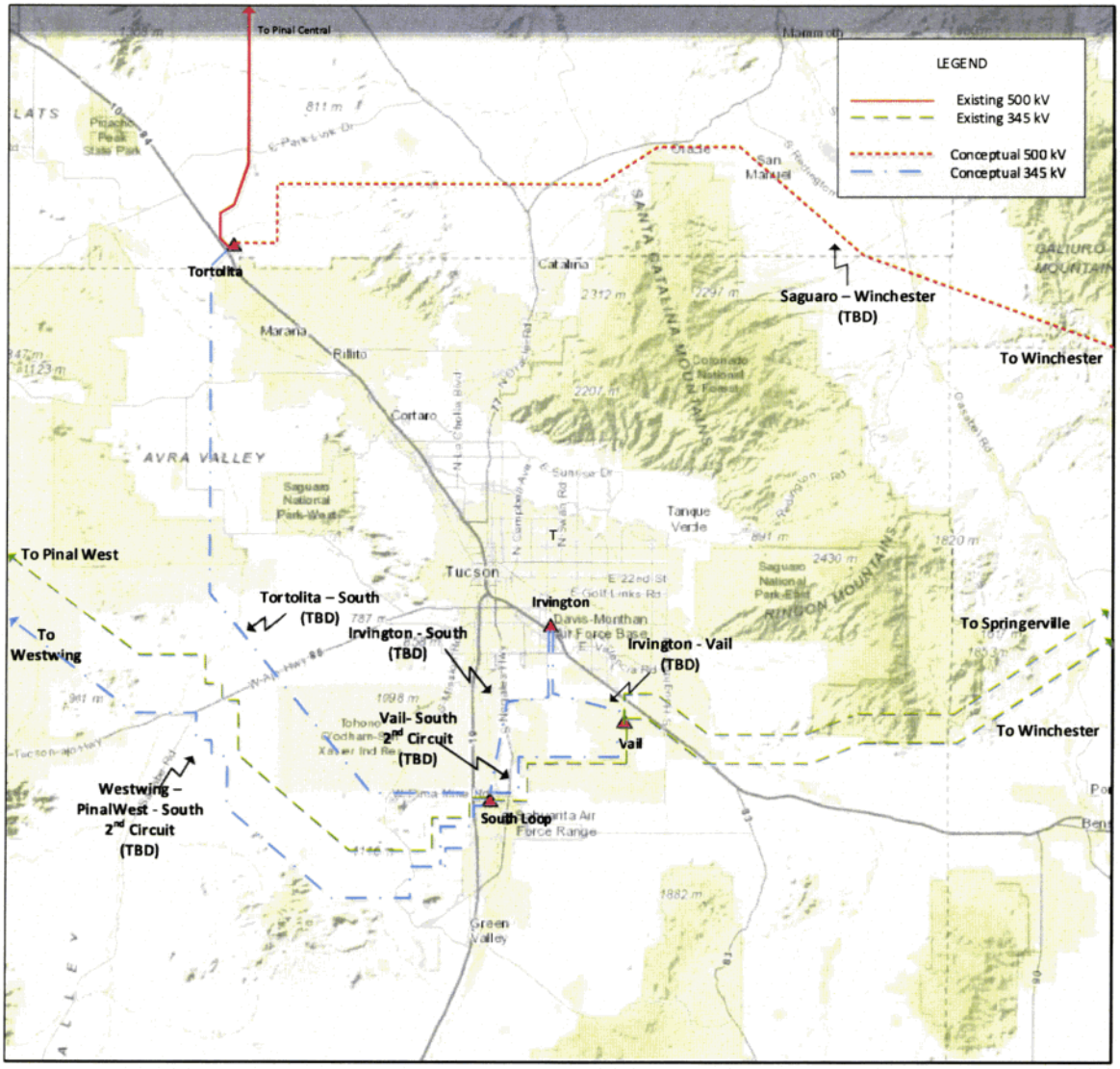

Figure 2 Local Existing and Conceptual EHV Transmission Facilities Map

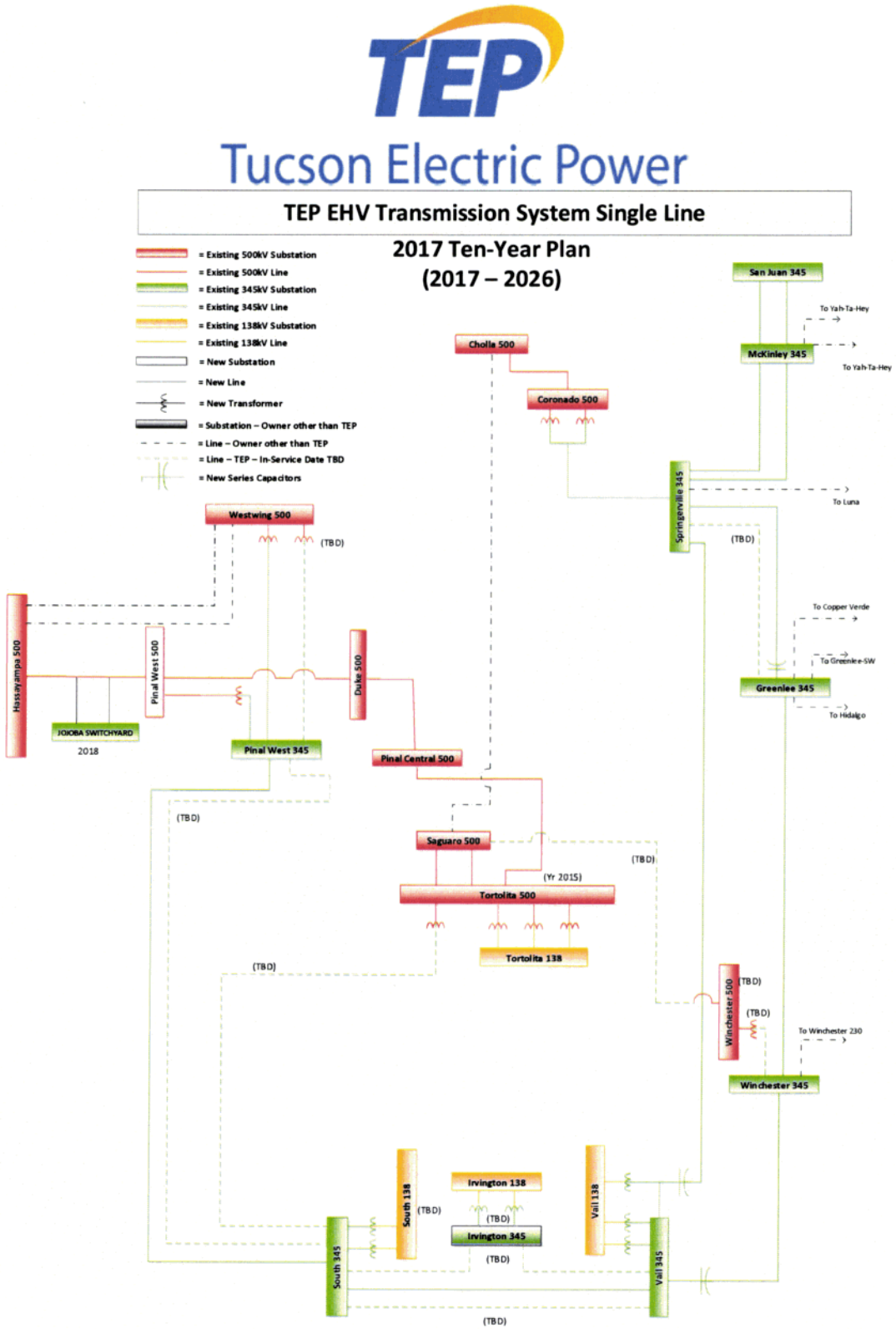

Figure 3 Existing and Planned EHV Transmission Facilities Single-Line Diagram

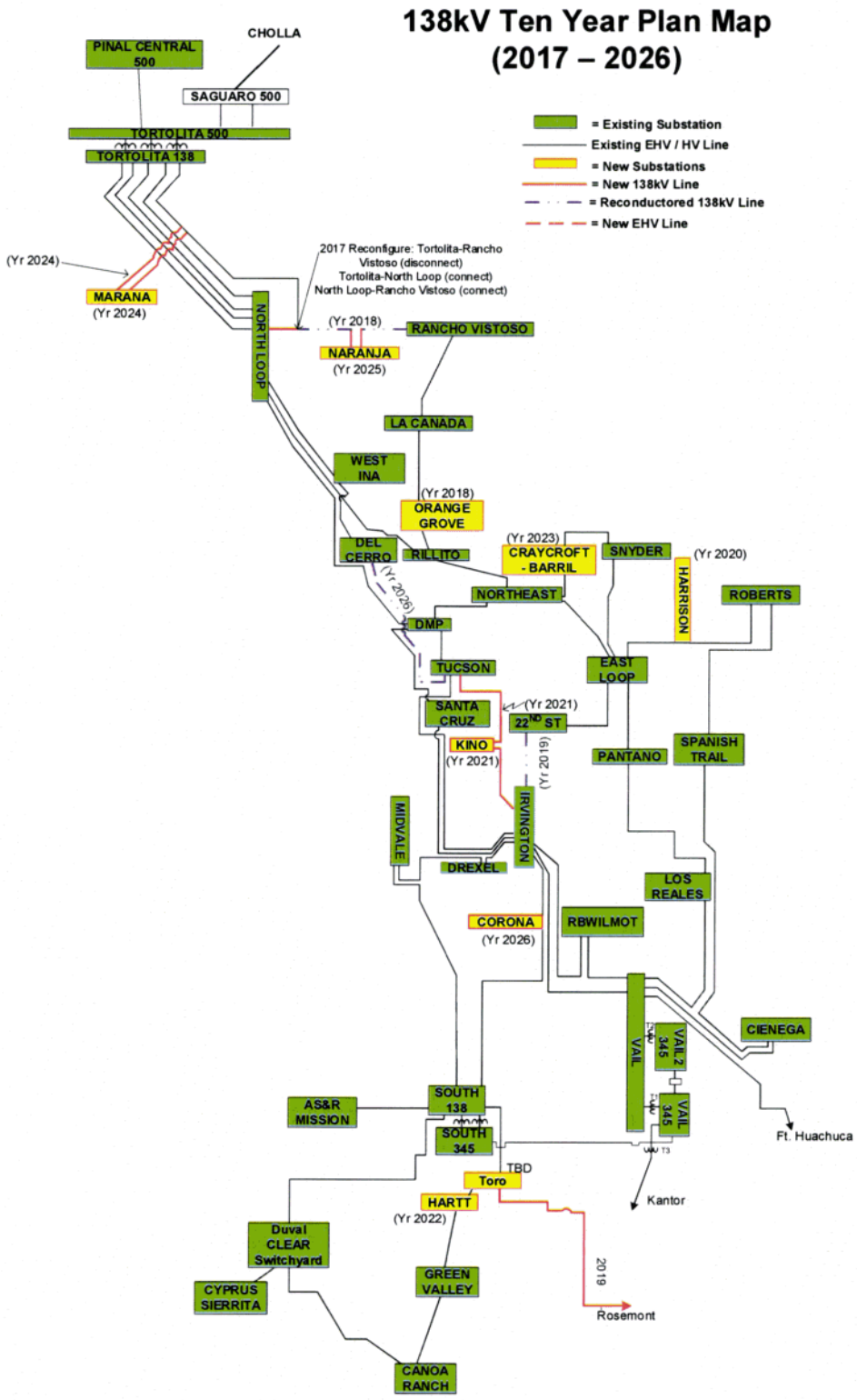

Figure 4 TEP Local Area 138-kV Ten Year Transmission Plan

Planned EHV Transmission Projects

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Hassayampa – Pinal West 500-kV Line Loop-in to Jojoba Switchyard	
Facility Parameters:	
a) Voltage:	500-kV
b) Capacity:	System dependent
c) Point of Origin:	Jojoba substation
d) Point of Termination:	Interconnection with existing Hassayampa – Pinal West line
e) Length:	Less than 3 spans
Routing:	Drop existing line into existing switchyard
Purpose:	To provide connectivity between existing 500-kV transmission lines.
Date:	
a) Construction Start:	2018
b) In-Service Date:	2018
Is Certificate Necessary:	Certificate is part of Case # 124
Technical Studies:	Initial interconnection request submitted to SRP in 2014. In April 2015, SRP began the Interconnection Facilities Study ("IFAS"). SRP issued to TEP a draft IFAS report in December 2015. SRP will continue to work to complete the IFAS and draft report at the earliest possible time.

Conceptual EHV Transmission Projects

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Vail Substation to Irvington Substation	
Facility Parameters:	
a) Voltage:	345-kV
b) Capacity:	System dependent
c) Point of Origin:	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination:	Irvington Substation (Sec. 03 T15S R14E)
e) Length:	Approximately 11 miles
Routing:	TBD
Purpose:	To reinforce TEP's EHV system and to provide a new tie between TEP's HV and EHV systems.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Yes
Technical Studies:	Studies in progress via SWAT and internal TEP study efforts.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington Substation to South Substation	
Facility Parameters:	
a) Voltage:	345-kV
b) Capacity:	System dependent
c) Point of Origin:	Irvington Substation (Sec. 03 T15S R14E)
d) Point of Termination:	South Substation (Sec. 36 T16S R13E)
e) Length:	Approximately 16 miles
Routing:	TBD
Purpose:	To reinforce TEP's EHV system and to provide a new tie between TEP's HV and EHV systems.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Yes
Technical Studies:	Studies in progress via SWAT and internal TEP study efforts.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Saguaro Substation to Winchester Substation	
Facility Parameters:	
a) Voltage:	500-kV
b) Capacity:	System dependent
c) Point of Origin:	Saguaro Substation
d) Point of Termination:	Winchester Substation
e) Length:	Approximately 80 miles
Routing:	In accordance with the CEC approved in Decision 46801 (January 23, 1976).
Purpose:	To reinforce TEP's EHV system and to provide additional capacity for the flow of power from the Palo Verde area into TEP's eastern transmission system.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Certificate is part of case # 23
Technical Studies:	Studies in progress via SWAT and internal TEP study efforts.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Vail Substation to South Substation – 2nd circuit	
Facility Parameters:	
a) Voltage:	345-kV or 500-kV
b) Capacity:	System dependent
c) Point of Origin:	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination:	South Substation (Sec. 36 T16S R13E)
e) Length:	14 miles
Routing:	Parallel and adjacent to existing Vail – South Line.
Purpose:	To reinforce TEP's EHV system and to provide additional transmission capacity between Vail and South Substations.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Certificate is part of case # 15
Technical Studies:	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Springerville Substation to Greenlee Substation - 2nd circuit	
Facility Parameters:	
a) Voltage:	345-kV
b) Capacity:	System dependent
c) Point of Origin:	Springerville Substation (Sec. 34 T11N R30E)
d) Point of Termination:	Greenlee Substation (Sec. 29 T5S R31E)
e) Length:	110 miles total, 27 miles in Arizona
Routing:	Parallel and adjacent to existing Springerville to Greenlee line.
Purpose:	To reinforce TEP's EHV system and to provide additional transmission capacity between Vail and South Substations.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Certificate is part of case #'s 12, 30, 63 and 73
Technical Studies:	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Tortolita Substation to South Substation	
Facility Parameters:	
a) Voltage:	345-kV
b) Capacity:	System dependent
c) Point of Origin:	Tortolita Substation (Sec. 23 T10S R10E)
d) Point of Termination:	South Substation (Sec. 36 T16S R13E)
e) Length:	68 miles
Routing:	From Tortolita Substation south through Avra Valley to existing Westwing-South 345-kV transmission line right-of-way, then parallel and adjacent to existing Westwing – South line to South Substation.
Purpose:	To reinforce TEP's EHV system and to provide additional capacity for the flow of power in Southern Arizona.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Certificate is part of case # 50
Technical Studies:	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 70's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Westwing Substation to South Substation – 2nd circuit	
Facility Parameters:	
a) Voltage:	345-kV or 500-kV
b) Capacity:	System dependent
c) Point of Origin:	Westwing Substation (Sec. 12 T4N R1W)
d) Point of Termination:	South Substation (Sec. 36 T16S R13E)
e) Length:	178 miles
Routing:	Parallel and adjacent to existing Westwing to South line and will include loop-in to Pinal West.
Purpose:	To deliver power and energy from major TEP interconnections in the Northwest Phoenix region.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Certificate is part of case # 15
Technical Studies:	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Gila River to Pinal West 500-kV Transmission Line	
Facility Parameters:	
a) Voltage:	500-kV
b) Capacity:	System dependent
c) Point of Origin:	Gila River Switchyard
d) Point of Termination:	Pinal West Substation
e) Length:	37 to 50 miles depending upon routing
Routing:	TBD
Purpose:	Proposed joint project by TEP and American Southwest Transmission Company (ASWTC), to reinforce the existing transmission grid and increase capacity between the Gila River Power Plant and points east.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	Yes
Technical Studies:	Studies in progress via TEP and ASWTC.

Planned HV Transmission Projects

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
North Loop – Rancho Vistoso 138-kV Line Re-Conductor	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	North Loop Substation
d) Point of Termination:	Rancho Vistoso Substation
e) Length:	Approximately 10.5 Miles
Routing:	Existing
Purpose:	Required to comply with reliability standards. Required for flows on line exceeding existing rating of 1574A. Final rating to be 2264A continuous.
Date:	
a) Construction Start:	2017
b) In-Service Date:	2018
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington – 22nd Street 138-kV Line Re-Conductor	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Irvington Substation
d) Point of Termination:	22nd Street Substation
e) Length:	Approximately 4 Miles
Routing:	Existing
Purpose:	Required to comply with reliability standards. Required for flows on line exceeding existing rating of 1986A. Final rating to be 2000A continuous.
Date:	
a) Construction Start:	2019
b) In-Service Date:	2019
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Del Cerro– Tucson 138-kV Line Re-Conductor	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Del Cerro Substation
d) Point of Termination:	Tucson Substation
e) Length:	Approximately 6.75 miles
Routing:	Existing
Purpose:	Required to comply with reliability standards. Required for flows on line exceeding existing rating of 1749A. Final rating to be 2264A continuous and 2538A emergency.
Date:	
a) Construction Start:	2025
b) In-Service Date:	2026
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies.

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Tortolita Substation – Rancho Vistoso Substation Reconfiguration to Tortolita Substation – North Loop Substation #5 and North Loop Substation – Rancho Vistoso Substation	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Tortolita Substation
d) Intermediate Point:	North Loop Substation
e) Point of Termination:	Rancho Vistoso Substation
f) Length:	Approximately 22 miles
Routing:	Existing
Purpose:	To provide a more reliable connection to the existing Rancho Vistoso substation.
Date:	
a) Construction Start:	2017
b) In-Service Date:	2017
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Future Toro Switchyard to Rosemont Substation Radial 138 kV Distribution line	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	TBD
c) Point of Origin:	Future Toro Switchyard that will be a loop-in of the TEP South – Green Valley 138-kV Line (Sec. 29 T17S R14E)
d) Point of Termination:	Future Rosemont Switchyard (Sec. 30 T18S R16E)
e) Length:	Approximately 13.2 miles
Routing:	Existing
Purpose:	To provide electrical service to large retail customer (mine load) located east of Green Valley, AZ
Date:	
a) Construction Start:	2018
b) In-Service Date:	2019(Dependent upon approval of Mine Record of Decision from United States Forest Service)
Is Certificate Necessary:	Certificate is part of case # 164
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Loop-in of existing La Canada – Rillito 138-kV Transmission Line into future Orange Grove 138-kV Substation	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	La Canada 138-kV Substation
d) Interim Point:	Future Orange Grove 138-kV Substation
e) Point of Termination:	Rillito 138-kV Substation
f) Length:	Loop-in off of existing line
Routing:	Existing
Purpose:	Loop-in of the existing La Canada - Rillito 138-kV circuit and drop into future station adjacent to the right-of-way
Date:	
a) Construction Start:	2017
b) In-Service Date:	2018
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Vail Substation to East Loop Substation through Spanish Trail and Roberts Substations, looping-in the Roberts-East Loop line to the future Harrison Substation.	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination:	East Loop Substation (Sec. 8 T14S R15E)
e) Length:	1. Phase 1: Vail Substation to East Loop Substation: 22 miles 2. Phase 2: East Loop – Roberts – 7 miles, Spanish Trail to Roberts – 5.75 miles 3. Phase 3: Vail Substation to East Loop Substation: 22 miles 4. Phase 4: East Loop – future Harrison: Approximately 3 miles Roberts – future Harrison – approximately 4 miles
Routing:	East and north from Vail Substation along existing transmission line to Irvington and Houghton Roads, then north along Houghton Road to Speedway Boulevard, then east and north to Roberts Substation and west along Speedway to East Loop Substation.
Purpose:	To provide additional electric service to the eastern portion of TEP's service area and to reinforce the local transmission system.
Date:	
a) Construction Start:	1976
b) In-Service Date:	1. Phase 1: Completed, 1977 (Spanish Trail Substation to East Loop and Vail Substation.) 2. Phase 2: Completed, 1983 (Roberts Substation and associated 138-kV lines.) 3. Phase 3: TBD 4. Phase 4: 2020 (Loop-in of the existing Roberts –East Loop 138-kV circuit and drop into future Harrision 138-kV Substation adjacent to the right-of-way.)
Is Certificate Necessary:	Certificate is part of case # 8
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington Substation –Tucson Station #2 138-kV	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Irvington 138-kV Substation
d) Interim Point:	Future Kino 138-kV Substation
e) Point of Termination:	Tucson 138-kV Substation
f) Length:	Irvington – Kino – approximately 6 miles Kino – Tucson – approximately 5 miles
Routing:	To be determined
Purpose:	To connect the future Kino 138/13.8 kV Substation to the local 138-kV system.
Date:	
a) Construction Start:	2020
b) In-Service Date:	2021
Is Certificate Necessary:	Yes
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Loop-in of future Toro – Green Valley 138-kV transmission line into future Hartt 138-kV substation	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Future Toro 138-kV Substation (to be constructed in 2018)
d) Interim Point	Future Hartt 138-kV Substation (to be constructed in 2022)
e) Point of Termination:	Green Valley 138-kV Substation
f) Length:	Loop-in off of existing line
Routing:	Looping the existing South – Future Toro – Green Valley 138-kV circuit and drop into future station adjacent to the right-of-way
Purpose:	Required to connect the future Hartt 138/13.8 kV Substation to the local 138-kV system.
Date:	
a) Construction Start:	2018
b) In-Service Date:	2022
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Loop-in of existing Northeast – Snyder 138-kV Transmission Line into future Craycroft-Barril 138-kV Substation	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Northeast 138-kV Substation
d) Interim Point	Future Craycroft-Barril 138-kV Substation
e) Point of Termination:	Snyder 138-kV Substation
f) Length:	Loop-in off of existing line
Routing:	Existing Northeast-Snyder Corridor. Requires 1 span of wire to drop into station.
Purpose:	Required to connect the future Craycroft-Barril 138/13.8 kV Substation to the local 138-kV system.
Date:	
a) Construction Start:	2022
b) In-Service Date:	2023
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Interconnection of Tortolita – North Loop #5 138-kV with future TEP Marana 138-kV Substation	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Tortolita 138-kV Substation
d) Interim Point	Future Marana 138-kV Substation
e) Point of Termination:	North Loop 138-kV Substation
f) Length:	Approximately 4 miles from existing circuit
Routing:	Loop-in a circuit from the Tortolita- North Loop corridor (line 125) at the Trico-Marana Rd. alignment and extend approximately 4 miles of double-circuit pole-line west across I-10 to proposed Marana substation site near Sanders Rd.
Purpose:	Required to connect the future Marana 138/13.8 kV Substation to the local 138-kV system.
Date:	
a) Construction Start:	2023
b) In-Service Date:	2024
Is Certificate Necessary:	Yes
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Interconnection of North Loop – Rancho Vistoso 138-kV line with future Naranja 138-kV Substation	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	North Loop 138-kV Substation
d) Interim Point	Future Naranja 138-kV Substation
e) Point of Termination:	Rancho Vistoso 138-kV Substation
f) Length:	Approximately 1mile from existing circuit
Routing:	Loop-in a circuit from the North Loop – Rancho Vistoso corridor alignment and extend approximately 1 mile of double-circuit pole-line south to future Naranja substation site.
Purpose:	Required to connect the future Naranja 138/13.8 kV Substation to the local 138-kV system.
Date:	
a) Construction Start:	2024
b) In-Service Date:	2025
Is Certificate Necessary:	Yes
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Interconnection of existing Irvington – South Loop 138-kV Transmission Line into future Corona 138-kV Substation	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System dependent
c) Point of Origin:	Irvington 138-kV Substation
d) Interim Point	Future Corona 138-kV Substation
e) Point of Termination:	South Loop 138-kV Substation
f) Length:	Approximately 1mile from existing circuit
Routing:	Existing Irvington – South Loop Corridor. Requires 1 span of wire to drop into station.
Purpose:	Required to connect the future Corona 138/13.8 kV Substation to the local 138-kV system.
Date:	
a) Construction Start:	2025
b) In-Service Date:	2026
Is Certificate Necessary:	Yes
Technical Studies:	Annual 138-kV planning studies

Planned HV Reactive Projects

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
North Loop Substation 138-kV Capacitor Banks #1 and #2 Upgrade	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	Exist: 36.7 MVAC each at 138-kV Proposed: 48.9 MVAC each at 138-kV
c) Point of Origin:	North Loop Substation
d) Point of Termination:	North Loop Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2016
b) In-Service Date:	2016, In-service[3]
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

[3] This project has been completed and will be removed from future Ten Year Plans

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Canoa Ranch 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	24.4 MVAC at 138-kV
c) Point of Origin:	Canoa Ranch Substation
d) Point of Termination:	Canoa Ranch Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2016
b) In-Service Date:	2016, In-service[4]
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

[4] This project has been completed and will be removed from future Ten Year Plans

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Roberts Substation 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	24.4 MVAC at 138-kV
c) Point of Origin:	Roberts Substation
d) Point of Termination:	Roberts Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2017
b) In-Service Date:	2017
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Midvale Substation 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	24.4 MVAC at 138-kV
c) Point of Origin:	Midvale Substation
d) Point of Termination:	Midvale Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2017
b) In-Service Date:	2017
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington Substation 138-kV Capacitor Bank #3 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	26.4 MVAC at 138-kV
c) Point of Origin:	Irvington Substation
d) Point of Termination:	Irvington Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2020
b) In-Service Date:	2020
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Pantano Substation 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	26.4 MVAC at 138-kV
c) Point of Origin:	Pantano Substation
d) Point of Termination:	Pantano Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2020
b) In-Service Date:	2020
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
22nd Street Substation 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	26.4 MVAC at 138-kV
c) Point of Origin:	22nd Street Substation
d) Point of Termination:	22nd Street Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2020
b) In-Service Date:	2020
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Drexel Substation 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	26.4 MVAC at 138-kV
c) Point of Origin:	Drexel Substation
d) Point of Termination:	Drexel Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2021
b) In-Service Date:	2021
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Robert Bills Substation 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	26.4 MVAC at 138-kV
c) Point of Origin:	Robert Bills Substation
d) Point of Termination:	Robert Bills Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2021
b) In-Service Date:	2021
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Orange Grove Substation 138-kV Capacitor Bank #1 Addition	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	26.4 MVAC at 138-kV
c) Point of Origin:	Orange Grove Substation
d) Point of Termination:	Orange Grove Substation
e) Length:	NA
Routing:	NA
Purpose:	Voltage support of the TEP 138-kV system.
Date:	
a) Construction Start:	2021
b) In-Service Date:	2021
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Conceptual HV Transmission Projects

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington - Vail 138-kV Line Re-Conductor	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System Dependent
c) Point of Origin:	Irvington Substation
d) Point of Termination:	Vail Substation
e) Length:	Approximately 11 Miles
Routing:	Existing
Purpose:	To facilitate short notice interconnection of large industrial loads in the Port of Tucson area.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington – RobertBills - Vail 138-kV Line Re-Conductor	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System Dependent
c) Point of Origin:	Irvington Substation
d) Point of Termination:	Robert Bills Substation
e) Length:	Approximately 14 Miles
Routing:	Existing
Purpose:	This line is parallel to the Irvington – Vail 138-kV line and would need to be re-conductored for n-1 outages of the Irvington - Vail 138-kV line.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington – South 138-kV Line Re-Conductor	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System Dependent
c) Point of Origin:	Irvington Substation
d) Point of Termination:	South Substation
e) Length:	Approximately 18 Miles
Routing:	Existing
Purpose:	To facilitate short notice interconnection of large industrial loads in the TAA area.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington – Drexel – Midvale - South 138-kV Line Re-Conductor	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System Dependent
c) Point of Origin:	Irvington Substation
d) Interim Point:	Drexel Substation
e) Interim Point:	Midvale Substation
f) Point of Termination:	South Substation
g) Length:	Approximately 18 Miles
Routing:	Existing
Purpose:	This line is parallel to the Irvington – South 138-kV line and would need to be re-conductored for n-1 outages of the Irvington – South 138-kV line.
Date:	
a) Construction Start:	TBD
b) In-Service Date:	TBD
Is Certificate Necessary:	No
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Irvington Substation to East Loop Substation (through 22nd Street Substation)	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	System Dependent
c) Point of Origin:	Irvington Substation (Sec. 03 T15S R14E)
d) Point of Termination:	East Loop Substation (Sec. 08 T14S R15E)
e) Length:	Irvington – East Loop: 9 Miles (Total) • Phase 1: Irvington Substation to 22nd Street Substation: 4 miles • Phase 2: 22nd Street to East Loop Substation: 5 miles
Routing:	North and East of Irvington Substation, through 22nd Street Substation, then East and North to East Loop Substation.
Purpose:	To provide additional electric service to the central area of TEP's service area and to reinforce the local transmission system.
Date:	
a) Construction Start:	1985
b) In-Service Date:	• Phase 1: Completed, 1994 (Irvington Substation to 22nd Street Substation.) • Phase 2: Completed, 2000 (22nd Street Substation to East Loop Substation.) • Phase 3: TBD (2nd circuit of Phase 1.)
Is Certificate Necessary:	Certificate is part of case # 66
Technical Studies:	Annual 138-kV planning studies

Tucson Electric Power	TRANSMISSION PROJECTS TEN-YEAR PLAN
Project Designation:	
Future 138-kV Transmission line	
Facility Parameters:	
a) Voltage:	138-kV
b) Capacity:	TBD
c) Point of Origin:	TBD
d) Point of Termination:	TBD
e) Length:	TBD
Routing:	TBD
Purpose:	Beginning in the year 2025 the 138-kV North Loop – Rillito line shows up as an overloaded element given the loss of the North Loop – West Ina and North Loop DeMoss Petrie lines. This line will be need to eliminate the overload seen in future years
Date:	
a) Construction Start:	2024
b) In-Service Date:	2025
Is Certificate Necessary:	Yes
Technical Studies:	Annual 138-kV planning studies

Attachment A DG and EE Study Report

Tucson Electric Power

Study of the Effects of Distributed Renewable Generation and Energy Efficiency Programs

DOCKET NO: E-00000D-17-0001

Introduction

In the 6th BTA Decision (Decision 72031, December 10, 2010), the Arizona Corporation Commission ("Commission") ordered jurisdictional utilities to address the effects of distributed renewable generation ("DG") and energy efficiency ("EE") programs on future transmission needs in their ten-year plan filings. In the 8th BTA (Decision 74875, October 24, 2014), the Commission updated its original order such that only evaluation of DG and EE effects were to be done for the fifth year of the study only. This analysis was conducted to determine how the fifth year of the study would be affected by the absence of load reductions resulting through DG and EE programs.

Case Development

The study was conducted using the case developed for the 2021 study year used in the development of Tucson Electric Power's ("TEP") Ten-Year Plan ("TYP"). The case was developed from an approved Western Electric Coordinating Council ("WECC") base case. The study was performed for the 2021 study year.

Loads

Loads used were specifically developed for transmission planning for use in TEP's TYP and were approved by TEP management in December of 2015. This forecast takes into account DG and EE programs, as well as TEP's retail customer load. Forecasted DG and EE loads were provided from TEP's Energy Management department. These loads were provided as of March 2016. An additional 5% stability margin was added to each load within the TEP transmission planning area. This stability margin is added to ensure compliance with TPL-001-WECC-CRT-2.1 System Performance Regional Criterion. Loads used for the 2021 study year were as provided in ***Table 1*** below.

Table 1, Load Summary

Area	Tucson	Rosemont[5]	Santa Cruz[6]	Thornydale	DG	EE	Net	Without DG & EE
Load	2667	130	79.00	34.00	34	89	3033	2910
w/5% stability Margin	2800.35	136.5	82.95	35.70	34	89	3178.50	3055.5

Study Methodology

Power flow analysis was conducted to identify thermal overloads under normal and contingency conditions in compliance with the NERC Reliability Standards and Western Electricity Coordinating Council ("WECC") Transmission System Planning Performance Criteria. Proposed projects were determined such that the performance measures of the NERC Reliability Standards and WECC Transmission System Planning Performance Criteria are met for Category P0 and P1-P7 conditions as defined in NERC Standard TPL-001-4.

In order to study the effects of DG &EE, the DG & EE loads were added back into the 5th year case developed for the Ten-Year Plan. The newly developed DG & EE case ("case") was then studied using the same criteria as that used in the development of the TYP. Results of the output was compared with the results from the 2021 study year developed for the TYP.

Results and Summary

There were no additional transmission system needs identified and therefore no additional projects were required due to the effects of DG & EE. All projects included in the plan would be required with or without the effects of DG and EE programs. The impact

[5] The 2021 load forecast assumes that the proposed Rosemont Mine is at 100% production.
[6] TEP provides transmission services to UNS Electric's service area in Santa Cruz County.

of DG and EE programs did not result in a delay or cancellation of any projects required for the 2021 study year, nor were any additional projects required if the effects of DG and EE are not considered.

End of document