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AZ CORP COMMISSION
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BEFORE THE

ARIZONA POWER PLANT AND TRANSMISSION

LINE SITING COMMITTEE

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY, IN CONFORMANCE WITH THE REQUIREMENTS OF ARIZONA REVISED STATUTES §§ 40-360, *et seq.*, FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AUTHORIZING THE TS-5 TO TS-9 500/230 kV TRANSMISSION LINE PROJECT, WHICH ORIGINATES AT THE FUTURE TS-5 SUBSTATION, LOCATED IN THE WEST HALF OF SECTION 29, TOWNSHIP 4 NORTH, RANGE 4 WEST AND TERMINATES AT THE FUTURE TS-9 SUBSTATION, LOCATED IN SECTION 33, TOWNSHIP 6 NORTH, RANGE 1 EAST, IN MARICOPA COUNTY, ARIZONA.	Case No. 138 Docket No. L-00000D-08-0330-00138 **10,000 WEST'S NOTICE OF FILING EXHIBITS**

Arizona Corporation Commission
DOCKETED
DEC -9 2008
DOCKETED BY

10,000 West, L.L.C., by and through undersigned counsel, hereby files and submits its Notice of Filing Exhibits for the above-captioned matter. The following Exhibits, attached hereto, are being filed with Docket Control on this date as follows:

1. Exhibit 10-W1 – APS's 2007-2016 Ten Year Plan

2. Exhibit 10-W2 – APS's 2008-2017 Ten Year Plan

3. Exhibit 10-W3 – ACC's Fourth Biennial Transmission Assessment – 2006-2015

4. Exhibit 10-W4 – APS Year Plans 2008-2017 5th BTA Presentation

5. Exhibit 10-W5 – Gateway South & Transwest Express Conceptual Technical Report Appendix – Maps of Studied Alternatives

6. Exhibit 10-W6 – 2007 WestConnect Transmission Plan [Selected Pages]

7. Exhibit 10-W7 – APS' PowerPoint Presentation of Mike DeWitt (01/18/05)

8. Exhibit 10-W8 – Article "Utilities Report Lower Customer Growth Rate, Power Use" dated 08/08/08

9. Exhibit 10-W9 – Article: "Arizona Dealing with Inflated Population Counts" dated 06/15/08

10. Exhibit 10-W10 – WestConnect Alternative Routes

11. Exhibit 10-W11 – Hassayampa Map

12. Exhibit 10-W12 – Letter dated 02/01/06 from Town of Buckeye to Bureau of Land Management

13. Exhibit 10-W13 – MAG Future Use Study

14. Exhibit 10-W14 – Plaintiff's Motion for Summary Judgment [Selected Pages]

15. Exhibit 10-W15 – Various pictures of Festival Ranch site

16. Exhibit 10-W16 – Transwest Express and Gateway South PowerPoint

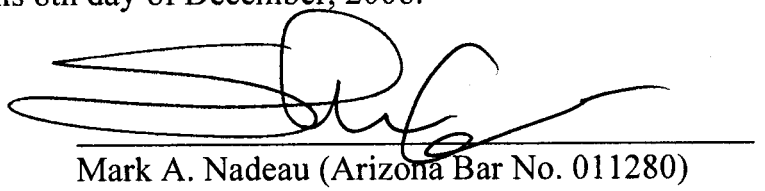
17. Exhibit 10-W17 – Interstate 10 – Hassayampa Valley Roadway Framework Study

18. Exhibit 10-W18 – Additional pictures of Festival Ranch site

19. Exhibit 10-W31– Right of First Offer Agreement Between APS and the Anschutz Corporation Regarding the TransWest Connect Project

20. Exhibit 10-W32 – Copies of Correspondence from W.L. Bouchard & Associates to APS on Behalf of 10,000 West to APS During the Public Comment Process

RESPECTFULLY SUBMITTED this 8th day of December, 2008.



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ORIGINAL and 25 **COPIES** of the foregoing filed this 8th day of December, 2008, to:

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By: _____
Linda Farrell

10-W1

ARIZONA PUBLIC SERVICE COMPANY
2007–2016
TEN-YEAR PLAN

Prepared for the

Arizona Corporation Commission

January 2007

ARIZONA PUBLIC SERVICE COMPANY
2007 - 2016
TEN-YEAR PLAN

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ARIZONA PUBLIC SERVICE COMPANY
2007–2016
TEN-YEAR PLAN

GENERAL INFORMATION

Pursuant to A.R.S. § 40-360.02, Arizona Public Service Company ("APS") submits its 2007-2016 Ten-Year Plan. Additionally, pursuant to Arizona Corporation Commission ("Commission") Decision No. 63876 (July 25, 2001) concerning the first Biennial Transmission Assessment, APS is including with this filing its Transmission Planning Process and Guidelines and maps showing system ratings on APS' transmission system. The Transmission Planning Process and Guidelines outline generally APS' internal planning for its high voltage and extra-high voltage transmission system, including a discussion of APS' planning methodology, planning assumptions, and its guidelines for system performance. The system ratings maps show emergency and continuous system ratings on APS' extra-high voltage system, and on its Metro, Northern, and Southern 230kV systems.

This 2007–2016 Ten-Year Plan describes planned transmission lines of 115kV or higher voltage that APS may construct, or participate in, over the next ten-year period. Pursuant to A.R.S. § 40-360(10), underground facilities are not included. There are approximately 228 miles of 500kV transmission lines, 109 miles of 230kV transmission lines, and 18 bulk transformers contained in the projects in this Ten-Year Plan filing. The total investment for the APS projects and the anticipated APS portion of the participation projects as they are modeled in this filing is estimated to be approximately $1 billion and the projects will add an expected 2000 MW of additional EHV scheduling capability. Also, over the next ten years the import capability into the Phoenix area will increase by 4170 MW, while the import capability into the Yuma area will

increase by 310 MW. The following table shows a breakdown of the projects contained in this Ten-Year Plan.

	Projects in Ten-Year Plan
500kV transmission lines	228 miles
230kV transmission lines	109 miles
Bulk Transformers	18
Total Investment	$1 billion
EHV Scheduling Capability	+2000 MW (+28 %)[1]
Total Phoenix Area Import	+4170 MW (+31 %)[1]
Yuma Area Import	+310 MW (+61 %)[1]

[1] Based on 2006 values.

Also, some of the previously reported facilities that have been completed, canceled, or deferred beyond the upcoming ten-year period are not included. The projects at the end of this Ten-Year Plan that have in-service dates of To Be Determined (TBD) are projects that have been identified, but are either still outside of the ten-year planning window or their in-service dates have not yet been established. They have been included in this filing for informational purposes. A summary of changes from last year's plan is provided below, along with a list of projects that have been added to this year's Ten-Year Plan. Also, a section is included that briefly describes any projects that are still in the feasibility planning phase.

For the convenience of the reader, APS has included system maps showing the electrical connections and in-service dates for all overhead transmission projects planned by APS for Arizona, the Phoenix Metropolitan Area, and the Yuma Area. Written descriptions of each proposed transmission project are provided on subsequent pages in the currently expected chronological order of each project. The line routings shown on the system maps and the descriptions of each transmission line are intended to be general, showing electrical connections and not specific routings, and are subject to revision. Specific routing is recommended by the Arizona Power Plant and Transmission Line Siting Committee and ultimately approved by the

Commission when issuing a Certificate of Environmental Compatibility and through subsequent right-of-way acquisition. Pursuant to A.R.S. § 40-360.02, this filing also includes technical study results for the projects identified. The technical study results show project needs which are generally based on either security (contingency performance), adequacy (generator interconnection or increasing transfer capability) or both.

APS participates in numerous regional planning organizations and in the WestConnect organization. Through membership and participation in these organizations the needs of multiple entities, and the region as a whole, can be identified and studied. This allows for the potential of maximizing the effectiveness and utilization of new projects. Regional organizations that APS is a member of include the Western Electricity Coordinating Council (WECC), the Southwest Area Transmission Planning (SWAT), and the Southwest Transmission Expansion Plan (STEP). The plans included in this filing are the result of these coordinated planning efforts. APS is open to other entities participating in any existing or future planned projects.

APS believes that the projects identified in this 2007-2016 Ten-Year Plan, with their associated in-service dates, will ensure that APS' transmission system meets all applicable reliability criteria. Changes in regulatory requirements or underlying assumptions such as load forecasts, generation or transmission expansions, economic issues, and other utilities' plans, may substantially impact this Ten-Year Plan and could result in changes to anticipated in-service dates or project scopes. Additionally, future federal and regional mandates may impact this Ten-Year Plan specifically and the transmission planning process in general. This Ten-Year Plan is tentative information only and, pursuant to A.R.S. § 40-360.02(F), is subject to change without notice at the discretion of APS, based on land usage, growth pattern changes, regulatory or legal developments, or for other reasons.

Changes from 2006-2015 Ten-Year Plan

The following is a list of projects that were changed or removed from the Ten-Year plan filed last year, along with a brief description of why the change was made.

- TS9 – Pinnacle Peak 500kV line and TS5 – TS9 500kV line

  The 2006-2015 Ten-Year Plan showed the Raceway 500kV substation as one of the terminations of each line. In the 2007-2016 Ten-Year Plan, the Raceway 500kV substation has been renamed and referred to as the TS9 500kV substation due to the location of this 500kV substation being approximately one mile away from the Raceway 230kV substation.

- Raceway – Avery 230kV line, the Avery – TS6 – Pinnacle Peak 230kV line, and the TS9 – Pinnacle Peak 500kV line

  The 2006-2015 Ten-Year Plan showed the Raceway-Avery 230kV line and the Avery-TS6-Pinnacle Peak 230kV line projects as double circuit 230kV projects, with the second circuit being a 230kV Westwing-Pinnacle Peak line for SRP. The 2006-2015 Ten-Year Plan also showed the Raceway (TS9)-Pinnacle Peak 500kV line as a single circuit 500kV line. With recent siting and planning efforts, these projects are proposed to be combined with the final project being a 500/230kV double circuit. There will be one 500kV line from a future TS9 500kV substation to the APS Pinnacle Peak substation, which will be expanded to include a 500kV bus and one 230kV line from Raceway to Avery to TS6 to Pinnacle Peak. Also, the 2006-2015 Ten-Year Plan showed the in-service date for the TS6 230kV substation as 2010. The latest planning studies show that the in-service date for the substation can be delayed until 2011.

- TS5-Buckeye 230kV line

  The 2006-2015 Ten-Year Plan referred to the future 230kV lines that will be needed to the west of the White Tank Mountains as conceptual projects due to the preliminary nature of those plans and the dynamic situation with the future development that is expected to occur in the area. Due to the continued work with stakeholders in the area and the timing and nature of the future developments, planning efforts regarding the need for additional electrical facilities have become more active. For the 2007-2016 Ten-Year Plan the preliminary project descriptions for one of those transmission lines is being included with a TBD date. The project included in this plan is the TS5-Buckeye 230kV line.

- Desert Basin – Pinal South 230kV line

  The Santa Rosa-Pinal South 230kV line project was listed in the 2006-2015 Ten-Year Plan as a conceptual project. With SRP's announced proposal of a Desert Basin-Pinal South 230kV line the Santa Rosa-Pinal South 230kV line will be replaced with the Desert Basin-Pinal South 230kV line. The Desert Basin-Pinal South 230kV line project will be a 230kV line that will, for the majority of the routing of the line, be constructed on the same towers as the South East Valley 500kV line between approximately where the line will cross Thornton Road and the future Pinal South substation. The 230kV line will interconnect into the Desert Basin 230kV substation heading north and west. The timing for this project is currently scheduled for 2011. SRP is the project manager for the Desert Basin-Pinal South 230kV line project.

New Projects in the 2007-2016 Ten-Year Plan

The following is a list of projects that are in the 2007-2016 Ten-Year Plan that were not in the 2006-2015 Ten-Year Plan.

- Sundance – Pinal South 230kV line

  This project will be a 230kV line that will be built between APS' Sundance generating station and the future Pinal South 230kV substation. The timing for this project, which corresponds with the timing of the Desert Basin-Pinal South 230kV project, is currently listed as 2011.

Conceptual Projects in the Feasibility Planning Phase

The following projects, described below for informational purposes, are still in a preliminary planning phase.

- TransWest Express Project

  In 2005, APS announced that it would explore the building of transmission from Wyoming to northern Arizona. APS indicated that the TransWest Express Project was being studied as a means to provide Arizona and other western states increased access to electricity generated from coal, wind and other resources in Wyoming. During 2006, APS studied the technical and environmental feasibility of the TransWest Express Project. This feasibility study was conducted with input and feedback on interim results from interested stakeholders. The feasibility study examined three AC alternatives, one DC alternative, and one AC/DC hybrid alternative.

  Through the technical transmission analysis, APS developed cost estimates, estimated system losses, and estimated system capacity for each of the five

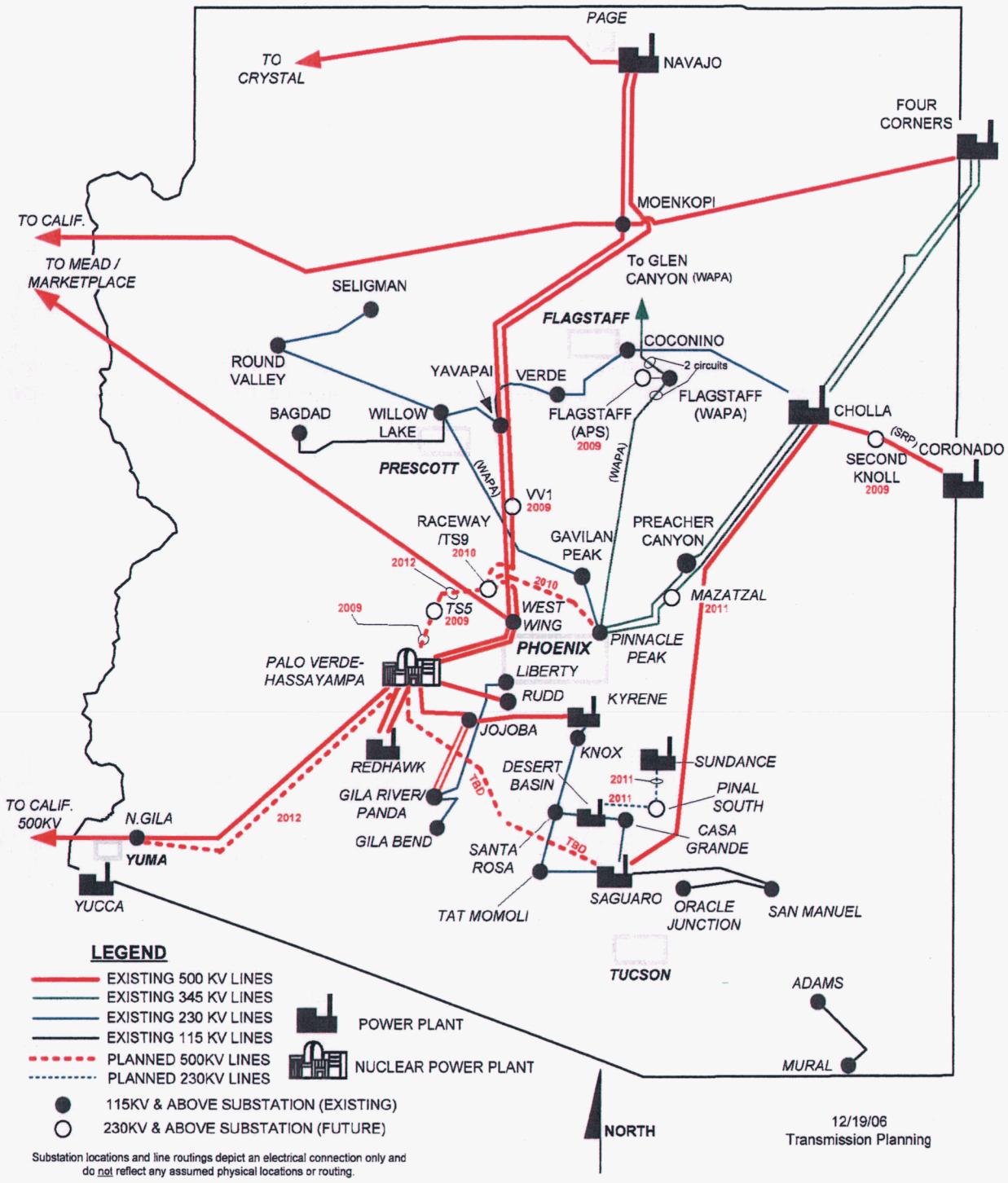
alternatives. The permitting analysis consisted of the preparation of a jurisdictional inventory and identification of high level environmental opportunities and issues for each of the five alternatives. APS has performed an internal economic analysis of the TransWest Express Project, including an evaluation of Wyoming resources compared to resource and transmission alternatives in Arizona. The results of the feasibility analysis show that all five alternatives are technically viable. The economic analysis supports the DC or AC/DC hybrid alternatives. Multiple permitting opportunities have been identified.

The next phase of the project, which is projected to take up to five years, is permitting and siting. APS presently is negotiating a Phase 2 agreement with potential partners that would establish the financial responsibility for Phase 2 and option rights for participation in future phases of the project. The Phase 3 construction phase is estimated to take up to three years, which results in the earliest project in-service date being 2015. Additional information on the feasibility study and stakeholder process can be found on the TransWest Express Project website at: https://transwest.azpsoasis.com/.

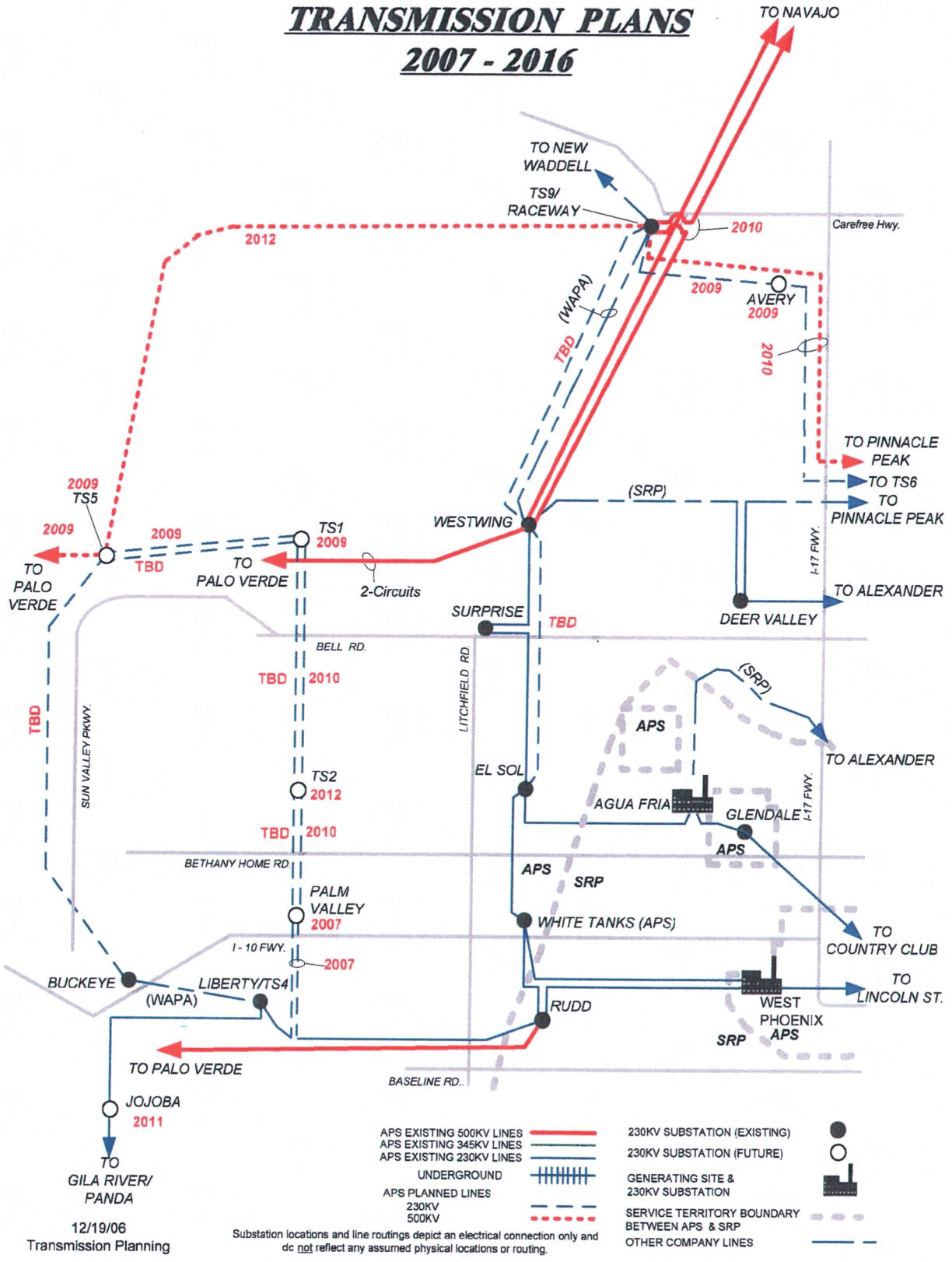
- Cholla – Phoenix Metropolitan Area 500kV line

This project will be a 500kV line that will be built between APS' Cholla 500kV substation and the Phoenix Metropolitan area and is being studied as a means to provide access to Cholla area resources for APS. The scope and timing for this project is still under study.

APS EHV & OUTER DIVISION 115/230 KV TRANSMISSION PLANS 2007 - 2016



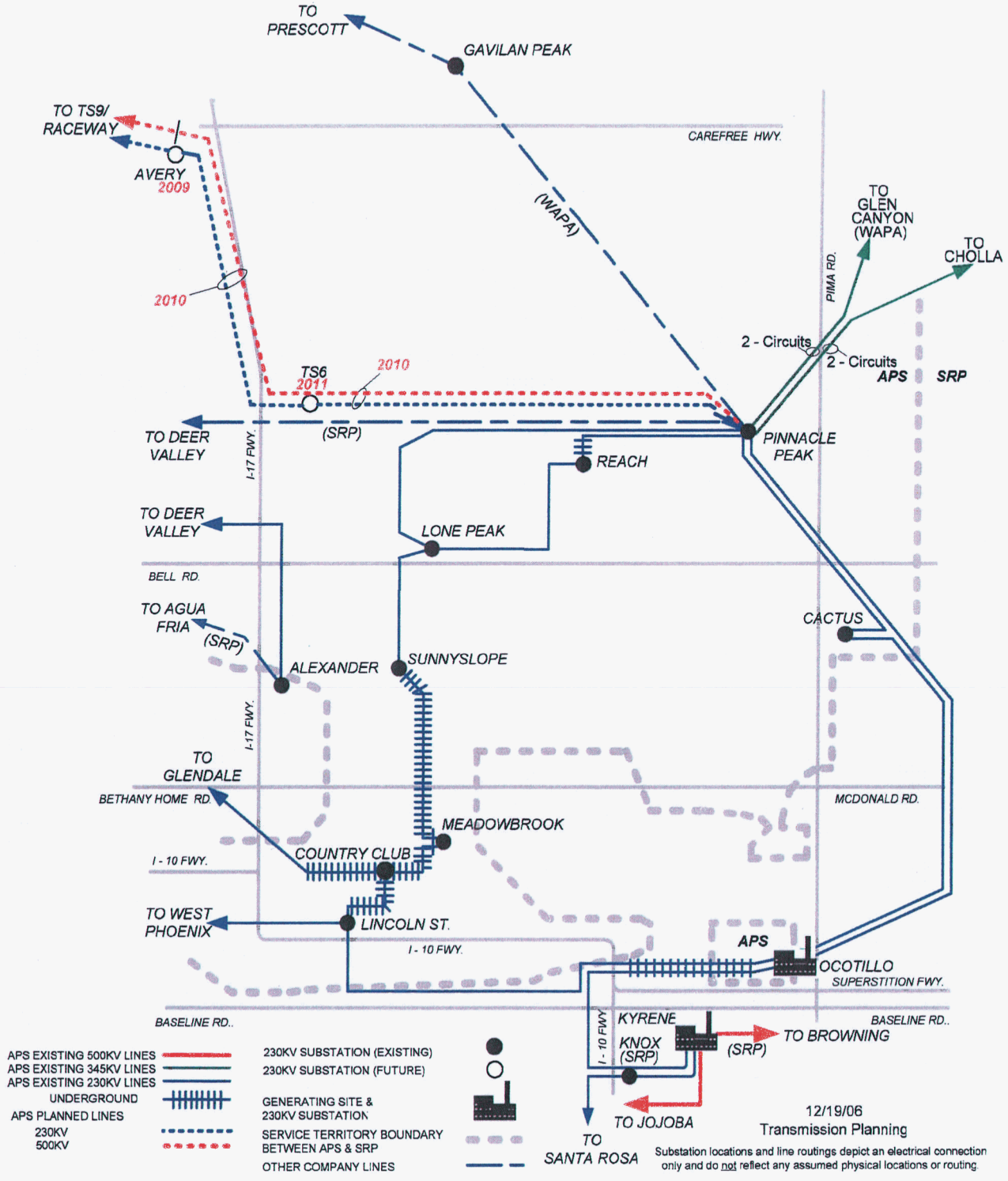
PHOENIX METROPOLITAN (WEST) AREA TRANSMISSION PLANS 2007 - 2016



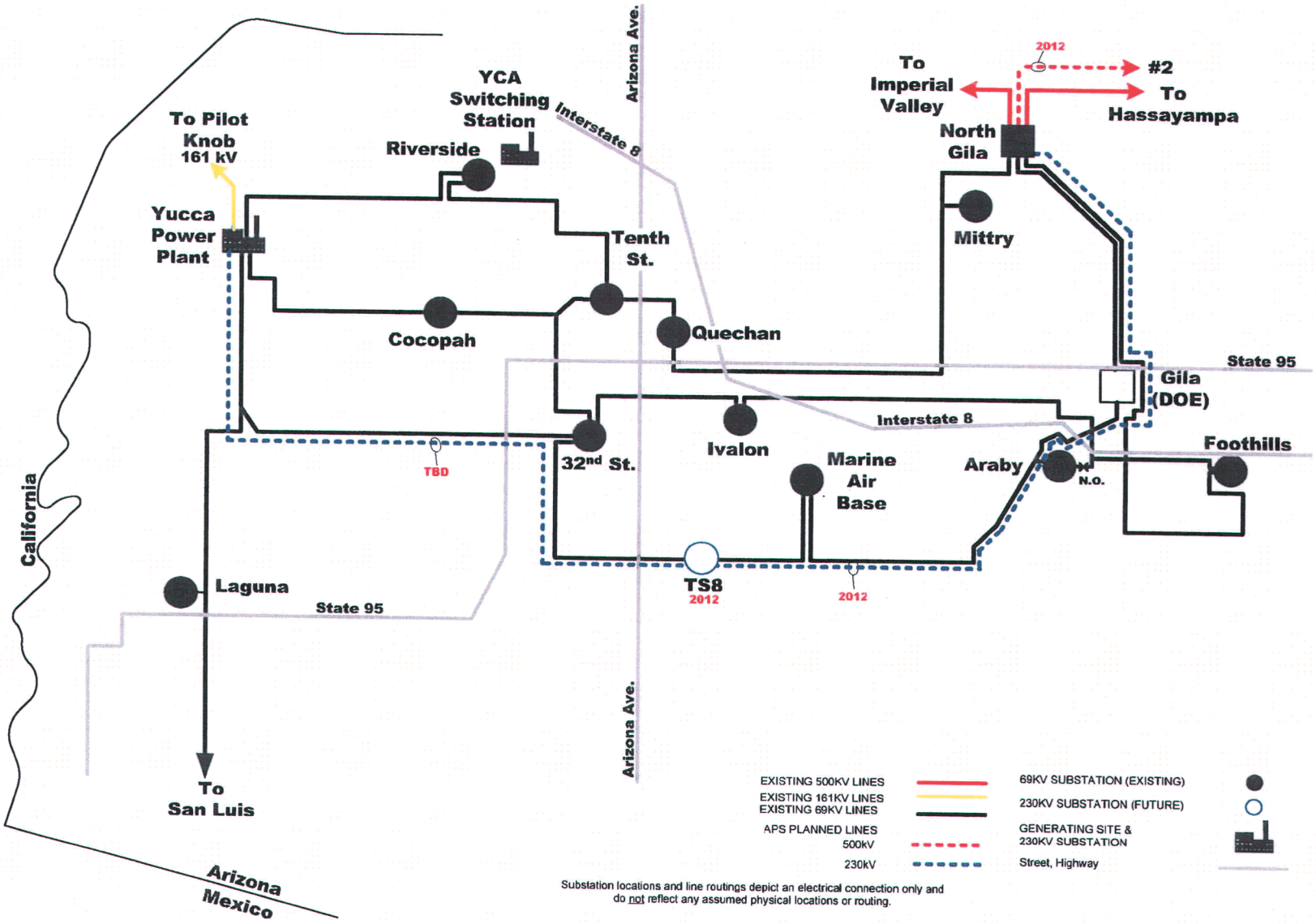
12/19/06
Transmission Planning

Substation locations and line routings depict an electrical connection only and dc not reflect any assumed physical locations or routing.

PHOENIX METROPOLITAN (EAST) AREA TRANSMISSION PLANS 2007 - 2016



Yuma Area Transmission Plans 2007- 2016



Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2007

Line Designation	Rudd – Palm Valley – TS4 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	Rudd-Liberty 230kV transmission line near the intersection of Broadway Road and Perryville Road; within Sec. 28, T1N, R1W.
(d) Intermediate Point	Palm Valley 230/69kV substation to be constructed in 2007 near the corner of Camelback Rd. and Cotton Ln.; Sec. 24, T2N, R2W.
(e) Point of Termination	A new TS4 230kV substation located just south of the WAPA Liberty substation, Sec. 19, T1N, R2W.
(f) Length	Approximately 7 miles of double-circuit 230kV.
Routing	North from the existing Rudd-Liberty 230kV transmission line approximately 7 miles to the Palm Valley substation and returning south, back to the existing line. Also, the termination of the line will be moved from the Liberty substation to the TS4 substation.
Purpose	This project will provide a source for the Palm Valley 230/69kV substation and 69kV substations planned in the western and southwestern Phoenix Metropolitan area to accommodate the growing need for electric energy in the area. Increased reliability and quality of service will result for customers served by the 230/69kV substation.
Date	
(a) Construction Start	2002 (The component that was already certificated in Case No. 115, Decision No. 64473, Rudd-Liberty was in-service for the summer of 2003.) Construction for the double-circuit to Palm Valley will start in 2007.
(b) Estimated In Service	2007

Certificate of Environmental Compatibility issued 2/12/02 (Case No. 115, Decision No. 64473, Southwest Valley Project). Revised on 4/9/02, Decision No. 64704. This CEC is for the 230kV line, Rudd-Liberty, running east and west on the same poles as the Palo Verde-Rudd 500kV line. The portion of line running from the existing Rudd-Liberty line to the Palm Valley substation and for the TS4 substation was sited as part of the West Valley South 230kV Transmission Line Project and a Certificate of Environmental Compatibility was issued 12/24/03 (Case No. 122, Decision No. 66646, West Valley South 230kV Transmission Line Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	Second Knoll loop-in of Coronado-Cholla 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	240 MVA.
(c) Point of Origin	Coronado-Cholla 500kV line; Sec. 9, T14N, R21E.
(d) Intermediate Point	None.
(e) Point of Termination	Second Knoll 500/69kV substation to be built in 2009; Sec. 9, T14N, R21E.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing line corridor to the Second Knoll substation.
Routing	The Second Knoll substation will be built adjacent to the Coronado-Cholla 500kV line, therefore limiting the distance to not exceed two spans.
Purpose	This project will serve projected need for electric energy in Show Low and the surrounding communities. The project will improve reliability and continuity of service for the growing communities in the area.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	345/69kV interconnection at WAPA's Flagstaff 345kV bus.
Size	
(a) Voltage	345kV AC.
(b) Capacity	200 MVA.
(c) Point of Origin	WAPA's Flagstaff 345kV substation; Sec. 24, T21N, R9E.
(d) Intermediate Point	None.
(e) Point of Termination	A new 69kV substation to be built in 2009 adjacent to WAPA's Flagstaff substation; Sec. 24, T21N, R9E.
(f) Length	Not to exceed two spans.
Routing	A 345/69kV transformer will interconnect into WAPA's Flagstaff substation.
Purpose	This project will serve projected need for electric energy in APS' northern service area. The project will improve reliability and continuity of service for the growing communities in northern Arizona.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	VV1 loop-in of Navajo-Westwing 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	240 MVA.
(c) Point of Origin	Navajo-Westwing 500kV line, near the crossing of the Navajo-Westwing 500kV line with APS' Willow Lake-Childs 69kV line; location to be determined.
(d) Intermediate Point	None.
(e) Point of Termination	VV1 500/69kV substation to be built in 2009 near the crossing of the Navajo-Westwing 500kV line with APS' Willow Lake-Childs 69kV line; location to be determined.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing Navajo-Westwing line corridor to the VV1 substation.
Routing	The VV1 substation will be built adjacent to the Navajo-Westwing 500kV line, therefore limiting the distance to not exceed two spans.
Purpose	This project will serve projected electrical needs and provide support to the existing subtransmission system in the Verde Valley and Prescott areas.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	Palo Verde-TS5 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palo Verde switchyard or a new switchyard at Arlington Valley Energy facility.
(d) Intermediate Point	Proposed Harquahala Junction switchyard.
(e) Point of Termination	TS5 500/230kV substation to be constructed in 2009; Sec. 29, T4N, R4W.
(f) Length	Approximately 45 miles of single-circuit line.
Routing	Generally leaving the Palo Verde Hub vicinity following the Palo Verde-Devers #1 and the Hassayampa-Harquahala 500kV lines until crossing the CAP canal. Then following the canal to the new TS5 substation.
Purpose	This line will serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area as well as increase the export capability from the Palo Verde hub. This is a joint participation project with APS as the project manager.
Date	
(a) Construction Start	2007
(b) Estimated In Service	2009

Certificate of Environmental Compatibility issued 8/17/05 (Case No. 128, Decision No. 68063, Palo Verde Hub to TS5 500kV Transmission project). APS, as project manager, holds the CEC.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	TS5-TS1 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	TS5 500/230kV substation to be constructed in 2009; Sec. 29, T4N, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	TS1 230/69kV substation to be constructed in 2009; Sec. 20, T4N, R2W.
(f) Length	Approximately 15 miles of double-circuit 230kV line.
Routing	East from TS5 substation along the CAP canal to approximately 243rd Ave., south to the existing 500kV transmission line corridor, and then east along the corridor to the TS1 substation.
Purpose	This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area, providing more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities such as El Mirage, Surprise, Youngtown, and Buckeye. The first circuit is scheduled to be in-service for the summer of 2009 and the in-service date for the second circuit will be evaluated in future planning studies.
Date	
(a) Construction Start	2007
(b) Estimated In Service	2009

Certificate of Environmental Compatibility issued 5/5/05 (Case No. 127, Decision No. 67828, West Valley North 230kV Transmission Line project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	Raceway-Avery 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	Raceway substation located along the Westwing-New Waddell 230kV line, approximately 3 miles south of the New Waddell Dam; Sec. 4, T5N, R1E.
(d) Intermediate Point	None.
(e) Point of Termination	A new Avery substation near Dove Valley Road and 39th Avenue; Sec. 15, T5N, R2E.
(f) Length	Approximately 10 miles.
Routing	South from Raceway substation approximately 1 mile, paralleling existing transmission lines, then east approximately 9 miles to the new Avery substation.
Purpose	This line will serve projected need for electric energy in the area immediately north of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for the area's growing communities such as Anthem, Desert Hills and New River.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	Pinnacle Peak-TS6-Avery 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	Pinnacle Peak substation; Sec. 10, T4N, R4E.
(d) Intermediate Point	TS6 substation to be constructed in 2011; Sec. 8, T4N, R3E.
(e) Point of Termination	Avery substation to be constructed in 2009 near Dove Valley Road and 39th Avenue; Sec. 15, T5N, R2E.
(f) Length	Approximately 16 miles.
Routing	Along the existing 230kV right-of-way, west 10 miles from Pinnacle Peak substation to approximately Interstate 17, generally parallel to and south of Happy Valley Road; then north 5 miles, generally parallel to Interstate 17, to Dove Valley Road, then west to the new Avery substation.
Purpose	This project will serve projected need for electric energy in the area immediately north of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for the growing communities in the areas of Anthem, Desert Hills, New River, and north Phoenix.
Date	
(a) Construction Start	2004
(b) Estimated In Service	2010

Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	Palm Valley-TS2-TS1 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palm Valley 230/69kV substation to be constructed in 2007 near the corner of Camelback Rd. and Cotton Ln.; Sec. 24, T2N, R2W.
(d) Intermediate Point	TS2 230/69kV substation to be constructed in 2012; Sec. 25, T3N, R2W.
(e) Point of Termination	TS1 230/69kV substation to be constructed in 2009; Sec. 20, T4N, R2W.
(f) Length	Approximately 12 miles of double-circuit 230kV line.
Routing	North from the Palm Valley substation, generally following the Loop 303, to the TS1 substation passing the location of the future TS2 substation which is currently projected to be in-service in 2012.
Purpose	This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area, providing more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities such as El Mirage, Surprise, Youngtown, and Buckeye. The first circuit is scheduled to be in-service for the summer of 2010 and the in-service date for the second circuit will be evaluated in future planning studies.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2010

The Palm Valley-TS2 230kV line portion was sited as part of the West Valley South 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 12/24/03 (Case No. 122, Decision No. 66646). The TS1-TS2 230kV line portion was sited as part of the West Valley North 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 5/5/05 (Case No. 127, Decision No. 67828).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	TS9 – Pinnacle Peak 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS9 500kV substation to be constructed in 2010 adjacent to the Navajo-Westwing 500kV line and approximately 1 mile from the existing Raceway 230kV substation; approximately Sec. 33, T6N, R1E.
(d) Intermediate Point	None.
(e) Point of Termination	Pinnacle Peak 500kV substation to be constructed in 2010 near the location of the existing Pinnacle Peak 345/230kV substation; Sec. 10, T4N, R4E.
(f) Length	Approximately 26 miles of single-circuit line.
Routing	East from TS9 500kV substation to a new Pinnacle Peak 500kV substation.
Purpose	This line is a result of joint planning through the SWAT forum. The project is needed to increase the import capability to the Phoenix Metropolitan area and strengthen the transmission system on the east side of the Phoenix Metropolitan valley. This will be a joint participation project with APS as the project manager. The loop-in of a Navajo-Westwing 500kV transmission line into the Raceway 500kV substation will be part of this project.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2010

Arizona Corporation Commission decision on the Certificate of Environmental Compatibility for the TS9-Pinnacle Peak 500kV line is expected in first quarter of 2007 (Case No.131, TS9-Pinnacle Peak 500/230kV Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	TS9 to Raceway 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS9 substation to be constructed in 2010 adjacent to the Navajo-Westwing 500kV line and approximately 1 mile from the existing Raceway substation; approximately Sec. 33, T6N, R1E.
(d) Intermediate Point	None.
(e) Point of Termination	Raceway substation; Sec. 4, T5N, R1E.
(f) Length	Approximately 1 mile of 230kV lines from the 500/230kV transformers at the TS9 substation to the Raceway substation.
Routing	The 230kV line would run south from the TS9 substation to the Raceway substation.
Purpose	The TS9 substation will be located north of the existing Raceway substation due to physical/geographic constraints. The 500/230kV transformers will be located at the TS9 500kV substation, therefore a 230kV line is needed between the 500/230kV transformers and the Raceway substation.
Date	
(a) Construction Start	2009
(b) Estimated In Service	2010

Arizona Corporation Commission decision on the Certificate of Environmental Compatibility for the TS9 500kV to Raceway 230kV line is expected in first quarter of 2007 (Case No.131, TS9-Pinnacle Peak 500/230kV Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Jojoba loop-in of TS4-Panda 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	188 MVA.
(c) Point of Origin	TS4-Panda 230kV line near the existing Jojoba 500kV switchyard; Sec. 25, T2S, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	Jojoba 230/69kV substation to be built in 2011, adjacent to the existing Jojoba 500kV switchyard; Sec. 25, T2S, R4W.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing line corridor to the Jojoba 230/69kV substation.
Routing	Jojoba 230/69kV substation will be adjacent to the TS4-Panda 230kV line so it will not exceed two spans.
Purpose	This substation will be needed to serve projected need for electric energy for the growing communities in the areas of Buckeye, Goodyear, and Gila Bend.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2011

Certificate of Environmental Compatibility issued 10/16/00 (Case No. 102, Decision No. 62960, Gila River Transmission Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Mazatzal loop-in of Cholla-Pinnacle Peak 345kV line.
Size	
(a) Voltage	345kV AC.
(b) Capacity	200 MVA.
(c) Point of Origin	Cholla-Pinnacle Peak 345kV line; near Sec. 3, T8N, R10E.
(d) Intermediate Point	None.
(e) Point of Termination	Mazatzal 345/69kV substation; approximately Sec. 3, T8N, R10E.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing Cholla-Pinnacle Peak line corridor to the Mazatzal substation.
Routing	The Mazatzal substation will be built adjacent to the Cholla-Pinnacle Peak 345kV line so it will not exceed two spans.
Purpose	This substation will serve projected need for electric energy in the area of Payson and the surrounding communities. Additionally, improved reliability and continuity of service will result for the growing communities in the Payson area.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2011

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Desert Basin – Pinal South 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Desert Basin substation; Sec 13, T6S, R5E.
(d) Intermediate Point	None.
(e) Point of Termination	Future Pinal South substation; Sec 6, T7S, R8E.
(f) Length	Approximately 21 miles of 230kV line.
Routing	The line will head generally south and east from the Desert Basin substation to a point on the certificated alignment of the 500kV Southeast Valley line in the vicinity of Cornman and Thornton Roads. Then the 230kV line would be on the same structures as the approved 500kV South East Valley line, for approximately 15 miles, to the future Pinal South substation in Coolidge, AZ.
Purpose	This line will serve increasing loads in Pinal County and will improve reliability and continuity of service for the rapidly growing communities in Pinal County. This project, in conjunction with the Sundance-Pinal South 230kV project will increase APS' ability to deliver energy from the Sundance Generation facility over APS' transmission system. It will also allow the existing remedial action scheme (RAS) implemented for the Desert Basin Generating Station to be removed. SRP is the project manager.
Date	
(a) Construction Start	2009
(b) Estimated In Service	2011

Authority for the 230kV portion of the line that will be strung on the 500kV structures was granted in the Certificate of Environmental Compatibility issued in 2005, Case No. 126, Decision Nos. 68093 and 68291 and subsequently confirmed after filing for compliance in Condition 23 of the Certificate of Environmental Compatibility awarded in Case No. 126 in Decision No. 69183. SRP is expected to file the Certificate of Environmental Compatibility for the portion of the line between the Desert Basin substation and the Southeast Valley 500kV alignment in the first quarter of 2007.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Sundance – Pinal South 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Sundance substation; Sec 2, T6S, R7E.
(d) Intermediate Point	None.
(e) Point of Termination	Future Pinal South substation; Sec 6, T7S, R8E.
(f) Length	Approximately 5 miles of 230kV line.
Routing	Routing for this line has not been determined. Will generally head south from the Sundance substation into the future Pinal South substation.
Purpose	This line will serve increasing loads in Pinal County and will improve the reliability and continuity of service for the rapidly growing communities in the area. This project, in conjunction with the Desert Basin-Pinal South 230kV project, will increase APS' ability to deliver energy from the Sundance Generation facility over APS' transmission system.
Date	
(a) Construction Start	2009
(b) Estimated In Service	2011

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2012

Line Designation	TS5 – TS9 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS5 500/230kV substation to be constructed in 2009; Sec. 29, T4N, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	TS9 500kV substation to be constructed in 2010 adjacent to the Navajo-Westwing 500kV line and approximately 1 mile from the existing Raceway 230kV substation; approximately Sec. 33, T6N, R1E.
(f) Length	Approximately 40 miles of single-circuit line.
Routing	North from TS5 substation and then in a northeasterly direction to the TS9 substation.
Purpose	This line will be needed to serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area as well as increase the export capability from the Palo Verde hub and provide support for multiple Westwing 500/230kV transformer outages. This will be a joint participation project with APS as the project manager.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2012

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2012

Line Designation	Palo Verde switchyard (or vicinity)-North Gila 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palo Verde switchyard or vicinity.
(d) Intermediate Point	None.
(e) Point of Termination	North Gila 500/69kV substation or another substation adjacent to the North Gila location; Sec. 11, T8S, R22N.
(f) Length	Approximately 117 miles of single-circuit line.
Routing	West and south from the Palo Verde Hub area to the Yuma area.
Purpose	As a new transmission path to the Yuma area, this 500kV line will provide transmission capacity required to supplement limited transmission and generation resources in the Yuma area. This is a joint participation project with APS as the project manager.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2012

An application for a Certificate of Environmental Compatibility is expected to be filed in 2007.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2012

Line Designation	North Gila – TS8 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	North Gila 230kV substation to be constructed in 2012; Sec 11, T8S, R22W.
(d) Intermediate Point	None.
(e) Point of Termination	TS8 230kV substation to be constructed in 2012; location to be determined.
(f) Length	Approximately 15 miles of 230kV line on double-circuit poles.
Routing	The routing for this line has not yet been determined.
Purpose	This project is required to serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2012

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	TS5 – Buckeye 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS5 230kV substation to be constructed in 2009; Sec 29, T4N, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	Buckeye 230kV substation; Sec 7, T1N, R3W.
(f) Length	Approximately 20 miles of 230kV line on double-circuit structures.
Routing	The routing for this line has not yet been determined.
Purpose	This project will serve the increasing need for electric energy in the west and northwest portions of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for this fast growing portion of Maricopa County.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Yucca – TS8 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Yucca 230kV substation that would be constructed in the future; Sec 11, T8S, R22W.
(d) Intermediate Point	None.
(e) Point of Termination	TS8 230kV substation to be constructed in 2012; location to be determined.
(f) Length	Approximately 13 miles of 230kV line on double-circuit poles.
Routing	The routing for this line has not yet been determined.
Purpose	This project would serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Westwing-El Sol 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Westwing substation; Sec. 12, T4N, R1W.
(d) Intermediate Point	None.
(e) Point of Termination	El Sol substation; Sec. 30, T3N, R1E.
(f) Length	Approximately 11 miles of single-circuit line.
Routing	Per Certificate.
Purpose	This line will increase system capacity to serve growing demand for electric energy in the Phoenix Metropolitan area, while maintaining system reliability and integrity for delivery of bulk power from Westwing south into the APS Phoenix Metropolitan area 230kV transmission system.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

Certificate of Environmental Compatibility issued 7/26/73 (Case No. 9, docket No. U-1345). Note that this Certificate authorizes two double-circuit lines. Construction of the first double-circuit line was completed in March 1975. Construction of the second line, planned to be built with double-circuit capability but initially operated with a single circuit, is described above.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Westwing – Raceway 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Westwing substation; Sec 12, T4N, R1W.
(d) Intermediate Point	None.
(e) Point of Termination	Raceway 230kV substation located along the Westwing-New Waddell 230kV line, approximately 3 miles south of the Waddell Dam; Sec. 4, T5N, R1E.
(f) Length	Approximately 7 miles of 230kV line on double-circuit poles.
Routing	Northeast from Westwing substation paralleling existing transmission lines to the Raceway 230kV substation.
Purpose	This line will serve increasing loads in the far north and northwest parts of the Phoenix Metropolitan area and provide contingency support for multiple Westwing 500/230kV transformer outages. The in-service date for the first circuit will continue to be evaluated in future planning studies by APS and the in-service date for the second circuit will be evaluated in future planning studies by SRP.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley 230kV Transmission Line Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Palo Verde - Saguaro 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palo Verde Switchyard; Sec. 34, T1N, R6W.
(d) Intermediate Point	None.
(e) Point of Termination	Saguaro substation; Sec. 14, T10S, R10E.
(f) Length	Approximately 130 miles of new line to be built on single-circuit poles or towers. Some sections may be built on double-circuit structures.
Routing	South and east from the Palo Verde switchyard, paralleling existing transmission lines for part of the route. The approved corridor is defined in the CEC identified below.
Purpose	This line is the result of the joint participation CATS study. The line will be needed to increase the adequacy of the existing EHV transmission system and permit increased power delivery throughout the state. It is anticipated the line will be a joint participation project.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

Certificate of Environmental Compatibility issued 01/23/1976 (Case No. 24, Decision No. 46802).

10-W2

ARIZONA PUBLIC SERVICE COMPANY
2008–2017
TEN-YEAR PLAN

Prepared for the

Arizona Corporation Commission

January 2008

ARIZONA PUBLIC SERVICE COMPANY
2008 - 2017
TEN-YEAR PLAN

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ARIZONA PUBLIC SERVICE COMPANY
2008–2017
TEN-YEAR PLAN

GENERAL INFORMATION

Pursuant to A.R.S. § 40-360.02, Arizona Public Service Company ("APS") submits its 2008-2017 Ten-Year Plan. Additionally, pursuant to Arizona Corporation Commission ("Commission") Decision No. 63876 (July 25, 2001) concerning the first Biennial Transmission Assessment, APS is including with this filing its Transmission Planning Process and Guidelines and maps showing system ratings on APS' transmission system. The Transmission Planning Process and Guidelines outline generally APS' internal planning for its high voltage and extra-high voltage transmission system, including a discussion of APS' planning methodology, planning assumptions, and its guidelines for system performance. The system ratings maps show continuous and emergency system ratings on APS' extra-high voltage system, and on its Metro, Northern, and Southern 230kV systems.

This 2008–2017 Ten-Year Plan describes planned transmission lines of 115kV or higher voltage that APS may construct, or participate in, over the next ten-year period. Pursuant to A.R.S. § 40-360(10), underground facilities are not included. There are approximately 181 miles of 500kV transmission lines, 96 miles of 230kV transmission lines, and 19 bulk transformers contained in the projects in this Ten-Year Plan filing. The total investment for the APS projects and the anticipated APS portion of the participation projects as they are modeled in this filing is estimated to be approximately $900 Million and the projects will add an expected 2000 MW of additional EHV scheduling capability. Also, over the next ten years the import capability into the Phoenix area will increase by 3837 MW, while the import capability into the Yuma area will

increase by 272 MW. The following table shows a breakdown of the projects contained in this Ten-Year Plan.

	Projects in Ten-Year Plan
500kV transmission lines	181 miles
230kV transmission lines	96 miles
Bulk Transformers	19
Total Investment	$900 Million
EHV Scheduling Capability	+2000 MW (+28 %)[1]
Total Phoenix Area Import	+3837 MW (+28 %)[1]
Yuma Area Import	+272 MW (+65 %)[1]

[1] Based on 2007 values.

Also, some of the previously reported facilities that have been completed, canceled, or deferred beyond the upcoming ten-year period are not included. The projects at the end of this Ten-Year Plan that have in-service dates of To Be Determined (TBD) are projects that have been identified, but are either still outside of the ten-year planning window or their in-service dates have not yet been established. They have been included in this filing for informational purposes. A summary of changes from last year's plan is provided below, along with a list of projects that have been added to this year's Ten-Year Plan. Also, a section is included that briefly describes any projects that are still in the feasibility planning phase.

For the convenience of the reader, APS has included system maps showing the electrical connections and in-service dates for all overhead transmission projects planned by APS for Arizona, the Phoenix Metropolitan Area, and the Yuma Area. Written descriptions of each proposed transmission project are provided on subsequent pages in the currently expected chronological order of each project. The line routings shown on the system maps and the descriptions of each transmission line are intended to be general, showing electrical connections and not specific routings, and are subject to revision. Specific routing is recommended by the Arizona Power Plant and Transmission Line Siting Committee and ultimately approved by the

Commission when issuing a Certificate of Environmental Compatibility and through subsequent right-of-way acquisition. Pursuant to A.R.S. § 40-360.02, this filing also includes technical study results for the projects identified. The technical study results show project needs which are generally based on either security (contingency performance), adequacy (generator interconnection or increasing transfer capability) or both.

APS participates in numerous regional planning organizations and in the WestConnect organization. Through membership and participation in these organizations the needs of multiple entities, and the region as a whole, can be identified and studied. This allows for the potential of maximizing the effectiveness and utilization of new projects. Regional organizations that APS is a member of include the Western Electricity Coordinating Council (WECC), the Southwest Area Transmission Planning (SWAT), and WestConnect which established a formal sub-regional transmission planning process during 2007. The plans included in this filing are the result of these coordinated planning efforts. APS is open to other entities participating in any existing or future planned projects.

APS believes that the projects identified in this 2008-2017 Ten-Year Plan, with their associated in-service dates, will ensure that APS' transmission system meets all applicable reliability criteria. Changes in regulatory requirements or underlying assumptions such as load forecasts, generation or transmission expansions, economic issues, and other utilities' plans, may substantially impact this Ten-Year Plan and could result in changes to anticipated in-service dates or project scopes. Additionally, future federal and regional mandates may impact this Ten-Year Plan specifically and the transmission planning process in general. This Ten-Year Plan is tentative information only and, pursuant to A.R.S. § 40-360.02(F), is subject to change without notice at the discretion of APS, based on land usage, growth pattern changes, regulatory or legal developments, or for other reasons.

Changes from 2007-2016 Ten-Year Plans

The following is a list of projects that were changed or removed from the Ten-Year plan filed last year, along with a brief description of why the change was made.

- Palo Verde – Sun Valley 500kV line & Sun Valley – TS9 500kV line

  The 2007-2016 Ten-Year Plan showed the TS5 500kV substation as one of the terminations of each of these lines. In the 2008-2017 Ten-Year Plan, the TS5 500kV substation has been renamed and referred to as the Sun Valley 500kV substation. Also, the last Ten-Year Plans showed the in-service date for Palo Verde-Sun Valley 500 kV & Sun Valley – TS1 230 kV projects as 2009. The latest planning studies show that the in-service date for the project can be delayed until 2010.

- TS9-Raceway-Avery-TS6-Pinnacle Peak 230 kV line

  The 2007-2016 Ten-Year Plans showed the in-service date for the proposed Raceway-Avery 230 kV line as 2009. Also, the 2007-2016 Ten-Year Plans showed the in-service date for the proposed Avery-TS6-Pinnacle Peak 230kV line as 2010. The latest planning studies show that the in-service date for the 230kV line between Raceway and Pinnacle Peak can be delayed until 2010, with the in-service date for the Avery substation being in 2013 and the in-service date for the TS6 substation being in 2012. Also, the in-service date for the 500/230kV transformer and 230kV line from TS9 to Raceway would be 2012.

- Sugarloaf loop-in of Coronado-Cholla 500 kV line

  The 2007-2016 Ten-Year plan has the Second Knoll loop-in of the 500 kV Coronado-Cholla line. In the 2008-2017 Ten year plan, Second Knoll substation has been renamed and referred to as the Sugarloaf substation.

- 345/69 kV Interconnection at Western's Flagstaff 345 kV bus

  The 2007-2016 Ten-Year Plans showed the in-service date for this interconnection as 2009. The latest planning studies show that the in-service date for the interconnection can be delayed until 2010.

- Jojoba loop-in of TS4-Panda 230 kV line.

The 2007-2016 Ten-Year Plans showed the in- service date for the proposed Jojoba loop-in of TS4- Panda 230 kV projects as 2011. The latest planning studies show that the in-service date for the project can be delayed until 2013.

- Sundance-Pinal South 230 kV line

  The 2007-2016 Ten-Year Plans showed a single circuit for the 230 kV Sundance-Pinal South line. The latest planning studies show that a second circuit between the two substations will allow APS to reliably and economically deliver energy to APS transmission system. The in-service date for the second circuit will be evaluated in future planning studies.

- Sun Valley – TS11 – Buckeye 230 kV line.

  The 2007-2016 Ten-year plans showed a 230 kV line between APS' Sun Valley and Buckeye substations. The 2008-2017 Ten-year plans show that a new TS11 substation will now be interconnected to the original 230 kV line.

New Projects in the 2008-2017 Ten-Year Plan

- Sun Valley-TS9 230 kV line.

  This project will be a 230 kV line built between future APS' future Sun Valley and TS9 substation. This 230 kV line originates from the Sun Valley 500/230 kV

substation and is proposed to be the 230 kV portion of a double circuit with the Sun Valley- TS9 500 kV line. The timing of this project is to be determined.

- North Gila- Yucca 230 kV line

  This project will be a 230 kV line between APS' North Gila and Yucca Substations. The timing of this project is still to be determined.

- Sun Valley-TS10-TS11 230 kV line

  This project will be a 230 kV line from APS' Sun Valley substation to TS11 substation, with the future TS10 substation to be interconnected to the line. The timing of this project is still to be determined.

Conceptual Projects in the Feasibility Planning Phase

The following projects, described below for informational purposes, are still in a preliminary planning phase, and are dependent on future resource alternative selection.

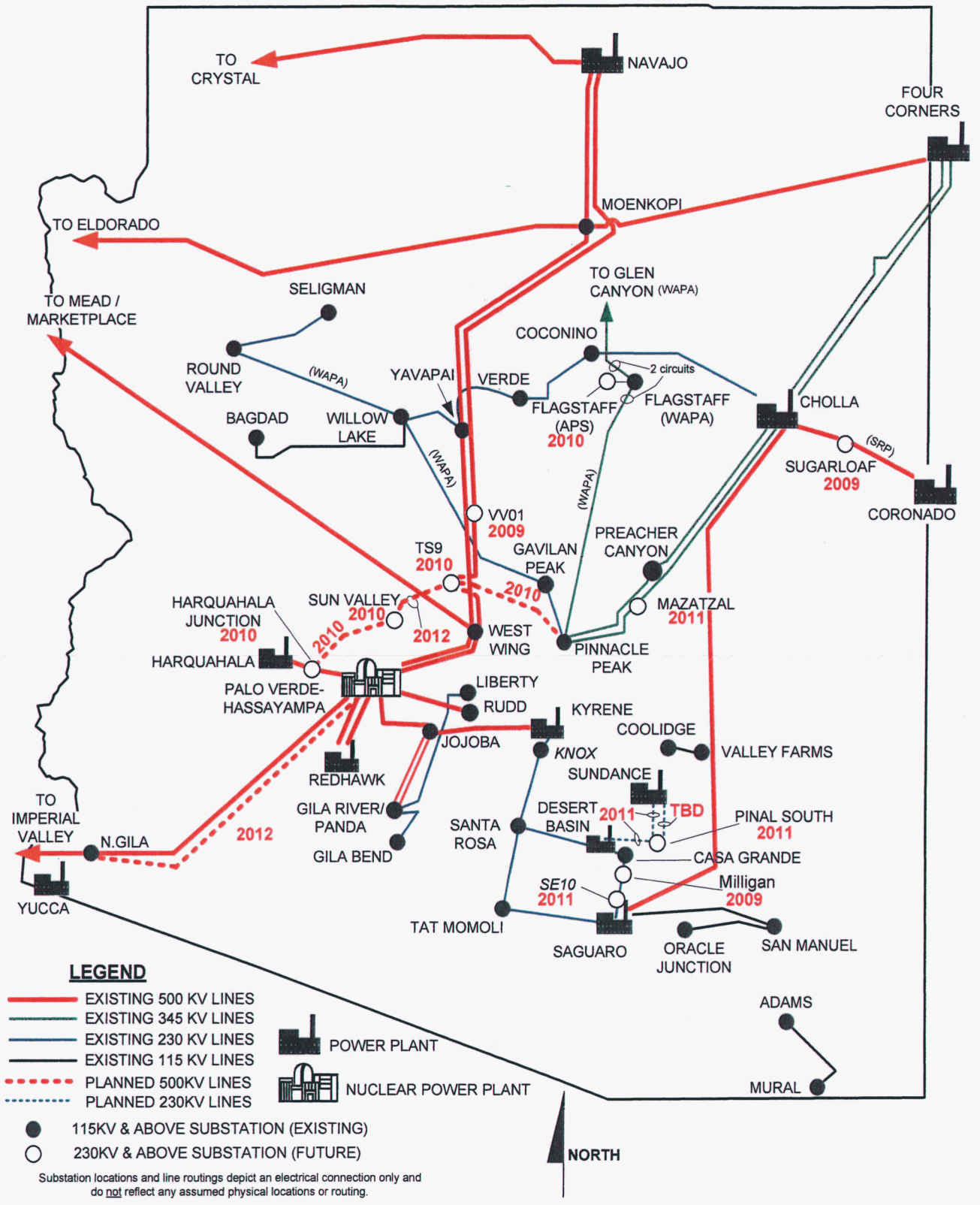
- TransWest Express Project

  In August 2007, APS entered into an agreement with PacifiCorp, National Grid and the Wyoming Infrastructure Authority to co-develop the TransWest Express project and PacifiCorp's recently announced Gateway South Transmission project. The Trans West Express Project involves construction of a 500 kV DC transmission line from Wyoming to Arizona with a capacity of 3000 MW. This project provides multiple benefits, which include the ability to meet the growing demand for electricity, improved reliability of the entire western grid, expanded access to renewable energy resources, lower environmental impact through combined use of transmission corridors and greater economies of scale. The proposed in-service date for this project is 2015.

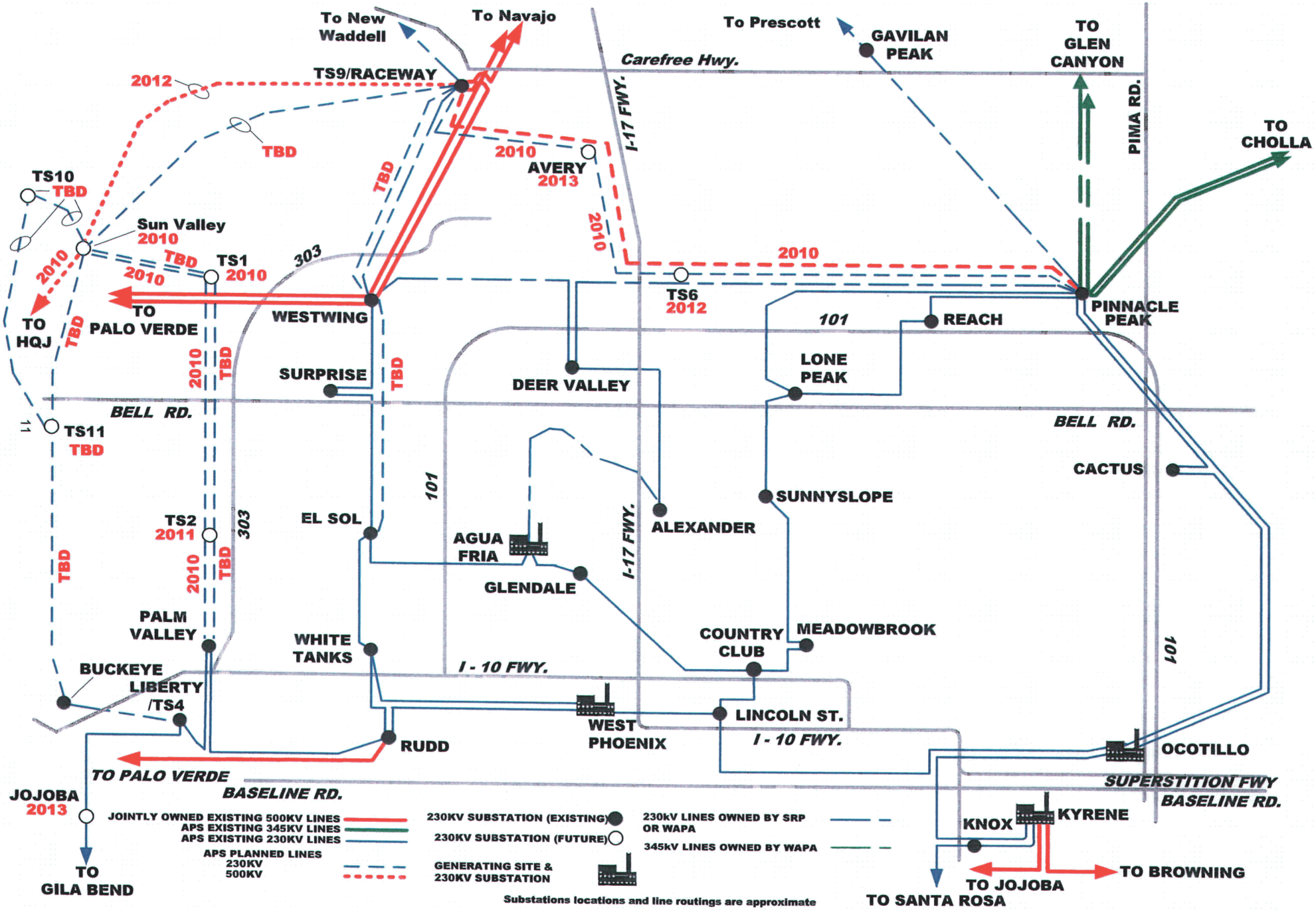
- Cholla – Phoenix Metropolitan Area 500kV line

This project will be a 500kV line that will be built between APS' Cholla 500kV substation and the Phoenix Metropolitan area and is being studied as a means to provide access to Cholla area resources for APS. The scope and timing for this project is still under study.

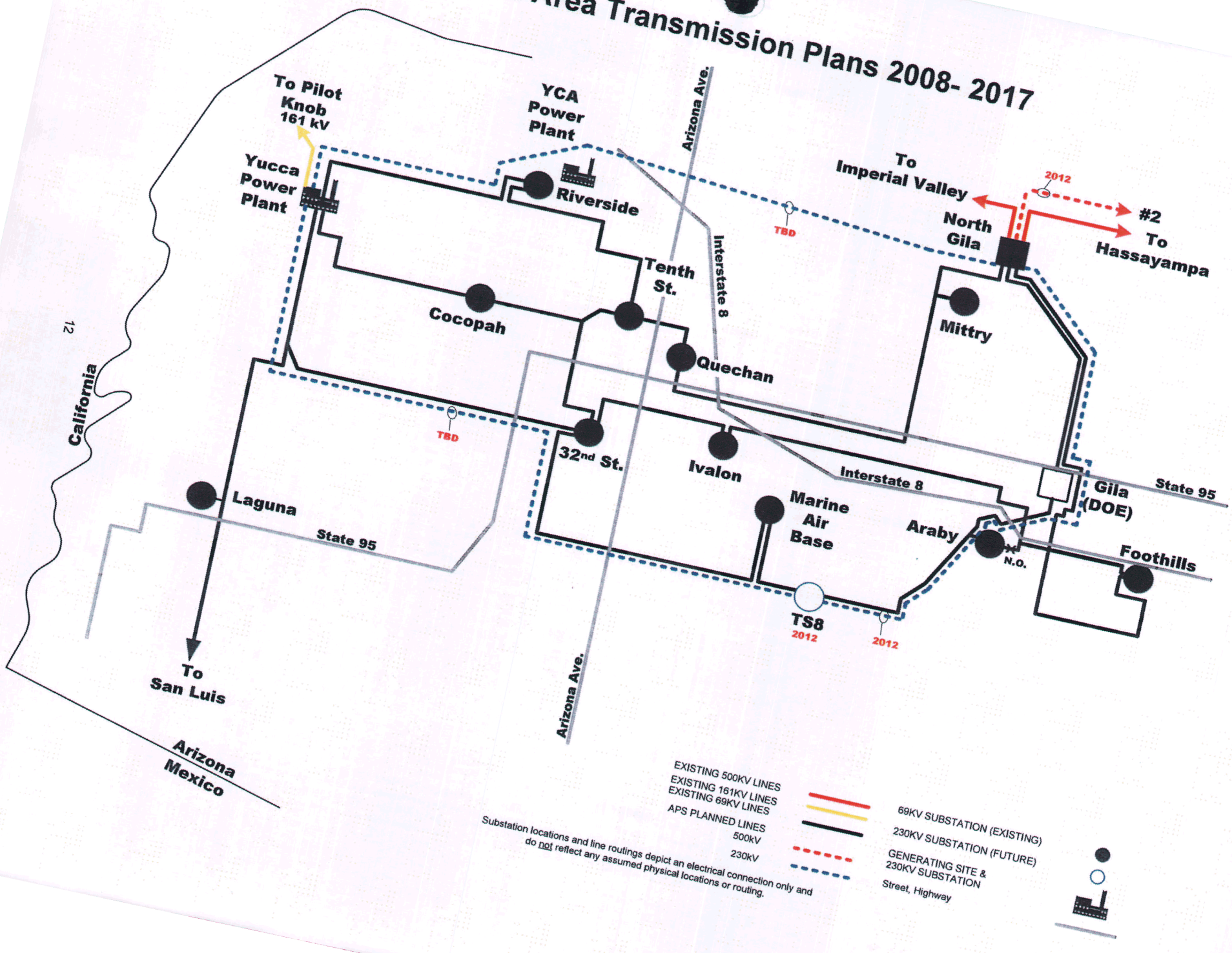
APS EHV & OUTER DIVISION 115/230 KV TRANSMISSION PLANS 2008 - 2017



PHOENIX METROPOLITAN AREA TRANSMISSION PLANS 2008-2017



Yuma Area Transmission Plans 2008- 2017



Substation locations and line routings depict an electrical connection only and do not reflect any assumed physical locations or routing.

Project Name: **Sugarloaf loop-in of Coronado - Cholla 500kV line**

Planned In-Service Date: **2009**

Project Sponsor: Arizona Public Service

Other Participants: SRP

Voltage Class: 525kV AC

Facility Rating: 240 MVA

Point of Origin: Coronado - Cholla 500kV line; Sec. 9, T14N, R21E

Point of Termination: Sugarloaf 500/69kV substation to be in-service in 2009; Sec. 9, T14N, R21E

Intermediate Points of Interconnection:

Length of Line (in miles): Less than 1 mile

General Route:

The Sugarloaf substation will be constructed adjacent to the existing Coronado-Cholla 500kV line.

Purpose of Project:

This project is needed to provide the electrical source and support to the sub-transmission system to serve the increasing need for electric energy in Show Low and the surrounding communities. The project will improve reliability and continuity of service for the growing communities in the area. The Sugarloaf substation will interconnect into SRP's Coronado-Cholla 500kV line, therefore SRP will construct, own, and operate the new Sugarloaf 500kV substation.

Schedule:

Construction Start: 2008

In-Service Date: 2009

Permitting / Siting Status:

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Project Name: **Milligan loop-in of Saguaro-Casa Grande 230kV line**

Planned In-Service Date: **2009**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: 188 MVA

Point of Origin: Saguaro-Casa Grande 230kV line; Sec. 18, T8S, R8E

Point of Termination: Milligan substation to be in-service by 2009; Sec. 18, T8S, R8E

Intermediate Points of Interconnection:

Length of Line (in miles): Less than 1 mile

General Route:

The Milligan 230/69kV substation will be constructed adjacent to the Saguaro-Casa Grande 230kV line.

Purpose of Project:

This project is needed to provide the electrical source and support to the sub-transmission system to serve the increasing need for electric energy in southern Pinal County, in the Eloy area. The project will also increase the reliability and continuity of service for those areas.

Schedule:

Construction Start: 2008

In-Service Date: 2009

Permitting / Siting Status:

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Project Name: **VV01 loop-in of Navajo - Westwing 500kV line**

Planned In-Service Date: **2009**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 525kV AC

Facility Rating: 240 MVA

Point of Origin: Navajo-Westwing 500kV line; approximately Sec. 24, T12N, R2E

Point of Termination: VV01 substation to be in-service by 2009; approximately Sec. 24, T12N, R2E

Intermediate Points of Interconnection:

Length of Line (in miles): Less than 1 mile

General Route:

The VV01 substation will be constructed adjacent to the Navajo-Westwing line.

Purpose of Project:

This project is needed to provide the electrical source and support to the sub-transmission system to serve the increasing electrical needs in the Verde Valley and Prescott areas. Also, the project will result in increased reliability and continuity of service for the Verde Valley and Prescott areas.

Schedule:

Construction Start: 2008

In-Service Date: 2009

Permitting / Siting Status:

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Project Name: **345/69kV Interconnection at Western's Flagstaff 345kV bus**

Planned In-Service Date: **2010**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 345kV AC

Facility Rating: 200 MVA

Point of Origin: Western's Flagstaff 345kV substation; Sec. 24, T21N, R9E

Point of Termination: A new Flagstaff 69kV substation to be in-service by 2010; Sec. 24, T21N, R9E

Intermediate Points of Interconnection:

Length of Line (in miles): Less than 1 mile

General Route:

A 345/69kV transformer will interconnect into Western's Flagstaff substation.

Purpose of Project:

This project is needed to provide the electrical source and support to the sub-transmission system to serve the increasing need for electric energy in APS's northern service area. The project will also improve reliability and continuity of service for the growing communities in northern Arizona.

Schedule:

Construction Start: 2009

In-Service Date: 2010

Permitting / Siting Status:

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Project Name: **Palo Verde Hub - Sun Valley 500kV line**

Planned In-Service Date: **2010**

Project Sponsor: Arizona Public Service

Other Participants: SRP, CAWCD

Voltage Class: 525kV AC

Facility Rating: To be determined

Point of Origin: Palo Verde Switchyard or a new switchyard at Arlington Valley Energy Facility.

Point of Termination: Sun Valley substation to be in-service by 2010; Sec. 29, T4N, R4W

Intermediate Points of Interconnection: Proposed Harquahala Junction substation; approximately Sec. 25, T2N, R8W

Length of Line (in miles): Approximately 45 miles

General Route:

Generally leaving the Palo Verde Hub vicinity following the Palo Verde-Devers #1 and the Hassayampa-Harquahala 500kV lines until crossing the CAP canal. Then easterly, generally following the CAP canal, on the north side of the canal to the new Sun Valley substation.

Purpose of Project:

This project is needed to serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area as well as increase the export capability from the Palo Verde hub. This is a joint participation project with APS as the project manager. The initial plan of service for the project will be a 500kV line between the Harquahala Junction switchyard and the Sun Valley substation. The need for the 500kV line portion between the Harquahala Junction switchyard and the Palo Verde (or Arlington) switchyard will be continuously evaluated in future studies. The Harquahala Junction switchyard will interconnect into the existing Hassayampa-Harquahala 500kV line.

Schedule:

Construction Start: 2008

In-Service Date: 2010

Permitting / Siting Status:

Certificate of Environmental Compatibility issued 8/17/05 (Case No. 128, Decision No. 68063, Palo Verde Hub to TS5 500kV Transmission project). APS, as project manager, holds the CEC.

Project Name: **Sun Valley - TS1 230kV line**

Planned In-Service Date: **2010**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: 3000 A

Point of Origin: Sun Valley substation to be in-service by 2010; Sec. 29, T4N, R4W

Point of Termination: TS1 substation to be in-service by 2010; Sec. 20, T4N, R2W

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 15 miles

General Route:

East from the Sun Valley substation along the CAP canal to approximately 243rd Ave., south to the existing 500kV transmission line corridor, and then east along the corridor to the TS1 substation.

Purpose of Project:

This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area. Also, the project will provide more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities in the area; such as El Mirage, Surprise, Youngtown, Buckeye, and unincorporated Maricopa county. The first circuit is scheduled to be in-service for the summer of 2009 and the in-service date for the second circuit will be evaluated in future planning studies.

Schedule:

Construction Start: 2008

In-Service Date: 2010

Permitting / Siting Status:

Certificate of Environmental Compatibility issued 5/5/05 (Case No. 127, Decision No. 67828, West Valley North 230kV Transmission Line project).

Project Name: **Palm Valley - TS2 - TS1 230kV line**

Planned In-Service Date: **2010**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: 3000 A

Point of Origin: Palm Valley substation; Sec. 24, T2N, R2W

Point of Termination: TS1 substation to be in-service by 2010; Sec. 20, T4N, R2W

Intermediate Points of Interconnection: TS2 substation to be in-service by 2011; Sec. 25, T3N, R2W

Length of Line (in miles): Approximately 12 miles

General Route:

North from the Palm Valley substation, generally following the Loop 303 to Cactus road, west on Cactus road to approximately 191st Avenue, and then north on 191st Avenue to the TS1 substation. The future TS2 substation is currently projected to be in-service in 2011.

Purpose of Project:

This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area, providing more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities in the area; such as El Mirage, Surprise, Youngtown, Goodyear, and Buckeye. The first circuit is scheduled to be in-service for the summer of 2010 and the in-service date for the second circuit will be evaluated in future planning studies.

Schedule:

Construction Start: 2008

In-Service Date: 2010

Permitting / Siting Status:

The Palm Valley-TS2 230kV line portion was sited as part of the West Valley South 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 12/24/03 (Case No. 122, Decision No. 66646). The TS1-TS2 230kV line portion was sited as part of the West Valley North 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 5/5/05 (Case No. 127, Decision No. 67828).

Project Name: **TS9 - Pinnacle Peak 500kV line**

Planned In-Service Date: **2010**

Project Sponsor: Arizona Public Service

Other Participants: SRP

Voltage Class: 525kV AC

Facility Rating: To be determined

Point of Origin: TS9 substation to be in-service by 2010; Sec. 33, T6N, R1E

Point of Termination: Pinnacle Peak substation; Sec. 10, T4N, R4E

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 26 miles

General Route:

South from TS9 substation approximately 2 miles, generally paralleling the Navajo-Westwing 500kV lines, then turning east at approximately Dove Valley road to approximately Interstate 17. At Interstate 17 the line heads south to Happy Valley road where it turns east to the Pinnacle Peak substation, paralleling the existing 230kV transmission line corridor.

Purpose of Project:

This project is a result of joint planning through the SWAT forum. The project is needed to increase the import capability to the Phoenix Metropolitan area and strengthen the transmission system on the east side of the Phoenix Metropolitan valley. This is anticipated to be a joint participation project with APS as the project manager. The loop-in of the Navajo-Westwing 500kV line into the TS9 substation will be a part of the project. Also, the line will be constructed as 500/230kV double-circuit capable, with the TS9-Raceway-Avery-TS6-Pinnacle Peak 230kV line as the 230kV circuit.

Schedule:

Construction Start: 2008

In-Service Date: 2010

Permitting / Siting Status:

Certificate of Environmental Compatibility issued on 2/13/07 (Case No. 131, Decision No. 69343, TS9-Pinnacle Peak 500/230kV Project).

Project Name: **TS9 - Raceway - Avery - TS6 - Pinnacle Peak 230kV line**

Planned In-Service Date: **2010**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: 3000 A

Point of Origin: TS9 230kV substation to be in-service by 2012; Sec. 33, T6N, R1E

Point of Termination: Pinnacle Peak substation; Sec. 10, T4N, R4E

Intermediate Points of Interconnection: Raceway substation; Sec. 4, T5N, R1E
Avery substation to be in-service by 2013; Sec. 15, T5N, R2E
TS6 substation to be in-service by 2012; Sec. 8, T4N, R3E

Length of Line (in miles): Approximately 27 miles

General Route:

South from the TS9 substation to the existing Raceway substation, then south from Raceway approximately 1 mile, paralleling existing transmission lines. Then east approximately 9 miles, paralleling Dove Valley Road to the location of the future Avery substation. From Avery the line will continue east along Dove Valley Road to Interstate 17. At Interstate 17 the route will head south 5 miles, generally paralleling the west side of Interstate 17 until Happy Valley Road. The line will turn east, generally parallel to the existing 230kV transmission line corridor, for approximately 10 miles to the existing Pinnacle Peak substation.

Purpose of Project:

This project is needed to serve the increasing need for electric energy in the area immediately north of the Phoenix Metropolitan area and the northern portions of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for the growing communities in the area; such as Anthem, Desert Hills, New River, and north Phoenix. The in-service date for the 500/230kV transformer at TS9 is currently scheduled for 2012. The in-service dates for the Avery and TS6 substations are currently scheduled for 2013 and 2012, respectively. The in-service dates for the substations and 500/230kV transformer at TS9 will be continuously evaluated in future planning studies.

Schedule:

Construction Start: 2008

In-Service Date: 2010

Permitting / Siting Status:

Certificate of Environmental Compatibility was issued2/13/07 (Case No. 131, Decision No. 69343, TS9-Pinnacle Peak 500/230kV Project).

Project Name: **Mazatzal loop-in of Cholla-Pinnacle Peak 345kV line**

Planned In-Service Date: **2011**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 345kV AC

Facility Rating: 200 MVA

Point of Origin: Cholla-Pinnacle Peak or Preacher Canyon-Pinnacle Peak 345kV line; near Sec. 3, T8N, R10E

Point of Termination: Mazatzal substation to be in-service by 2011; Sec. 3, T8N, R10E

Intermediate Points of Interconnection:

Length of Line (in miles): Less than 1 mile

General Route:

The Mazatzal 345/69kV substation will be constructed adjacent to the Cholla-Pinnacle Peak 345kV line corridor.

Purpose of Project:

This project is needed to provided the electric source and support to the sub-transmission system to serve the increasing need for electric energy in the area of Payson and the surrounding communities. Additionally, improved reliability and continuity of service will result for the growing communities in the Payson area.

Schedule:

Construction Start: 2010

In-Service Date: 2011

Permitting / Siting Status:

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Project Name: **SE10 loop-in of Saguaro-Casa Grande 230kV line**

Planned In-Service Date: **2011**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: 188 MVA

Point of Origin: Saguaro-Casa Grande 230kV line; approximately Sec. 17, T10S, R10E

Point of Termination: SE10 substation to be in-service by 2011; Sec. 17, T10S, R10E

Intermediate Points of Interconnection:

Length of Line (in miles): Less than 1 mile

General Route:

The SE10 230/69kV substation will be constructed adjacent to the Saguaro-Casa Grande 230kV line. Approximately 2 miles west of the Saguaro Generating Facility.

Purpose of Project:

This project is needed to provide the electrical source and support to the sub-transmission system to serve the increasing need for electric energy in southern Pinal County. The project will also increase the reliability and continuity of service for those areas.

Schedule:

Construction Start: 2010

In-Service Date: 2011

Permitting / Siting Status:

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Project Name: **Desert Basin - Pinal South 230kV line**

Planned In-Service Date: **2011**

Project Sponsor: Salt River Project

Other Participants: Arizona Public Service

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: Desert Basin Power Plant Switchyard; Sec. 13, T6S, R5E

Point of Termination: Pinal South substation to be in-service by 2011; Sec. 30, T6S, R8E

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 21 miles

General Route:

From the Desert Basin Generation Station, in Casa Grande near Burris and Kortsen Roads, approximately 6 miles generally south and east to a point on the certificated SEV 500kV line near Cornman and Thornton Roads (vicinity of the proposed CATSHV03 Substation). Then the 230kV line will be attached to the 500kV structures for approximately 15 miles to the proposed Pinal South Substation south of Coolidge, AZ.

Purpose of Project:

The project will improve the reliability of the 230kV system in the region by reducing the loading on existing lines in the area; increase local area system capacity; create one of the 230kV components of the CATS-HV proposed transmission system for the central Arizona area. Also, APS participation in the project, along with APS's Sundance-Pinal South 230kV line, will allow APS to increase the reliability to deliver the output of the Sundance Generation Facility.

Schedule:

Construction Start: 2009

In-Service Date: 2011

Permitting / Siting Status:

Authority for the portion of the 230kV line to be attached to the 500kV structures is provided for in the CEC granted in Case No. 126, awarded in 2005 (ACC Decision No. 68093 and No. 68291), and subsequently confirmed in Decision No. 69183, which approved SRP's compliance filing for Condition 23 of the CEC. SRP was granted a CEC for Case No. 132 in 2007 (ACC Decision No. 69647) for the approximately six mile portion of the project not previously permitted from Desert Basin Generating Station to the vicinity of Cornman and Thornton Roads south of Casa Grande.

Project Name: **Sundance - Pinal South 230kV line**

Planned In-Service Date: **2011**

Project Sponsor: Arizona Public Service

Other Participants: ED-2

Voltage Class: 230kV AC

Facility Rating: 3000 A

Point of Origin: Sundance substation; Sec. 2, T6S, R7E

Point of Termination: Pinal South substation to be in-service by 2011; Sec. 30, T6S, R8E

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 6 miles

General Route:

The route has not yet been approved by the ACC, but will generally head south from the Sundance facility to to a point south of State Route 287/Florence Boulevard and then head east into the Pinal South substation.

Purpose of Project:

This project will serve increasing loads in Pinal County and will improve reliability and continuity of service for the rapidly growing communities in the area. Also, the project will increase the reliability of the Sundance Generation facility by providing a transmission line in a separate corridor than the existing lines that exit the plant. This project, in conjunction with the Desert Basin-Pinal South 230kV project, will allow APS to reliably and economically deliver energy from the Sundance Generation facility over APS's transmission system. The project will be constructed as a 230kV double-circuit capable line, but initially operated as a single-circuit. The in-service date for the second circuit will be evaluated in future planning studies.

Schedule:

Construction Start: 2009

In-Service Date: 2011

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility was filed in December, 2007 (Case No. 136). A decision from the ACC is expected in 2008.

Project Name: **Sun Valley - TS9 500kV line**

Planned In-Service Date: **2012**

Project Sponsor: Arizona Public Service

Other Participants: SRP, CAWCD

Voltage Class: 525kV AC

Facility Rating: To be determined

Point of Origin: Sun Valley substation to be in-service in 2009; Sec. 29, T4N, R4W

Point of Termination: TS9 substation to be in-service in 2010; Sec. 33, T6N, R1E

Intermediate Points of Interconnection:

Length of Line (in miles): To be determined

General Route:

The route for this project has not yet been determined. Generally the line will head north-northeast out of the Sun Valley substation and then east to the TS9 substation.

Purpose of Project:

This project is needed to serve the increasing need for electric energy in the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area, as well as increase the export capability from the Palo Verde hub. The line will also increase the reliability of the EHV system by completing a 500kV loop that connects the Palo Verde Transmission system, the Southern Navajo Transmission system, and the Southern Four Corners system. This project is anticipated to be 500/230kV double-circuit capable. It is anticipated that the project will be constructed as 500/230kV double-circuit capable.

Schedule:

Construction Start: 2010

In-Service Date: 2012

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility has not yet been filed. An application is expected to be filed in the second quarter of 2008.

Project Name: **Palo Verde Hub - North Gila 500kV #2 line**

Planned In-Service Date: **2012**

Project Sponsor: Arizona Public Service

Other Participants: SRP, IID, WMIDD

Voltage Class: 525kV AC

Facility Rating: To be determined

Point of Origin: Hassayampa switchyard, Arlington Valley Power Plant, or Redhawk Power Plant

Point of Termination: North Gila substation; Sec. 11, T8S, R22W

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 110 miles

General Route:

This line will generally follow the route of the existing Hassayampa - North Gila 500kV #1 line.

Purpose of Project:

As a new transmission path to the Yuma area, this 500kV line will provide transmission capacity required to supplement limited transmission and generation resources in the Yuma area. This is a joint participation project with APS as the project manager.

Schedule:

Construction Start: 2009

In-Service Date: 2012

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility was filed 10/3/07 (Case No. 135). The CEC application was approved by the Arizona Power Plant and Transmission Line Siting Committee on November 20th. A final vote by the Arizona Corporation Commission is expected to take place in early 2008.

Project Name: **North Gila - TS8 230kV line**

Planned In-Service Date: **2012**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: 3000 A

Point of Origin: North Gila substation; Sec. 11, T8S, R22W

Point of Termination: TS8 substation to be in-service by 2012; Sec. 25, T9S, R23W

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 15 miles

General Route:

The routing for this line has not yet been determined.

Purpose of Project:

This project is needed to serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.

Schedule:

Construction Start: 2010

In-Service Date: 2012

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility has not yet been filed. An application is expected to be filed in 2008.

Project Name: **Jojoba loop-in of TS4-Panda 230kV line**

Planned In-Service Date: **2013**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: 188 MVA

Point of Origin: TS4-Panda 230kV line; Sec. 25, T2S, R4W

Point of Termination: Jojoba 230/69 substation to be in-service by 2013; Sec. 25, T2S, R4W

Intermediate Points of Interconnection:

Length of Line (in miles): Less than 1 mile

General Route:

The Jojoba 230/69kV substation will be constructed adjacent to the TS4-Panda 230kV line.

Purpose of Project:

This project is needed to provide the electrical source and support to the sub-transmission system to serve the increasing need for electric energy for the growing communities in the area; such as Buckeye, Goodyear, and Gila Bend. The project will also increase the reliability and continuity of service for those areas.

Schedule:

Construction Start: 2012

In-Service Date: 2013

Permitting / Siting Status:

Certificate of Environmental Compatibility issued 10/16/00 (Case No. 102, Decision No. 62960, Gila River Transmission Project) for the Gila River Transmission Project included the interconnection of the 230kV substation.

Project Name: **Sun Valley - TS11 - Buckeye 230kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: Sun Valley substation to be in-service by 2010; Sec. 29, T4N, R4W

Point of Termination: Buckeye substation; Sec. 7, T1N, R3W

Intermediate Points of Interconnection: TS11 substation; location to be determined

Length of Line (in miles): To be determined

General Route:

The routing for this line has not yet been determined.

Purpose of Project:

This project is needed to serve the increasing need for electric energy in the largely undeveloped areas west of the White Tank Mountains. This project will provide the first portion of the transmission infrastructure in this largely undeveloped area and provides a transmission connection between the northern and southern transmission sources that will serve the area. Improved reliability and continuity of service will result for this fast growing portion of Maricopa County. It is anticipated that this project will be constructed with double-circuit capability, but initially operated as a single circuit. The in-service date and location of the TS11 230/69kV substation will be determined in future planning studies based upon the development of the area.

Schedule:

Construction Start: TBD

In-Service Date: TBD

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility has not yet been filed.

Project Name: **Sun Valley - TS10 - TS11 230kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: Sun Valley substation to be in-service by 2010; Sec. 29, T4N, R4W

Point of Termination: A future TS10 substation; location to be determined

Intermediate Points of Interconnection: A future TS11 substation; location to be determined

Length of Line (in miles): To be determined

General Route:

The route for this project has not yet been determined.

Purpose of Project:

This project will be needed to provide a transmission source to serve future load that emerges in the currently undeveloped areas northwest of the White Tank Mountains. This line is anticipated to be a 230kV line emanating from the Sun Valley substation, with the future TS10 230/69kV substation to be interconnected into the 230kV line.

Schedule:

Construction Start: TBD

In-Service Date: TBD

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility has not yet been filed.

Project Name: **Sun Valley - TS9 230kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: Sun Valley substation to be in-service in 2010; Sec. 29, T4N, R4W

Point of Termination: TS9 substation to be in-service in 2010; Sec. 33, T6N, R1E

Intermediate Points of Interconnection: To be determined

Length of Line (in miles): To be determined

General Route:

The route for this project has not yet been determined. Generally the line will head north-northeast out of the Sun Valley substation and then east to the TS9 substation.

Purpose of Project:

This project will be needed to provide a transmission source to serve future load that emerges in the currently undeveloped areas south and west of Lake Pleasant. This line is anticipated to be the 230kV circuit on the Sun Valley-TS9 500/230kV double-circuit line.

Schedule:

Construction Start: TBD

In-Service Date: TBD

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility has not yet been filed. An application is expected to be filed in the second quarter of 2008.

Project Name: **North Gila - Yucca 230kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: North Gila substation; Sec. 11, T8S, R22W

Point of Termination: Yucca substation; Sec. 36, T7S, R24W

Intermediate Points of Interconnection:

Length of Line (in miles): To be determined

General Route:

The routing for this line has not yet been determined.

Purpose of Project:

This project is needed to serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.

Schedule:

Construction Start: TBD

In-Service Date: TBD

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility has not yet been filed.

Project Name: **Yucca - TS8 230kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: Yucca substation; Sec. 36 , T7S, R24W

Point of Termination: TS8 substation to be in-service in 2012; Sec. 25, T9S, R23W

Intermediate Points of Interconnection:

Length of Line (in miles): To be determined

General Route:

The routing for this line has not yet been determined.

Purpose of Project:

This project is needed to serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.

Schedule:

Construction Start: TBD

In-Service Date: TBD

Permitting / Siting Status:

An application for a Certificate of Environmental Compatibility has not yet been filed.

Project Name: **Westwing - El Sol 230kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: Westwing substation; Sec. 12, T4N, R1W

Point of Termination: El Sol substation; Sec. 30, T3N, R1E

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 11 miles

General Route:

Per certificate. Generally following the existing Westwing-Surprise-El Sol 230kV corridor.

Purpose of Project:

This project will increase system capacity to serve growing demand for electric energy in the Phoenix Metropolitan area, while maintaining system reliability and integrity for delivery of bulk power from Westwing south into the APS Phoenix Metropolitan area 230kV transmission system.

Schedule:

Construction Start: TBD

In-Service Date: TBD

Permitting / Siting Status:

Certificate of Environmental Compatibility issued 7/26/73 (Case No. 9, Docket No. U-1345). Note that this Certificate authorizes two double-circuit lines. Construction of the first double-circuit line was completed in March 1975. Construction of the second line, planned to be built with double-circuit capability, but initially operated with a single circuit, is described above.

Project Name: **Westwing - Raceway 230kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: Arizona Public Service

Other Participants: None

Voltage Class: 230kV AC

Facility Rating: To be determined

Point of Origin: Westwing substation; Sec. 12, T4N, R1W

Point of Termination: Raceway substation; Sec. 4, T5N, R1E

Intermediate Points of Interconnection:

Length of Line (in miles): Approximately 7 miles

General Route:

Northeast from Westwing substation paralleling existing transmission lines to the Raceway 230kV substation.

Purpose of Project:

This project will serve increasing loads in the far north and northwest parts of the Phoenix Metropolitan area and provide contingency support for multiple Westwing 500/230kV transformer outages. The in-service date will continue to be evaluated in future planning studies.

Schedule:

Construction Start: TBD

In-Service Date: TBD

Permitting / Siting Status:

Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley 230kV Transmission Line Project).

Project Name: **Palo Verde - Saguaro 500kV line**

Planned In-Service Date: **To be determined**

Project Sponsor: CATS Sub-Regional Planning Group Participants

Other Participants: To be determined

Voltage Class: 525kV AC

Facility Rating: To be determined

Point of Origin: Palo Verde switchyard; Sec. 34, T1N, R6W

Point of Termination: Saguaro substation; Sec. 14, T10S, R10E

Intermediate Points of Interconnection: To be determined

Length of Line (in miles): Approximately 130 miles

General Route:

Generally south and east from the Palo Verde area to a point near Gillespie Dam, then generally easterly until the point at which the Palo Verde-Kyrene 500kV line diverges to the north and east. The corridor then is generally south and east again, adjacent to a gas line corridor, until meeting up with the Tucson Electric Power Company's Westwing-South 345kV line. The corridor follows the 345kV line until a point due west of the Saguaro Generating Station. The corridor then follows a lower voltage line into the 500kV yard just south and east of the Saguaro Generating Station.

Purpose of Project:

This line is the result of the joint participation CATS study. The line will be needed to increase the adequacy of the existing EHV transmission system and permit increased power delivery throughout the state.

Schedule:

Construction Start: TBD

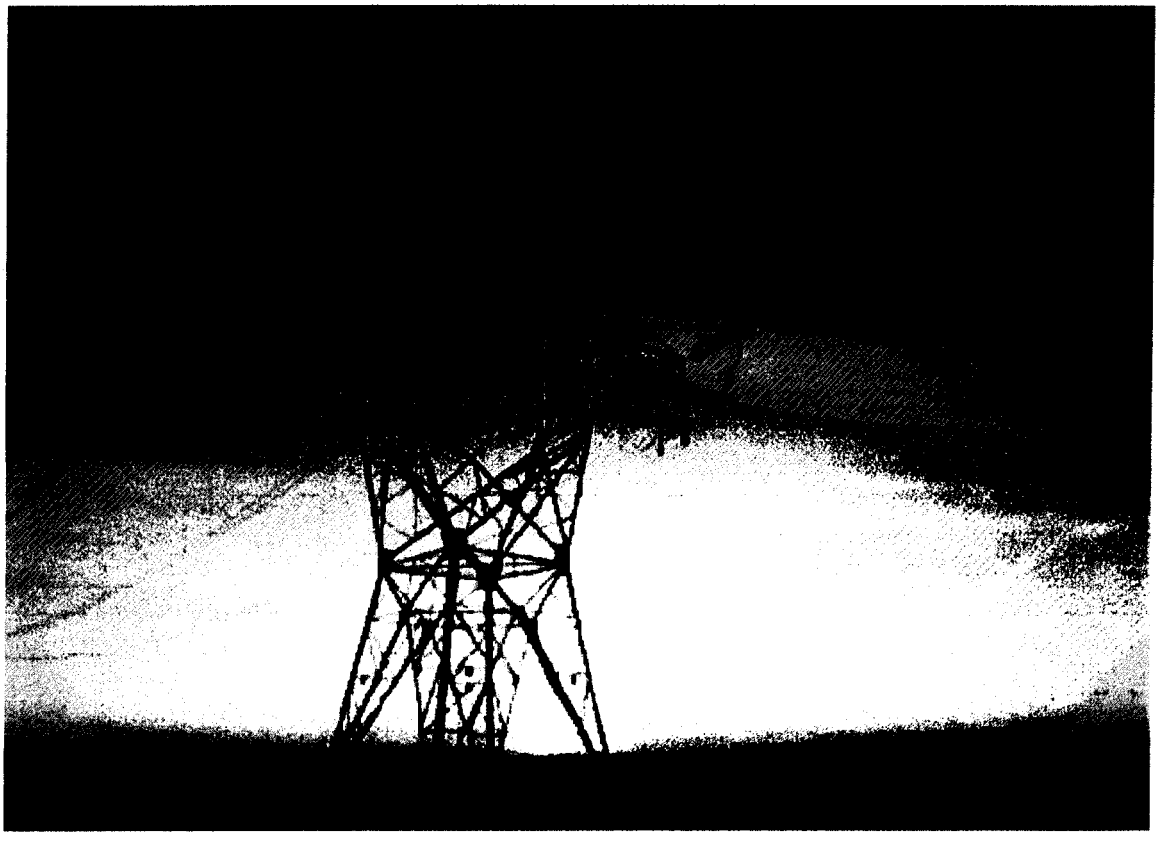
In-Service Date: TBD

Permitting / Siting Status:

Certificate of Environmental Compatibility issued 1/23/1976 (Case No. 24, Decision No. 46802).

10-W3

Arizona Corporation Commission Fourth Biennial Transmission Assessment – 2006-2015



Arizona Corporation Commission Fourth Biennial Transmission Assessment for 2006-2015,
Docket No. E-00000D-05-0040

Arizona Corporation Commission Utilities Division

KEMA, Inc.

Arizona Corporation Commission

Docket No. E-00000D-05-0040

Decision No. _____

Fourth Biennial Transmission Assessment

2006-2015

January 30, 2007

Arizona Corporation Commission Staff

and

KEMA Inc.
4400 Fair Lakes Court
Fairfax, VA 22033

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Common acronyms

AC	Alternating Current
ACC	Arizona Corporation Commission
ANPP	Arizona Nuclear Power Project
APS	Arizona Public Service
ATC	Available Transfer Capability
AZ	Arizona
AZNM	AZ-NM EHV Subcommittee
BTA	Biennial Transmission Assessment
BTU	British Thermal Unit
CA	California
CAO	Control Area Operator
CATS	Central Arizona Transmission System
CAWCD	Central AZ Water Conservation District
CC	Combined Cycle
CDEAC	Clean and Diversified Energy Advisory Committee
CEC	Certificate of Environmental Compatibility
CRT	Colorado River Transmission Subcommittee
DOE	Department of Energy
DPA	Dine Power Authority
DSW	Desert Southwest Region
ED	Electric District
EFOR	Equivalent Forced Outage Rate
EOR	East of (Colorado) River
EPACT	Energy Policy Act
EPS	Environmental Portfolio Standards
ERO	Electric Reliability Organization
EHV	Extra High Voltage
FACTS	Flexible AC Transmission System
FPA	Federal Power Act
FERC	Federal Energy Regulatory Commission
FOR	Forced outage rate
GT	Gas Turbine
HV	High Voltage
HVDC	High Voltage Direct Current
HY	Hydro
IID	Imperial Irrigation District
IPP	Independent Power Producer
I/S	In-Service
ISO	Independent System Operator
KV	Kilovolt
KWh	Kilowatt-Hour
LSE	Load Serving Entity
MISO	Midwest Independent System Operator
MLSC	Maximum Load Serving Capability
MORC	Minimum Operating Reliability Criteria
MOU	Memorandum of Understanding
MVA	Megavolt-Ampere
MVar	Mega-var
MW	Megawatt
n-0	No Contingency
n-1	Single Contingency
n-2	Double Contingency
n-1-1	Overlapping Contingency
NERC	North American Electric Reliability Council
NG	Natural Gas
NM	New Mexico
NOI	Notice of Inquiry
NTP	Navajo Transmission Project
NOPR	Notice of Proposed Rulemaking
OASIS	Open Access Same Time Information System
OATT	Open Access Transmission Tariff
PJM	Pennsylvania-New Jersey-Maryland (ISO)
PNM	Public Service of New Mexico
PURPA	Public Utilities Regulatory Policy Act
PV	Palo Verde
RMR	Reliability Must Run
RMS	Reliability Management System
RTO	Regional Transmission Organization
SCE	Southern California Edison
SCED	Security Constrained Economic Dispatch
SDG&E	San Diego Gas and Electric
SEV	South East Valley
SIL	Simultaneous Import Limit
SRP	Salt River Project
SSG-WI	Seams Steering Group – Western Interconnection
ST	Steam Turbine
STEP	Southwest Transmission Expansion Planning Group
SWAT	Southwest Area Transmission Study Group
SWPG	Southwest Power Group
SWTC	Southwest Transmission Cooperative
TEP	Tucson Electric Power
TEPPC	Transmission Expansion Planning Policy Committee
TNMP	Texas-New Mexico Power Company
TTC	Total Transfer Capability
UDC	Utility Distribution Company
UNS	UniSource Energy Corp.
WAPA	Western Area Power Administration ("Western")
WECC	Western Electricity Coordinating Council
WGA	Western Governors' Association

Executive summary

A.R.S. §40-360.02.E states "The (Ten-Year) plans shall be reviewed biennially by the commission and the commission shall issue a written decision regarding the adequacy of the existing and planned transmission facilities in this state to meet the present and future energy needs of this state in a reliable manner." This Fourth Biennial Transmission Assessment (BTA) was undertaken by the Arizona Corporation Commission (ACC or "Commission") Staff ("Staff") to fulfill the above stated statutory obligation.

The Ten-Year transmission plans filed in January 2005 and 2006 under Docket No. E-00000D-05-0040 are the subject of this assessment. Of particular interest are the many activities related to the collaborative regional planning process. Reliability Must Run (RMR) studies were submitted by industry to address concerns identified in earlier BTAs and are also the topic of this assessment.

Staff's approach in organizing the BTA remained the same as for the previous BTA. Staff relied on analyzing the Ten-Year studies, RMR Studies, and other technical reports and documents filed with the Commission by the various organizations rather than performing technical studies of their own. Staff hired a consulting organization, KEMA, to assist in this effort.

Staff uses a set of guiding principles to determine whether the Arizona transmission system will be adequate during the next ten-year period. Staff's guiding principles are based upon best engineering practices established in Arizona, coupled with the use of regional and national reliability council criteria and standards, and related state and federal policies.

This report by Arizona Corporation Commission Staff is intended to inform the Commission regarding the adequacy of the existing and planned transmission facilities in the state to meet the present and future energy needs of the state in a reliable manner pursuant to the obligation stated by A.R.S. §40-360.02, Title 40, Chapter 2, paragraph G.

The reliability of an existing or planned electric system under existing, alternative or future operating conditions can only be determined by technical simulation studies, including load flow, stability and short circuit analysis. Such studies require the application of a set of study criteria to measure the system's performance. In assessing the Arizona transmission system adequacy, Staff and KEMA critically reviewed and analyzed the transmission planning documents assembled by Staff and addressed the following questions:

1. Do the proposed Arizona transmission system plans meet the load serving requirements of the state during the 2006-2015 time period in a reliable manner?
2. Was the transmission planning process conducted in accordance with the transmission planning principles and good utility practices accepted by the power industry?

3. What steps were taken in the new transmission planning studies to effectively address the Commission's concerns raised in the earlier BTAs about the adequacy of the state's transmission system to reliably support the competitive wholesale market emerging in Arizona?
4. Do the generation interconnection practices in Arizona adequately reflect technical aspects of the generation interconnection policies as defined in Federal Energy Regulatory Commission (FERC) Orders?
5. Do the transmission plans adequately reflect North American Electric Reliability Council's (NERC) latest activities related to compliance with the transmission planning standards, as well as compliance with Western Electricity Coordinating Council (WECC) reliability standards?

This transmission assessment represents the professional opinion of Commission Staff and the Commission's Consultant, KEMA. The BTA is not an evaluation of individual transmission provider's facilities or quality of service. This BTA report does not set Commission policy and does not recommend specific action for any individual Arizona transmission provider. It assesses the adequacy of Arizona's transmission system to reliably meet existing and future energy needs of the state. This transmission assessment will not become official unless and until it is adopted by Commission Decision.

Commission Staff is pleased to report that the collaborative process between the Commission and Arizona utilities, which began in previous BTAs, has continued to evolve in a constructive manner during the Fourth BTA. Transmission owners have been responsive to many issues raised by Staff in prior BTAs, including the level of ability of the Palo Verde transmission system to handle full generation output at the Palo Verde Hub, Palo Verde Hub reliability issues and the economic viability of generators at the Hub, clarifying the criteria and study processes Arizona utilities utilize to formulate their RMR plans, and a number of other issues that are discussed in this report.

Extensive regional planning studies have been conducted in a collaborative process for 2006-2015. Studies for more localized service areas within the state were also included. In addition to addressing normal system conditions with all lines in service (n-0), this year's filings also included analysis of significant overlapping or concurrent outage events (n-1-1 and n-2 events, respectively). Current and planned transmission projects are increasing the Palo Verde Hub transmission capacity to both the east and the west. Phoenix and Yuma area RMR concerns raised in the Third BTA have been satisfactorily addressed. In addition, several major future interstate projects were identified in this BTA for Commission and stakeholder review.

As evidence of the collaborative long-term planning and expansion process taking place in Arizona, at least eight major projects in the ten year filing period have multiple utility sponsors. Collaborative long-term planning studies were also conducted by the utilities; including a study of the collective impact of individual transmission owner expansion plans in the Central Arizona region. A collaborative study approach was used to determine the 2006 Phoenix area RMR requirements. Collaborative planning efforts are also leading to expanded delivery

capability from Arizona to southern California across Path 49, as defined by WECC. Major n-1-1 overlapping contingency events and n-2 extreme contingency events were addressed for the first time in the Fourth BTA. Such analysis is consistent with WECC/NERC reliability standards and the Staff's vision of expanded studies to address certain types of more extreme events.

The Fourth BTA also concludes that short-term upgrades on Path 49 and addition of two planned Arizona 500 kV projects (Hassayampa-Pinal West-Santa Rosa in 2008 and Palo Verde-TS5 in 2009) will significantly increase the outlet capability of the Palo Verde Hub. The Path 49 upgrades will also help to remedy market limitations between Arizona, California and Southern Nevada.

Staff offers the following conclusions for Commission consideration:

1. The electric industry in Arizona has been very responsive to concerns raised in the Commission's previous BTAs.
2. Extensive regional studies addressing the interstate transmission needs have been conducted in a collaborative process.
3. Transmission providers have performed RMR studies for each local transmission import constrained area they serve and have complied with RMR requirements of the previous BTAs.
4. In general, the existing and proposed Arizona transmission system meets the load serving requirements of the state in a reliable manner:
    a. Many planned 345 kV and 500 kV Extra High Voltage (EHV) and 115 kV and 230 kV High Voltage (HV) projects will increase transmission system capability to support increased interstate power transfers, and to provide reliable transfers within the state of Arizona.
    b. The planned EHV system appears to be adequate throughout the study period. As is often the case, plans for the later years of the period are less well defined than those in the early years. Future reports should include more discussion of alternate additions considered for the final five years of the study period. This will allow the Commission and public to be better informed regarding future possibilities.
    c. The RMR studies show that the RMR areas will have load-serving capacity sufficient to provide reliable supply during the next ten-year period. The 2006 RMR study analyzed expected 2008 and 2015 system conditions and concludes that projected reserves in the Phoenix area in both years are greater than the 99% reliability reserve requirement of 865 MW. These results appear to resolve the Staff's concern from the 2004 study. However, regarding the Mohave County RMR study results, the situation remains unclear. As discussed in §6.2.5 (page 111) this is due in large part to the absence of filings by Western Area Power Administration in the BTA process.
    d. The RMR studies show no economic justification for additional transmission projects as an alternative to dispatch of local area generation. Concerns

raised in the last BTA concerning extreme contingencies and data transparency have been satisfactorily addressed in this BTA.

e. The planned Arizona transmission system meets the WECC and NERC single contingency criteria (n-1).

f. Since interconnection of merchant plants commenced at the Palo Verde Hub, the Palo Verde east transmission system capability has increased from 3,810 MW to 6,970 MW as a result of several transmission upgrades. Several new 500 kV transmission line projects within Arizona are proposed as additional reinforcements in 2008 through 2012 that will significantly increase the outlet capability of the Palo Verde Hub to Arizona and California.

5. Short-term upgrades to Path 49 have added 505 MW to the pre-existing 2,800 MW Palo Verde west transmission system for power delivery to California. However, transmission from Palo Verde to California is inadequate to allow all new Palo Verde Hub generation full access to the California market. Several 500 kV transmission projects are being studied to remedy such market limitation between Arizona, California and Nevada.

6. Some new power plants are interconnected to Arizona's bulk transmission system via a single transmission line or tie rather than using Arizona's best engineering practices of multiple lines emanating from power plants. As interconnection of new transmission lines are considered for the Palo Verde Hub, they should be encouraged to terminate at these new power plant switchyards in order to mitigate this regional reliability concern.

Concerns outlined by Staff in the above conclusions are not easily or quickly resolved. The public's best interest warrants effective and decisive remedies. Therefore, Staff offers the following recommendations for Commission consideration and action:

1. Continue to support use of:

   a. *Guiding Principles for ACC Staff Determination of Electric System Adequacy and Reliability* (attached as Appendix A) to aid Staff in its determination of adequacy and reliability of power plant and transmission line projects,

   b. NERC and WECC criteria and FERC policies for adequacy and reliability assessments of the transmission system, and

   c. Collaborative planning study forums of transmission providers, merchant plant developers, and other interested parties for the purpose of ensuring consumer benefits of generation additions and cost-effective transmission enhancements and interconnections.

2. Endorse Staff's recommendations that:

   a. RMR 10-year study results are to be filed with ten-year transmission plans by January 31, of even number years, to coincide with the associated ACC obligation to perform a Biennial Transmission Assessment.

   b. All future interconnections proposed at the Palo Verde Hub, either new generation or new transmission line, must perform a risk assessment of the Hub to ascertain to what degree the proposed project mitigates the pre-existing risks to extreme outage events. This assessment must precede a project's application for a Certificate of Environmental Compatibility (CEC) with the Commission. The recommendations of the Palo Verde Risk Assessment report should be followed if a proposed project would otherwise exacerbate the existing risk at the Hub.

   c. Arizona utilities should continue performing RMR studies for all transmission import constrained local areas:

      i. Utilizing a collaborative study forum;

      ii. Improving economic analysis of RMR mitigation;

      iii. Clarifying projected system peak load and supply conditions in Mohave County beyond 2012 and appropriate mitigation measures, if any;

      iv. Clarify anticipated generation retirements in each constrained load area and the impact of such retirements on the RMR requirements.

1. Overview

1.1 Assessment authority

Arizona statutes require every organization contemplating construction of any transmission line within Arizona during a ten-year period to file a ten-year plan with the Arizona Corporation Commission (ACC) on or before January 31 of each year.[1] In 1999, the Arizona state legislature placed a statutory obligation with the ACC to biennially review the plans filed with the Commission and "issue a written decision regarding the adequacy of the existing and planned transmission facilities in Arizona to meet the present and future energy needs of the state in a reliable manner."[2]

In 2001, the Arizona legislature further modified the Arizona Power Plant and Transmission Line Siting statutes resulting in two new statutory requirements related to filing of plans with the Commission. Every organization contemplating construction of a new power plant within Arizona is now required to file a plan with the Commission 90 days before filing an application for a Certificate of Environmental Compatibility (CEC).[3] Additionally, all plans filed with the Commission are to be accompanied by power flow and stability analysis reports showing the effect of plant interconnections on the current *(and future)* Arizona electric transmission system.[4]

[1] A.R.S. § 40-360.02.A

[2] A.R.S. § 40-360.02.G

[3] A.R.S. § 40-360.02.B

[4] A.R.S. § 40-360.02.C.7

1.2 Summary of previous Biennial Transmission Assessments

1.2.1 First BTA 2000-2009

Staff of the ACC initiated its First Biennial Transmission Assessment (BTA) in 2000, under Docket No. E-00000A-01-0120. A written decision of that assessment was rendered in July 2001. In the First BTA, Staff determined that the State of Arizona (State) transmission system was not adequate[1] to provide reliable supply to the State electrical load, neither for the present nor for the future conditions. Staff recommended two standards for measuring transmission adequacy and security:

1. There should be sufficient transmission import capability to reliably serve all loads in a utility's service area without limiting access to more economical or a less polluting remote generation.
2. New power plants must have sufficient interconnected transmission capacity to reliably deliver their full output without use of remedial action schemes or displacing existing generation at the same interconnection for single contingency (n-1) outages.

1.2.2 Second BTA 2002-2011

The Staff initiated its Second BTA in 2002, under Docket No. E-00000A-02-0065. Written Decision No. 65476 of that assessment was rendered on December 19, 2002. In this BTA, Staff concluded that the electric industry had been very responsive[2] to concerns raised by Staff in the First BTA. The BTA process was built upon an extensive collaborative transmission planning process open to all stakeholders. In addition, some merchant power plant developers had begun proposing transmission system reinforcements to resolve transmission barriers to the wholesale market. Transmission providers had agreed to participate in a RMR study process for transmission-constrained areas with which they are interconnected. Most importantly, numerous new transmission projects had been announced and filed with the Commission since its First BTA.

[1] BTA 2002-2011, Page 2

[2] BTA 2002-2011, Executive Summary, Page ii

Staff concluded that the existing and planned Arizona transmission system generally met the load serving requirements of the State in a reliable manner. However, Staff had several concerns about the adequacy of the State's transmission system to reliably support the competitive wholesale market emerging in Arizona. These concerns included:

- Limited access by competitive wholesale generators to local Arizona markets due to local transmission import constraints that result in local RMR generation requirements;
- Failure of planned Palo Verde transmission system additions to accommodate the full output of all new power plants connected at the Palo Verde Hub;
- Limited additional long-term firm transmission capacity available to export or import energy over Arizona's transmission system; and
- A single transmission line or tie being used to connect some new power plants to Arizona's bulk transmission system rather than using Arizona's best engineering practices of multiple connections from power plants.

Staff recognized that the above concerns were not easy to resolve, and offered the following recommendations for Commission consideration and action:

1. Continue to support use of the "Guiding Principles for ACC Staff Determination of Electric System Adequacy and Reliability" to aid Staff in its determination of adequacy and reliability of power plant and transmission line projects.
2. Request Staff to commence rule making proceedings to determine how:
   a. Utility distribution companies (UDCs) should ensure sufficient transmission import capacity to reliably serve all loads in its service area without limiting access to more economical or less polluting remote generation[1], and
   b. New power plants should demonstrate sufficient transmission capacity exists to reliably and economically deliver their full output without use of remedial action schemes for single contingency (n-1) outages or displacing existing generation at the interconnection.
3. Encourage transmission providers to continue to investigate and study, in a collaborative fashion, local area import constraints in accordance with the RMR Study Plan outlined in Section 7.2 of the BTA 2002.

[1] Each utility distribution company also has an obligation to assure that adequate transmission import capability is available to meet the load requirements of all distribution customers in its service area. This requirement is also coupled with a requirement that Arizona utilities competitively procure 100% of their standard offer requirements, with at least 50% procured through competitive bidding. This later requirement was stayed by the Commission in Decision No. 61969, for Staff to determine the proper level of competitive solicitation. Staff used these guiding principles, criteria, standards and rules for this biennial transmission assessment.

4. Continue to encourage collaborative study activities between transmission providers and merchant plant developers for the purpose of:

   a. Ensuring consumer benefits of generation additions and cost-effective transmission enhancements and interconnections, and

   b. Facilitating restructuring of the electric utility industry to reliably serve Arizona consumers at just and reasonable rates via a competitive wholesale market.

1.2.3 Third BTA 2004-2013

The Staff initiated its Third BTA in 2004, under Docket No. E-00000D-03-0047. Written Decision No. 67457 of that assessment was rendered on January 4, 2005. In this BTA, Staff concluded that the electric industry had been very responsive to concerns raised in the Staff's second BTA. [1]

Staff concluded that the existing and planned Arizona transmission system generally met the load serving requirements of the State in a reliable manner. However, Staff had several concerns about the adequacy of the State's transmission system to reliably support the competitive wholesale market emerging in Arizona. These concerns included:

- No transmission improvements had been made to the pre-existing 2,800 MW Palo Verde west transmission system capability to deliver power to California. Therefore, transmission from Palo Verde to California is inadequate to allow all new Palo Verde Hub generation full access to the California market. Three 500 kV transmission projects are being studied to remedy such market limitation between Arizona, California and Nevada.
- There was very little existing long-term firm transmission capacity available to export or import energy over Arizona's transmission system. Studies investigating transmission additions required between Arizona and California and between New Mexico and Arizona continue to explore the scope, participation and timing of alternative projects.
- Some new power plants had interconnected to Arizona's bulk transmission system via a single transmission line or tie rather than using Arizona's best engineering practices of multiple lines emanating from power plants. As interconnection of new transmission lines are considered for the Palo Verde Hub, they should be encouraged to terminate at these new power plant switchyards in order to mitigate this regional reliability concern.

[1] BTA 2004-2013, Executive Summary

Staff recognized that the above concerns were not easy to resolve, and offered the following recommendations for Commission consideration and action:

- Continue to support use of:
  a. "Guiding Principles for ACC Staff Determination of Electric System Adequacy and Reliability" (attached as Appendix A) to aid Staff in its determination of adequacy and reliability of power plant and transmission line projects,
  b. NERC and WECC criteria and FERC policies for adequacy and reliability assessments of the transmission system, and
  c. Collaborative planning study forums of transmission providers, merchant plant developers, and other interested parties for the purpose of ensuring consumer benefits of generation additions and cost-effective transmission enhancements and interconnections.

- Endorse Staff's recommendation that:
  a. RMR studies continue to be performed and filed with ten year plans in even numbered years for inclusion in future BTA reports and that:
     - Future RMR studies provide more transparent information on input data and economic dispatch assumptions, and
     - Arizona utilities collaborate with the Staff to develop and effectively implement more stringent criteria as appropriate for RMR areas in the 2006 BTA.
  b. All future interconnections proposed at the Palo Verde Hub, either new generation or new transmission lines, must perform a risk assessment of the Hub to ascertain to what degree the proposed project mitigates the pre-existing risks to extreme outage events. This assessment must precede a project's application for a CEC with the Commission. The recommendations of the Palo Verde Risk Assessment report should be followed if a proposed project would otherwise exacerbate the existing risk at the Hub.
  c. The Fourth BTA address and document:
     - Compliance with single contingency criteria overlapped with the bulk power system facilities maintenance (n-1-1) (for the first year of the BTA analysis) as required by WECC and NERC.
     - Extreme contingency outages studied for Arizona's major generation hubs and major transmission stations including identification of associated risks and consequences if mitigating infrastructure improvements are not planned.

1.3 Fourth Biennial Assessment – Purpose and Framework

1.3.1 Purpose

Staff undertook the Fourth BTA, which evaluates the utilities' 2006-2015 transmission plans filed in January 2006, under Docket No. E-00000D-05-0040. This report fulfills the Staff's statutory obligation to review these transmission plans and assess whether the Arizona transmission system is adequate. The 2005 and 2006 RMR Studies are also the subject of this assessment. Of particular interest are the adjustments made by the industry to address the concerns identified in the Staff's First, Second and Third BTAs. Staff hired a consulting organization, KEMA Inc. to assist Staff in this effort.

The adequacy of an existing or planned electric system is determined by technical simulation studies. Such studies require the use of databases, software and transmission planning reliability standards, and planning assumptions. In the BTA process the Arizona transmission utilities conduct their own studies, participate in the collaborative regional planning process, and present the study results in their ten-year plan reports and at public workshops. Staff and KEMA reviewed and analyzed all these study reports assembled by Staff, and organized two workshops. Staff relied on the technical reports and documents filed with the Commission by the various organizations, rather than performing technical studies of their own.

Staff used a set of guiding principles to aid it in determining the adequacy and reliability of both transmission and generation systems.[1] Staff's guiding principles are based upon best engineering practices established in Arizona coupled with the use of WECC and NERC planning standards.[2] Staff and KEMA critically reviewed and analyzed the transmission planning documents assembled by Staff and addressed the following questions:

- Do the proposed Arizona transmission system plans meet the load-serving requirements of the state during the 2006-2015 period, in a reliable manner?
- Was the transmission planning process conducted in accordance with the transmission planning principles and good utility practices accepted by the power industry and the reliability standards established by NERC and WECC?
- What steps were taken in the new transmission planning studies to effectively address Staff concerns raised in previous BTAs about the adequacy of the state's transmission system to reliably support the competitive wholesale market in Arizona?

[1] Guiding Principles for ACC Staff Determination of Electric System Adequacy and Reliability: Appendix A Arizona's Best Engineering Practices, Jerry D. Smith, ACC, pre-filed comments for the Gila Bend Power Plant Hearing, Docket No. E-00000V-00-0106, November 9, 2000

[2] http://www.wecc.biz/modules.php?op=modload&name=Downloads&file=index&req=viewsdownload&sid=101, and http://www.nerc.com/~filez/standards/Reliability_Standards.html

- Do the generation interconnection practices in Arizona adequately reflect technical aspects of the generation interconnection policies as defined in FERC Orders?

- Do the transmission plans adequately reflect NERC latest activities related to compliance with the transmission planning standards, as well as compliance with WECC reliability standards?

1.3.2 Framework

Staff and KEMA made use of a three-stage process to facilitate the electric industry's participation in the fourth BTA:

1. Workshop 1: industry presentation;
2. Preparation of Initial Draft Report and industry comments on draft; and
3. Workshop 2: Staff/KEMA presentation and Final Report.

An overview of each stage is described below.

1.3.2.1 Workshop 1: industry presentation

Staff and KEMA organized and facilitated a one-day public Workshop on June 6, 2006. Transmission Providers and Regional Planning Groups presented information regarding their transmission expansion plans and related activities to supply native load customers for the next ten-years. In addition, merchant transmission and wind generator developers reported on their development plans.[1] The Workshop provided an informal setting to promote effective discussions of the presentations from transmission providers and merchant plant developers. The Workshop I participants are listed in Appendix B.

The workshop was organized in six presentations by the following entities:

1. Southwest Area Transmission Planning (SWAT), Central Arizona Transmission System (CATS), Extra-high voltage (EHV)—Gary Romero;
2. Arizona Public Service—Bob Smith;
3. Diné Power Authority—Steve Begay;
4. Salt River Project—Chuck Russell;
5. Southwest Transmission Cooperative (SWTC)—Bruce Evans; and
6. Tucson Electric Power—Ed Beck.

[1] The Workshop presentation materials are located on the ACC website.

An open period of discussion and audience questions followed each presentation.

Staff's opinion is that the Transmission Providers presented enough information to allow a suitable assessment of the status of Arizona's transmission system reliability.

1.3.2.2 Preparation of initial draft report and industry comment on draft

Staff and KEMA provided the first draft of the 2006 BTA report for industry review and comment. The first draft of the report was based on the utilities' filed plans and the participants' responses to questions raised at Workshop 1.[1] The draft report and industry comments were placed on the Commission website to expedite the review process.

1.3.2.3 Workshop 2: Staff/KEMA presentation and final report

Workshop 2, organized on September 8, 2006, presented the Staff's response to industry comments on the first draft of the 2006 BTA Report and allowed for discussion and questions.[2] The Workshop again provided an informal setting to promote effective discussions of the presentations from transmission providers and merchant plant developers. The list of Workshop 2 participants is included in Appendix B.

The workshop was organized in one main session followed by an open period of discussion and audience questions. To facilitate focused and meaningful presentations and discussions at the Workshop, Staff provided a copy of the draft report several weeks before the Workshop.

The Staff and their consultant presented 6 major issues and 6 less significant issues for discussion. The 6 major issues were:

1. Palo Verde Hub transmission constraints.
2. Palo Verde Hub connection issues—addressed issues related to connection requirements for new generators in Arizona.
3. FERC/ACC jurisdictional issues in regard to Palo Verde Hub reliability criteria (raised in written comments)—all parties agreed that NERC and WECC set minimum criteria and that states and individual utilities can set more stringent criteria.
4. Non-transmission options included in the BTA—written comments questioned why demand-side and renewable options were not included in the BTA. It was generally agreed that the BTA should discuss and clarify how renewables and demand-side options have been included in the BTA.

[1] Transcripts of June 30, 2004 Workshop I

[2] The Workshop presentation materials are located on the ACC website.

5. The adequacy of total Arizona import/export capability—it was agreed that completed projects and projects now underway should provide enough capability to meet known needs.

6. The inclusion of more conceptual interstate projects in the BTA. A number of additional interstate projects should be mentioned including Inland Northern Lights, Harry Allen to Mead 500kV lines #1 and #2, and the Robinson Summit to Harry Allen 500kV line.

The six less significant issues were:

1. The Energy Policy Act of 2005 (EPAct-05) and recent FERC Orders might be better shown in an Appendix.

2. A specific section should be added regarding WECC activities, actions, and initiatives including Resource Adequacy and West-wide System Model and mention the Regional Planning Initiative, Planning Principles with SWAT & CCPG, and WestConnect Objectives & Procedures for Regional Transmission Planning.

3. A discussion of what aspects of recent actions regarding the PV risk assessment can be added to the report. The public portions of the Palo Verde Hub Risk Assessment study as part of the Palo Verde Hub-TS5 500kV project should be noted in the BTA report.

4. A discussion of the Staff's continued concern about generation-only control areas and their ability or willingness to fulfill their reliability obligations. Comments at the meeting indicated that Staff was less concerned about this than in past years; however, the issue needs to maintain some visibility into the future.

5. The need for new capacity in the Phoenix area by 2012 in regard to RMR studies as discussed in the draft BTA report.

6. Several suggestions to revise the text:

    - The conclusions should include a statement that installed generation has more than kept pace with the growth in retail sales. KEMA/Staff agree.

    - The last bullet of §4.3.1 in the draft BTA report recommended that the ACC siting standards require a generator to "offer up to 10% of plant capacity for ancillary services to the local Control Area Operator (CAO) or RTO with which it interconnects.

    - The draft report stated that no evaluations appear to be made of NERC category C or D criteria – multiple and extreme contingencies. This statement is not true and will be removed from the text.

- Various typographic errors identified in various written comments will be corrected.

All the issues presented were resolved successfully as a result of the Workshop discussions and are reflected in this final report.

2. Related regulatory activities and Arizona industry response

This section describes selected regulatory and industry activities since the 2004 BTA. Only those activities related to transmission infrastructure, transmission grid expansion at regional and sub-regional levels, transmission congestion, transmission reliability, and transmission rights and pricing are described. This section considers how such industry activities relate to the transmission expansion, siting and analysis in Arizona.

2.1 Federal regulatory activities

2.1.1 Energy Policy Act of 2005

EPAct-05 encourages investment in the nation's energy infrastructure, and was intended to establish a comprehensive, long-range energy policy. The Act is meant to enhance protections for electricity consumers, and to encourage energy efficiency and conservation. It provides incentives for conservation, traditional energy production, and newer, more efficient, energy production technologies. EPAct-05 is more than 1,700 pages long and contains hundreds of provisions.

The major provisions that impact directly on electricity transmission siting include:

1. Title XII – Electricity, Subtitle A – Reliability Standards
2. Title XII – Electricity, Subtitle B – Transmission Infrastructure Modernization
3. Title XII – Electricity, Subtitle C – Transmission Operation Improvements

Additional provisions that have an impact on Electricity include Subtitle D – Transmission Rate Reform, Subtitle E – Amendments to PURPA, Subtitle F – Repeal of PUHCA, Subtitle G – Market Transparency, Enforcement, and Consumer Protection, Subtitle J – Economic Dispatch, and Title XVIII – Studies.

2.1.2 Relevant FERC Orders and actions

2.1.2.1 Electric reliability—Docket No. RM05-30-000

In response to EPAct-05 requirements FERC issued a Notice of Proposed Rulemaking (NOPR) on September 1, 2005, that contained proposed regulations concerning Electric Reliability Organization (ERO) certification, the process for developing and enforcing reliability standards, delegation of ERO authority to regional reliability entities, ERO funding and other matters necessary to implement FPA §215. FERC received approximately 1,700 pages of comments on the NOPR and made a number of changes to its proposed regulations based on these comments. On February 3, 2006, FERC issued its final rule as Order 672.

The regulations adopted by Order No. 672 establish:

- Criteria that an entity must satisfy to qualify as the ERO;
- Procedures for the ERO to propose new or modified reliability standards for FERC review;
- Procedures for timely resolution of any conflict between a reliability standard and a FERC-approved Tariff or Order;
- Procedures for resolving an inconsistency between a state action and a reliability standard;
- Regulations pertaining to ERO funding;
- Procedures governing an enforcement action by the ERO, regional entity or FERC;
- Criteria for delegating ERO authority to regional entities;
- Regulations governing the issuance by the ERO of periodic reports assessing the reliability and adequacy of the North American bulk-power system; and
- Procedures for creating regional advisory bodies composed of representatives of state governments and formed to advise FERC, the ERO or regional entities on reliability matters.

The formal implementation process began on April 4, 2006.

On July 20, 2006, NERC was certified as the ERO with some modifications and clarifications to NERC's proposed governance structure, funding, reliability standards development process, enforcement program and pro forma Regional Entity delegation agreement. FERC directed NERC to make several improvements to its proposed standardized agreement for delegating enforcement authorities to Regional Entities, including clarification of due process and other steps associated with enforcement of reliability standards. FERC also directed NERC to make changes to the ERO's procedural rules, and to speed the process for developing new reliability standards in response to a FERC-imposed deadline.

All proposed reliability standards must be submitted by the ERO to FERC for its approval. Only reliability standards approved by FERC are enforceable. FERC expects to undertake a rulemaking later in 2006 as part of its review of the 102 reliability standards submitted by NERC for FERC review.

On April 20, 2006, FERC granted a petition from the governors of Arizona, California, Colorado, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming to establish a regional advisory body, as provided for under EPAct-05. The Western Interconnection Regional Advisory Body (WIRAB) may provide advice to FERC, the ERO and a Regional Entity on specific issues affecting that region, and FERC may give deference to the advice of the regional advisory body.

WIRAB was created by Western Governors under Section 215 of the Federal Power Act and was approved by FERC in July 2006. The WIRAB is to advise WECC, the ERO and FERC on whether proposed reliability standards and the governance and budgets of the ERO and WECC are in the public interest as well as to consult with DOE on the designation of national interest transmission corridors. FERC may request that WIRAB provide advice on other topics. Members include representatives from the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington and Wyoming, the Canadian provinces of Alberta and British Columbia, and Mexico.[1]

2.1.2.2 Transmission monitoring report to Congress

The Department of Energy (DOE) and FERC issued a report to Congress on February 2, 2006 on Transmission System Monitoring, i.e., the steps which must be taken to establish a system to make available to all transmission owners and regional transmission organizations (RTOs) in the Eastern and Western interconnections real-time information on the functional status of all transmission lines within the interconnections.

The study assessed technical means for implementing a transmission information system and to identify the steps FERC or Congress would need to take to require implementation of such a system. The analysis identified nine steps that could be taken to establish, and two steps that could be taken to implement, an interconnection-wide real-time monitoring system that could give a near-instant picture of the transmission system's health.

2.1.2.3 Long-term transmission rights

EPAct-05 required FERC to implement the subsection which requires FERC to exercise its authority under the FPA in a manner that facilitates planning and expansion of transmission facilities to meet the reasonable needs of load-serving entities (LSEs) to satisfy their native load obligations and enables LSEs to secure firm transmission rights on a long-term basis for long-term power supply to meet their service needs. On July 20, 2006, FERC adopted seven guidelines in response. The final rule requires independent transmission organizations such as regional transmission organizations and independent system operators that oversee organized electricity markets to make long-term firm transmission rights available to all transmission customers.

2.1.2.4 Promoting transmission investment

On July 20, 2006, FERC implemented incentive based rate treatments for transmission of electric energy in interstate commerce. For the most part, the final rule adopts the proposals put forth in FERC'S November 2005 proposed rulemaking.

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[1] More information on WIRAB can be found on their website at http://www.westgov.org/wieb/site/wirab/wirabindex.htm.

2.1.2.5 Regional joint boards

FERC was required to convene regional joint boards to study security-constrained dispatch in various market regions and submit to Congress a report on the recommendations of the joint boards. FERC designated the market regions for the joint boards, established the joint boards, designated a FERC Commissioner to chair each board, requested that each state nominate a board representative to the appropriate joint board and submit their name and contact information. The Canadian provinces, Canada and Mexico were also invited to participate, as observers, on the appropriate joint boards.

FERC identified four regions: the South (Texas and the states in the southeast and Southwest Power Pool); the West (states in the Western Interconnection); the Northeast (New York and the states in New England); and PJM/MISO (states that are served primarily by PJM Interconnection, LLC and Midwest Independent Transmission System Operator, Inc.). Studies and recommendations were submitted to FERC by each of the regional joint boards between May 12, 2006 and July 11, 2006.

The West region consists of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota (a portion of this state is in the Western Electricity Coordinating Council), Utah, Washington and Wyoming.

The West Region analysis of security constrained economic dispatch (SCED) discusses the basics of SCED and how it functions in the Western Interconnection. It also addresses three recommendations made to the Joint Boards by the DOE in *The Value of Economic Dispatch, A Report to Congress Pursuant to Section 1234 of the Energy Policy Act of 2005.*

There were nine major issues considered by the West Region Joint Board:

1. Independence of dispatcher.
2. Utility dispatch of third party power through contracts.
3. Transparency of dispatch information and processes.
4. Consolidation of control areas in a region.
5. Import/export schedule changes within an hour.
6. Some practical limitations on economic dispatch.
7. First DOE Recommendation: review dispatch practices.
8. Second DOE Recommendation: standardize dispatch contract terms.
9. Third DOE Recommendation: review dispatch tools.

2.1.2.6 Demand response and advanced metering survey

FERC was required to publish an annual report, by region, that assesses demand response resources. The report reviews and identifies on a regional basis, the following issues: saturation and penetration of advanced metering communication systems; existing demand response and time based rate programs; annual resource constitution of demand resources; potential for demand response as a quantifiable, reliable resource for regional planning purposes; steps taken to ensure that demand resources are provided equitable treatment in regional transmission expansion planning and operations; and, finally, regulatory barriers to improved customer participation in demand response, peak reduction, and critical peak pricing programs.

2.1.2.7 Electric energy market competition

FERC required a five-member inter-agency task force (the "Electric Energy Market Competition Task Force") to submit to Congress a report on competition within wholesale and retail markets for electric energy in the U.S. The Draft *Report To Congress On Competition In The Wholesale And Retail Markets For Electric Energy* was issued on June 5, 2006.

2.1.2.8 Ensuring timely and coordinated review and permitting of electric transmission facilities

DOE and heads of all federal agencies with authority to issue federal authorizations for electric transmission facilities must enter into an MOU to ensure timely and coordinated review and permitting of electric transmission facilities. FERC states on its website that this action has been initiated; however there is no additional information as to the progress or current status of this action.

2.1.2.9 Rules for applications for national transmission corridor permits

EPAct-05 2005 adds a new section to the Federal Power Act (FPA), providing for federal siting of electric transmission facilities under certain circumstances. On June 16, 2006, FERC issued a NOPR on Regulations for Filing Applications for Permits to Site Interstate Electric Transmission Corridors.

EPAct-05 provides for federal backstop siting authority of certain electric transmission facilities in order to increase transmission capacity and maintain system reliability. Upon the Secretary of Energy's designation of national interest electric transmission corridors experiencing electric transmission capacity constraints or congestion that adversely affects consumers, FERC may issue permits to construct or modify electric transmission facilities.

A proposal to build or expand electric transmission facilities brought before FERC must be used for interstate commerce, be consistent with the public interest, significantly reduce

transmission congestion in interstate commerce, be consistent with national energy policy, and maximize as much as possible existing towers and structures.

2.1.2.10 FERC Open Access Transmission Tariff (OATT) reform

A Notice of Inquiry (NOI) regarding the *pro forma* open access transmission tariff reform requiring comparable open access by non-regulated transmission utilities was issued by FERC on September 15, 2005. Response to the NOI included over 4,000 pages of comments and reply comments from all types of industry stakeholders.

FERC released a NOPR for OATT reform on May 18, 2006, with comments due by August 7, 2006, and Reply Comments due by September 20, 2006.

The proposed major reforms include:

- Greater consistency and transparency in Available Transfer Capability (ATC) calculation
- Open, coordinated and transparent planning
- Reform of energy imbalance penalties
- Reform of rollover rights policy
- Clarify tariff ambiguities
- Increase transparency and customer access to information
- Core elements of Order No. 888 being retained:
- Comparability requirement
- Protection of native load
- States jurisdiction over bundled retail load
- Functional unbundling to address undue discrimination
- Reciprocity

2.2 Western Governors Association efforts

The Western Governors' Association (WGA) is an independent, nonpartisan organization of Governors representing 18 Western states, and three U.S.-flag Pacific islands. While it is not a regulatory body, the WGA is currently exploring clean and diversified energy options; encouraging pro-active transmission expansion; promoting coordinated permitting of needed interstate transmission expansion; developing a renewable energy tracking system; and urging the adoption of federal legislation to make reliability standards mandatory. Recent actions that

took place in the West to advance the Governors' energy policies for the region include the following:[1]

2.2.1 Proactive regional transmission planning

The WGA responded to the requirement in the EPAct-05 that federal agencies designate energy corridors on federal lands and identify transmission congestion. The Governors noted that if such federal efforts are done well, they could contribute to the Governors' efforts to develop needed transmission. However, if done poorly the federal intervention into state siting has the potential to slow down the development of needed transmission.

It was noted in the WGA 2006 Annual Report that the pace of transmission planning and development has accelerated in the West and that many major transmission proposals are under development.

In April of 2006, the WECC assumed interconnection-wide transmission planning responsibilities. WECC's efforts will supplement proactive transmission planning underway within the sub-regions of the Western Interconnection.

- A joint task force of Western states, provinces and industry has been working with DOE to evaluate transmission congestion in the Western Interconnection as stipulated in EPAct-05. (See §2.1.2.5, above.)
- Implementation of the transmission recommendations of the WGA Clean and Diversified Energy Advisory Committee can further strengthen transmission planning and development processes.

2.2.2 Clean and diversified energy initiative

The WGA launched the Clean and Diversified Energy Initiative with the adoption of a resolution that established three goals for the West:

1. Develop an additional 30,000 MW of clean energy by 2015 from both traditional and renewable sources;
2. Achieve a 20% increase in energy efficiency by 2020; and
3. Ensure a reliable and secure transmission grid for the next 25 years.

The Clean and Diversified Energy Advisory Committee (CDEAC) was commissioned in 2004 by the Western Governors to identify technically and financially viable policy mechanisms, stressing non-mandatory, incentive-based approaches, to meet the goals established in the Governors' resolution. On June 11, 2006, the CDEAC released a report and recommendations

[1] Western Governors' Association 2005 Annual Report and Western Governor's Association 2006 Annual Report..

for achieving and possibly exceeding the WGA's clean and diversified energy objectives. The report included specific recommendations regarding Transmission, as follows[1]:

"To ensure adequate transmission for the region to tap its vast clean and diversified energy resources, Western Governors should adopt and take necessary steps to implement the following actions. The recommendations are grouped according to federal, regional, state and local entities and industries that would implement the recommendations.

1) FERC's ongoing review of its open access transmission policy under Order 888 provides an excellent venue to urge FERC to make needed reforms. The Western Governors should engage FERC to make changes to its transmission policies to:

    a. Promote a conditional-firm, priority non-firm and other transmission service products;

    b. Encourage transparent review and assessment of ATC;

    c. Eliminate rate pancaking (i.e. access fees imposed on transmission customers contracting for service across multiple control areas) in the transmission system in a manner that addresses concerns about financial impacts such as recovery of costs and cost shifting;

    d. Promote control-area consolidation on a case-by-case basis, where an analysis finds that benefits exceed the costs and there are no significant adverse impacts on reliability;

    e. Encourage congestion management systems that allow access to least-cost generation within reliability security constraints;

    f. Encourage common Web sites for Open Access Same Time Information Systems (OASIS) to facilitate transmission transactions;

    g. FERC code of conduct rules should ensure that the transmission planning processes include as much information about future and existing resources as possible. Given different industry interpretations of code-of-conduct rules, FERC should clarify the rule to allow transmission planners and resource planners of a vertically integrated utility to participate in joint discussions at transparent regional planning meetings and state-approved resource planning and acquisition process; and

    h. Request that FERC convene a technical conference to develop needed reforms of interconnection and transmission queuing processes.

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[1] *Clean Energy, a Strong Economy and a Healthy Environment*, June 11, 2006. (www.westgov.org/wga_reports.htm)

2) The Western Governors should take an active leadership role to promote state and regional policies in collaboration with state legislatures to:

   a. Ensure resources to enable state participation in regional transmission planning;

   b. Encourage the electric power industry to make the existing proactive, transparent interconnection-wide and sub-regional transmission planning processes a priority;

   c. Review, and if necessary, amend state laws to require PUCs and public power boards to consider regional transmission needs;

   d. Support the goal of a regional planning capability that can yield critical information for stakeholders and regulators to allow rigorous evaluation of large, long-term investments in transmission;

   e. Bring together stakeholders and forge solutions to regional transmission needs, cost allocation and siting where RTOs or Independent System Operators (ISO) do not exist, and ensure state participation in such activities by existing RTOs/ISOs;

   f. Promote use of an open season process by project developers as a means of demonstrating demand for and value of new transmission projects, and expand project participation;

   g. Urge FERC and PUCs to form joint panels on transmission cost recovery that would explicitly consider risks and needs for incentives, such as forms of preapproval, higher rates of return on transmission investments, and quicker cost recovery of transmission investments;

   h. States should consider adopting funding mechanisms to support research, development and demonstration of advanced technologies in the public interest;

   i. Urge transmission operators to develop workable agreements at seams between ISO and non-ISO systems to enable effective grid operations;

   j. Ensure that there are resources and political commitments to successfully implement the WGA Transmission Permitting Protocol and the Midwest Electric Transmission Protocol for new interstate transmission proposals; and

   k. Evaluate the option of forming an interstate compact for creation of a regional siting agency pursuant to Section 1221 of the Energy Policy Act of 2005, and encourage consistent siting processes within their states through use of standardized applications, joint data and studies,

coordinated schedules and deadlines and other mechanisms, where possible.

3) Western Governors should urge state public utility commissions to adopt policies and promote legislation, if necessary, to:

   a. Establish tiered standards of review for prudency and application of transmission incentives for transmission expansion costs featuring a lower standard for screening studies and planning, a moderate standard for permitting and the acquisition of rights-of-way, and a higher standard for construction costs;

   b. For states with mandatory renewable portfolio standards (RPS), regulatory commissions should make public Interest findings associated with cost effective transmission projects that will enable states to attain energy policy goals;

   c. Expand transmission in advance of generation to enable the modular development of location-constrained, clean and diversified resource areas to meet cost-effective Renewable Portfolio Solicitations, Integrated Resource Plans and state goals, similar to recent Texas and Minnesota legislation for new transmission and the renewable trunk line (Tehachapi) model for new transmission;

   d. Coordinate multi-state review of transmission projects by developing common principles for cost allocation and cost recovery, and adopt a common Western procedural process that would identify and coordinate the applications, forms, analyses and deadlines; and

   e. Promote cost-effective transmission expansion by accommodating both non-dispatchable and dispatchable resources.

4) Western Governors should collaborate with the appropriate federal agency to implement the Energy Policy Act provisions to designate energy corridors on federal lands by:

   a. Committing state agency resources to participate in the federal effort and to identify contiguous corridors on adjacent state lands;

   b. Urging Congress to fund federal land management agency corridor planning efforts; and

   c. Fostering designation of corridors on lands not owned by the federal government or the states to ensure continuity in corridors. Designation and preservation of transmission corridors is important in rapidly urbanizing parts of the region.

d. Western Governors should encourage the Western electric power industry to:

   i. Synchronize regional transmission planning efforts to resource acquisition plans of LSEs and plans of generators;

   ii. Support and collaborate with state infrastructure authorities that have been created to facilitate transmission expansion; and

   iii. Ensure institutional homes for regional transmission planning."

2.2.3 Western Renewable Energy Generation Information System

Western Renewable Energy Generation Information System (WREGIS) is a voluntary, independent renewable energy registry and tracking system for the Western Interconnection. It is being developed and is sponsored by the WECC, Western Governors' Association and the California Energy Commission. It is similar in scope to renewable tracking systems already implemented in ISO-New England, PJM and the Electric Reliability Council of Texas (ERCOT). The WREGIS charter was approved by the WECC in December 2004. Stakeholder Advisory Committee officers were elected in July 2006. Administrative operations for WREGIS are located at the WECC offices in Salt Lake City, Utah and the first WREGIS administrator was hired in October 2006.

Participation is open to regulators and all market participants including load-serving entities, generators, marketers, brokers/wholesalers, end-users and others. The Stakeholder Advisory Committee which consists of 85 elected members includes the Arizona Corporation Commission, Arizona Power Authority, Western Area Power Administration, APS, SRP, TEP, and the Arizona Electric Power Cooperative, Inc.

WREGIS was initiated in response to the need for a tracking and verification system for renewable energy in the Western Interconnection and to ensure that renewable energy producers are counted properly for the purpose of Renewables Portfolio Standard portfolios in each of the western states. The target date for operational status is mid-2007. When fully implemented WREGIS will include the capability for issuing renewable energy certificates, based on each MWh of renewable energy produced. These certificates are expected to have value in meeting regulatory requirements (compliance with state and provincial programs) as well as in voluntary commodity markets. The implementation of a regional system such as WREGIS provides economies of scale that would not be possible with individual state/province systems.

2.2.4 Western Interconnection Regional Advisory Body

The WIRAB was created by Western Governors and was discussed above in §2.1.2.1.

3. Transmission planning

Individual utilities within the state of Arizona plan and design their bulk transmission systems in accordance with the NERC, WECC regional Reliability Criteria for System Planning and Minimum Operating Reliability, guidelines established at the state level, and their own internal planning criteria, guidelines and methods. These planning practices are utilized to ensure that their respective systems are planned to provide reliable service to customers under various system conditions. In addition, they ensure that neighboring utilities and neighboring states plan their systems in a coordinated manner by following a consistent set of standards, guidelines and criteria in order to provide an economical and reliable supply of electricity.

This Chapter addresses the standards and processes used by the Arizona utilities in developing transmission.

3.1 Transmission reliability standards

3.1.1 NERC reliability standards

The interconnected bulk electric systems in the United States, Canada, and the northern portion of Baja California, Mexico are comprised of many individual systems. Each system has its own: electrical characteristics; set of customers; geographic, weather, and economic conditions; and regulatory and political climates. By their very nature, the bulk electric systems involve multiple parties. Since all electric systems within an integrated network are electrically connected, whatever one system does can affect the reliability of the other systems. Therefore, to maintain the reliability of the interconnected bulk electric systems, all electric industry participants are required to comply with the NERC Planning Standards.

The NERC Planning Standards define the reliability of the interconnected bulk electric systems using the following two terms:

> **Adequacy** — The ability of the electric systems to supply the aggregate electrical demand and energy requirements of their customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.
>
> **Security** — The ability of the electric systems to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.

It is usually considered that adequacy is related to system planning and security is related to system operation.

NERC requires that systems must be planned to withstand the probable forced outage and maintenance outage system contingencies at projected customer demand and anticipated

electricity transfer levels. Extreme but less probable contingencies measure the robustness of the electric systems and should be evaluated for risks and consequences. NERC has four basic planning standards:[1]

> *S1. The interconnected transmission systems shall be planned, designed, and constructed such that with all transmission facilities in service and with normal (pre-contingency) operating procedures in effect, the network can deliver generator unit output to meet projected customer demands and provide contracted firm (non-recallable reserved) transmission services, at all demand levels, under the conditions defined in Category A of* Table 1.
>
> *S2. The interconnected transmission systems shall be planned, designed, and constructed such that the network can be operated to supply projected customer demands and contracted firm (non-recallable reserved) transmission services, at all demand levels, under the conditions of the contingencies as defined in Category B of* Table 1.
>
> *The transmission systems also shall be capable of accommodating planned bulk electric equipment maintenance outages and continuing to operate within thermal, voltage, and stability limits under the conditions of the contingencies as defined in Category B of* Table 1.
>
> *S3. The interconnected transmission systems shall be planned, designed, and constructed such that the network can be operated to supply projected customer demands and contracted firm (non-recallable reserved) transmission services, at all demand levels, under the conditions of the contingencies as defined in Category C of* Table 1. *The controlled interruption of customer demand, the planned removal of generators, or the curtailment of firm (non-recallable reserved) power transfers may be necessary to meet this standard.*
>
> *The transmission systems also shall be capable of accommodating planned bulk electric equipment maintenance outages and continuing to operate within thermal, voltage, and stability limits under the conditions of the contingencies as defined in Category C of* Table 1.
>
> *S4. The interconnected transmission systems shall be evaluated for the risks and consequences of a number of each of the extreme contingencies that are listed under Category D of* Table 1.

In summary, NERC requires that transmission systems should be planned to withstand both single contingency (Category B), and double or multiple contingencies (Category C). In addition NERC requires that transmission systems should be planned to withstand the same set of contingencies with one bulk facility out of service for planned maintenance. The extreme contingencies (Category D), require that transmission systems be evaluated for the risks and consequences, but not for planning reinforcements.

[1] NERC Planning Standards, September 16, 1997, page 9-10: www.nerc.com/pub/sys/all_updl/pc/pss/ps9709.pdf

Table 1: NERC transmission system standards-normal and contingency conditions

Category	Contingencies: Initiating event(s) and contingency element(s)	Elements out of service	System Limits or Impacts: Thermal limits	Voltage limits	System stable	Loss of demand or curtailed firm transfers	Cascading outages[c]
A - No Contingencies	All facilities in service	None	Applicable Rating [a] (A/R)	Applicable Rating [a] (A/R)	Yes	No	No
B - Event resulting in the loss of a single element.	Single line ground (SLG) or 3-phase (3Ø) fault, with normal clearing:						
	1. Generator	Single	A/R	A/R	Yes	No [b]	No
	2. Transmission circuit	Single	A/R	A/R	Yes	No [b]	No
	3. Transformer	Single	A/R	A/R	Yes	No [b]	No
	Loss of an element without a Fault.	Single	A/R	A/R	Yes	No [b]	No
	Single pole block, normal clearing[f]:						
	4. Single pole (DC) line	Single	A/R	A/R	Yes	No[b]	No
C - Event(s) resulting in the loss of two or more (multiple) elements.	SLG fault, with normal clearing[f]:						
	1. Bus section	Multiple	A/R	A/R	Yes	Planned/controlled[d]	No
	2. Breaker (failure or internal fault)	Multiple	A/R	A/R	Yes	planned/controlled[d]	No
	SLG or 3Ø fault, with normal clearing[f], manual system adjustments, followed by another SLG or 3Ø fault, with normal clearing[f]:						
	3. Category B (B1, B2, B3, or B4) contingency, manual system adjustments, followed by another Category B (B1, B2, B3, or B4) contingency	Multiple	A/R	A/R	Yes	Planned/controlled[d]	No
	Bipolar block, with normal clearing[f]:						
	4. Bipolar (dc) Line Fault (non 3Ø), with Normal Clearing[f]:	Multiple	A/R	A/R	Yes	Planned/controlled[d]	No
	5. Any two circuits of a multiple circuit towerline[g]	Multiple	A/R	A/R	Yes	Planned/controlled[d]	No
	SLG Fault, with delayed clearing[f] (stuck breaker or protection system failure):						
	6. Generator 8. Transformer	Multiple	A/R	A/R	Yes	Planned/controlled[d]	No
	7. Transmission 9. Bus Section circuit	Multiple	A/R	A/R	Yes	Planned/controlled[d]	No
D [e] - Extreme event resulting in two or more (multiple) elements removed or cascading out of service	3Ø Fault, with delayed clearing [f] (stuck breaker or protection system failure): 1. Generator 3. Transformer 2. Transmission 4. Bus Section 5. Circuit 3Ø Fault, with normal clearing[f]: breaker (failure or internal fault) Other: 6. Loss of towerline with three or more circuits 7. All transmission lines on a common right-of way 8. Loss of a substation (one voltage level plus transformers) 9. Loss of a switching station (one voltage level plus transformers) 10. Loss of all generating units at a station 11. Loss of a large load or major load center 12. Failure of a fully redundant special protection system (or remedial action scheme) to operate when required Operation, partial operation, or misoperation of a fully redundant special protection system (or remedial action scheme) in response to an event or abnormal system condition for which it was not intended to operate 14. Impact of severe power swings or oscillations from disturbances in another Regional Council.	Evaluate for risks and consequences. May involve substantial loss of customer demand and generation in a widespread area or areas. Portions or all of the interconnected systems may or may not achieve a new, stable operating point. Evaluation of these events may require joint studies with neighboring systems.					

a) Applicable rating refers to the applicable normal and emergency facility thermal rating or system voltage limit as determined and consistently applied by the system or facility owner. Applicable ratings may include emergency ratings applicable for short durations as required to permit operating steps necessary to maintain system control. All ratings must be established consistent with applicable NERC Planning Standards addressing facility ratings.
b) Planned or controlled interruption of electric supply to radial customers or some local network customers, connected to or supplied by the faulted element or by the affected area, may occur in certain areas without impacting the overall security of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted firm (non-recallable reserved) electric power transfers.
c) Cascading is the uncontrolled successive loss of system elements triggered by an incident at any location. Cascading results in widespread service interruption which cannot be restrained from sequentially spreading beyond an area predetermined by appropriate studies.
d) Depending on system design and expected system impacts, the controlled interruption of electric supply to customers (load shedding), the planned removal from service of certain generators, and/or the curtailment of contracted firm (non-recallable reserved) electric power transfers may be necessary to maintain the overall security of the interconnected transmission systems.
e) A number of extreme contingencies that are listed under Category D and judged to be critical by the transmission planning entity(ies) will be selected for evaluation. It is not expected that all possible facility outages under each listed contingency of Category D will be evaluated.
f) Normal clearing is when the protection system operates as designed and the fault is cleared in the time normally expected with proper functioning of the installed protection systems. Delayed clearing of a fault is due to failure of any protection system component such as a relay, circuit breaker, or current transformer (CT), and not because of an intentional design delay.
g) System assessments may exclude these events where multiple circuit towers are used over short distances (e.g., station entrance, river crossings) in accordance with Regional exemption criteria.
Source: NERC Planning Standards, June 15, 2001

3.1.2 WECC reliability standards

WECC provides the coordination that is essential for operating and planning a reliable and adequate electric power system for the western region of the continental USA, Canada, and Mexico. The WECC member systems' transmission facilities are planned in accordance with the NERC/WECC Reliability Criteria for Transmission System Planning. These criteria establish the performance levels intended to limit the adverse effects of each member's system operation on others, and recommend that each member system provide sufficient transmission capability to serve customers, to accommodate planned inter-area transfers, and to meet its transmission obligation to others.

The *WECC Reliability Criteria* adopted all the NERC criteria mentioned in section 3.1.1 and asks its members to comply with several additional requirements, two of which are more stringent than those in some other NERC regions:[1]

WECC-S2 *The NERC Category C.5 initiating event of a non-three-phase fault with normal clearing shall also apply to the credible common mode contingency of two adjacent circuits on separate towers. The credibility of such an outage depends upon the credibility of the common mode failure. The credible outage of two circuits could result from a lightning storm or forest fire. Considerations in the determination of credibility should include line design; length; location, whether forested, agricultural, mountainous, etc.; outage history; operational guidelines; and separation between circuits.*

WECC-S3 *The common mode simultaneous outage of two generator units connected to the same switchyard, not addressed by the initiating events in NERC Category C, shall not result in cascading.*

In summary, WECC requires that the outage of two adjacent circuits on different towers or the outage of two units at the same plant meet NERC Category C performance standards. This is in addition to the requirement that transmission systems should be capable of withstanding the same set of contingencies with one bulk facility out of service for planned maintenance. WECC also adds voltage dip and frequency deviation requirements for the effects of outages on neighboring systems. All except two WECC planning standards are at least as stringent as the NERC standards. The two exceptions are C2 and C9.[2] WECC currently has been granted a waiver for these standards and analysis is ongoing to determine whether NERC should grant a variance.[3] This exception is not required by the Arizona utilities as they comply with NERC's C2 and C9 standards.

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[1] NERC/WECC Planning Standard, August 8-9, 2002, Page 11

[2] C2-Breaker Failure, C9-Bus Section Failure

[3] Prepared by the Resource and Transmission Adequacy Task Force of the NERC Planning Committee NERC Board of Trustees June 15, 2004, Table 2 Transmission Adequacy, (Revised 2/23/04) ftp://www.nerc.com/pub/sys/all_updl/pc/rtatf/RTATF_Report3OTapprvd_061504.pdf

WECC's Reliability Management System (RMS) agreement establishes a process to manage compliance with the established criteria. This process includes compliance monitoring, annual study reports, a project review and rating process, and an operating transfer capability policy group process. Compliance is ensured with regard to control performance, operating reserve and operating transfer capability, and disturbance control. While WECC members self-declare their compliance, WECC conducts compliance reviews through random audits. The RMS includes system operator requirements for managing transactions within major transmission path operating limits. WECC also addresses the unscheduled flow mitigation scheme approved by FERC.

For reliable operation of the western interconnection, WECC requires all entities to comply with their Minimum Operating Reliability Criteria (MORC)[1]. Staff supports the MORC, which applies to system operation under all conditions even when facilities required for secure and reliable operation have been delayed or forced out of service. MORC principles applicable to the transmission system operation are:

- The interconnected power system shall be operated at all times so that system instability, uncontrolled separation, cascading outages, or voltage collapse will not occur as a result of single or multiple contingencies of sufficiently high likelihood.
- Continuity of service to load is the primary objective of the MORC. Preservation of interconnections during disturbances is a secondary objective except when preservation of interconnections will minimize the magnitude of load interruption.

Since electric system reliability is so vital to Arizona, Staff contends that it is appropriate to apply the more stringent of either NERC or WECC criteria for planning of the Arizona system.

3.1.2.1 Transmission paths in the WECC

A grouping or set of transmission lines connecting two areas is often referred to as a transmission path. Transmission paths consist of one or more lines emanating from a common location or between two regions. The performance of each transmission line within a transmission path is interdependent upon the performance of other lines in the same path. The adequacy and security of the whole transmission system is often determined by the performance of key and critical transmission paths.

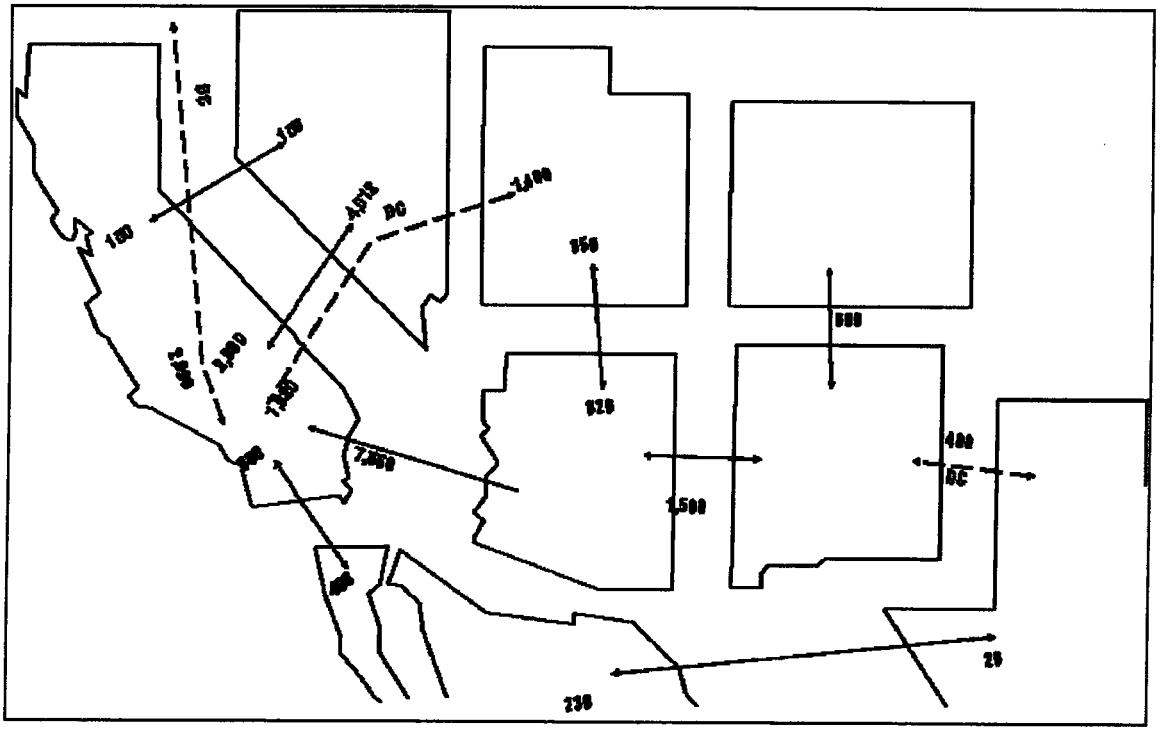
Transmission lines and paths are also rated in terms of their Total Transfer Capability (TTC). The TTC is the reliability limit of a transmission line or path. This rating is established by technical studies that consider the network topology and operational conditions affecting the

[1] http://www.wecc.biz/sdpp.html

adequacy and security of the transmission line or path. The thermal rating and the stability limit of transmission lines are both considered when establishing the TTC of transmission facilities.

WECC has an established process for determining the TTC of major transmission paths in the western interconnection. The transmission path consisting of lines between Arizona and California has the largest TTC of any established path in the Western Interconnection. The map in Figure 1 shows the non-simultaneous TTC of the Arizona area for 2008.[1]

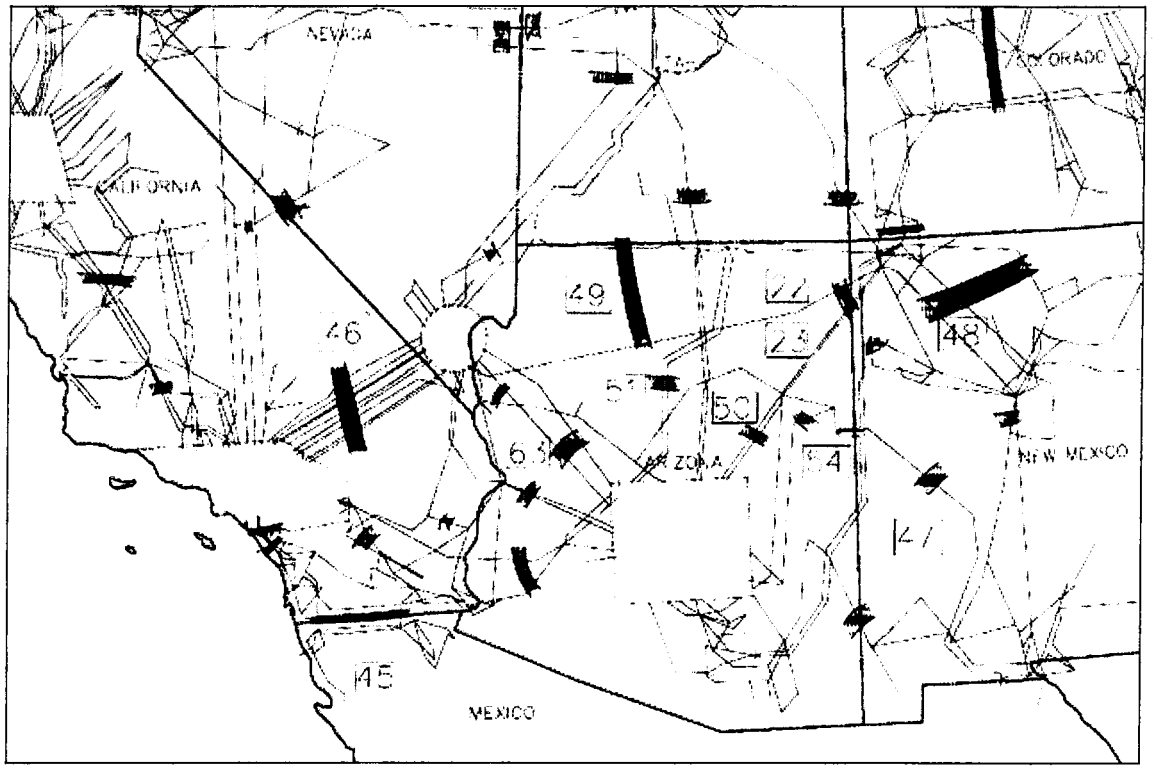
Figure 1: Total transfer capabilities for key WECC transmission paths (2005)



[1] WECC Ten -Year Coordinated Plan Summary, June 2005, page 54.

The paths of interest to Arizona are shown in Figure 2, and are defined below in Table 2.[1] A path of particular interest to Arizona is Path 49, East of Colorado River (EOR) that connects Arizona, Nevada, and California. Paths 22, 23, 50 and 51 all lie between Four Corners/San Juan and the Phoenix area.

Figure 2: WECC Paths affecting Arizona



[1] *Western Interconnection Transmission Path Flow Study*, Planning Work Group, Seams Steering Group – Western Interconnection, February 2003.

Table 2: WECC paths effecting Arizona

WECC path	WECC path name
22	Southwest of Four Corners Four Corners – Moenkopi Four Corners – Cholla #1 Four Corners – Cholla #2
23	Four Corners 345/500 kV Qualified Path
45	SDG&E – CFE
46	West of Colorado River (WOR)
47	New Mexico -Greenlee
48	Northern New Mexico (NM2)
49	East of Colorado River
50	Cholla - Pinnacle Peak
51	Southern Navajo
54	Coronado - Silver King – Kyrene
63	Perkins-Mead-Marketplace 500 kV Line

3.1.2.2 WECC initiatives since the last BTA

The key WECC-led initiatives currently in progress or completed over the past two years (since the last BTA) include:

- Funding the Westwide System Model
  - Consolidate real-time and planning models
  - Provide Interconnection-wide real-time and near-time Contingency Analyses and other network applications
- Funding the Western Interchange Tool
  - Utilize existing E-Tag platform to ensure interchange schedules are reconciled
  - Provide Reliability Coordinators with better tools to monitor interchange scheduling
- Develop a Reliability Coordination Strategy
  - Ensure compliance with NERC Standards
  - Significantly improve effectiveness
- Completion of 2003 Northeast Blackout Recommendations
  - Integration of recommendations as appropriate

- Continued comprehensive review of disturbances within the Western Interconnection
  - Detailed and Abbreviated Disturbance Reporting process.
- Development of regional mandatory standards
- Significant interaction with FERC and NERC
  - Discussions with FERC Staff concerning standards and compliance
  - Development of the NERC-ERO Delegation Agreement
- Operating Reserve Standards
- Formation of Transmission Expansion Planning Policy Committee (TEPPC)
- Reconstitution of the L&R Subcommittee
- Development of Resource Adequacy Criteria

3.1.3 Arizona utilities transmission planning standards

The utilities in Arizona plan their system facilities by following NERC and WECC reliability standards. In addition, each utility in the State develops its own internal reliability criteria and planning processes to assist in planning its EHV-345kV and above, HV transmission system, and local areas. Each utility plans the transmission system to operate with no thermal overloads on lines and equipment, and voltages within defined limits under normal and emergency conditions. The Arizona transmission system is planned based on NERC and WECC single contingency criteria.[1] These criteria require that there should be no loss of load on the system for a single element contingency. There are credible disturbances, which are not probable, for which it is not economically feasible to protect against. These criteria recognize the need for direct load tripping for more severe disturbances, but the load tripping should be controlled to limit the adverse impact of the disturbance. Uncontrolled load shedding is unacceptable even under the most adverse, credible disturbance.

The Arizona utilities have provided detailed information regarding the assumptions, studies performed and criteria used in their 10-year plans. The studies include power-flow, stability, and short-circuit analyses (although short-circuit analysis is usually not filed in the BTA). Consistent with industry practice, it appears that the plans are primarily developed to meet NERC category A and B criteria—normal and single contingency conditions. In some cases, the utility's studies include evaluations of NERC category C & D – multiple and extreme contingencies. Chapter 8 addresses the results of such studies performed in the fourth BTA.

[1] Workshop I Transcript, Page 165, Lines 9-17

As is discussed later in chapter 6 of this report, the utilities also perform companion studies of transmission and generation requirements for local load pockets that are constrained by limited import capability and depend to some extent on local generation to support customer reliability. Such generation is typically referred to as reliability must-run (RMR) generation. It is not unusual in U.S. transmission planning practices that transmission systems supplying large urban areas (RMR areas) have more stringent criteria than used for the rest of the system. Staff and the Arizona utilities are making a collaborative effort to develop and effectively implement appropriate criteria for RMR areas.

3.1.4 Transmission ratings

Transmission facilities can be loaded up to their continuous or emergency ratings. The ratings may be set by thermal, stability, or voltage conditions. Thermal limits are set depending on the characteristics of the individual components, while stability and voltage limits depend on the topology and characteristics of the combined generation-transmission-load network.

3.1.4.1 Thermal limits

Thermal limits relate to heating of equipment. High temperatures cause physical damage to the equipment and shorten the life of the equipment. In extreme heating conditions, the equipment can be damaged or destroyed. Utilities and manufacturers set temperature standards that are applied to different pieces of the transmission system to limit loss of life and prevent destroying equipment.

Each transmission line has a utility-defined thermal rating based upon size and type of conductor, and its design and construction. The capability of the line will also be impacted by required spacing and clearances for trees, shrubs, buildings, animals and various human activities. Each transmission line has a thermal rating based on its current carrying capacity measured in amperes. Such ratings are dependent upon ambient weather, temperature, wind, and atmospheric conditions. Other devices connected to a circuit such as switches, connectors, and metering equipment may also thermally limit transmission lines. The most restrictive device rating in series with the transmission line establishes the thermal rating used for that transmission line.

Circuit breakers and transformers are other major devices that have thermal ratings. These ratings are set by the manufacturers to prevent damage or destruction of the equipment. While thermal ratings are set based on ampere loading, they are usually converted to a megawatt rating assuming nominal voltage conditions. Thermal ratings are time dependent and may range from a short time emergency rating to a continuous rating.

3.1.4.2 Stability limits

The limit of a group of transmission facilities may also be determined by stability or voltage limits. These represent limits on the system's ability to successfully respond to contingencies, even if no thermal limits are exceeded.

For many system contingencies generators in different parts of the power system will "speed up" slightly while others will "slow down" slightly. The two areas will be briefly operating at slightly different frequencies when this happens. In nearly all cases, the transmission system is strong enough to keep the two parts of the system connected so that they quickly return to normal speed (frequency). In these cases the system remains stable.

For a few system configurations and contingencies, the transmission system is not strong enough to maintain the two areas' frequencies in balance. In these cases the two areas will separate from each other and operate isolated. This is an example of an unstable system condition.

In most cases, however, one or more of the islands will experience partial or full loss of load. This occurs because one, or more, of the areas will be importing from the others. Thus, when the transmission connection is lost, the importing area will be unbalanced, with more load than generation. When the imbalance is large, the only option for the importing area is to shed load; causing a partial blackout. If the imbalance is very large a complete blackout of the island will occur. It is also possible for the exporting area to experience problems when the islands form.

There are situations in many systems, especially those in the western United States, where transfers are limited by stability problems before any thermal limits are reached. In these cases the transfer will be stability limited. These stability (and voltage) limits are established via technical studies that determine the maximum power that can be transferred over a group of lines.

3.1.4.3 Voltage limits

For nearly all system contingencies different parts of the power system will experience changes in voltages. In some areas voltages rise; while in others voltages will fall. Usually equipment and system operators are able to adjust the voltages to maintain acceptable levels. If voltages rise too much, however, equipment can be damaged due to insulation or other hardware failures. If the voltages fall too low it may not be possible to control, and voltage will continue to fall, resulting in a blackout. The greatest risk is usually to an importing area where the lowest voltages will usually be experienced.

3.2 Arizona transmission planning processes

Planning methods and guidelines are used as the basis for the development of future transmission facilities. Transmission plans are updated on a continuous basis to determine the projected facilities needs for each year over a ten-year period.

In addition to planning their transmission systems to meet their internal needs, the utilities in the State actively engage in a coordinated regional planning of transmission facilities in order to ensure that (a) the best coordinated approach is being used for expanding the interconnected system, (b) opportunities for joint projects and resulting cost savings to customers are identified, and (c) the EHV and HV transmission facilities are planned in the broader context of the needs of the State, and to take advantage of the diverse locations of load centers and generation complexes in the State.

The utilities in the State are also coordinating the planning activities with the utilities in the neighboring states to identify and construct interstate transmission facilities in order to take advantage of the import and export of competitive energy that would benefit the customers.

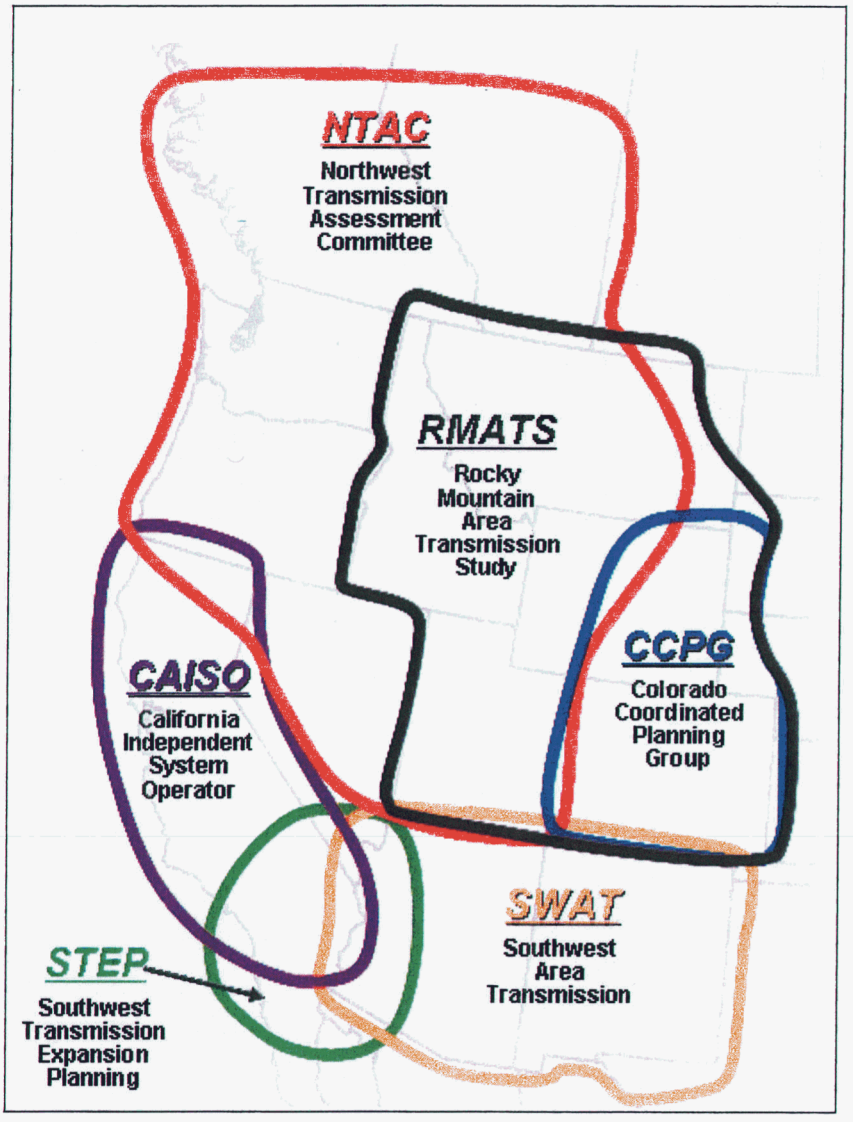
Since the 2002 BTA, with the encouragement of the ACC and its Staff, the planning process has become much more collaborative and regional. This is a significant improvement in the Arizona planning process. While individual transmission providers remain responsible for their individual transmission projects, the planning process has become so regional that plans are best presented on a regional basis, rather than by individual companies.

3.2.1 Regional transmission planning affecting Arizona

Coordinated regional planning in Arizona dates back at least to the late 1960s when the NERC and its regional Councils were formed. The Arizona utilities were part of one of these regional Councils, the Western Systems Coordinating Council (WSCC). In the years since that time many regional planning coordinating groups have formed and evolved. The WECC has succeeded the WSCC. And there are now six regional transmission-planning groups active in the WECC as shown in Figure 3.[1] As shown on the figure, the sub-regional groups that are directly involved with transmission planning in Arizona are the Southwest Transmission Expansion Planning group (STEP) and the Southwest Area Transmission group (SWAT).

[1] Web sites for these groups are:
RMATS –http://psc.state.wy.us/htdocs/subregional/home.htm
SWAT – http://www.azpower.org/swat
CAISO – http://www.caiso.com/thegrid/planning/index.html
STEP – http://www.caiso.com/docs/2002/11/04/2002110417450022131.htmp
NTAC – http://www.nwpp.org/ntac
CCPG – http://ccpg.basinelectric.com

Figure 3: Six sub-regional planning groups in the WECC



3.2.1.1 Southwest Transmission Expansion Planning (STEP) group

STEP was created as an ad-hoc group to coordinate transmission plans in the Arizona, Southern Nevada, Southern California, and Northern Mexico area. STEP first met in November 2002 and has met periodically since. Participants include representatives from utilities, independent power producers, state agencies/regulators and other stakeholders with an interest in the transmission system in Southern Nevada, Arizona and Southern California. STEP's focus is on economically driven expansion projects that support the development of seamless west-wide markets while satisfying established reliability standards.

STEP goals and functions

The group adopted the following common goal:

> To provide a forum where all interested parties are encouraged to participate in the planning, coordination, and implementation of a robust transmission system between the Arizona, Southern Nevada, Mexico, and Southern California areas that is capable of supporting a competitive, efficient, and seamless west-wide wholesale electricity market while meeting established reliability standards. The wide participation envisioned in this process is intended to result in a plan that meets a variety of needs and has a broad basis of support.

STEP performs 12 basic planning functions:

1. Produces a long-term bulk transmission expansion plan biennially.
2. Identifies current and future transmission congestion that is an impediment to the efficient operation of the western market.
3. Develops, through a collaborative process, strategic transmission options and specific alternative plans for reinforcing the transmission system and for reducing or eliminating congestion.
4. Reviews project-sponsored studies, if requested by the Project Sponsor.
5. Relies, as much as possible, on the technical studies conducted by Project Sponsors and studies conducted in other forums.
6. Performs technical studies without duplicating work performed by others.
7. Shares the study work and will normally be documented in a report.
8. Provides a forum to facilitate stakeholder development of projects through the planning effort.
9. Facilitates the phased implementation of completed plans.
10. Works closely with regulatory and governmental agencies in developing facility plans.
11. Closely coordinates with the other regional planning and reliability groups.
12. Provides a forum for discussing different approaches for funding potential transmission projects.

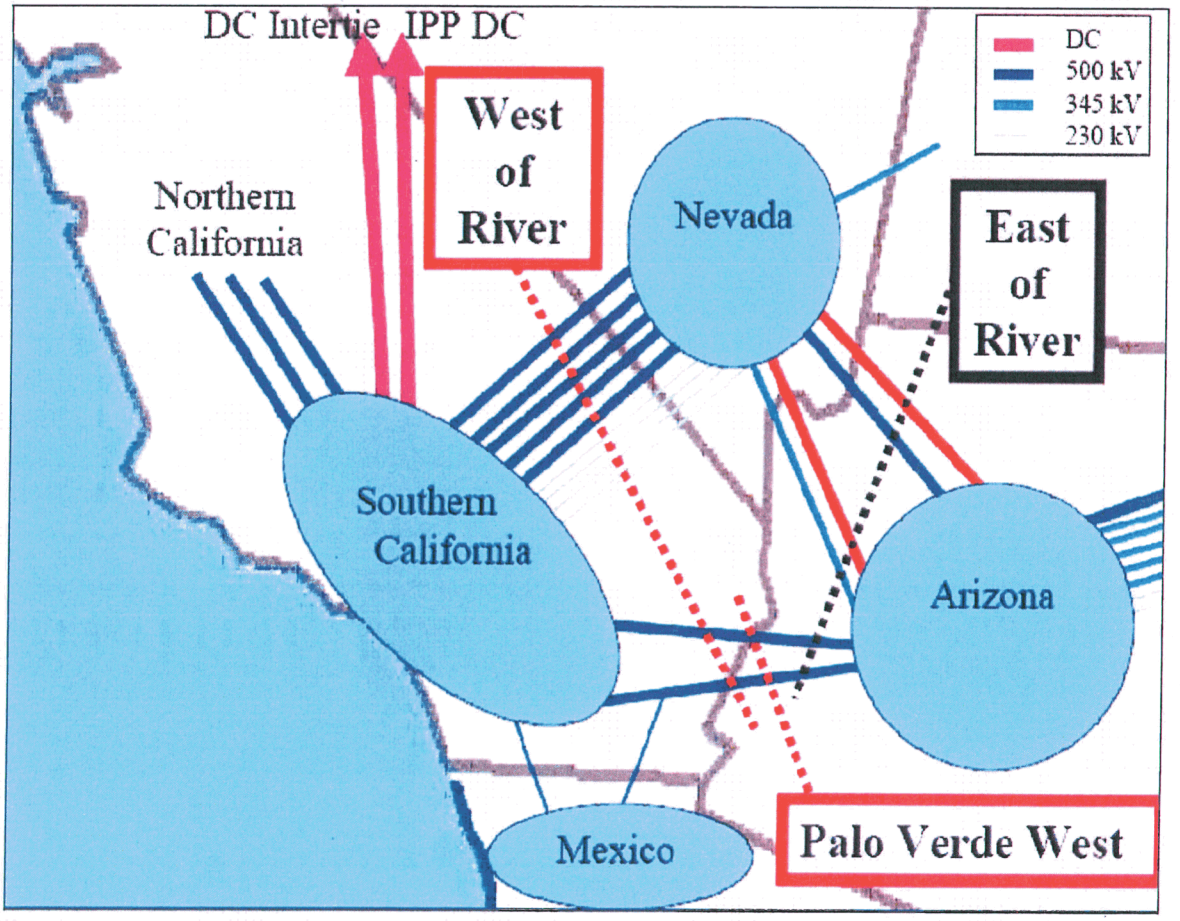
Since its inception, STEP has been a valuable forum for sharing both technical and economic studies to develop transmission projects to mitigate inefficient congestion on the system. Although early STEP efforts focused to a large extent on shorter-term alternatives to increase the Arizona-California transfer capability, the focus has expanded considerably and now includes activities such as:

- Major California ISO planning issues for a the whole southern California region;
- SWAT/STEP coordination of the Colorado River Transmission system planning;
- Eastern Nevada transmission studies;
- Transmission for delivery of renewable resources in the region; and
- Other major generation proposals in the region, including Baja California.

STEP Arizona-California

The focus of the STEP Arizona-California (STEP-AC) group is on the transmission transfer capability between Arizona and California. This means that there is some geographic overlap with other groups that are focused on the "internal" transmission needs of the areas within Arizona and California. Numerous Arizona to California upgrade alternatives have been, and continue to be coordinated, through the efforts of STEP. The first of these upgrades, the Short-term Path 49 ("East of River") upgrade project was placed in service in 2006 raising transfer capability by 505 MW.

Figure 4: Transmission area of STEP-AC planning group

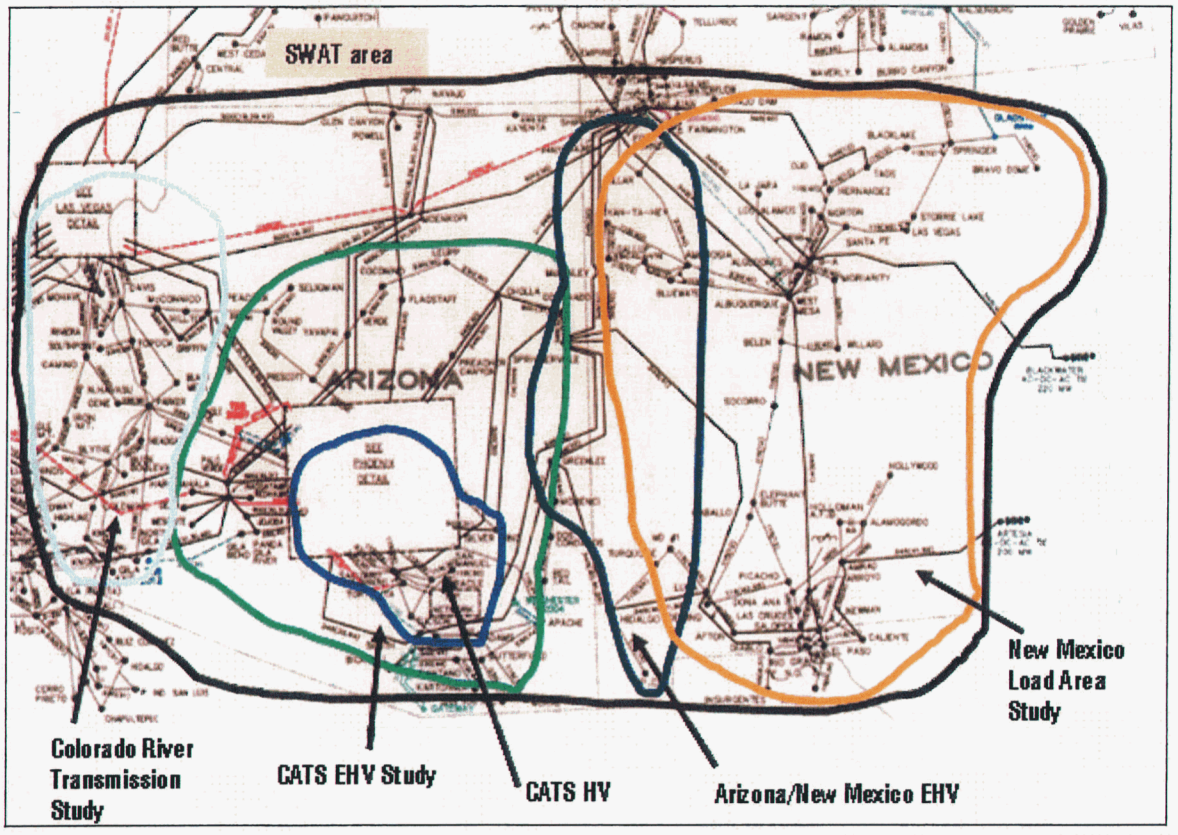


3.2.1.2 Southwest Area Transmission (SWAT) Study Group

SWAT is divided into five study areas as shown in Figure 5 each with its own study group. Four of these include facilities in Arizona (the exception is the New Mexico area). Each of these areas is a logical transmission region that involves multiple transmission providers. In each

case, a participating SWAT member (typically a transmission provider or consultant) is designated as the lead entity that coordinates the necessary computer analyses.

Figure 5: Areas covered by SWAT study groups



Central Arizona Transmission System (CATS) Study Group

Historically, Arizona's EHV transmission system has been developed to interconnect large generation resources to major load centers located in the Phoenix and Tucson metropolitan areas. The resultant transmission development within Arizona was a system that moved power to these two load centers from coal-fueled generation in the northeast and the Palo Verde nuclear plant.

In the past, each utility in Arizona developed their individual plans using a common system model of the transmission system. Some regional planning was also performed in the past for joint projects such as the Arizona Nuclear Power Project (ANPP). The individual utility expansion (e.g., ten-year) plans were shared among the utilities before the annual filings with the ACC. This process has been improved by becoming more collaborative and open as a result of the efforts of the utilities, the Arizona Commission, and other stakeholders. This improved

collaboration and openness has made it possible for the utilities to better identify joint solutions to meet future needs of Arizona and the region.

Part of this process includes the formation of the Central Arizona Transmission System (CATS) study group. CATS is comprised of two subcommittees:

- CATS-EHV — to investigate the extra-high voltage (345 and 500 kV) transmission network in central Arizona; and
- CATS-HV — to investigate high voltage (115, 138 and 230 kV) transmission network needs in the Phoenix/Tucson area. In addition to APS and SRP, this study area includes facilities of irrigation districts, electric cooperatives, Native American tribal lands, and small Arizona communities.

SWAT Arizona-New Mexico (SWAT-AZ-NM) Study Group

This subgroup was formed in 2004 and there have been several long-standing groups studying portions of the AZ-NM region. The SWAT AZ-NM is focused on the transmission needs of the eastern Arizona-Western New Mexico region, including possible generation projects for the region that could total about 7,500 MW over the next 10 years. Recent discussions within the subgroup have centered on development of the Desert SW Regional Black-start Plan in conjunction with the WECC Rocky Mountain/Desert Southwest Reliability Center. The group has also started reviewing new EHV transmission projects from New Mexico to Arizona to deliver new thermal and renewable resources being developed in New Mexico, such as the Navajo Transmission Project in the north and the SunZia SW Transmission Project in southeastern Arizona.

SWAT Colorado River Transmission (SWAT-CRT) Study Group

SWAT-CRT was created as a sub region to the SWAT planning group. Its basic intent is to look at the needs for transmission and the current status of the transmission systems within western Arizona and southern Nevada. Membership, as with SWAT, is completely open. This group is merged with the STEP-AC group. The merged group reports to both SWAT & STEP. There are more than 20 entities that are participating or monitoring the CRT-AC meetings and activities.

The study group is now pursuing a two-phased approach:

1. First, stressing the existing East of River path to investigate what can be done to increase transmission capability into northwestern Arizona and southern Nevada with the existing facilities.
2. Second, investigating a new switchyard (Harquahala Junction) that would connect APS' proposed TS-5 project with the proposed Palo Verde – Devers #2 line for this purpose.

They coordinated various proposed projects that increased capacities of Devers/Palo Verde, East of River to 9,000 MW and also the APS TS-5 project.

Other SWAT Study Groups

In addition to the above groups, the SWAT-New Mexico Work Group continued its efforts to address joint AZ/NM regional planning issues, and two new work groups have recently been formed - the SWAT Short Circuit Work Group and the SWAT Black Start and Restoration Work Group.

Other areas within Arizona

While there have been laudable activities by the various stakeholders to encourage and participate in regional coordinated transmission planning, not all transmission needs are regional. There are other areas not covered by a regional study group. There are also purely local transmission needs within the areas covered by the regional study groups. These areas are the responsibility of the utility serving the area. The needs of these areas have been included in the BTA filings of the Arizona utilities. These facilities have been planned based on the individual utility criteria. Examples include the 115 kV and 138 kV projects in the state and the several reconductoring projects proposed by TEP. (These projects are discussed later, in Chapter 5.)

3.2.1.3 Seams Steering Group

The Seams Steering Group-Western Interconnection (SSG-WI) committee was formed by the three western RTOs to facilitate reviews of issues related to the interfaces between the RTOs in the WECC. A planning work group (PWG) was formed within SSG-WI to establish a collaborative planning mechanism to coordinate the transmission plans of Western RTOs. The Group's scope addresses long term congestion issues and scheduling timelines that impact the marketing of energy between RTOs in the West. The SSG-WI issued its first interconnection wide transmission plan, *Framework for Expansion of the Western Interconnection Transmission System,* in October of 2003. The SSG-WI has been terminated and the planning activities have been incorporated into the WECC Transmission Expansion Planning Policy Committee responsibilities.

3.2.1.4 WECC Transmission Expansion Planning Policy Committee (TEPPC)

During 2005 the WECC Board of Directors voted to establish a new committee with a focus on transmission expansion planning policy issues. The TEPPC is intended to fill this role. TEPPC is still in the formative stages and as such is unlikely to have any measurable impact on the current 10-year plans under review as part of the Fourth BTA. Even so it appears that parties from Arizona are becoming significantly involved in the TEPPC. Mr. David Areghini of SRP, who also serves as a WECC Board Member, has been appointed as the TEPPC Co-Chairman. Mr. Prem Bahl of the ACC has been appointed as the regulatory representative on TEPPC. Mr. Robert

Kondziolka, Mr. Robert Smith, and Mr. Harlow Peterson, all from the state of Arizona, have been appointed to positions on the Committee. Given this level of involvement by Arizona parties it can be reasonably assumed that any policies or decisions developed through the TEPPC process will be appropriately reflected in future 10-year plan submittals to the ACC. The TEPPC expects to focus on economically driven transmission expansion planning policies and processes.

3.2.2 WestConnect

WestConnect is an organization composed of utility companies providing transmission of electricity in the southwestern United States. The members work collaboratively to assess stakeholder and market needs and to develop cost-effective enhancements to the western wholesale electricity market. WestConnect is committed to coordinating its work with other regional industry efforts to achieve as much consistency as possible in the Western Interconnection.

WestConnect is pursuing a number of initiatives that could potentially enhance wholesale electricity markets in the west. Some of these efforts include:

- Flow-Based Market Investigations;
- Market Monitoring;
- Pricing;
- Regional Planning;
- Transmission Products;
- TTC/ATC Process; and
- Virtual Control Area.

A number of work groups are actively developing proposals for enhancements. Consensus products from work groups are taken to the Steering Committee for approval and implementation.

3.2.3 Arizona planning practices for local area transmission constraints

In the 2003 RMR study the transmission providers worked collectively to quickly develop studies to respond to the Track B proceeding needs. Due to the short time available there was no opportunity to develop a collaborative process. There were numerous comments about the deficiencies of the 2003 "closed" process. The lessons learned from the 2003 process were:

- Open the study process to all stakeholders, not just the transmission providers.
- Provide opportunities for stakeholders to review and critique RMR results before the ACC workshop.

- Reach an agreement, to the extent possible, regarding the modeling of load and generation included in the Phoenix area.
- Evaluate the extent to which operation of the various Phoenix-area generation mitigate Phoenix area import constraints.
- Solve the confusion regarding implications of Mohave County RMR Study conclusions.

The 2004 RMR studies were much more collaborative. The study forum became integral to the regional CATS study program. The 2004 process allowed for input and/or participation from all groups of stakeholders. In comparison to the 2003 RMR study, the 2004 study:

- Had a process and reviews open to all stakeholders and facilitated a review and comments at each stage of the process.
- Used improved modeling and definition of the load and generation included in the Phoenix area.
- Showed that the planned transmission improvements appear to mitigate the RMR concerns for the Yuma, Phoenix and Tucson areas.
- Found that local Phoenix area generation reserve was an issue beginning in 2013.
- Was unable to agree completely on whether Mohave County is an RMR area or if it is a contractually limited system.
- Found additional transmission lines are needed in Santa Cruz County by 2008 to serve peak load so that the county is no longer susceptible to extended outages for transmission events. The county becomes transmission import constrained by 2010 even with the proposed second transmission line to Nogales.

It seems clear that the hard work of the transmission providers and the other stakeholders during the last two BTA's has resulted in an improved work product and a more collaborative study process. This collaborative process has continued in 2006 as evidenced by the joint APS/SRP RMR study of the Phoenix load area. The latest study indicates that RMR costs for the Phoenix area are expected to remain under $1 million per year through at least 2015. These costs are too small to support capital projects to eliminate the Phoenix area RMR requirements.

The result of the following four RMR study process recommendations, which were included as part of the 2004 Biennial Transmission Assessment was noted by Staff in the 4th BTA:

1. GOAL – "All of the Arizona utilities should continue performing RMR studies for all transmission import constrained local areas using a collaborative process similar to what occurred in 2004." RESULT - Staff is satisfied with the degree to

which this was included in the 2006 planning process, especially for the Phoenix metropolitan area.

2. GOAL – "Improvements should be made in some aspects of the economic analysis that accompanies these types of studies. Data and assumptions should be consistent among the various utilities' studies. To this end, the Staff suggests using the SSG-WI, or another common publicly available, database. In addition, there should be more transparency regarding the data input, assumptions used and the results of the economic analyses." RESULT - Staff observes that there has been progress in this regard in the 4th BTA, and encourages continued efforts to make these economics as transparent and consistent as possible.

3. GOAL – "Conditions in Mohave County must be reviewed in order to understand whether mitigation is required due to constraints on the physical system or whether it can be managed through contractual or commercial practices." RESULT - Staff concludes that the 2006 BTA process has not fully resolved this question and better documentation is needed for Mohave County in future BTA's to confirm that Western's system has sufficient transmission capacity to meet the projected loads in the area.

4. GOAL – "The RMR 10-year study results should be filed with the 10-year transmission plans by January 31 of even numbered years to coincide with associated commission obligation to perform a BTA." RESULT - For the 2006 BTA, APS filed its RMR report covering the greater Phoenix and Yuma load areas on January 30, 2006. SRP did not file a separate RMR study, but relied on the APS filing for the Phoenix load area. Tucson Electric completed it submittal for the Tucson local area on February 3, 2006. UniSource Energy did not update its RMR analysis for Santa Cruz County in the 2006 BTA due to permitting issues that are pending before Federal agencies. No party in the 2006 BTA filed an RMR analysis for Mohave County.

4. Adequacy of the existing system

Adequacy, as discussed earlier, is the ability of the electric systems to supply the aggregate electrical demand and energy requirements of their customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements. Adequacy is generally considered a planning issue related to the capability and amount of facilities installed. This section of the report addresses the adequacy of the existing Arizona transmission system.

The adequacy of an electric system is evaluated using computer simulation studies. These studies use: databases, assumptions, and reliability criteria. The Arizona transmission utilities conduct these studies, participate in the collaborative regional planning process, and present the study results in the ten-year plan reports and at public workshops. Staff and KEMA reviewed and analyzed all these study reports relying on these reports and documents filed with the Commission by the various organizations, rather than performing technical studies of their own.

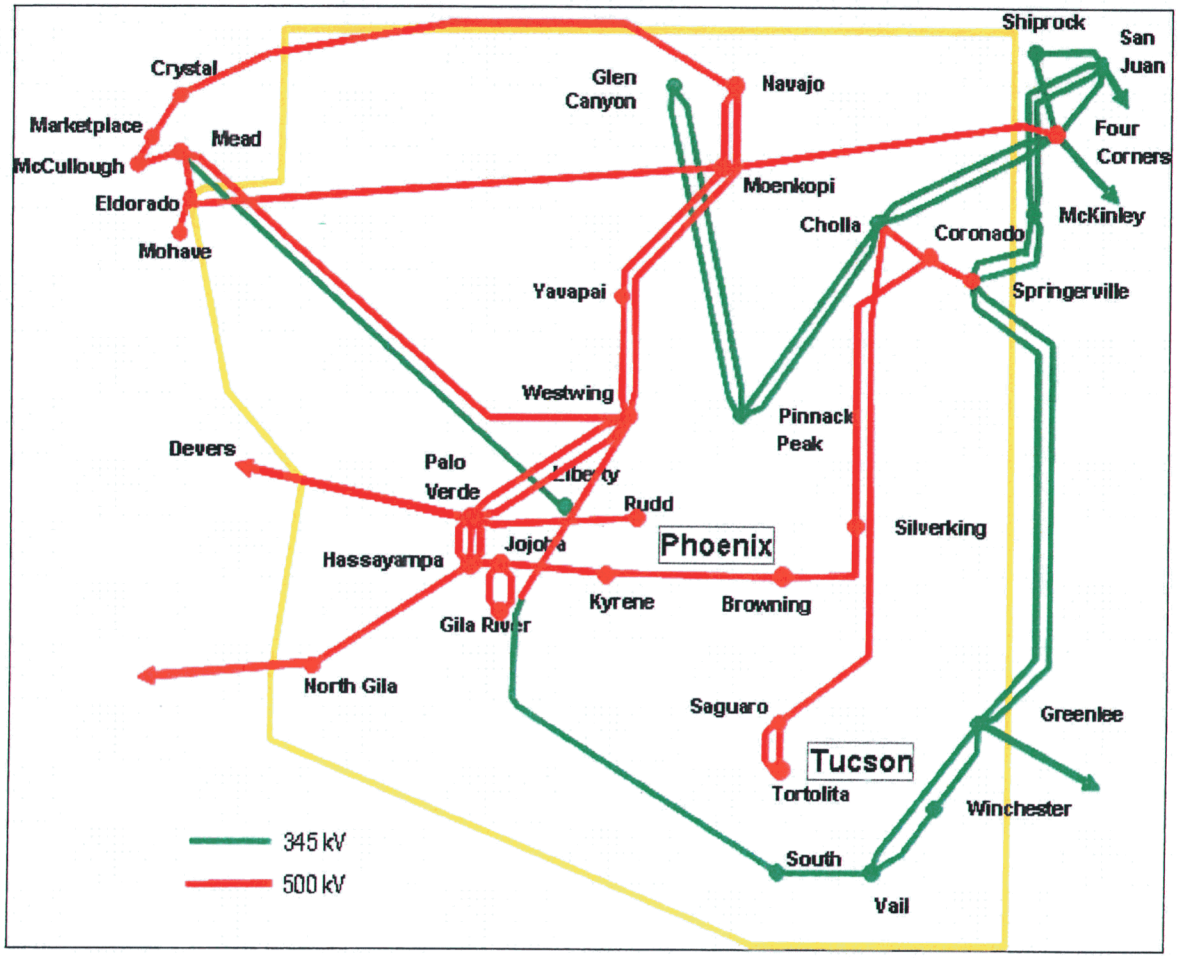
4.1 System description

The demand for electricity continues to grow in Arizona reaching a 2006 non-coincident peak of 19,289 MW.[1] Installed generation has more than kept pace with the growth in demand. As of May of 2006, installed generating plants that deliver their generation to the transmission grid that were operating within the State of Arizona provided a total of 24,249 MW of summer capacity. Approximately 70% of this capacity is owned by Arizona or federal utilities. Non-utility generators and utilities that are not located in Arizona own the remainder. Data on the generating plants operated within the State of Arizona are provided in Appendix C.

With a few exceptions (e.g. Palo Verde-Devers 500 kV, Hassayampa-North Gila 500 kV, and Navajo-Crystal 500 kV), the existing transmission facilities within the state of Arizona are owned and operated by APS, SRP, TEP, UniSource Energy Services, SWTC and Western Area Power Administration (WAPA). Figure 6 illustrates the existing EHV transmission facilities in the State of Arizona. EHV facilities, rated at a nominal system voltage of 345 kV and 500 kV, are the backbone of the Western Interconnection transmission system.

[1] Source: WECC preliminary 2006 summer loads and resources assessment of non-coincident July control area peaks.

Figure 6: Arizona EHV transmission system



All new transmission lines that have been added since the Third BTA are listed in Table 3.

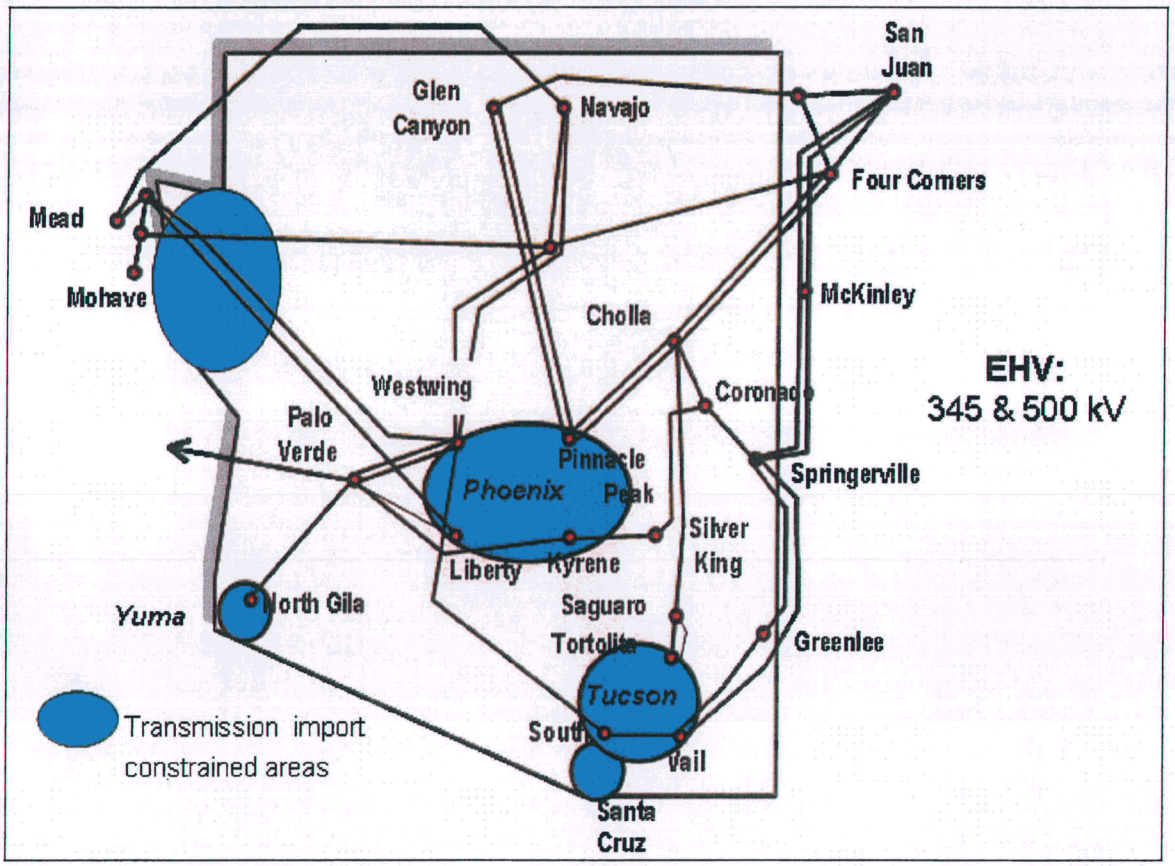
Table 3: Major new transmission lines and stations added since the third BTA

Year	Description	Voltage
2004	Loop-in of existing Greenlee-Vail 345 kV line to new Winchester 345 kV switchyard	345 kV
2005	Saguaro-Tortolita #2 line	500 kV
	Gavillan peak loop-in of Pinnacle Peak- Prescott	230 kV
	Browning substation	230 kV
2006	Loop in of existing Irvington station to Vail substation #1 line through Robert Bills -Wilmot Substation.	138 kV

4.2 Local area transmission constraints

In addition to the overall needs of the Arizona transmission system, there are five local transmission constraints as shown in Figure 7. To address this issue, a method was established to address these load pockets. The 2002 BTA defined local load pockets as geographic locations in an electric system where the load cannot be served using a normal economic merit-order generation dispatch due to transmission limitations. Handling these load pockets is discussed later, in §6.2 (page 91).

Figure 7: Local areas with transmission constraints



4.3 Palo Verde Hub operational issues

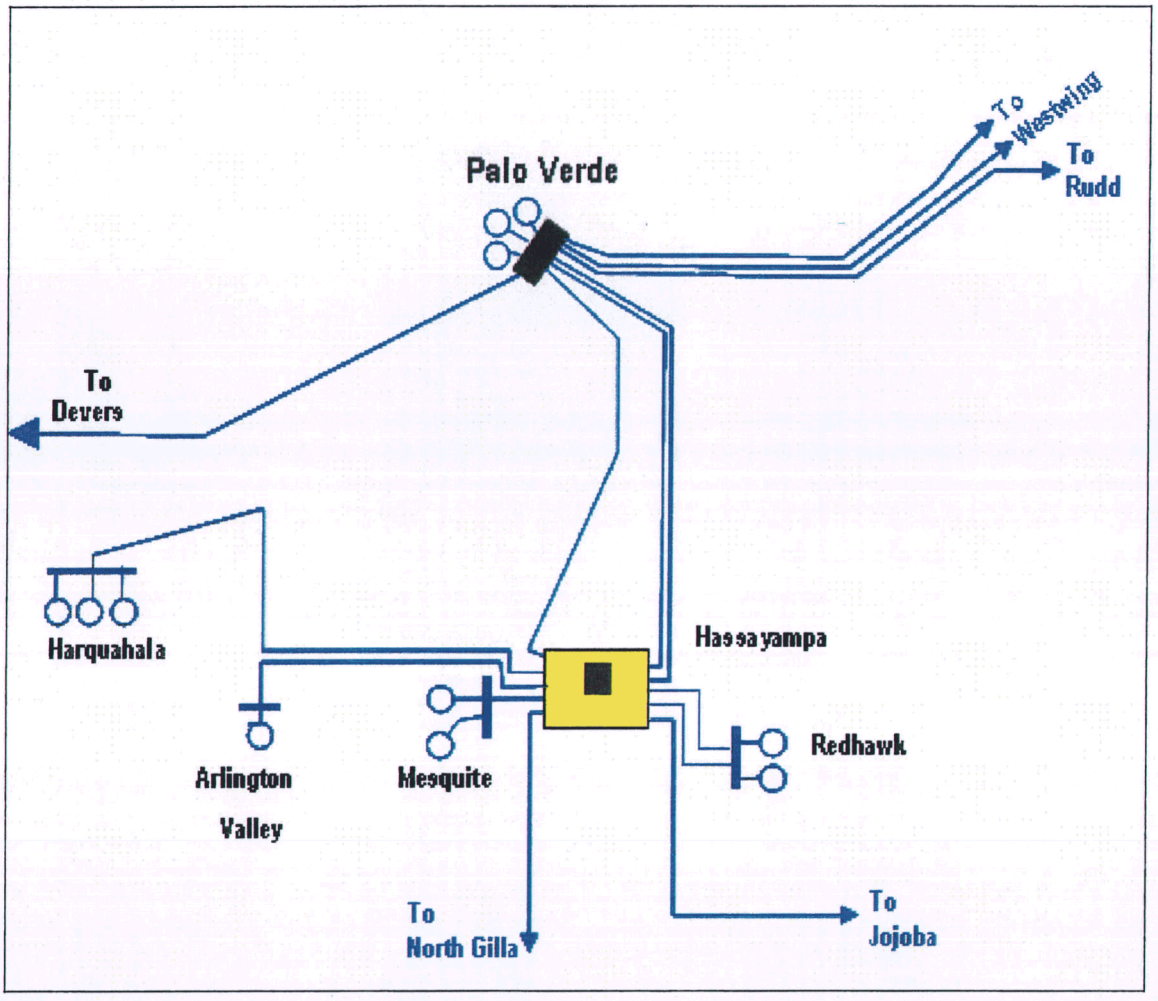
To support bilateral power trading, numerous electricity-trading hubs have emerged over the past few years. A hub is a location on the power grid representing a delivery point where power is sold and ownership changes hands. Potentially, each control area on the power grid could become a trading hub, but 10 hubs account for the bulk of power trading. Of these 10 major

trading hubs, five of them are located in the western United States. One of these is the Palo Verde hub that represents an important access point to the California market.

4.3.1 Palo Verde Hub transmission constraints

The Palo Verde Nuclear Generating Station is located approximately 35 miles southwest of the Phoenix Metropolitan area. It is comprised of three nuclear generating units with a total output of approximately 3,974 MW. Four merchant generator plants with an aggregate net output capacity of 4,118 MW are interconnected to the Palo Verde Hub via the Hassayampa Switchyard. Additional merchant generation with a net capacity of 2,080 MW is connected to Jojoba. All of these generators deliver their output through the Palo Verde transmission system. The Palo Verde transmission system, as illustrated in Figure 8, consists of six 500 kV transmission lines.

Figure 8: Palo Verde Transmission System



The total generation interconnected to the hub is shown in Table 4.

Table 4: Gross Generation Interconnected to the Hub

Plant name	Installed capacity (MW)	In-service date
Palo Verde	3,974	Upgrade: (steam generators replaced) PV 2 2003 PV 1 2005
Redhawk #1, #2	1,020	2002
Arlington Valley 1	600	2002
Mesquite	1,350	2003
Harquahala	1,048	2003
Gila River Power, LP	2,080	2003
Total	**10,172**	

The changes in generation and transmission capability connected to the Hub are shown in Table 5. The transmission capability at the hub appears to be adequate in 2006 and increasing in future years.

Table 5: Palo Verde transmission and generation capability

Year	Generation capability (MW) Actual or expected	Transmission capability (MW) West 500 kV path	East 500 kV path	Combined total[7]	Reason for change
2000	3,810	2,800	3,810	6,610	No changes - historical values
2001	3,810	2,800	4,750	7,550	Study work by APS/SRP updated East path rating based on "actual" vs. "scheduled" flows
2002	5,600	2,800	4,750	7,550	Addition of Red Hawk & Arlington Valley generation
2003	7,971	2,800	5,120	7,920	Addition of Mesquite & Harquahalla generation., and refined Path rating study work by APS/SRP
	9,939	2,800	6,620	9,420	New PV to Rudd 500 kV line and addition of Gila River Power, L.P. Generation
	9,900	2,800	6,970	9,770	Refined 500kV East Path rating study work by APS/SRP with addition of the 500/230kV interconnection at Gila River
	9,990	2,800	6,970	10,207	Capability of the Gila River 500/230 kV interconnection added 437 MW to total Palo Verde transmission capacity
	10,045	2,800	6,970	10,207	PV 2- Generation upgrade (new steam generator)
2005	10,103	2,800	6,970	10,207	PV 1- Generation upgrade (new steam generator)
2006	10,172	3,305	6,970	10,712	Path 49 short term upgrade
2007	10,230	3,305	6,970	10,712	PV 3 generation upgrade (new steam generator)
2008	10,230	3,305	8,010	11,752	New PV–Pinal West–Santa Rosa line[1]
2009	10,230	3,305	8,550	12,292	New PV-TS5 lines[2]
	10,230	4,505	8,550	13,492	New PV – Devers II line[3]
2010	10,230	4,505	8,915	13,857	New Raceway– Pinnacle Peak line
2011	10,230	4,505	9,280	14,222	New Santa Rosa – Pinal South – Browning line[4]
2012	10,230	4,505	9,780	14,722	New TS5 – Raceway line [5]
	10,230	5,105	9,780	15,322	New Hassayampa – North Gila line[6]

Notes: (Estimates based on SRP and/or APS preliminary study results.)

1. Estimated 1,040 MW increase.
2. Estimated 540 MW increase.
3. Accepting rating of 1200 MW was approved by WECC.
4. Estimated 365 MW increase by extending the SEV line to Browning.
5. Estimated 600 MW increase studies for the impact of .TS5 – Raceway line (2012) are incomplete.
6. Estimated 600 MW increase.
7. Starting in 2003 includes the additional Gila River to Phoenix 230kV capability of 437 MW

Staff has been concerned in recent years that the Palo Verde transmission system needs to maintain adequate capability to deliver the full power output of interconnected generators.

Consequently, Staff has taken the position that, in addition to the transmission providers, merchant power plants, should share the responsibility and obligation to resolve Arizona transmission constraints.

4.3.2 Palo Verde Hub outlet capacity and risk assessment

Operation of the Palo Verde Hub and interconnected generation has been and continues to be a subject of much interest to Staff. In the Third BTA, Staff observed that the transmission outlet capacity at Palo Verde was inadequate for the delivery of all capacity from power plants located at this key Hub. Based on information provided during the Fourth BTA, it appears that this situation is being mitigated by transmission expansion plans from 2006-2009.

With the completion of WECC Path 49 upgrades this year, the West of Palo Verde Hub path capability has increased by 505 MW to a new limit of 3,305 MW. In combination with the East of Palo Verde path rating of 6,970 MW this yields a combined transmission capability out of the Hub of 10,712 MW. The total output of the existing generation at Palo Verde (Table 4) is 10,172 MW. Thus, the maximum transmission capability now slightly exceeds the available generation at the Hub. This is an encouraging development, however, Staff also observes that a portion of the transmission capability at the Hub will often be unavailable due to unscheduled flows ("loop flows") occurring on the WECC interconnection. These unscheduled flows result from power flowing from remote generators over the multiple parallel paths of the interstate grid. These flows can run in the hundreds of MW at the Hub. They are particularly prevalent in the westbound direction at Palo Verde. These unscheduled flows reduce the scheduling capability out of the Hub on a one for one basis.

Staff believes that such loop flows can still be expected to cause some level of transmission constraints at the Hub, even though it appears this situation will continue to improve with the planned transmission upgrades as shown in Table 5. Transmission outages and derations will also have some affect on the available transmission capability out of the Hub. However, Staff assumes that these will be offset by outages and derations of generation at the Hub. Finally, the Hub is located between two widely disparate markets (Arizona to the east vs. California to the west) and this will, to some extent, frustrate efforts to fully capture the simultaneous transmission capacity available out of the Hub. In summary, Staff concludes that more of the generation at the Hub will now get to market, but congestion (and market anomalies) will continue to constrain dispatch to some degree at the Hub. Furthermore, it appears this dispatch constraint should be fully mitigated with the completion of transmission projects out of the Hub in the next few years.

The 3rd BTA summarized Staff's concerns for the Palo Verde Hub as:

- Hub interconnected generation capacity comparable to entire WECC operating reserve requirement;
- Plants interconnecting to the Hub via single line;
- Common pipeline for gas fired plants;
- Transmission deliverability for the full (combined) output of all proposed plants at the Hub has not been demonstrated;
- NERC category D studies are not being performed; and
- Generator-only control areas emerging at Palo Verde hub.

In response to Staff concerns, in siting the Palo Verde to Rudd transmission line, the applicants, APS and SRP, agreed to facilitate an industry review and work to achieve consensus with Staff on the reliability and system security measures appropriate for a large commercial hub such as Palo Verde.[1] Such measures were to be recommended to WECC for consideration and adoption. If and when consensus is achieved between applicants and Staff, then the applicants were to work with Staff to initiate action to implement those measures on a statewide basis independent of the WECC action. Staff is encouraged by the response of the utilities to the above concerns since the 3rd BTA, discussed in more detail later in this section.

For the initial Palo Verde risk assessment performed in 2003, APS, SRP and Staff, considered the potential causes of extreme events, and those were viewed to fall into one of four categories:[2]

1. Intentional acts;
2. Weather related;
3. Nature initiated; and
4. Equipment or human. To analyze system response under these extreme events, the study team analyzed the set of NERC/WECC category D extreme contingencies:

- Palo Verde switchyard;
- Hassayampa switchyard;

[1] Palo Verde to Rudd Transmission Line Siting Case, Arizona Corporation Commission Case No. 115 Certificate of Environmental Compatibility: "Condition No. 23 – Applicants agree to facilitate an industry review and work to achieve consensus with Staff on the reliability and system security measures appropriate for a large commercial hub such as the Palo Verde Hub. Such measures shall be recommended to WECC for consideration and adoption. If and when consensus is achieved between Applicants and Staff, Applicants shall work with Staff to initiate action to implement such measures on a statewide basis independent of WECC action." Condition and study work does not include nor address contractual, regulatory, commercial, business or operational issues.

[2] Palo Verde Hub Risk Assessment Study, Phase I Results, 5/06/03, Confidential Results were not presented

- Palo Verde Hub ties;
- Common gas pipeline; and
- Railroad event.

Although these are low probability events, if they were to occur, three to four thousand megawatts of generation at the hub would be lost, as well as the hub associated transmission lines. The study results show that the system will become unstable. It was determined that several thousand megawatts of load would have to be shed in order to maintain system stability. Consequently, in order to avoid increased risk at the hub, Staff recommends that:

- Future generation or transmission projects seeking interconnection with the Palo Verde system should consider risk mitigation for extreme events.
- For overall diversity, performance and risk mitigation, future transmission lines should consider terminating at generating stations interconnected at the hub rather than at the Palo Verde or Hassayampa Switchyards.
- Future generators desiring to interconnect at the Palo Verde hub should also be interconnected to at least one other location in the transmission network.

In addition to the above Staff recommendations, presented to the Corporation Commission and the industry, Staff also recommends for WECC consideration a planning guide applicable to all generation hub station that includes:

- NERC Category B (n-1-1), C (n-1-2) [1] and D, risks and consequences, type evaluations should be performed on all generation hub substations. All types of initiating events applicable to a particular generation hub station should be considered in order to determine how to model the associated disturbances, likely duration of the common substation outage and the cumulative risk and consequences of such an outage. System consequences of hub substation outages may be severe and warrant mitigation measures. Evaluations of future generation or new transmission interconnections to such generation hub substations shall consider the effect of the proposed interconnection on the cumulative risk and consequences of a common event outage of the generation hub substation. Alternatives to be considered should include the following:
  - Terminating the new line at different power plant substations currently connected to the generation hub.
  - Interconnecting new generation at more than one substation. Mitigation

measures include load-shedding schemes. The WECC process is still on going. However,

[1] "n-1-1" and "n-1-2 " refers to the criteria where a bulk facility is out of service before a single or double contingency occurs.

Staff developed a generic model of a generation hub concept to be used for the generation interconnection at major hubs (See Figure 9).

Figure 9: Generic model of hub concept

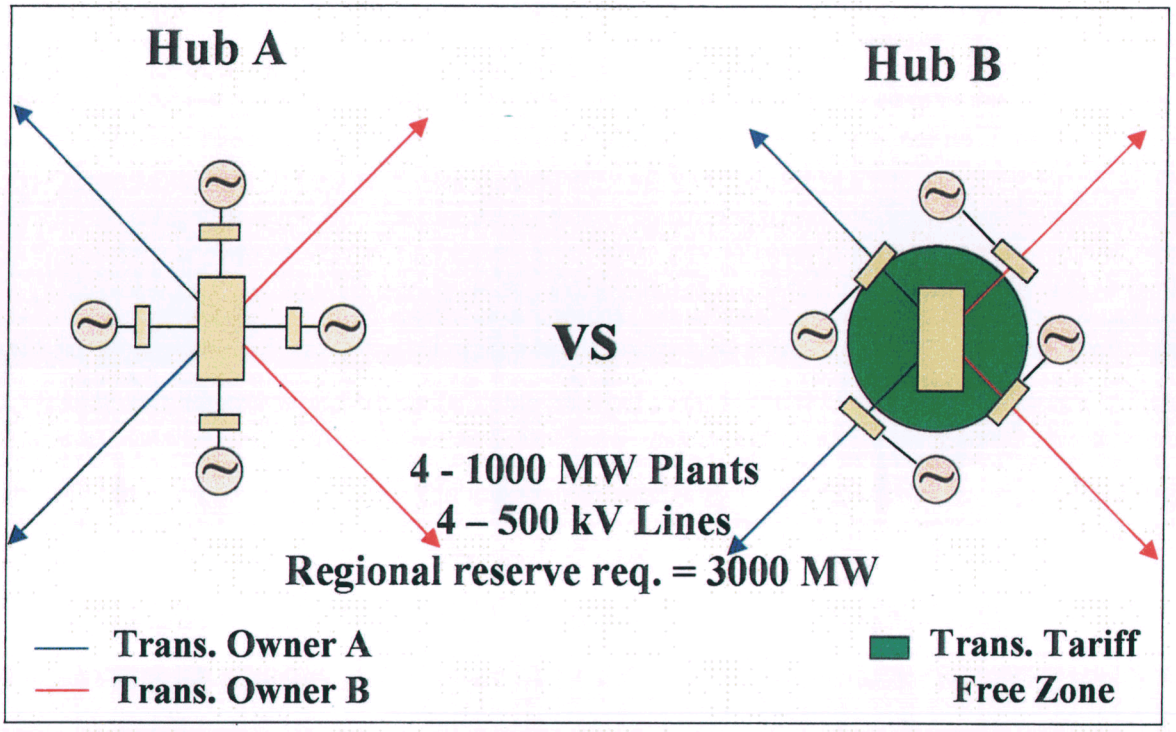


Figure 9 shows the Hub A concept, which has four power plants, each of 1,000 MW interconnected at a common switchyard. The switchyard has four 500 kV transmission lines interconnected. Two lines are owned by Transmission Provider A (shown in blue), and the other two are owned by Transmission Provider B (shown in red). What will happen if that common switchyard is lost, assuming that the regional reserve requirement is 3,000 MW? The 4,000 MW of generation, which is in excess of the reserve criteria for the region, is lost with the loss of the switchyard. This jeopardizes security of the operation of the whole network. Consequently, Staff concluded that this type of hub configuration, as more generation is added, becomes flawed.

As an alternative, Staff proposes that the industry consider the Hub B concept. The transmission lines are still interconnected to a common switchyard, the hub, but the generators have the transmission lines looped through the generator power plant switchyards. Now when the common switchyard is lost, each of the power plants is still interconnected to the line that is looped through it. However, in solving reliability concerns with this type of configuration, a commercial issue is left unresolved.

In Hub A, all of the generators were able to deliver to the hub without any transmission tariff implications, and it was a "come and get it" market concept. With the Hub B concept, the party that is buying from a power plant connected to one of the blue lines will have to pay the blue transmission provider's transmission tariff to get power to the hub. And if the party that is buying the power is taking service, on the red line they will also have to pay the red line tariff, resulting in a pancaking of the transmission rate.

The solution to this is to redefine the transmission tariff, by creating a transmission tariff free zone from the hub all the way out to the interconnection of the power plants. Staff has had some conversation with FERC staff regarding these concepts, and, in preliminary discussions, collectively concluded that there is a need for policy and regulations that balance reliability needs and market interests at these types of large hubs. Staff and FERC Staff have also agreed that generator-only control areas are acceptable only if reliability obligations and purposes are also being maintained.

In the 3rd BTA Staff raised several issues relative to the Palo Verde Interconnection Study efforts and the siting of all new power plants desiring to interconnect at Palo Verde. Consistent with the Commission's "Guiding Principles for ACC Staff Determination of Electric System Adequacy" (see Appendix A) the Staff expects that as new plants are constructed they will file a study report with the Commission prior to commercial operation that demonstrates the plant can deliver at full output to a market without causing curtailment of the existing generation at the Palo Verde hub. The Commission's guidelines also specify that new generation or transmission facilities throughout the state meet the following obligations:

- Arizona's best engineering practices: at least two transmission lines out of every plant;
- Meet WECC n-1 planning criteria without the use of remedial action, i.e., generation curtailment, unit tripping or load shedding; and
- All plants located inside a transmission import limited zone must offer sufficient energy to meet load requirements in excess of the applicable transmission import limit.

In addition to these established guidelines, the Staff expects new plants to comply with the following measures:

- WECC member/RMS agreement compliance; and
- Seek Southwest Reserve Sharing Group membership.

Staff also recommends that the Commission should require all future interconnections proposed at the Palo Verde Hub, either new generation or new transmission lines, to perform a risk assessment of the Hub to ascertain to what degree the proposed project mitigates the pre-existing risks to extreme contingency events. The recommendations of the Palo Verde Risk

Assessment report should be followed if a proposed project would otherwise exacerbate the existing risk at the Hub.

Staff also proposes that those exempt wholesale generator substations and embedded lines that have network function, should be reclassified as network facilities, and placed under an Arizona transmission provider's control, because they operate as part of the transmission network. In addition, Staff proposes that tariffs should be developed to avoid pancaking of transmission rates as new interconnections are made at those substations.

Finally, Staff proposes that the exempt wholesale generator substations and embedded lines that currently are not involved in the transmission network should have the same obligation to requested interconnections as a transmission provider has. For example, Staff proposes that regulations be developed so that power plants like Harquahala would not have the right to refuse an interconnection, but should have the right to require that reliability be maintained for the interconnection.

The Staff intends to interact with FERC as may be required to fully implement and enforce such interconnection standards in Arizona.

In regard to Palo Verde Hub risk assessment it should be noted that since the 3rd BTA three major filings have also addressed these issues and concerns as follows:

- SRP's PV—SE Valley
- APS's PV—TS5, and
- SCE's PV—Devers 2.

The Staff believes that these risk assessment issues should be addressed as part of all future interconnection filings at the Palo Verde Hub.

5. Adequacy of the future system

Every organization considering construction of a transmission line in Arizona during the next ten-years must file a ten-year plan with the ACC.[1] The plan must be filed on or before January 31 of each year and must provide:

1. The size and proposed route of any new transmission lines.
2. The purpose to be served by each new transmission line, and
3. The estimated date by which each transmission line will be in operation.

A compilation of planned transmission line additions filed in January 2006 that comprises the Ten-Year Plans for 2006-2015 is provided in Appendix F and Appendix G. Changes in Transmission plans since the 2004 BTA are provided in the Appendix E.

State statutes require that Staff determine the adequacy of these planned facilities to meet the energy delivery needs of Arizona in a reliable manner. This section of the report documents a review of the ten-year plans filed by the Arizona utilities, and Staff's assessment of how those plans differ from plans addressed in the third BTA.

While Ten-Year plans were filed by individual utilities, the underlying studies were performed in a collaborative process by geographic region as discussed in section 3.1.4. Since the studies for this BTA were performed by geographic region, the reviews are reported here by region in a way that parallels the collaborative studies.

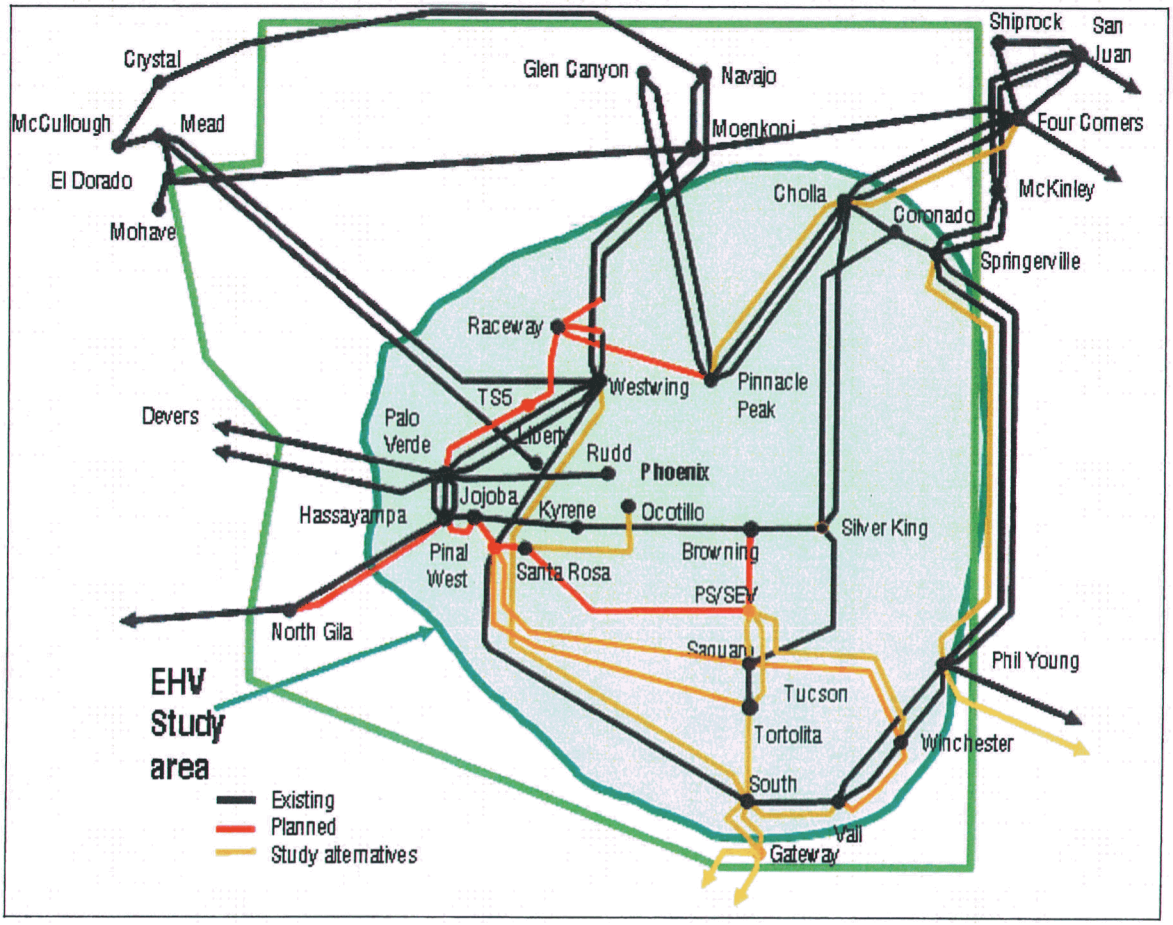
5.1 EHV system assessment

The existing Arizona EHV transmission system and planned additions are shown in Figure 10. The existing system is shown in black and the planned additions are shown in red. As can be seen in the figure the planned additions strengthen the connections between the Palo Verde area and western and southeastern Phoenix area, northern Pinal County and northwestern Tucson. The figure also shows many facilities in brown. These are alternatives that were evaluated by the utilities as part of CATS Phase III studies.

Some of the alternatives shown on Figure 10 are not listed in the ten-year plans but have been identified as being considered by the utilities in SWAT. These are mostly circuits between Phoenix and Four Corners. It is possible that as conditions change, some of these options may be included in future plans as a result of the SWAT process. The study alternatives, in total, strengthen the system east and northeast of Phoenix and north of Tucson.

[1] A.R.S. §40-360.02

Figure 10: Arizona EHV transmission area system and plans

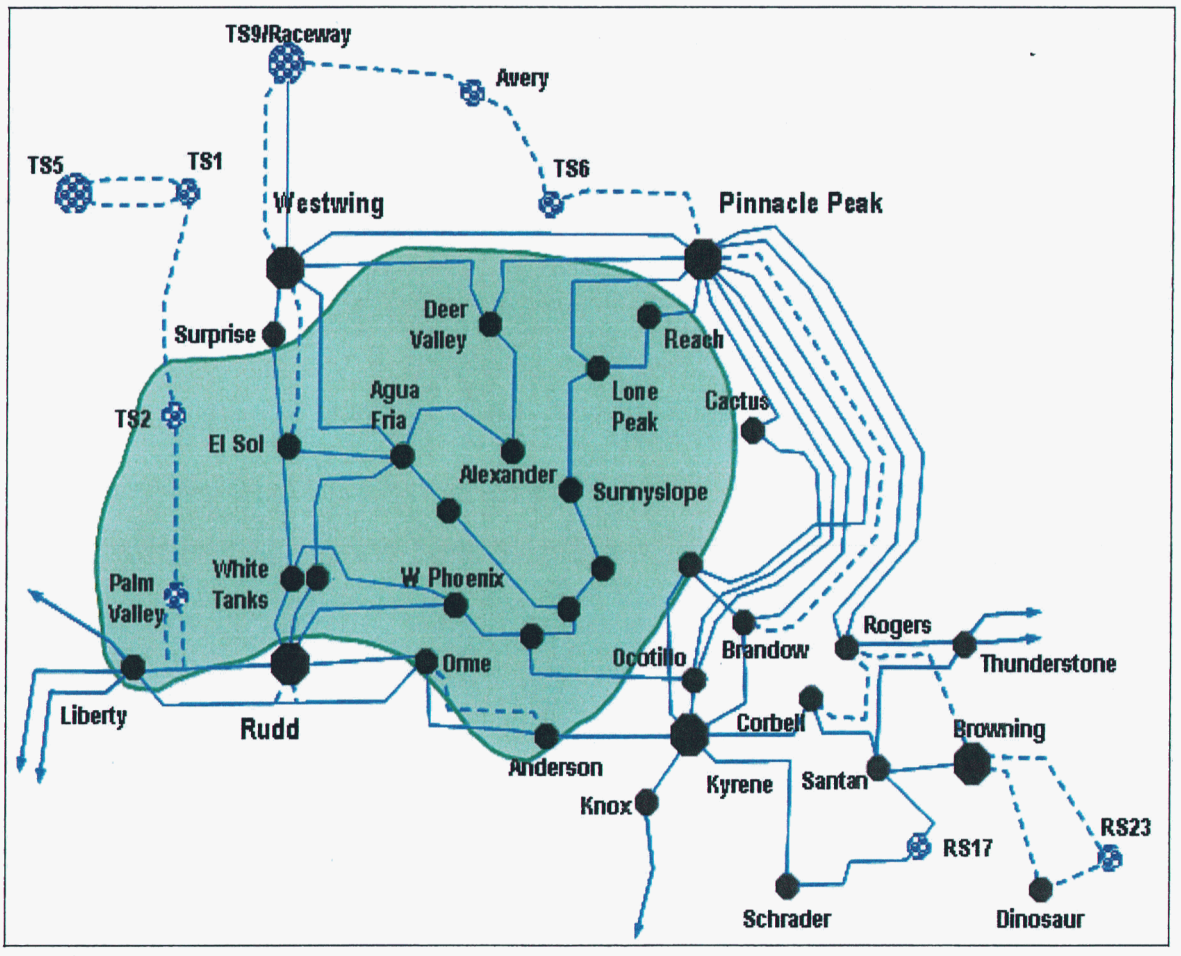


The individual EHV additions and reasons they are required are listed in Appendix F.

5.2 Metropolitan Phoenix area

The metropolitan Phoenix area including Scottsdale, Tempe and other surrounding cities and incorporated areas is currently the single largest load basin in the state with approximately 12,600 MW of peak electric demand. Major elements of the local HV transmission system for the Phoenix area are shown on Figure 11. The facilities in this area are operated by Arizona Public Service (APS), Salt River Project (SRP) and WAPA.

Figure 11: Phoenix metropolitan area HV transmission system



The HV individual additions and reasons they are required are listed in Appendix G.

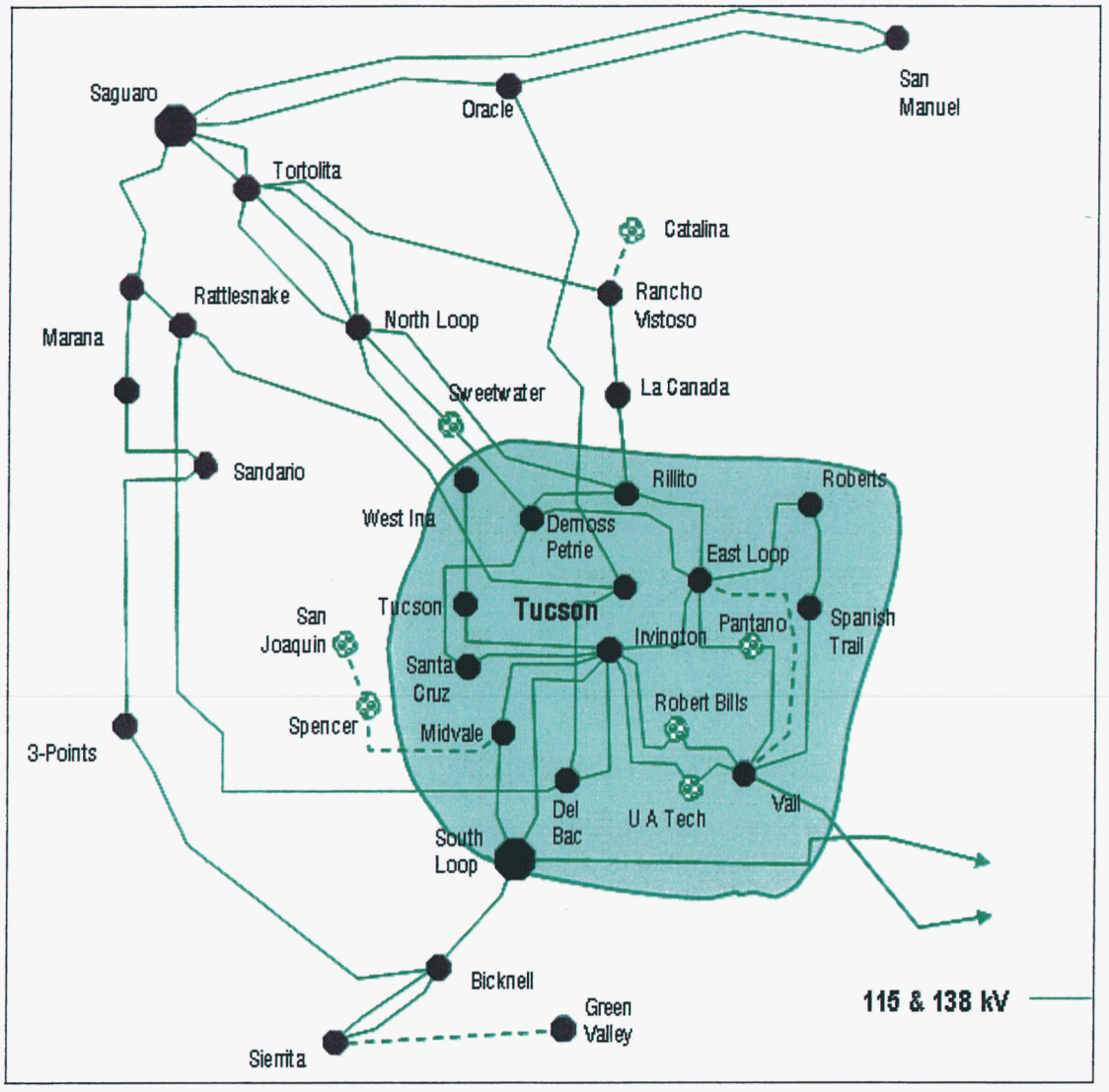
The 10 year plans submitted in the 4th BTA anticipate continued strong growth in the metropolitan area and include plans for at least 226 miles of new 500kV lines, 167 miles of new 230 kV, about 20 new bulk power transformers and other lower voltage facilities. Many of these new projects are joint efforts of APS and SRP. Based on estimates provided by APS these projects are expected to increase the delivery (import) capability into the metropolitan Phoenix area by nearly 5,000 MW. Over the same 10-year period the peak electrical demand in the area is forecast to grow about 3,500 MW. To the extent that the growth in import capability exceeds the load growth it will help to reduce customer energy costs and increase customer reliability.

Upon completion of the 500 kV projects identified in the current 10 year plans, a 500 kV transmission loop will be nearly completed around the metropolitan area. This partial loop will extend from the Northeast corner of the metropolitan area at Pinnacle Peak around the North, West and South sides of the metropolitan area to the Browning/Southeast Valley area. An additional 500 kV link on the East side of the metropolitan area, if added in future 10 year plans, would complete the full 500 kV metropolitan loop and provide enhanced reliability to the whole urban area.

5.3 Tucson and Nogales Areas

These neighboring areas in southeastern Arizona are both served by UniSource Energy Corp. (UNS). The focus of Tucson Electric Power's (TEP) 10-year expansion plan is to reinforce the EHV supply into Tucson from the north and install a new 345/138 kV source at the Gateway substation into the Nogales area. Various 345 kV and lower voltage transmission projects are also planned to address local load growth and RMR requirements. Once these projects are constructed a complete 500/345 kV transmission loop will be established around the Tucson load area. The existing and planned additions to the HV system are shown in Figure 12.

Figure 12: Tucson area HV transmission system



TEP, a UNS subsidiary, and SWTC are participants in the jointly owned Hassayampa-Pinal West 500kV project, which is planned to be in service in 2008. TEP's and SWTC's jointly owned Westwing-South 345kV line will loop in and out of the new Pinal West 500/345kV Substation. This loop-in will require less than one mile of new 345kV line construction and will provide TEP and SWTC with increased access to resources out of the Palo Verde area. TEP is also considering two alternative reinforcements from the north into Tortolita Substation in 2012. One is a new 500kV line from Pinal West to Tortolita Substation at the northern edge of the TEP service territory. The other option under review is a new 500 kV line from the proposed Pinal South Substation to Winchester or Tortolita. Both alternatives were reported in this 10-year

plan with the caveat that only one of the two will ultimately be selected as the preferred 2012 plan. Regardless of the option chosen, TEP plans to extend 500 kV from Tortolita to Winchester Substation on the eastern edge of its service area.

Pursuant to Siting Case No. 111, TEP proposes to construct a double circuit 345 kV line to interconnect its system with Comision Federal de Electricidad at the U.S.-Mexico border. The timing of this project is dependent on the Federal permitting process. The line would originate at South Substation near Tucson and proceed southward to a new Gateway 345/138 kV substation near Nogales, then continue on to the border with Mexico. Looping the new line into a new 345/138 kV substation at Gateway would provide a strong transmission source into Nogales. UNS proposes to build two 138/115 kV lines from Gateway into Nogales over the next 20 years. The first line would be built from Gateway to Valencia Substation during the next 10 years, in conjunction with the TEP-CFE interconnection project, with a second line added from Gateway to Sonoita Substation beyond the 10 year plan. Both lines from Gateway into Nogales may initially be operated at 115 kV, and eventually converted to 138kV operation.. UNS also plans to upgrade its existing 115 kV line from Vail Substation into Nogales to increase its operating voltage to 138 kV in 2012, and establish the new Gateway Substation as the southern terminus of this line.

The existing and future HV transmission system for the Tucson area is shown on Figure 12. The facilities in this region are operated by TEP, (SWTC) and WAPA. There are fewer new facilities in the Tucson area than in the Phoenix area. They are also more evenly distributed around the Tucson area to serve load in Tucson and to the northeast.

The planned HV transmission additions are listed in Appendix F. This Appendix includes a few facilities not shown in Figure 10 or Figure 12. These facilities are in the area between Phoenix and Tucson, as well as the area west of Tucson and the mining regions lying along the eastern edge of the area. There are also a number of "reconductoring" projects planned by TEP that are not listed in Appendix F since these projects use existing towers and substation facilities—they do not require new right-of-way for transmission.

5.4 Yuma area

Plans to reinforce the bulk power supply to the Yuma area in the 2006-2015 period focus on completion of a second Palo Verde-North Gila 500 kV line. The area is resource constrained at peak loads and depends on imports to serve the demand. Yuma's peak demand is forecasted to grow from under 400 MW today to 563 MW in 2015. By 2008 the Yuma load is expected to exceed import capability by as much as 1,703 hours per year. This increases the dependence of the area on local RMR units. Most of these imports are delivered to Yuma over the APS owned share of the existing Palo Verde (Hassayampa)-North Gila 500 kV line, which was upgraded in 2006 as part of a joint Arizona-California EHV transmission system upgrade. The addition of 100 MW of new generation in Yuma in 2008 plus construction of second 500 kV line from the

Palo Verde/Hassayampa area to North Gila in 2012, along with a 230 kV line from North Gila to the Yuma load center, will add 395 MW to serve the area's load growth.

The proposed second Palo Verde/Hassayampa-North Gila 500 kV line offers a good example of the type of collaboration that can be achieved between transmission providers in Arizona. The project is sponsored by APS with participation from SRP, Welton-Mohawk Irrigation and Drainage District (WMIDD), and the Imperial Irrigation District (IID). As previously discussed, APS proposes the line in order to increase Yuma's transmission import capability and serve growing peak demand in the Yuma area. On the other hand, SRP is participating in the line in order to access geothermal resources in the Yuma area that are available for export during off-peak load periods. WMIDD is participating in the line in order to increase its transmission import capability. The increase will allow WMIDD to serve growing peak demand in its service area and gain access to independent and geothermal resources.[1] Achieving such synergies increases the value of transmission projects to Arizona.

5.5 Arizona-California EHV system assessment

The transmission facilities between Arizona and southern California have been an important part of the western electric power grid for several decades. This importance has grown in recent years as considerable independent generation has been built in Arizona, Utah and Nevada. Of particular importance, have been the transmission facilities that cross the Colorado River between Arizona, California and southern Nevada—known as Path 49. This Path continues to be an important factor limiting power transfers in the West. This Path was an important part of the analysis made by STEP, as discussed in the previous chapter. Arizona entities hold significant ownership interests in several of the key lines that make up this path (e.g., Mead-Liberty, Mead-Perkins and Navajo-Crystal). However, except for the APS share of the Hassayampa-North Gila 500kV line, which supplies APS loads in the Yuma area, the remainder of the Arizona-California EHV (Path 49) transfer capability has no direct impact on supply to customers located in Arizona. Nevertheless, Path 49 is a major flowgate for the export of generation from Arizona to California, including resources in Arizona that are owned by California utilities.

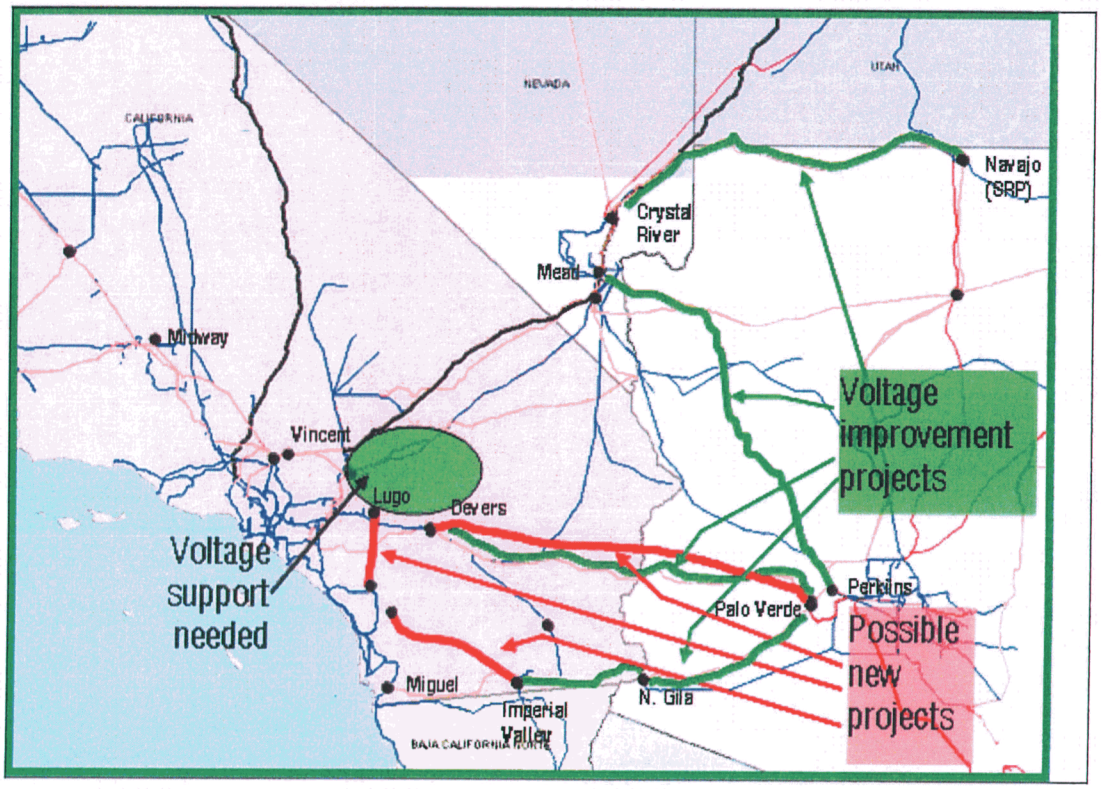
The area studied by STEP and the general options they identified are shown on Figure 13. The map reflects the three basic options identified by the STEP study team:

- Short-term upgrades on Path 49 – Series capacitor upgrades, second Devers 500/230 kV transformer, voltage support, and installation of flow control apparatus on Imperial Valley to El Centro 230kV (in California);
- Palo Verde-Devers #2 500 kV Line; and

1 In addition to participation in the second Palo Verde-North Gila 500 kV line, WMIDD is evaluating several other 230, 161, and 69 kV transmission additions to provide reliable electrical service to its customers.

- Upgrade of Path 49 to 9300 MW—(series capacitor upgrades on Mead-Perkins and Navajo-Crystal 500kV lines, etc.)

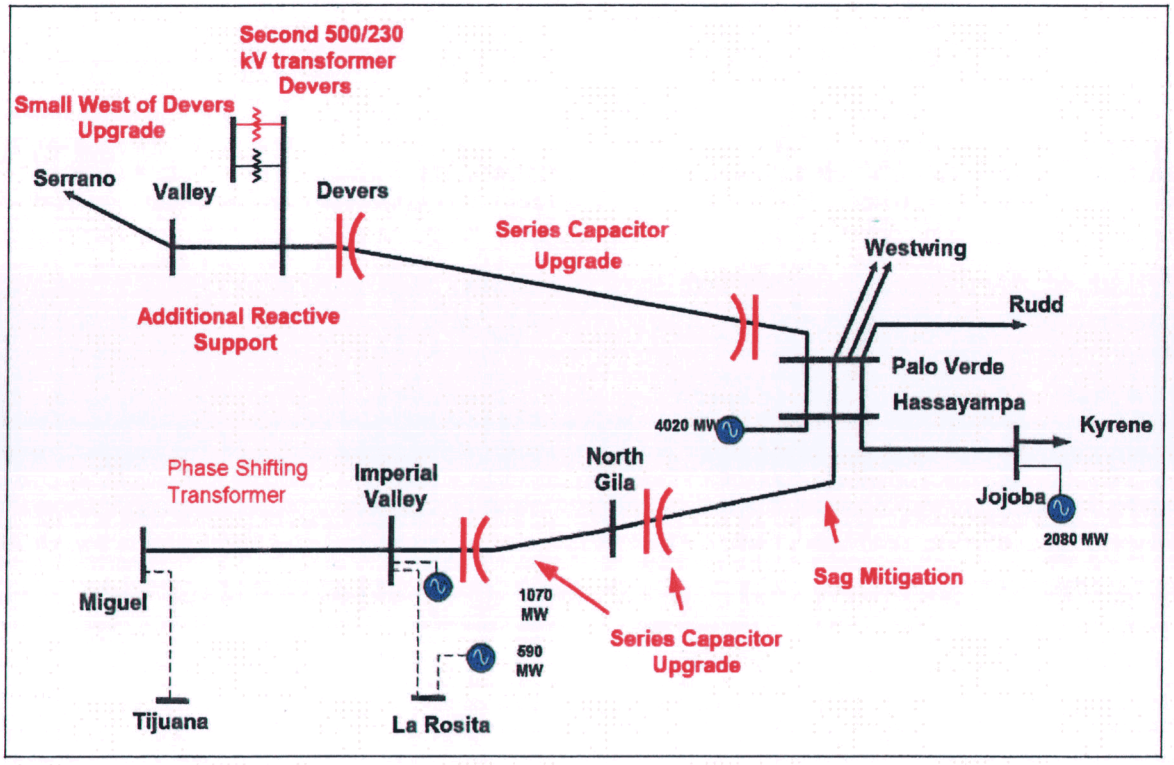
Figure 13: Arizona-California area transmission system



All of the planned short-term upgrades on Path 49 are now complete except for the Imperial Valley-El Centro phase shifter. However, the WECC granted a seasonal rating increase of 505 MW on Path 49 for Summer 2006 based on implementation of suitable operating procedures until this apparatus is installed.

A more detailed picture of these short-term Path 49 improvements is shown in red in Figure 14. These upgrades were completed in 2006 and will result in year-round increase of the Path 49 rating from 7,550 MW to 8,055 MW.

Figure 14: Arizona-California short-term transmission improvements

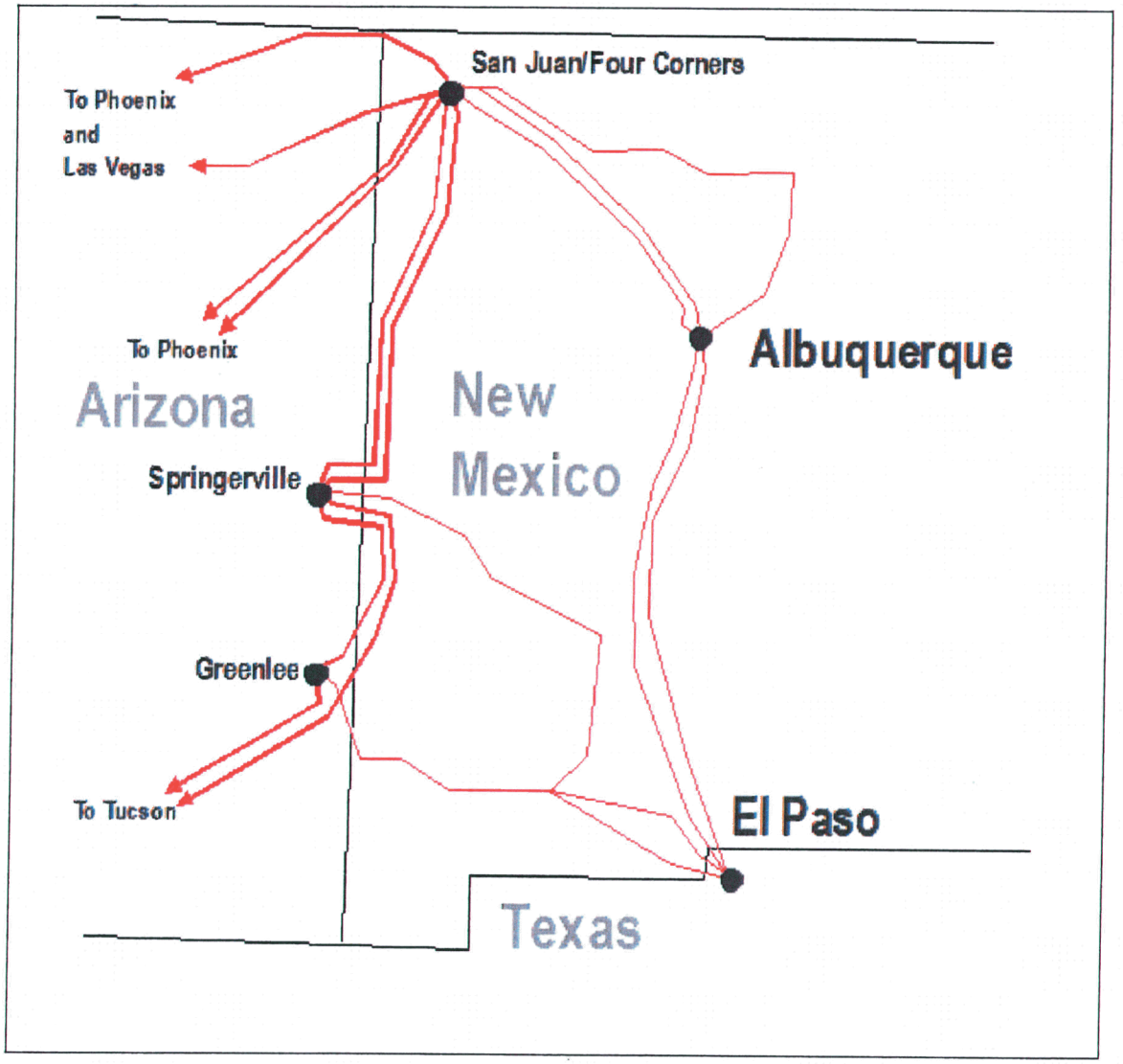


In the longer-term, the next new addition expected to occur by 2008 is the EOR (Path 49) 9,300 MW upgrade project. This involves upgrades of series capacitors in Arizona, as noted above, and is expected to increase the path rating by 1,250 MW. The project is currently in the final stage of WECC's path rating review process. The next major line addition planned is a second Palo Verde – Devers 500 kV transmission line sponsored by the Southern California Edison Company, with a planned in-service date of 2009. The project is still in licensing. If built, it will add a minimum of 1,200 MW of capability to Path 49 (based on the WECC approved path rating study). Recent studies show that that the transfer capacity increase due to the Palo Verde – Devers No. 2 line could be significantly higher. A subsequent 500kV line addition, also in licensing, is proposed from Imperial Valley to the west by San Diego Gas and Electric. It has a planned completion date of 2010, but should have minimal impact if any on the Path 49 rating.

5.6 Arizona-New Mexico EHV system adequacy

Arizona has limited interconnections with New Mexico as can be seen on Figure 15. The major generation in New Mexico is at San Juan/Four Corners and the output of the plants is shared by both Arizona and New Mexico utilities.

Figure 15: Major Arizona-New Mexico EHV Transmission



A SWAT subcommittee is evaluating this portion of the Western power system. The subcommittee goals are to:

- Align "common interest" projects

- Develop base case (starting with 2012)
- Develop "long-term" AZ-NM system
- Study particular "common interest" projects of Interested parties
- Bring results together for technical review and comments
- Incorporate into a single plan report

They are evaluating several specific projects including three coal projects (2,400 MW total), one wind project (100 MW), one new 500 kV line (NTP), and one new 345 kV line (PNM). Various parties are interested in a number of new generation possibilities for the region to serve load in Arizona, New Mexico, Utah, Colorado, and Nevada as shown in Table 6.

Table 6: Long-range transmission "needs" of parties in the AZ-NM region

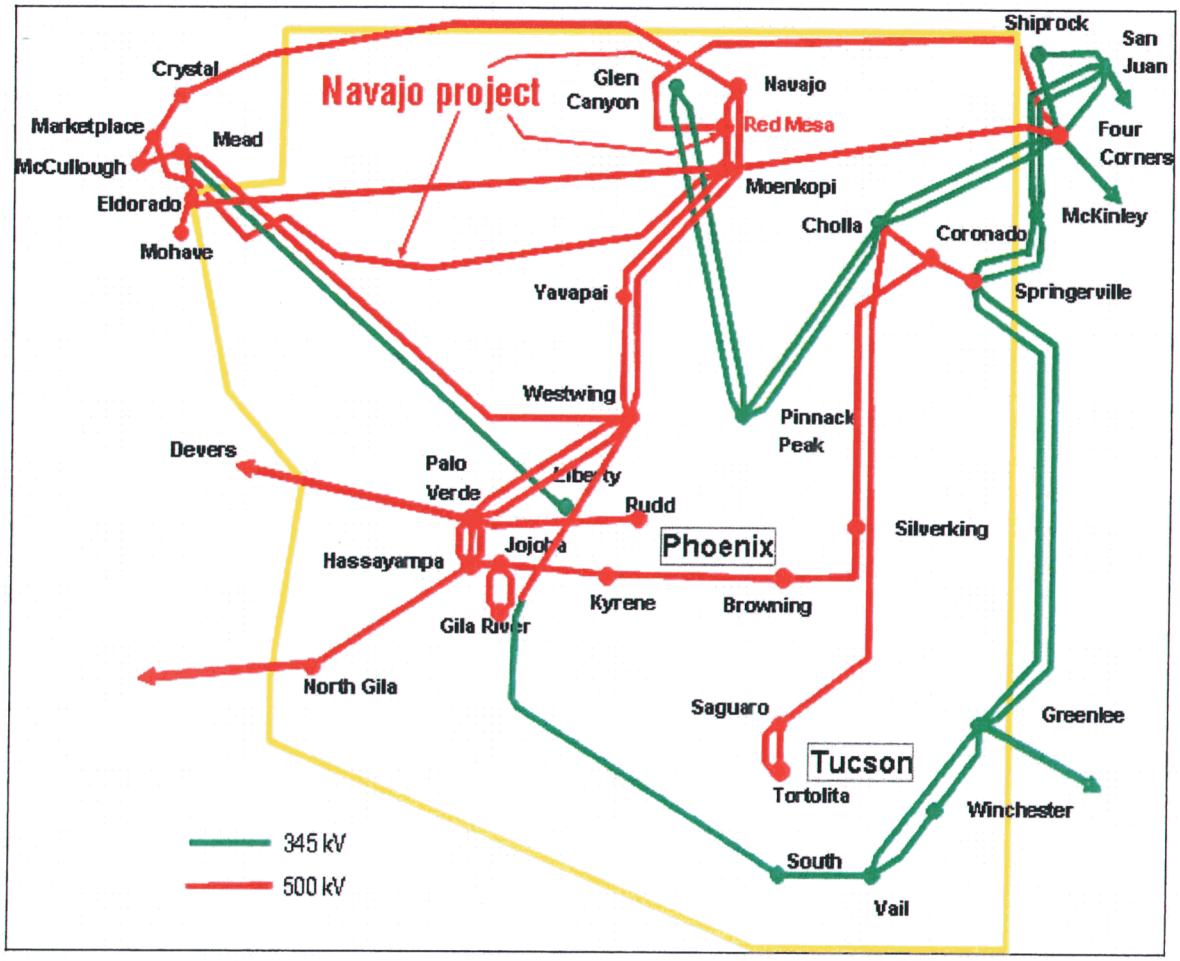
Interested party	Delivery amount desired	Desired market
AZ Electrical Districts	200 MW	Four Corners to CATS Area
Tri-State	200 MW	Springerville to Colorado
APS	1,000 MW	Four Corners to Phoenix
SRP	600 MW	Springerville to Phoenix
EPE	300 MW	Upgrade on WECC Path 47
TEP	500 MW	Springerville to Tucson
PNM	400 MW	Four Corners to Albuquerque
Pacific Corp.	500 MW	Four Corners to Utah
WAPA (SLC)	100 MW	Four Corners to Glen Canyon
SWTC	200 MW	Four Corners towards Tucson
NTP	1,500 MW	Four Corners to PHX and LV
BHP (Merchant Generator)	500 MW	Four Corners to PHX and ALB
STEAG (Merchant Generator)	1,400 MW	Four Corners to Phoenix
Western Wind (Merchant Generator)	100 MW	Coronado to Phoenix

5.7 Navajo Transmission Project

The Navajo Transmission Project is a 460- mile, 500 kV line with an expected capacity of 1,200 to 1,800 MW. It will interconnect the Four Corners, Moenkopi and Market Place substations, and traverse portions of three states as shown in red on Figure 16. The Diné Power Authority (DPA) is developing the transmission project in conjunction with its coal-fired Desert Rock

Energy Project in the Four Corners area of New Mexico.[1] DPA is partnering with Sithe Global Power on the transmission project. A significant portion of the right-of-way in Arizona is within the Navajo Nation, which includes 60% of the line length from Four Corners to Moenkopi substation.

Figure 16: Navajo Transmission Project concept



The Navajo Transmission Project has three distinct segments or phases, which are all being permitted together at this time. The sequence of the three segments is as follows:

- A 500 kV circuit from Four Corners (or a new station nearby) to Red Mesa (or a new substation nearby) to be place in-service in 2010;

[1] Diné Power Authority is an enterprise of the Navajo Nation. It was created in 1985 by the Navajo Tribal Council for the purpose of developing electric transmission and generation projects within the Navajo Nation. RockPort Capital Partners (RockPort) is a venture capital firm that is assisting DPA in the Project Development Activities. Steven Begay is the DPA General Manager and Alexander (Hap) Ellis III is a Partner in RockPort.

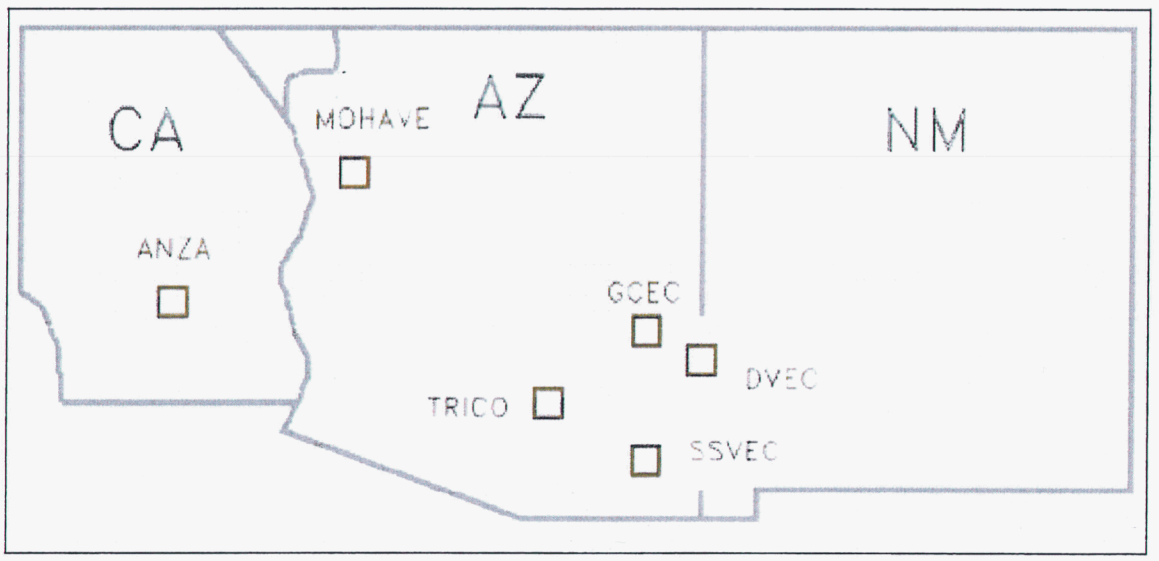
- Optional development of a 500 kV circuit from Red Mesa to Moenkopi; and
- Planned development of a 500 kV circuit from Moenkopi to an existing substation in the Las Vegas area, likely over the next ten years.

Diné's current plan is to construct Segment 1 first including the eastern terminal near the Four Corners Power Plant and to construct the Red Mesa Substation for interconnection to the central Arizona 500 kV grid. The Red Mesa Substation will intercept and loop-in only the Navajo – Moenkopi 500 kV line to achieve the interconnection. It is expected that system studies will indicate a project rating of 1,200-1,500 MW.

5.8 Southwest Transmission Cooperative

Southwest Transmission Cooperative, Inc. (SWTC) owns over 600 miles of transmission assets and serves over 550 MW of member system loads. Most of these facilities and member systems are located in Arizona as indicated in Figure 17. SWTC customer systems in Arizona include Mohave Electric Cooperative, Sulphur Springs Valley Electric Cooperative, Trico Electric Cooperative, Graham County Electric Cooperative, and Duncan Valley Electric Cooperative.

Figure 17: SWTC member systems



Many of SWTC's transmission assets operate at 230kV and 115kV, but they are also a participant in the proposed Hassayampa-Pinal West 500kV line and Pinal West-Santa Rosa 500kV line. SWTC participates in the SWAT Planning Group and subcommittees, including CATS-EHV, CATS-HV, the Colorado River Transmission Subcommittee (CRT) and the Arizona-New Mexico EHV Subcommittee (AZNM).

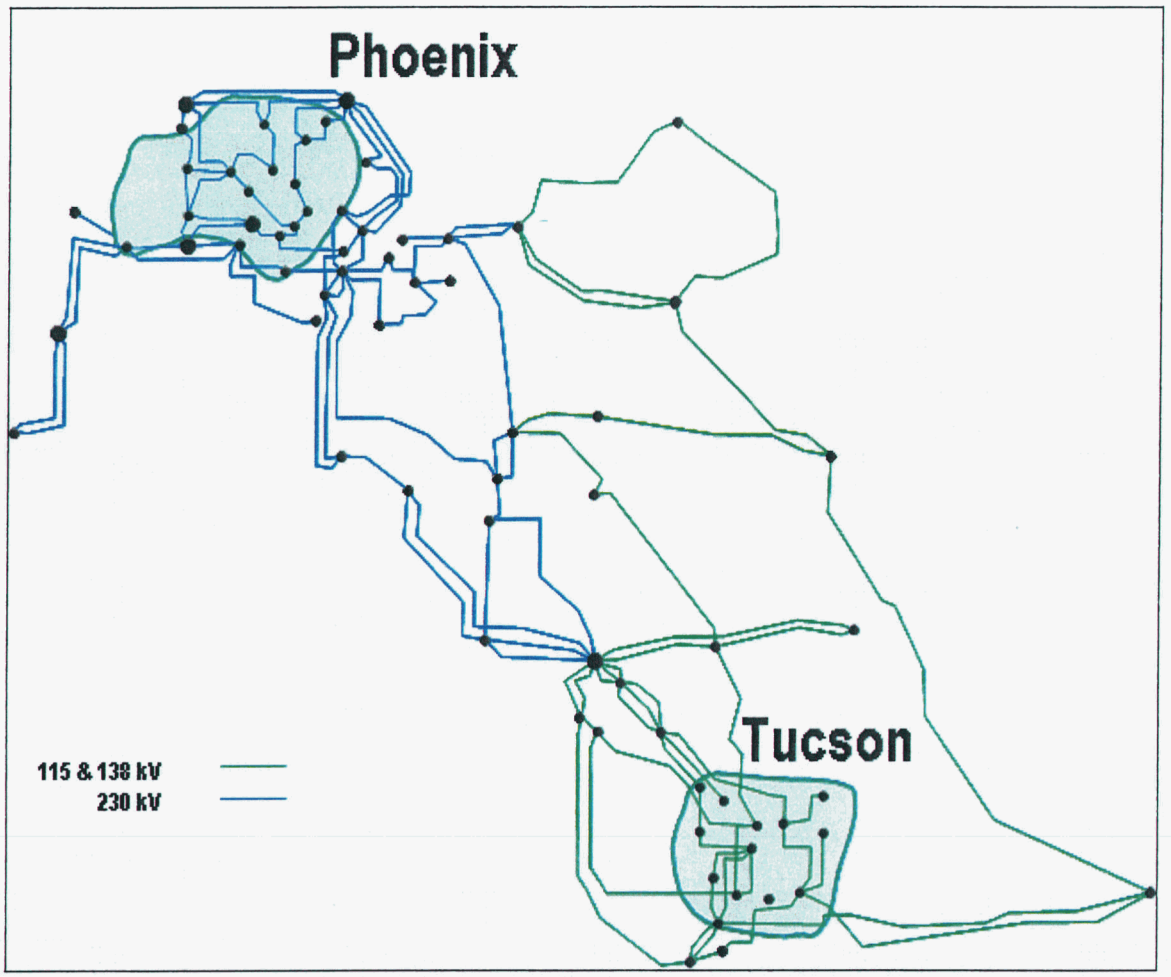
SWTC filed a 10 year plan with the Commission on February 2, 2006 and after consultation with the Commission staff SWTC filed an amended 10 year plan on July 28, 2006. The amended filing adds three new projects that were not contemplated in SWTC's original filing, as necessitated by rapid load growth in its Western and Southern service areas. SWTC's 10 year plan includes construction of new 230/69kV substations tapped into the Dos Condado-Morenci 230kV line and Butterfield-Pantano 230kV line and a new 230/24.9kV substation tapped into the Pantano-Sahuarita 230kV line. These projects and others included in SWTC's 10 year plan are driven by customer load growth.

Power flow and stability analysis conducted for 2006 and 2015 confirmed compliance with SWTC's n-0 and n-1 planning criteria, with the exception of these three n-1 contingencies: loss of the Apache-Butterfield 230 kV line; the Butterfield-San Rafael 230 kV line; or loss of the Pantano-Kartchner 115 kV line. For these outages SWTC studies show that performance violations occur in the 2015 case as a result of an unanticipated increase in a customer load forecast. The violations cannot be resolved through remedial action schemes. All three n-1 outages could result in a loss of load if they occurred during summer peak conditions. The load-serving entities APS, TEP, SWTC, and the Sulphur Springs Valley Electric Coop are working together to mitigate these contingencies and expect to provide an update of these plans in an upcoming 10-year filing.

5.9 Central Arizona EHV/HV system assessment

The existing Arizona HV (230, 138 and 115 kV) transmission system is shown in Figure 18. The 230 kV system is shown in blue and the 138 and 115 kV system is shown in green. Their primary role is to serve load in the areas between the cities rather than interconnect them (the two areas are also interconnected by existing and planned 345 kV and 500 kV EHV circuits.)

Figure 18: Phoenix-Tucson area HV transmission system



Participants in the 4th BTA presented two studies regarding the Central Arizona Transmission System (CATS). The first of these was a joint SWAT-CATS-EHV study for 2015 in which APS, SRP, SWTC, TEP and Western participated. The second was an Interim Report for the CATS-HV Study of Pinal County, conducted by a SWAT sub-committee. The latter study looked at an ultimate buildout of Pinal County as a load basin and developed a corresponding transmission plan to serve this load. SRP served as the study coordinator, but both of these studies were collaborative processes involving many participants. The CATS-HV study group was also very dependent on input regarding land use plans from municipalities and public agencies.

The SWAT-CATS-EHV study participants developed a joint 2015 base case for Central Arizona in order to assess the collective reliability impact of the transmission plans of individual transmission owners on the Central Arizona system. There were no base case or single contingency (n-1) problems found in the EHV system within the study area. However, some

problems were identified in lower voltage systems, which will be addressed in the respective short-term planning processes of the individual owners. The participants intend to repeat this collaborative study process every two years to coincide with future BTA's.

The interim report for the second study, CATS-HV, was included by SRP as Appendix 1 to its 10-year plan (2006-2015) BTA filing. The study developed an ultimate HV transmission plan that would satisfy reliability criteria for an ultimate load basin demand of 10,400 MW in a study area of approximately 5,200 square miles between Phoenix and Tucson outside of the current metropolitan areas. This area is mostly in Pinal County, although portions are located in Maricopa and Pima Counties. The current electric demand in the area is approximately 500 MW. The study does not predict when the load area will be fully developed (saturated), nor is it an optimization study that determines the minimum number of lines and substations required to serve the ultimate load. The study assumed that the majority of resources to serve area load will come from outside the county. Overloads on transmission elements outside the study area were noted, but not mitigated. The interim report summarizes the study results as follows:

> "The transmission solution studied to serve the expanded load in the Pinal County study area required the addition of 16 new 230kV substations, numerous 230kV lines, an a few 500kV lines. The 230kV lines added were a combination of 115kV transmission line upgrades to 230kV and new 230kV lines. The 500kV lines included the South East Valley (SEV) project and the Winchester-Pinal South 500kV line."

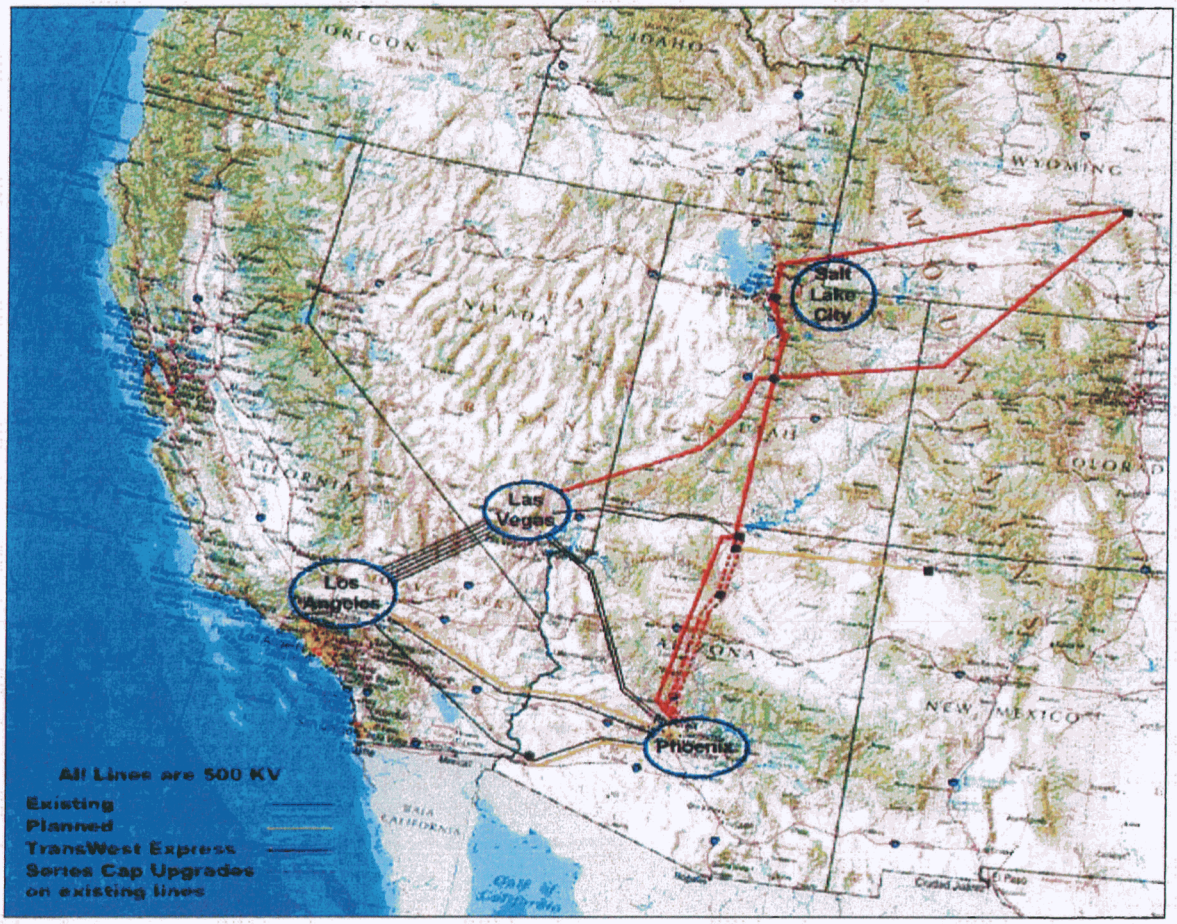
Participants in the CATS-HV study have recommended that the work be revisited every 5-10 years as General Plans of the communities in the study area are updated, major transmission and generation changes become known, or as significant land use changes occur.

5.10 Conceptual interstate transmission projects

A number of EHV transmission projects are under development in eastern Nevada that would not connect directly into the Arizona system, but may still increase Arizona's access to the electricity market in Nevada over existing interstate ties. These projects include the Harry Allen-Mead 500 kV line scheduled for completion in 2007, and the Inland Northern Lights project. A Robinson Summit-Harry Allen 500 kV line and second Harry Allen-Mead line are also under consideration. Furthermore, since the conclusion of the Third BTA, two significant conceptual interstate transmission projects have been announced that may have potential benefits to Arizona. The scope of both projects, still in the formative stages, would involve construction of interstate High Voltage Direct Current (HVDC) and/or EHV (500 kV or 765 kV) Alternating Current (AC) lines from Wyoming into the Pacific Southwest/Desert Southwest region. Both projects could potentially have significant impacts and benefits to the Arizona system.

One of these proposals, the TransWest Express Project, is sponsored by Arizona Public Service. The project involves construction of new transmission from Wyoming to Arizona or southern Nevada as shown in Figure 19. The goal of this proposal is to provide the Desert Southwest with access to coal and wind resources being developed in Wyoming. APS has conducted preliminary studies and initiated a series of meetings to develop stakeholder participation.

Figure 19: Conceptual TransWest Express Project



The second transmission proposal, referred to as the Frontier Project, was initiated in large part through efforts of the Western Governors Association and has similar objectives to the TransWest Project. However, the scope of the Frontier Line is somewhat broader and includes new transmission into northern California as well as the Pacific Southwest/Desert Southwest region. A consortium of sponsors is supporting preliminary studies and stakeholder meetings for the Frontier Project.

As the sponsor for TransWest Express Project, APS is also exploring potential opportunities for a collaborative project scope with sponsors for the Frontier Project. Staff encourages continued discussion along these lines along with a transparent, regional stakeholder planning process to fully explore alternatives and benefits of these closely related interstate transmission proposals.

5.11 Conclusions on adequacy of EHV and HV Arizona transmission system

The Arizona EHV and HV transmission system expansion plans appear to be adequate in the 10 year study period addressed by this BTA (2006-2015), except for two local n-1 contingencies in SWTC's 2015 study (i.e., loss of the Apache-Butterfield 230kV line or the Butterfield-San Rafael 230kV line). Planned facilities identified in the 10-year planning process are consistent with good utility practice. Given the number of alternative projects identified in the longer range plans it should be possible to meet future needs for supplying Arizona's electric system loads in an economical and reliable fashion. SWTC will continue its review of expansion options for the two n-1 contingency violations reported in its 2015 study and contemplates providing updated plans to mitigate these issues in its next 10-year filing to the Commission due 31 January 2007.

The 2006-2015 expansion plans include proposals for certain economically driven regional projects that may both provide economic benefits to Arizona consumers and increase transmission system capability beyond a level required just to maintain reliability. Commission Staff welcomes such proposals and encourages parties to pursue projects that provide economic benefits to Arizona consumers.

The CATS-HV interim study has identified a significant number of new HV and EHV lines and substations that could potentially be needed as soon as the next 10-15 years if the population and load in the area grow at high rates. Performing this study in order to identify an ultimate transmission plan for this potentially high growth area is a proactive approach to planning, but the conceptual transmission plan developed in the study for the greater Pinal County load basin will need continued refinement in coming years as growth patterns and other impacts become clearer. Since the rate of population and load growth in the area of study could be quite rapid, revisiting the study every 3-5 years would be preferable to the 5-10 year cycle suggested in the report. Continued collaboration between the transmission owners and the municipalities/public agencies in the study area in order to coordinate public land planning and utility land needs would also be highly desirable.

6. Local-area transmission system

6.1 Arizona reliability must-run generation requirements

Previous BTA's have defined a number of local load pockets in Arizona where the load cannot be served using a normal economic merit-order generation dispatch due to transmission limitations. During some portions of the year, generation units within the load pocket must be operated out of merit order to serve a portion of the local load. Such a resource requirement is often referred to as Reliability Must-Run (RMR) generation. The power generated from local generation may be more expensive than the power from outside resources; and may be environmentally less desirable. During RMR conditions, transmission providers must dispatch RMR generation to relieve the congestion on transmission lines.

The Commission's generic electric restructuring docket established that existing Arizona transmission constraints would limit APS' and TEP's ability to deliver competitively procured power to less than the required 50% of Standard Offer Service's load.[1] The Commission stayed this requirement in its Track B proceedings.. Each UDC is still obligated to assure that adequate transmission import capability is available to meet the load requirements of all distribution customers within its service area.[2] Known transmission constraints result in APS and TEP being dependent upon local reliability-must-run (RMR) generation to serve their peak load during certain hours of the year.

In order to provide the Arizona load pockets access to less costly power, the ACC Track A Decision No. 65154 ordered the Arizona utilities to work with Staff to develop a plan to resolve RMR concerns, and include the results of such a plan in the 2004 BTA. The same Decision ordered APS and TEP to file annual RMR study reports with the Commission in concert with their January 31 ten-year plan, for review prior to implementing any new RMR generation strategies, until the 2004 BTA is issued.

Beginning in 2003, the utilities readily responded with RMR studies. The third BTA Decision No. 65476 approved a collaborative RMR study plan agreed to by all Arizona transmission providers. The 2003 RMR study forum included only the transmission providers. Since 2004 the RMR process, in contrast, has been open to all interested parties through the CATS study forum.

6.1.1 RMR conditions and study methodology

In the 2002 BTA, Staff proposed that any UDC currently relying on local generation, or foreseeing a future time period when utilization of local generation may be required to assure reliable

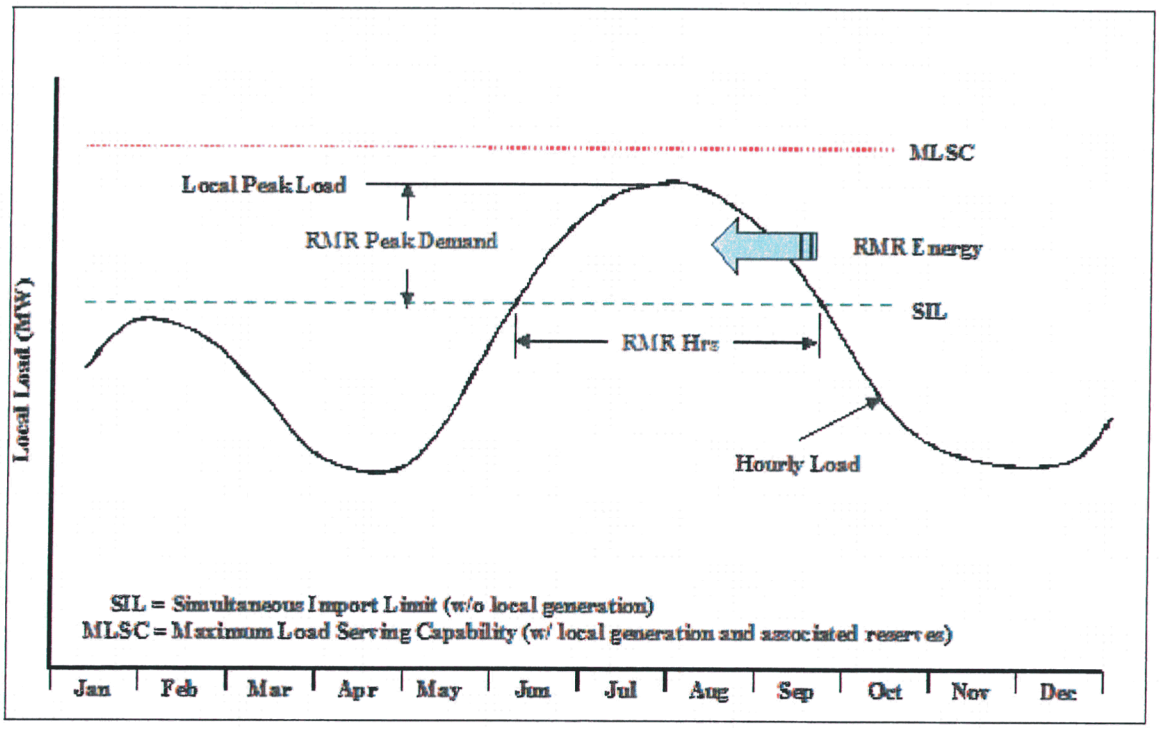
[1] Direct Testimony of Jerry D. Smith, and rebuttal testimony of Cary Deise, Docket No. E-00000A-02-0051.
[2] A.A.C. R14-2-1609.B

service for a local area, should perform and report the findings of an RMR study as a feature of their Ten-Year Plan filing with the Commission in January, 2003 and 2004. The 2002 BTA defined a Generic RMR Study Plan that required utilities to determine at least six RMR components to:

1. Define annual simultaneous import limits (SIL) for each transmission import limited area.
2. Provide a listing of all local generation and associated operational attributes.
3. Define RMR conditions for each year of the Ten-Year Plan.
4. Provide a local generation sensitivity analysis.
5. Identify and study alternative solutions.
6. Perform comparative analysis and present worth analysis of alternative solutions.

RMR conditions, required from RMR studies, are defined in the 2002 BTA and graphically presented in Figure 20.[1]

Figure 20: RMR Conditions



[1] 2002 BTA, Page 74-76

Essential indicators that the Commission intended to receive as a result from the RMR studies are:

- RMR hours - The number of hours during which the local load is above the SIL,
- RMR energy - The amount of energy served from RMR generation,
- RMR peak demand - The maximum RMR amount of capacity that the RMR generators would be required to produce,
- RMR costs – The costs of out-of-merit-order dispatch from RMR

The 2002 BTA established specific RMR procedures. The transmission system's simultaneous import limit (SIL) for each local constrained area is established for single contingencies (n-1) with no local generation in operation. An RMR condition exists during those times when the local load served by a UDC, or group of UDCs, exceeds that SIL. If no local generation exists for an RMR condition then the UDC(s) would have to utilize a load-shedding scheme for those contingencies that establish the SIL. This would imply a violation of WECC planning criteria since reliability practices are founded on the principle of continuity of service for single contingency outages.

When local generating units within the local load pocket are owned or under the operational control of the UDC(s), they are viewed as RMR units for the duration of the RMR condition. A local generating unit that is neither owned or under operational control of the UDC(s) may be considered a non-RMR unit. In some instances, a non-RMR unit may have a "must-offer" requirement to assure that system reliability is maintained. A local non-RMR unit that is operational during the hours an RMR condition exists will have the automatic effect of mitigating the constraint to the extent it serves local load or its capacity and energy is scheduled out of the local load pocket.

Local generation, irrespective of its composition of RMR and non-RMR units, may offer an acceptable planning solution to RMR conditions. The local RMR condition is essentially mitigated when local generation capacity and its associated voltage regulation ability is equal to or greater than that required to reliably serve the local RMR peak load. The question that needs to be answered is whether such dependence on local generation is prudent and in the consumers' best interest.

The maximum load serving capability (MLSC) of the local system is established by operating all local units at capacity, less local reserve requirements. The local MLSC equals to the SIL when there is no local generation. When local generation exists, the local MLSC is greater than the SIL but may fail to exceed the RMR peak load requirement. Such an RMR condition would require new transmission improvements or new local generation to assure reliable service to local consumers. When the MLSC is greater than the local peak demand, then the RMR condition is

mitigated and there is less risk that local load would be interrupted for local transmission or generation outages.

Utilization of reactive devices such as high voltage shunt capacitors, static or dynamic var compensators, or Flexible AC Transmission System (FACTS) control devices should be considered for voltage and var margin constrained SIL conditions. Similarly, maintaining a unity power factor at the sub-transmission bus of distribution substations and seasonal tap changes for transformers lacking automatic tap changer under load capability should be considered as a means of resolving voltage or var margin deficiencies. Advancing planned transmission lines or construction of previously unplanned lines should be among the alternatives studied for thermal and stability constrained SIL conditions.

A comparative analysis of all alternative solutions, including using local generation that mitigates the local RMR condition is to be documented. The following factors should be considered when documenting the merits of the various alternatives: impact on SIL, system reliability implications, system losses, operational flexibility, environmental effects, implementation requirements and lead-time, and opportunity for consumer benefits from competitive wholesale market. The following should also be identified in the comparative analysis of alternatives:

- The total expected cost, fixed and variable, for the local generation dispatch that results in the lowest local generation dispatch to mitigate annual RMR conditions.
- Total emission pollutants produced by the lowest local generation dispatch mitigating the annual RMR condition.

A present worth analysis of all alternative solutions is also to be performed. The cost analysis is to include an assessment of the total expected cost of operating local units versus remote units in combination with some transmission solution. Local and remote generation cost assumptions must be documented.

The accuracy of RMR conditions depends upon technical studies, engineering assumptions and validity of data needed to determine:

1. Hourly load forecast for the future years.
2. SIL by ensuring that:
    - Aggregate local area load is the total substation load actually impacted by the transmission constraint;
    - RMR generation within the local area is accurate;

- With RMR generation modeled out-of-service, the transmission system meets required normal (n-0) reliability criteria, showing no thermal and/or voltage limit violations;
- With RMR generation modeled out-of-service, the transmission system meets required reliability criteria for all single contingency outages showing no thermal and/or voltage criteria violations; and
- With RMR generation modeled out-of-service, the transmission system remains stable and shows no voltage instability.

3. RMR production costs by ensuring that:
   - Analysis is done using industry recognized production-cost model.
   - Production-cost model database contains projected generation additions as accurate as possible, knowing in advance that future generation additions and unit commitments are dependent on many factors and are subject to change.
   - Hydro generation modeling reflects actual operating conditions as accurately as possible.
   - Thermal generation modeling reflects the current projection of variable operating and maintenance costs.
4. Comparison of the present worth of RMR production costs and present worth of transmission alternative costs.

6.1.2 Summary of the RMR studies process

There were two unresolved issues with the 2004 RMR studies:

1. Staff remained concerned with local generation reserves for the Phoenix area post 2008.
2. Confusion remained regarding implications of Mohave County RMR Study results.

The 2006 RMR study analyzes expected 2008 and 2015 conditions and concludes that projected reserves in the Phoenix area in both years are greater than the 99% reliability reserve requirement of 865 MW. These results appear to resolve the Staff's concern from the 2004 study. However, regarding the Mohave County RMR study results, the situation remains unclear. As discussed in §6.2.5 (page 111) this is due in large part to the absence of filings by Western Area Power Administration in the BTA process.

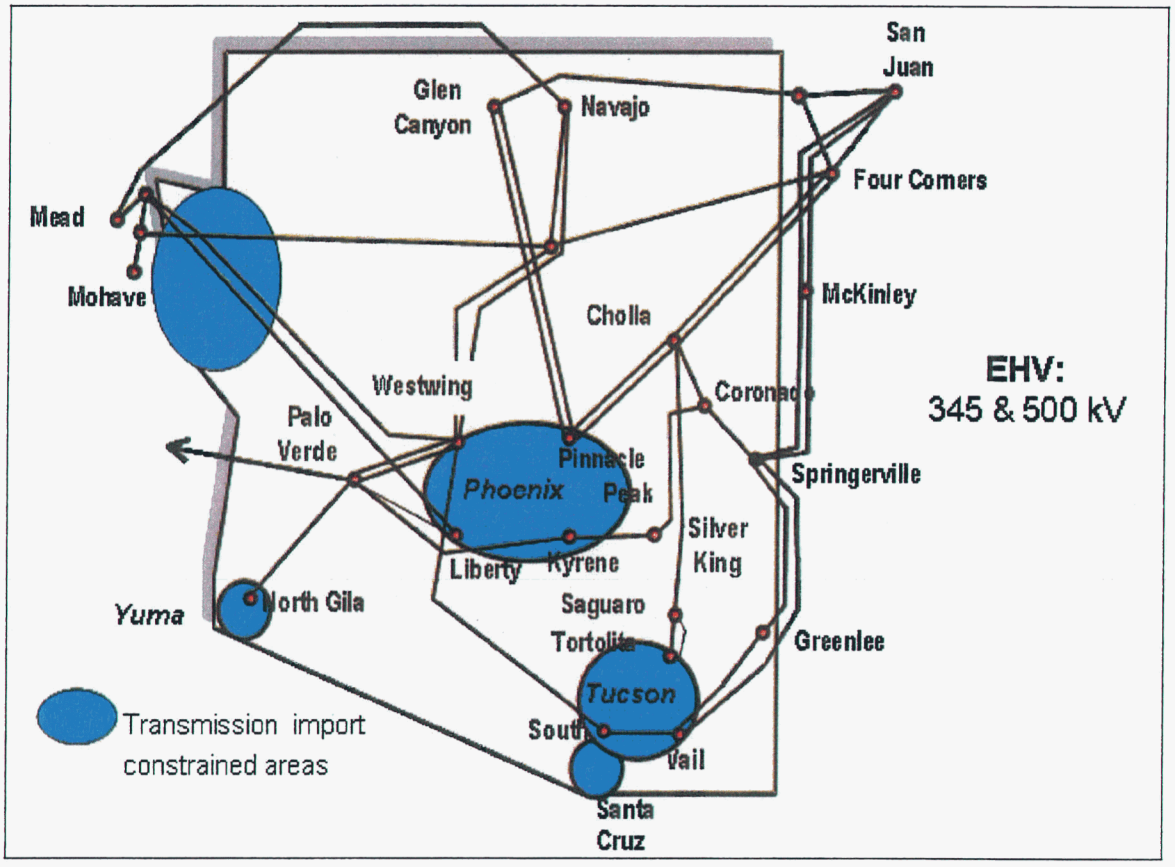
Based on the 2006 RMR study results Staff recommends that:

- Arizona utilities should continue performing RMR studies for all transmission import constrained local areas:
  - Utilizing a collaborative study forum;
  - Improving economic analysis of RMR mitigation;
  - Clarifying projected system peak load and supply conditions in Mohave County beyond 2012 and appropriate mitigation measures, if any;
  - Clarify anticipated generation retirements in each constrained load area and the impact of such retirements on the RMR requirements.
- RMR 10-year study results are to be filed with ten-year transmission plans by January 31, of even number years, to coincide with the associated ACC obligation to perform a Biennial Transmission Assessment.

6.2 Transmission import constraint areas

The previous BTAs identified five load pockets: Phoenix, Tucson, Yuma, Santa Cruz County and Mohave County. The issues and concerns in each of these five load pockets remain the subject of this BTA. Load pocket areas as identified in the previous BTAs are shown on Figure 21 (same as Figure 7 on page 55).

Figure 21: 2006 BTA Arizona load pocket areas



There is also a sixth constraint area in southeastern Arizona. The 160 MW load, from Ft. Huachuca to Douglas, is served via four radial transmission 115 kV lines. The loss of any one of these lines during summer peak could result in the inability of one or more of the load serving entities in this area to serve their entire load without some period of service interruption. These loading problems are being addressed by the recently formed Southeast Area Transmission System Study Group (SATS).

6.2.1 Phoenix area RMR conditions and imports assessment

6.2.1.1 Phoenix existing and future transmission system

The interconnected transmission system serving the metropolitan Phoenix area is owned and operated by APS, SRP and WAPA. A majority of the Phoenix Valley load is served by transmission imports. Load growth occurring in the North and West Valley is served by APS and the load growth in the East and South Valley is served by SRP.

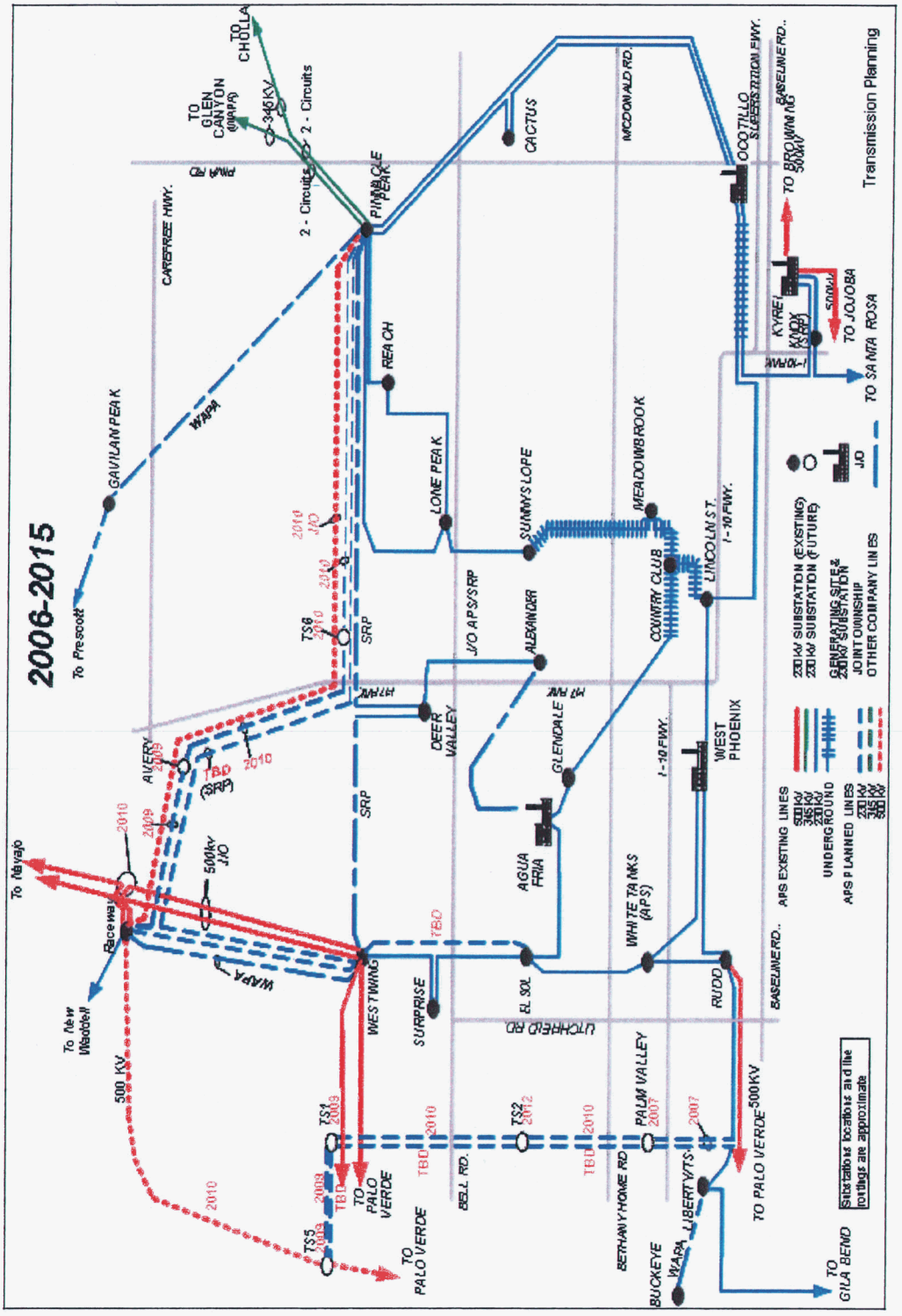
In its 2004 RMR Study, APS reported that the load flow and voltage stability analyses were done in order to determine Phoenix area critical outages as required by transmission planning criteria. APS conducts their analyses assuming that enough operating reserve will be available within the Phoenix area to respond during single contingencies.[1] By maintaining an operating reserve within the load pocket, APS performs contingency analysis under more critical conditions than just (n-1) category. These criteria require transmission planning to accommodate maintenance outages while still being able to meet the n-1 criteria during a subsequent forced outage. The nature of the Phoenix area load is such that during the eight month period of October-May, any line or local area generator can be taken out of service for maintenance with adequate import capability and local area generation remaining to meet the n-1 criteria. Maintenance outages of 12-14 hours can also be taken during the summer at night. This capability will be documented in future 10-year plan filings.

The voltage stability study was performed using Q-V analysis on the most reactive deficient buses in the Phoenix area. These buses were the Kyrene 500-kV, Kyrene 230-kV, Browning 230-kV, Westwing 230 kV, and the Pinnacle Peak 230-kV buses. A Q-V analysis is performed by adding reactive load at the critical bus until the voltage reaches a minimum value, which indicates potential voltage instability. The voltage stability import limit is determined as the lesser of 95% of the import with zero reactive margin, or 100% of the import with a 5% voltage drop following the worst single-contingency per WECC planning criteria.

At present the Phoenix area is served from the following major EHV substations: Westwing, Pinnacle Peak, Kyrene, Rudd, Browning, and Silverking. These EHV stations form the "cornerstones" of an extensive internal network of 230-kV transmission lines that constitute the high voltage system within the Phoenix load area. By summer 2009, the new TS5 EHV substation will be added in the northwestern Phoenix area. The 4th BTA filings anticipate that two more EHV substations will be added to help supply load growth in the Phoenix area by 2015, the South East Valley (SEV) substation and the Raceway substation on the north side of Phoenix. Figure 22 illustrates these existing EHV substations and the key planned additions.

[1] APS 2004 RMR Study, Page 8

Figure 22: New APS projects strengthening the Phoenix-area transmission system



KEMA

6.2.1.2 Phoenix area – SIL and RMR conditions for 2008 and 2015

The Phoenix area is a tight network of APS and SRP loads, resources, and transmission facilities. Because the Phoenix system is highly integrated, it was imperative that the import limits be determined for the combined area. The SWAT planning group was utilized to facilitate the public stakeholder process for completing this 2006 Phoenix area RMR study.

The SIL and the RMR conditions for the Phoenix area were performed for 2008 and 2015. These particular years were selected because the Seams Steering Group-Western Interconnection (SSG-WI) was preparing publicly available databases through a broad stakeholder process for those two specific years and they fit well within the 10-year planning horizon of the 4th BTA.

Base case and contingency power flow, stability, and voltage stability analyses were performed to determine import limitations. SIL and RMR conditions of the Phoenix area transmission network resulted in area import limits based on the analysis discussed above. The study process, representative years, and base cases were properly selected. After the SIL for the Phoenix area was determined, RMR conditions were evaluated. The evaluation was based on the area import limits, the area load, and local generation owned by APS and SRP. It should be noted that since the previous RMR study, the local generation that was owned by Pinnacle West Energy Corporation (PWEC) has been transferred to APS.

Table 7 shows the Phoenix-area MLSC for the two years studied and compares the MLSC to the forecasted peak demand. The MLSC is determined by adding the SIL and the local generation minus the local reserve requirement. APS determined the Phoenix area reserve requirements by performing a probabilistic analysis considering the size and forced outage rates of the local generating units that resulted in 99 percent reliability for serving all loads. This analysis resulted in the reserve requirements shown in Table 7 and on Figure 23.

Table 7: Phoenix Area Maximum Load Serving Capability

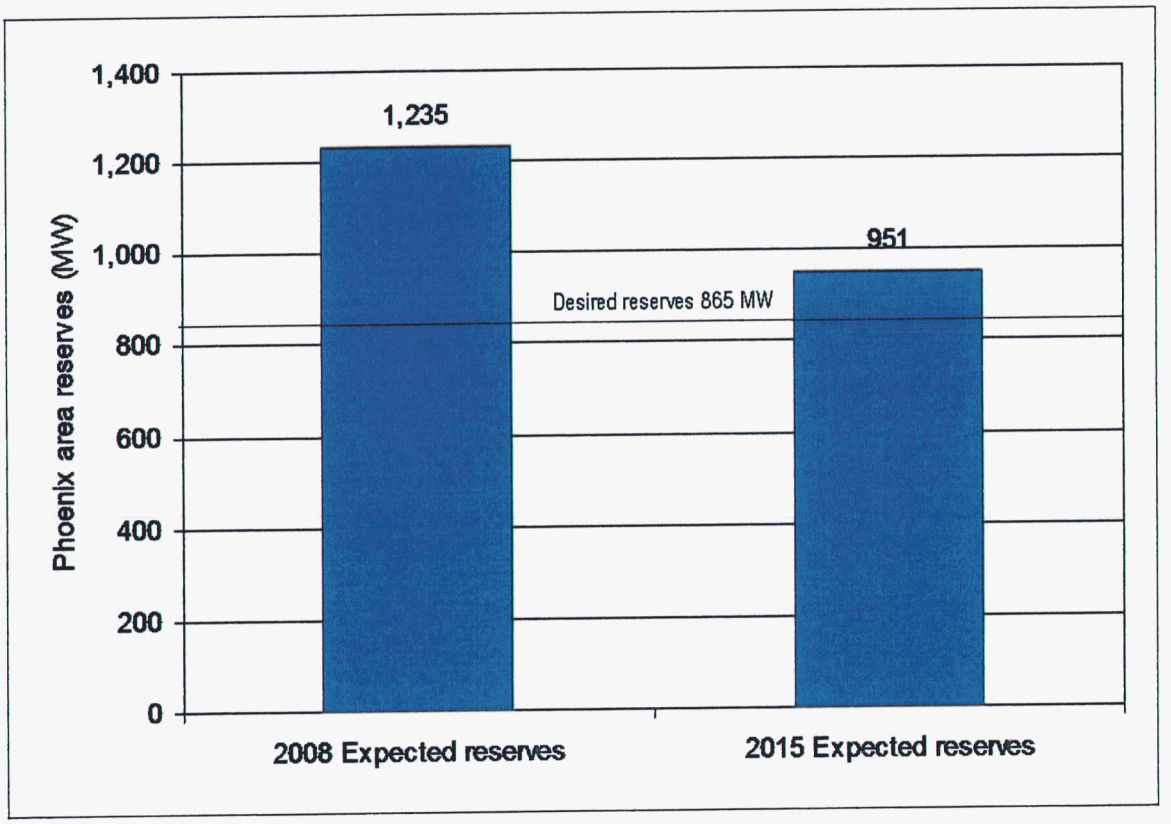
Year	SIL	Local generation	Required reserves	MLSC	Peak demand (MW)	Projected reserves
2008	9,700	3,674	865	13,860	12,625	1,235
2015	13,004	3,674	865	17,051	16,100	951

Based on these results, and the planned addition of the new TS5 substation in 2009 it appears the MLSC will exceed Peak Demand throughout the 10 year planning horizon. In the previous RMR study it was observed that the projected 2012 reserve margin of 346 MW was less than the required reserve margin of 865 MW. Staff concludes that, APS and SRP transmission plans filed

in the 2006 BTA increase import capability sufficiently to eliminate this reserve deficiency concern.

It should be noted that due to the calculation method used by APS, the MLSC does not equal the direct summation of SIL and Local Generation. APS determines the MLSC graphically by determining an operating nomogram for each year. The maximum amount of load that can be served is then determined from the highest point on the nomogram, which does not necessarily occur at the point of maximum local generation.

Figure 23: Phoenix area reserves



To determine the RMR costs for the Phoenix area, an economic analysis was performed using a regional production cost model. The production cost was determined for two scenarios:

- Phoenix load supplied by local area generation with the existing transmission system import limit; and
- Phoenix load supplied by local area generation without the existing transmission import system limit.

The difference between the production costs from these two cases shows the RMR cost of the transmission constraint.

These two cases were simulated with a detailed regional production-costing model that includes the generation and transmission system of the entire WECC. The model dispatches all generators on an economic basis to meet the overall WECC system load within constraints for control area reserve requirements and transmission limitations. The model also determines sales of economic generation to, and economic purchases from, other utilities in the region subject to regional transmission constraints. The accuracy of the RMR costs depends upon accuracy of the forecasts for load, generation heat rates and forced outage rates, fuel costs, and other costs. Because these costs are not easy to predict, Staff recommends that for the 2008 RMR Study, production cost analysis be conducted assuming low and high fuel cost scenarios, as well as a variation of the other cost components.

Based on the results of the 2006 Phoenix area RMR economic analysis as summarized in Table 8 below, Staff concludes that RMR costs will have a negligible impact on Arizona ratepayers in the 2006-2015 timeframe:

Table 8: Phoenix area RMR conditions and costs

Year	SIL[1] (MW)	Peak demand (MW)	Max RMR[2] (MW)	RMR[3] Hours	RMR energy[4] (GWh)	RMR energy (% of total)	RMR cost[5] ($M)
2008	9,700	12,625	2,853	845	650	1.1	0.0
2015	13,004	16,100	2,811	548	419	0.6	0.0

Table Key:

[1] SIL – System Simultaneous Import Limit is the maximum amount of capacity that can be reliably imported into the area with no local generation operating.

[2] Max RMR – The amount of local generation required to meet the area peak demand (Peak Demand minus Import Capability).

[3] RMR Hours – The number of hours that the area's demand exceeds the SIL, thus requiring the use of local generation to meet load, even if otherwise economically dispatched.

[4] RMR Energy – The annual energy that must be met by local generation (in excess of the SIL).

[5] RMR Cost – The difference in annual generation cost with and without the transmission limitation.

In the 3rd BTA, Staff recommended that APS (and others required to perform the 2006 RMR Studies) make available to the Staff the list of the actual generation unit data used in the model and generation units energy production calculated by the model. The Phoenix area generation summary from the 2006 RMR report is shown in Table 9.

Table 9: Phoenix Area Generation in 2006 RMR Study

Owner	Plant	Type	Summer capability	Minimum load	Minimum up time	Minimum down time	FOR	EFOR	Fuel type
APS	Ocotillo 1	ST	110	20	8	8	4%	6%	NG
APS	Ocotillo 2	ST	110	20	8	8	4%	6%	NG
APS	Ocotillo GT1	GT	55	4	2	1	10%	12%	NG
APS	Ocotillo GT2	GT	55	4	2	1	10%	12%	NG
APS	West Phoenix GT1	GT	55	4	2	1	10%	12%	NG
APS	West Phoenix GT2	GT	55	4	2	1	10%	12%	NG
APS	West Phoenix CC1	CC	85	20	8	6	3.5%	7%	NG
APS	West Phoenix CC2	CC	85	20	8	6	3.5%	7%	NG
APS	West Phoenix CC3	CC	85	55	8	6	3.5%	7%	NG
APS	West Phoenix CC4	CC	110	77	8	3	5%	7%	NG
APS	West Phoenix CC5	CC	525	160	8	6	8%	10%	NG
SRP	Aqua Fria 1	ST	113	57	8	8	4%	6%	NG
SRP	Aqua Fria 2	ST	113	57	8	8	4%	6%	NG
SRP	Aqua Fria 3	ST	181	92	8	8	4%	6%	NG
SRP	Aqua Fria 4	GT	73	35	1	8	10%	12%	NG
SRP	Aqua Fria 5	GT	73	32	1	8	10%	12%	NG
SRP	Aqua Fria 6	GT	73	32	1	8	10%	12%	NG
SRP	Crosscut Hydro1	HY	3	N/A	N/A	N/A	0%	0%	WAT
SRP	Kyrene 1	ST	34	14	8	8	4%	6%	NG
SRP	Kyrene 2	ST	72	29	8	8	4%	6%	NG
SRP	Kyrene GT4	GT	59	25	1	8	10%	12%	NG
SRP	Kyrene GT5	GT	53	24	1	8	10%	12%	NG
SRP	Kyrene GT6	GT	53	24	1	8	10%	12%	NG
SRP	Kyrene CC1	CC	250	161	4	4	8%	8%	NG
SRP	Santan 1	CC	92	35	3	8	3.5%	7%	NG
SRP	Santan 2	CC	92	35	3	8	3.5%	7%	NG
SRP	Santan 3	CC	92	36	3	8	3.5%	7%	NG
SRP	Santan 4	CC	92	35	3	8	3.5%	7%	NG
SRP	Santan 5	CC	550	330	4	4	8%	8%	NG
SRP	Santan 6	CC	275	165	6	4	8%	8%	NG
SRP	South Consolidated 1	HY	1						WAT
SRP	Transport GT1	GT	4						NG
Phoenix Total			**3,674**						

The general data used in the production cost model is shown in Table 10.[1]

Table 10: Generating unit operational characteristics

(Average values – AZ-NM-S. NV)

Fuel Type	Technology	Size MW	Install Date	Heat Rate Btu/kWh	VOM $/MWH	EFOR%
Gas/Oil	Steam			12,000	2.0	6%
Gas	SC	<100	Pre 2000	14,000	4.1	10%
Gas	SC	>100	Post 2000	10,500	4.1	5%
Gas	CC	<100	Pre 2000	8,700	2.0	5%
Gas	CC	500	Post 2000	7,000	3.0	5%
Coal	Steam	<500		11,200	1.4	7%
Coal	Steam	>500		10,000	1.4	9%

RMR cost analysis as well as Phoenix area Air Emission Reductions analysis show that removal of the transmission constraints could provide only negligible impact. Consequently, there are no alternatives proposed for reinforcing the Phoenix area transmission system to increase the transmission import limit other than the projects already planned.

6.2.1.3 Phoenix 2006 RMR Study Findings

The Phoenix area 2006 RMR study findings:

- All planned transmission expansion and available generation is needed to reliably serve Phoenix area peak loads in the 2006-2015 timeframe.
- Phoenix area load is expected to exceed import capability for less than 900 hrs/yr in 2008 and less than 600 hrs/yr in 2015. RMR energy represents approximately 1% of the total energy.
- Estimated cost to run local generation outside of economic dispatch is negligible and does not justify any advancement of the proposed Phoenix area construction projects to relieve RMR.
- Removing the transmission constraint would reduce emissions in the Phoenix area by a minimal amount in 2008 and 2015.

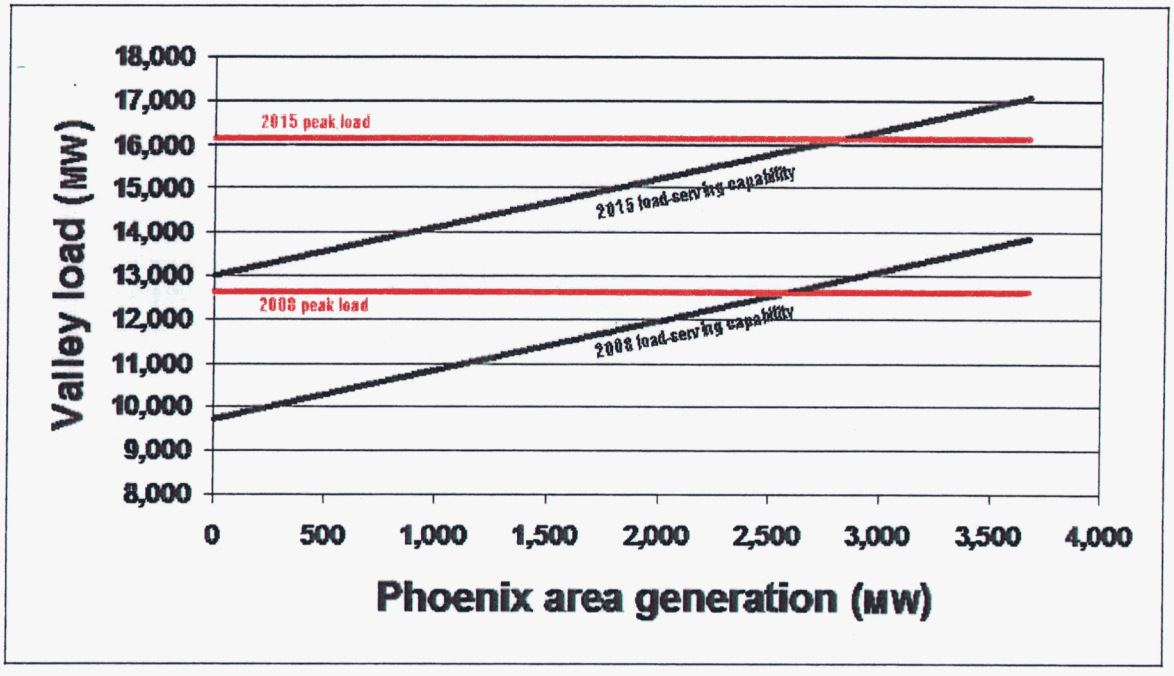
6.2.1.4 Staff observation

This section provides Staff's observations of the SIL and RMR components for the Phoenix Area. The Phoenix valley load and load-serving capabilities are shown in Figure 24. Staff accepts the conclusions of the report as summarized above, and concludes that based on the study results reported for the two years examined (2008 and 2015), RMR costs and emission impacts should

[1] APS 2004 RMR Study, Appendix A, Page 1

be negligible throughout the 2006-2015 period. Furthermore, based on the 2006 study results, there is no longer a concern about a resource margin deficiency in 2012 as raised in the 2004 BTA.

Figure 24: Phoenix area load serving capability



Staff concludes that the SIL and MLSC increases are attributable to the planned transmission improvements described in the 2006 BTA filings by APS and SRP. (See Appendix E and Appendix F.)

6.2.2 Yuma area RMR conditions and import assessment

6.2.2.1 Yuma existing and future transmission system

The Yuma area is served from three transmission sources:

- The first is the APS' North Gila 500/69 kV substation, which is located east of Yuma.
- The second is WAPA's Gila 161/69 kV station, which is also located east of Yuma.
- The third is APS' Yucca 161/69 kV station, which is located on the west side of Yuma near the Colorado River. APS' local generation is located at this station, along with an interconnection to IID's 161 kV system through two 161/69 kV

transformers. The IID 75 MW steam-generating unit is also located at this substation.

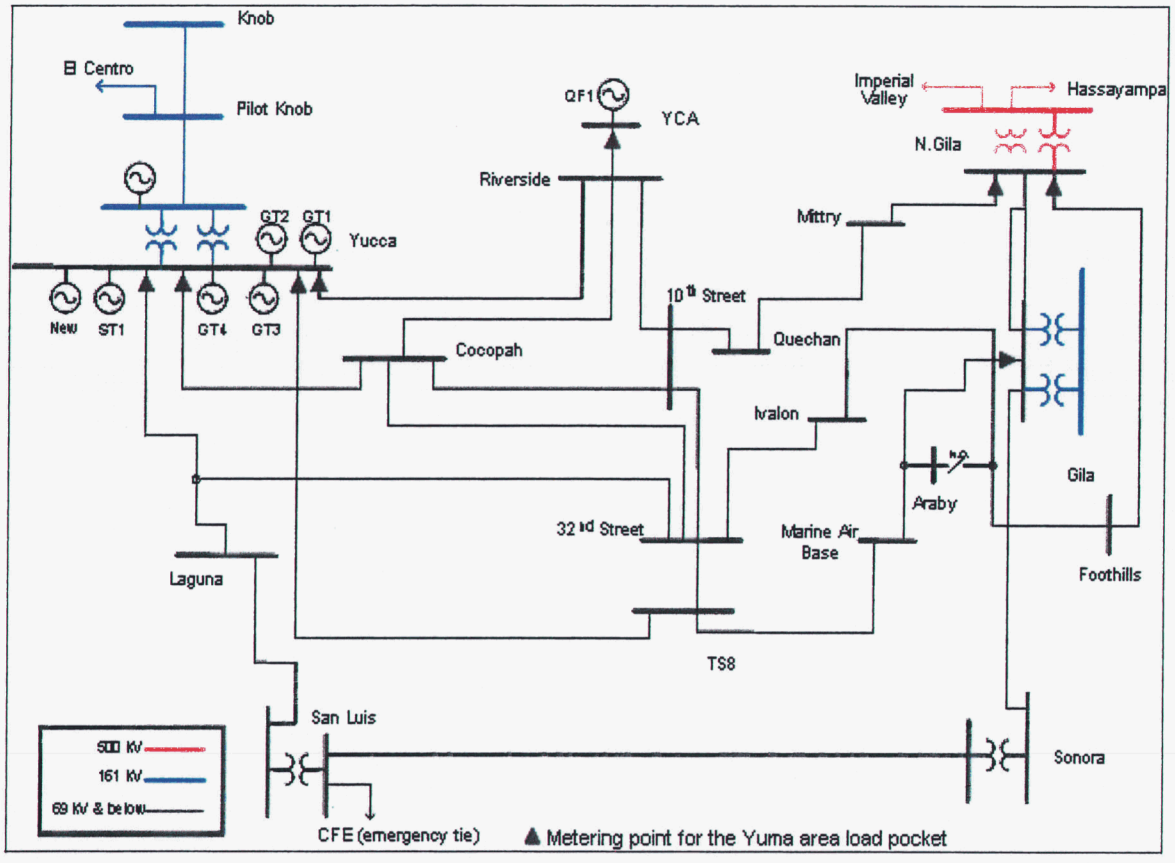
In its 2006 RMR Study, APS reported that load flow and voltage stability analysis were done to determine Yuma-area critical outages as required by transmission planning criteria. APS conducts contingency analysis based on single contingency (n-1) criteria.

Recent and planned additions in the Yuma area included in the 2008 RMR analysis were as follows:

- A second North Gila 500/69-kV transformer was installed in 2005 as a result of the 2003 RMR study.
- The Welton-Mohawk interconnection facilities and generators, which are planned for 2006, were modeled in the 2008 case. The interconnection facilities will consist of a 161-kV line and a third 161/69-kV transformer to WAPA's Gila substation, along with a 161-kV line and 161/69-kV to APS' North Gila 69-kV substation.
- 100 MW of new APS owned generation at Yucca Substation.

The planned 2008 Yuma area system and interconnections are shown in Figure 25:

Figure 25: APS Yuma area in 2008

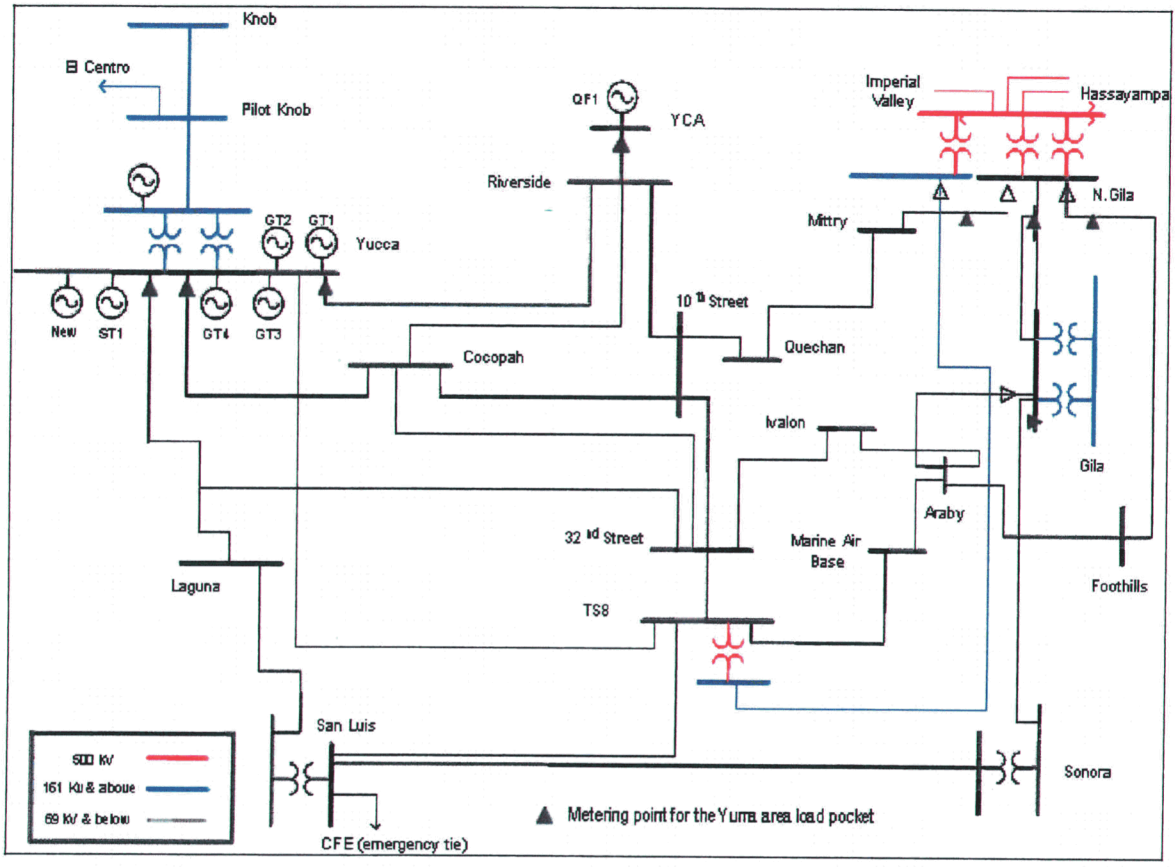


Planned additions in the Yuma area from 2008 to 2015 were modeled as follows:

- A North Gila 500/230kV transformer.
- A 230kV line from North Gila to a new TS8 230/69kV Substation in Yuma.
- A second 500kV line from the Palo Verde area to North Gila.

The resulting 2015 system and planned interconnections area shown in Figure 26.

Figure 26: APS Yuma area in 2015



6.2.2.2 Yuma area – SIL and RMR conditions for 2008 and 2015

With planned system additions for the Yuma area, along with some accelerated projects the SIL and MLSC for the Yuma area will increase enough to serve the rapidly growing load and maintain the desired generation reserves.

It should be noted that due to the calculation method used by APS, the MLSC does not equal the direct summation of SIL and Local Generation. APS determines the MLSC graphically by determining an operating nomogram for each year. The maximum amount of load that can be served is then determined from the highest point on the nomogram, which does not necessarily occur at the point of maximum local generation.

Several critical contingencies exist affecting the determination of the system import limit for the Yuma area in the 2008 through 2015 timeframe. For the 2008 period, the critical event is loss of the Hassayampa-N. Gila 500 kV line and the limiting element is the Pilot Knob-Yucca

161 kV line. In 2015, the critical outage is loss of the Cocopah-Riverside 69-kV line and the limiting element is the Riverside-10th Street 69kV line[1].

To determine the RMR costs for the Yuma area, an economic analysis was performed using a regional production–cost model, just as for Phoenix. The comments Staff provided in Section 6.2.1.2 are applicable to Yuma RMR cost calculation.

The analysis indicated that the Yuma import limit would be constraining for 336 hours in 2005, 2 hours in 2008, and zero hours in 2012. The energy associated with these hours amounts to 8 GWh. The cost of this constraint in 2005 is approximately $500,000.[2] APS found that it would be more economical to import cheaper power either from APS units outside the Yuma area or from the wholesale market.

The Yuma RMR cost analysis as well as the Yuma area Air Emission Reductions analysis shows that advancement of the transmission projects are not justified. Consequently, there are no alternatives proposed for reinforcement of the Yuma area transmission system in order to increase the transmission import limit other than projects already planed.

6.2.2.3 Yuma 2008 and 2015 RMR Study Findings

The Yuma area 2006 RMR study findings are as follows:

- All existing and planned Yuma area generation and transmission projects are needed to reliably serve the area.
- APS load is expected to exceed imports in 2008 by 1,703 hours. As a result of the second Palo Verde to North Gila 500kV line and other upgrades, this figure drops to 553 hours in 2015.
- Estimated annual cost to run local generation out of economic merit order is approximately $1.3 million in 2008, but due to the expansion plans from 2008 to 2015 these costs will be negligible in 2015.
- Removing the remaining transmission constraints would have a negligible impact on Yuma area air emissions in the 10 year plan period.

6.2.2.4 Staff observation

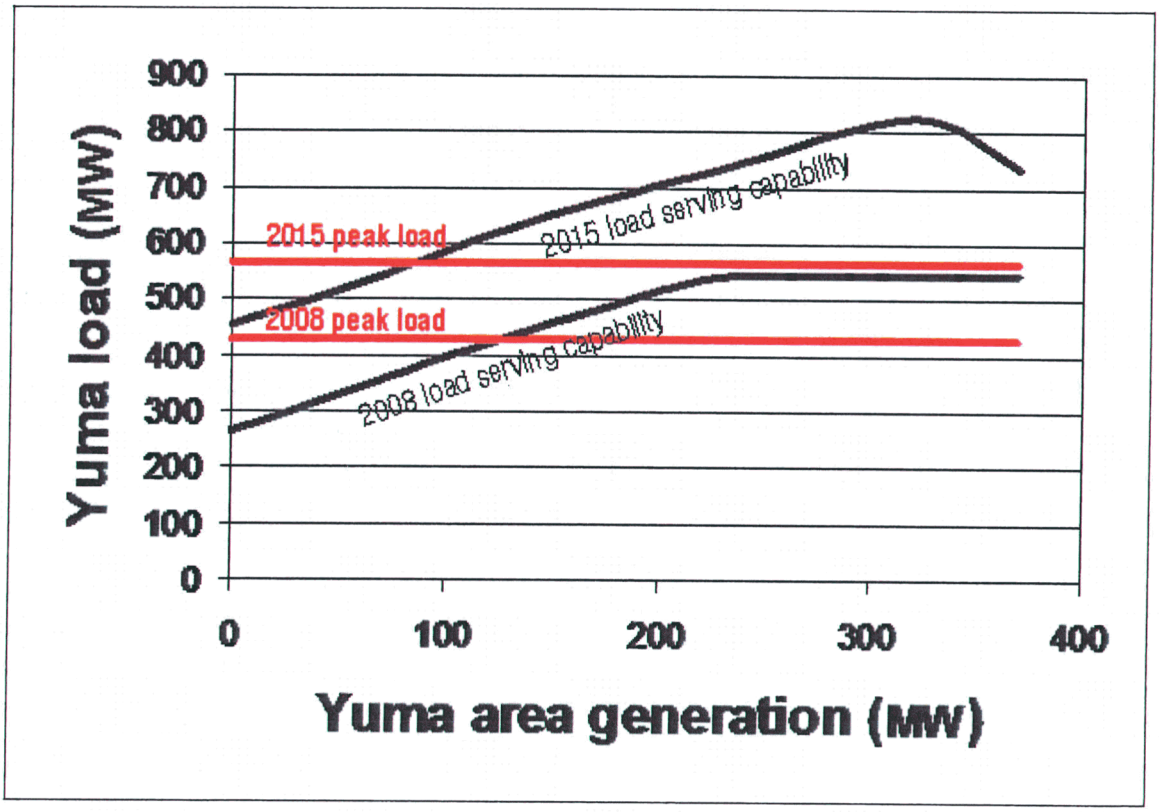
In this section, Staff provides its observations of the SIL and RMR components for the Yuma area. Addition of the second North Gila 500/69 kV transformer in 2005, the planned Yucca 100 MW generation addition and the proposed 500 kV Palo Verde-North Gila line appears to

[1] The description of the critical contingency for 2015 was revised in APS comments on the draft 4th BTA filed 9-1-06.

[2] APS 2004 RMR Study, Table 17, Page 49.

effectively manage RMR conditions in Yuma area.[1] With the planned additions, the future Yuma area load serving capability is shown in Figure 27. The crossover point of the MLSC line and the forecast load line determines the amount of RMR generation required at peak area load in the respective years of the graph. At load levels below the intersection of the MLSC line and the left axis RMR generation operation is no longer needed for reliability purposes, but may in fact still be dispatched economically on a merit order basis given the system mix of resources.

Figure 27: Yuma Area Load Serving Capability



6.2.3 Tucson area RMR conditions and import assessment

The Tucson area is located in a large valley surrounded by mountains and, until 1969, was served only by local generation. Now, imported power is transmitted from the Westwing substation in the northwest to the South substation in Tucson, and the Four Corners area and eastern Arizona power stations to both the Tortolita and the Vail substation in Tucson. TEP's 2006-2015 plan calls for increased access to resources from the Palo Verde area through the addition of new EHV tie points to TEP's system at either Pinal West or Pinal South substations.

[1] However, the RMR Study results may no longer be current given that the Welton-Mohawk interconnection facilities and generators described on page 100 are not occurring.

For single contingencies, the most economical combination of local generation and reactive devices is utilized to ensure that contingencies meet WECC/NERC reliability criteria. TEP also uses its own internal voltage criterion: 0.98 per unit post-outage 138 kV voltage. The TEP control area has historically been voltage-stability constrained. Local Var-responsive steam units and combustion turbines can be committed in the Tucson area to supply reactive support and to lower imports as necessary. In addition, TEP has an automated remedial action scheme (RAS) that responds to selected n-1 and n-2 contingencies with pre-determined switching of reactive devices and/or direct load tripping. Approximately 45% of TEP's load is available for tripping via this RAS. However, TEP does not have any planned load dropping for n-1 events.

TEP plans and operates its system to meet the WECC/NERC Reliability Criteria for level B (n-1), Level C (n-2; n-1-1), and Level D (n-2) contingencies, as well as the WECC Voltage Stability Criteria.

All base cases were co-developed by APS, SRP, TEP, WAPA, and SWTC. Planned system configuration changes for all these utilities were used to develop the various cases. Table 11 gives a description of the planned TEP projects.

Table 11: TEP area facility additions

	2005	2006	2008	2009	2012	Undetermined
		Pinal-West 345 kV substation § and interconnection to Westwing-South 345 kV line §	Rillito/LaCanada 138kV line upgraded from 340 MVA to 356 MVA	Irvington / South 138kV line upgraded from 309 MVA to 394 MVA	Tortolita – South 345 kV transmission line and associated 500/345 kV transformer at Tortolita (TBD)	Gateway 345kV substation connecting to Citizens/Unisource 115 kV system at Valencia via a 345/115 kV transformer
			North Loop /Rillito 138kV line upgraded from 287 MVA to 339 MVA §	Irvington / Vail #1 138kV line upgraded from 287 MVA to 356 MVA	Pinal West – Tortolita 500 kV line (TBD)	Two 345 kV transmission lines between TEP's South and Gateway substations
	Twenty-second / Irvington 138kV line upgraded from 331 MVA to 444 MVA (2005)			Irvington / Vail #2 138kV line upgraded from 287 MVA to 356 MVA		

6.2.3.1 Tucson Area – SIL and RMR Conditions for 2008 and 2015

All base cases used were co-developed by APS, SRP, TEP, WAPA, and SWTC. Planned system configuration changes for all these utilities were used to develop the various cases. RMR conditions are founded on the principle of continuity of service for single contingency transmission outages (n-1). TEP's 2006 filing states that both its 2008 and 2012 RMR cases are based on thermal constraints, rather than voltage constraints. Tucson-area critical RMR outage cases are shown in Table 12, below.

Table 12: TEP area critical RMR outage conditions

Year	Critical Outage	Nature of Constraint
2008	Saguaro-Tortolita 345kV (line #1 or #2)	Thermal (loss of either line overloads the other line)
2015	Winchester-Vail 345kV line	Thermal (loads Vail T2 at 100% of emergency rating)

The addition of the South T3 transformer eliminates the thermal constraint reported in the 2004 RMR study caused by loss of the South T2 transformer, which overloaded the 138 kV Irvington-Vail lines. The South T3 bank was determined to be the preferred solution, in place of the previous plan to upgrade the Irvington-Vail 138 kV lines.

As more IPPs continue to go in service, it is theoretically possible that TEP could import all power at peak and generate none locally, if sufficient 138 kV transmission line upgrades and sufficient Mvar availability could be made available either through SVC or synchronous condenser mode. TEP transmission import limit depends on local generation primarily because of the need for reactive power support. TEP plans to install a static var compensator in 2008 to address voltage stability and has also improved clearances on its critical sag limited lines to mitigate import constraints since the Third BTA. Although voltage stability limits still exist in the case without any local generation on line, if local generation is running the import limit reverts to a thermal constraint.

6.2.3.2 TEP area conclusions

- With TEP's recent installation of the South T3 transformer bank and other planned transmission projects shown in its 2006-2015 expansion plan filing, Tucson area RMR requirements can be met by the operation of Sundt Generating Units #3 and 4 in 2008, and Units #2-4 in 2015. TEP transmission import limits depend on local generation, primarily because of the need for reactive power support.
- TEP's expected RMR costs are under $1.5 million per year.

- TEP has not done long-term cost-benefit analysis for upgrades that might eliminate the RMR requirements, but based on the low RMR costs significant upgrades may not be cost justified.
- The analysis of air emissions provided subsequent to TEP's 2006 filing is as follows[1]:

Table 13: Assumptions used in air emission analyses

	Estimated SO_2	Estimated NOx	Estimated PM	Estimated CO
2008 RMR Environmental Output Sundt Steam Gas (lbs)	89	29,851	783	17,705,209
2015 RMR Environmental Output Sundt Steam Gas (lbs)	66	22,198	582	13,166,183

6.2.3.3 Staff observation

It is possible that, with incremental transmission improvements above those identified in TEP's 2006-2015 plan, the future Tucson area RMR requirements could be eliminated and the load area could have essentially unlimited access to lower cost resources from the outside market. However, it is unknown if such incremental upgrades are economically justified from the standpoint of customer rates. Staff recommends that TEP provide an economic analysis of this option in its 2008 BTA filings.

6.2.4 Mohave area RMR conditions and import assessment

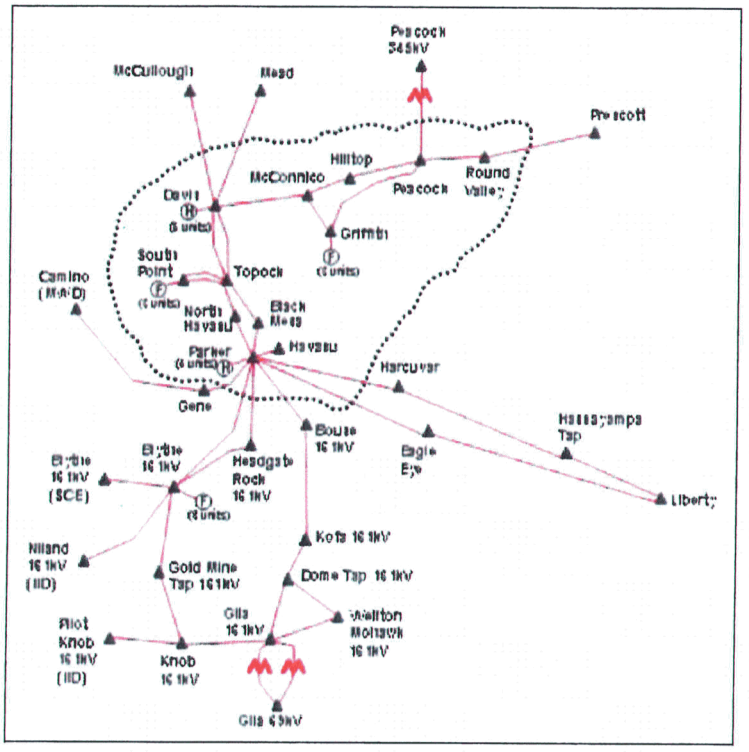
6.2.4.1 Mohave existing and future transmission system

The transmission system depicted in Figure 28, serves the cities of Kingman, Havasu, Bullhead, Mohave Indian Reservation, the City of Needles, California and the City of Parker and surrounding regions. Western's transmission serves the Mohave County area with inbound transmission, and Mohave Electric Cooperative, UniSource Energy Services, Aha MACV Power Service, City of Needles, and Arizona Public Service Company provide local transmission and distribution. Western's transmission systems provide import from Mead Substation in southern Nevada, Western's 345 kV transmission line from Liberty Substation to Peacock Substation, Western's Pinnacle Peak Substation to Peacock Substation to Davis Dam Substation, and two 230 kV lines from Liberty Substation to Parker Dam Substation.

[1] Data per email from TEP's Mary Tilford to TEP's Ed Beck dated 8-2-06.

While there would seem to be significant transmission into the area, the lines are also used to conduct energy through the area and beyond to south of Phoenix (Central and Southeastern Arizona) and to Yuma. The 2002 BTA reported that the paths into the area and beyond are contracted to their limits such that there is no additional transmission that can be contracted into the load pocket.

Figure 28: Study System for Mohave County



6.2.4.2 Mohave Area – SIL and RMR Conditions for 2005, 2008, and 2012

In response to a request from the Staff, in 2004 the Desert Southwest Region (DSW) of Western Area Power conducted a RMR Study of the transmission system in Mohave County for projected years 2005, 2008 and 2012. DSW owns and operates all the facilities of the transmission facilities that are used to import power into this load area. Distribution systems embedded on the DSW transmission network within the Study System include the following:

- Aha Macav;
- Arizona Public Service (APS);
- Central Arizona Water Conservation District (CAWCD);
- Mohave Electric Cooperative; and

- Unisource Energy Services (UES).

The SIL is limited by a WECC 5% post-transient voltage deviation at the Black Mesa 230 kV station. The MLSC is limited by a WECC 5% post-transient voltage deviation at the Black Mesa 230 kV station for the single contingency outage of the Parker-Black Mesa 230 kV line. In its filing for the 4th BTA, UES proposes to construct one new project in this area, a double circuit 230/69 kV line from Griffith Substation to North Havasu Substation. Both substations are internal to the Mohave County load area so it is unlikely they will affect the SIL for the area. However, this should be verified by further study in conjunction with Western. The stated purpose of the line is to reinforce the local system and provide a direct connection between two currently disconnected UES load centers in Mohave County.

6.2.4.3 Staff observation

According to the 2004 RMR study, Mohave should not be considered a transmission import constrained area through at least 2012. Other than contractual issues, the 2004 study concluded there is no technical limitation to importing outside generation in this timeframe. However, the situation beyond 2012 is unclear because the RMR study was not updated in 2006. For example, if peak demand in the load pocket grows by more than 3% per year from 2012 to 2015 it appears that demand will exceed the "contractually constrained" SIL of 647 MW triggering an RMR requirement. Given these uncertainties, Staff concludes that the adequacy of the Mohave supply system beyond 2012 is uncertain and should be addressed in detail in the 2008 BTA. This study should clarify the scheduling rights of each of the parties serving customers in the Mohave County load area versus the contractual SIL and provide options to mitigate this scheduling constraint.

6.2.4.4 Santa Cruz County RMR conditions and import assessment

At the present time the load in the Santa Cruz County area, Nogales in particular, is served by a single 115 kV line operated by UNS Electric. UNS Electric has generation located in the Nogales area that it runs on an emergency basis. When the single 115 kV line is out of service the local generation is used to pickup the load. During storm seasons, the local generation is started, but not brought on line until after a power outage occurs. The County is susceptible to transmission outages of a prolonged nature, and the Commission ordered[1] the construction of a second transmission line, known as the Gateway Project. The UNS Electric long-term plan to improve reliability for the Santa Cruz service territory is to construct that redundant transmission line from the new Gateway 345/115 kV substation (located about 3 miles from the Valencia substation near Nogales) to the Valencia substation.

[1] ACC Decision No. 62011, November 2, 1999

The second transmission line has been sited and approved by the state Power Plant and Line Siting Committee and the Commission. It is, at the present, going through the final stages of its environmental impact statement with the federal approval process. The Staff's estimate is that the project, when approved, will likely need three years to be placed in service.

6.2.4.5 Santa Cruz County – SIL and RMR conditions

TEP last completed the RMR study work for UNS Electric relative to the Santa Cruz County area in 2004, and did not update that study in 2006. The local peak load for Santa Cruz County grows from 63.6 megawatts in 2005 to 79.2 megawatts in 2012. The system import limit is 50 megawatts until 2012, at which time their studies assumed there were two lines supplying the area.

6.2.4.6 Santa Cruz County 2004 RMR study findings

The RMR peak load demands are 13 MW and 20 MW in the first two study years, and there are no RMR requirements in 2012. This is based on the assumption that the additional transmission line has been built by that time period.

6.2.4.7 Staff observation

With the second transmission line in service, the 3rd BTA concluded that a RMR condition is expected to exist in Santa Cruz County by the summer of 2008. Specifically, the RMR operation of the Valencia units will be required by the summer of 2008. Furthermore, the RMR operation of the Valencia units will become inadequate when the Santa Cruz County load reaches approximately 75 MW. The 75 MW load level is projected by the summer of 2010.

Until the second 115 kV line is constructed, UNS Electric and TEP will implement the approved "Outage Response Plan"[1]. Staff believes that the Outage Response Plan is sufficient to improve the restoration of service following a transmission line outage for Santa Cruz County customers of UNS Electric, but cannot assure continuity of service for outage of a transmission line.

In conclusion, since the 3rd BTA concluded that an RMR constraint may develop in Santa Cruz County by 2008 and no update to this forecast has been filed during the 4th BTA, Staff recommends that the Commission require UNS to file a detailed update of this RMR analysis with the Commission by January 2008.

[1] ACC Docket No. E-01032A-99-0401, TEP an UES " Supplemental Response to Commission Questions and Updated Outage Response Plan for Santa Cruz County", April 30, 2004

6.2.5 Overall Staff observations and recommendations on RMR

Staff raised a concern during the 3rd BTA regarding the available resource margin in the greater Phoenix load area for the 2012 timeframe. Based on revised expansion plans identified in filings by APS and SRP in the 4th BTA, Staff concludes that the resource margin in the Phoenix area should be adequate throughout the 2006-2015 timeframe. As a result of its 2006 RMR study for the Yuma area, APS has initiated a solicitation for 100 MW of new generation to be installed at the Yucca plant site by 2008. Based on the results of the 2006 Phoenix area and Yuma area RMR analyses, Staff concludes that these RMR costs will have a negligible impact on rates in the 2006-2015 timeframe. However, this does not take into account costs associated with the new generation solicitation that APS is conducting for the Yuma area, which is the subject of a separate proceeding before the Commission.

TEP projects an RMR requirement in the Tucson area of 160 MW in 2008 growing to 300 MW in 2015. They estimate the costs to dispatch these units (i.e., incremental costs above merit order dispatch) will be $1.37 million in 2008 and $1.02 million in 2015[1].

Although no RMR analysis was filed in the 4th BTA for Mohave County, participants are of the opinion that the Western Area Power Administration transmission system supplying Mohave County should be sufficient to meet the area's requirements. However, Staff concludes that the adequacy of the Mohave supply system beyond 2012 is uncertain due to contractual constraints and this issue should be addressed in detail in the 2008 BTA. The 2008 study should also determine if the proposed UES Griffith-North Havasu 230/69kV line will impact Mohave County import capability.

In the 2008 BTA, Arizona utilities should clarify how they intend to define future RMR boundaries given projected load growth and facility expansion in the greater Phoenix area as well as Pinal County to the south.

Staff observes that parties in the 4th BTA have referred to SIL in terms of both technical and contractual limits. The correlation between these two dimensions of SIL is unclear. For the next round of RMR studies due in January 2008 the parties should include a comparison of the technical SIL value against projected transmission ownership/scheduling rights into each constrained load area in Arizona during the 2008-2009 period.

Staff also observes that the calculation of MLSC and reserve margin values in the 2006 RMR studies is not transparent. In the 2008 RMR study, the parties should agree on a consistent and transparent methodology for computing the load serving capability/resource reserve margin values.

[1] Reflects revised data per TEP email from Mary Tilford to Ed Beck dated 8-2-06.

7. Future generation

7.1 2003 and 2004 generation interconnection requests

The FERC generation interconnection rule requests that each transmission provider post the generation interconnection queue on its OASIS website. Accordingly, the Arizona utilities are posting generation interconnection requests at their OASIS websites. The current queues are summarized below:

Table 14: Large Generators in Interconnection Queues[1]

Company	Maximum interconnect capacity (MW)	Location	Interconnection point	Projected in-service date	Type of facility
APS	700 (Unit 1)	San Juan County, NM	Four Corners 500kV Switchyard	1/10/2008	Coal
	700 (Unit 2)	San Juan County, NM	Four Corners 500kV Switchyard	4/1/2009	Coal
	60	Cococino County, AZ	Cholla-Cococino 69kV Line	12/31/2008	Wind
	128	Cococino County, AZ	Cholla-Zeniff-Show Low Western 69kV Line	12/31/2007	Wind
	22	Cococino County, AZ	Cholla-Zeniff-Show Low Western 69kV line	6/1/2007	Biomass
	99	Yuma County, AZ	Near MCAS 69kV Substation	4/1/2008	Gas Engine Generators
	100	Yuma County, AZ	Yucca 69kV Substation	6/1/2007	Combustion Turbine
	252 (net increase over existing interconnect capacity at site)	Maricopa County, AZ	Gila River 500kV Switchyard	Undocumented	Combined Cycle
	270	Cococino County, AZ	Seligman 230kV Switchyard	5/2/2008	Wind
	600	Navajo County, AZ	Chollas Power Plant Switchyard	5/1/2014	Coal (Unit 5)
	600	Navajo County, AZ	Chollas Power Plant Switchyard	5/1/2015	Coal (Unit 6)
SRP	None in queue				
TEP	15	Kingman, AZ	Dolan Springs Substation	Undocumented	Wind
	95	St. Johns, AZ	Co Spr	12/31/2007	Undocumented
	20	Nogales, AZ	Valencia Power Plant Switchyard	Undocumented	Undocumented

[1] The queues can be found in: www.oatioasis.com/AZPS/AZPSdocs/LGIP_Queue.pdf and www.oatioasis.com/TEPC/TEPCdocs/Inter_Requests.pdf

7.2 Impacts of renewable energy sources on the transmission network

The BTA does not specifically address the implementation of renewable energy resources. This information is included in the studies as projected resources to match projected loads and to be consistent with the resources requirements of the Environmental Portfolio Standards (EPS), and the recently approved Renewable Energy Standard and Tariff (REST) rules. While this is consistent with the requirements of the BTA, it could be useful to include a summary in future BTAs of the location of the resources, amounts included in the studies, and any specific transmission used to enable them, to the extent such information is known and is not confidential.

In Europe, substantial wind penetration exists today and is likely to increase over time. The impacts on the transmission network are viewed not as an obstacle to development, but rather as "speed bumps" that must be addressed.

Issues related to integrating larger amounts of renewable resources into utility plans have received increasing interest during the past few years. As an example a 2006 report to the Western Governors' Association made three transmission-related recommendations regarding incorporating renewable energy resources:[1]

1. "Ensure that targeted energy efficiency, central heating and power, and other demand-side resources are incorporated into state transmission planning.
2. "Ensure that utility interconnection policies best facilitate the use of a wide range of clean energy resources.
3. "Urge utilities to assess available transmission capacity and opportunities to make better use of the existing transmission systems."[2]

[1] *Clean Energy, a Strong Economy and a Healthy Environment,* a report of the Clean and Diversified Energy Advisory Committee to the Western Governors Association, 11 June 2006.

[2] *ibid,* page 4.

8. Study of n-1-1 and extreme contingencies

The Commission directed that as part of the 4th BTA parties address and document:

1. Compliance with single contingency events overlapping bulk power system maintenance outages (n-1-1) criteria for the first year of the BTA study period, consistent with WECC and NERC requirements.
2. Extreme contingency outage studies for Arizona's major generation hubs and major transmission stations, and associated risks and consequences, if mitigating infrastructure improvements are not planned.

APS, SRP and TEP filed n-1-1 studies of planned pre-summer 2006 maintenance conditions with the Commission in the first quarter 2006, pursuant to Protective Agreements.

TEP included selected overlapping and extreme contingency analysis for the Tucson area in its Ten Year Plan filing dated February 2, 2006. In addition, APS and TEP made presentations on overlapping and extreme contingency analysis at Workshop I of the 4th BTA held at the Commission on June 6, 2006. SRP service area results were included in the APS analysis. The extreme contingency cases are intended to address the consequence of two categories of events, specifically (1) common corridor line outages (n-2), and (2) concurrent transformer outages (n-2) at major EHV substations. The February 2, 2006 and June 6, 2006 reports were released as non-protected, public information; the results are summarized in Table 15 and Table 16.

Table 15: Overlapping contingency results

Company	Area(s) studied	Year(s) studied	Conditions studied	Results	Action plan (if applicable)
APS	Phoenix area (including SRP load)	Fall 2005 through Spring 2006	n-1-1 with Westwing Transformer #4 out of service	Maximum load serving capability exceeded the APS/SRP Phoenix Valley Load Forecast	Not needed
		Spring 2006	West Phoenix-Lincoln St 230kV out of service	Maximum load serving capability exceeded the APS/SRP Phoenix Valley Load Forecast	Not needed
TEP	TEP service area	2006 peak load	All EHV n-2 contingencies (TEP studied n-2 events in lieu of less severe n-1-1 events)	All cases met voltage criteria, but some overloads observed as noted below:	
			Winchester-Vail 345kV & Vail 345/138kV bank	SWTC Bicknell 345/230kV transformer overload	Not needed. Both TEP & SWTC can survive a trip of the Bicknell bank
			Saguaro-Tortolita 500kV & Tortolita 500/138kV bank	Avra-Marana and Avra-Sandario 115kV lines overload	Open either line to relieve the overload
			PYoung-Winchester 345kV & PYoung-Copper Verde 345kV	Green-SW 345/230kV transformer overload	Bank is included in Phelps-Dodge load-shedding scheme
			Springerville-PYoung 345kV & Springerville-Luna 345kV	Several 115kV line overloads in New Mexico	This has been referred to the appropriate utilities in New Mexico

Table 16: Extreme contingency results

Company	Area(s) studied	Year(s) studied	Conditions studied	Results	Action plan (if applicable)
APS	Phoenix area (including SRP loads)	2006 & 2016 (summer peak)	Cholla-Saguaro & Coronado-Silverking 500kV corridor outage	All load served and reserve requirements met.	Redispatch generation if needed
			Navajo South 500kV corridor outage	All load served and reserve requirements met.	Redispatch generation if needed
			Four Corners-Cholla-Pinnacle Peak 345kV corridor	All load served and reserve requirements met.	Redispatch generation, reconfigure system or shed up to 200 MW of load.
			Glen Canyon-Flagstaff-Pinnacle Peak 345kV corridor	All load served and reserve requirements met.	Redispatch generation, reconfigure system or shed up to 200 MW of load.
			Loss of all Kyrene 500/230kV banks	All load served and reserve requirements met.	Redispatch generation if needed
			Loss of all Browning 500/230kV banks	All load served and reserve requirements met.	Redispatch generation if needed
TEP	Tucson area	2008 (summer peak)	Loss of all Tortolita 500/138kV banks	No problems reported	
			Loss of all Vail 345/138kV banks	Shiprock transformer overload	This has been referred to WAPA
			Loss of all South 345/138kV banks	No problems reported	

Outage of the Palo Verde East corridor was not studied because there is no forestation. Westwing 500/230 kV multiple bank outage was not studied because they have additional spacing, fire walls, fire suppression and oil retention pits. Rudd 500/230 kV multiple bank outage was not studied because it is equivalent to loss of the Palo Verde-Rudd 500 kV line. Pinnacle Peak 345/230 kV multiple transformer bank outage was not studied because it is equivalent to outages of the 345 kV common corridor lines into the substation.

Staff concludes that these cases adequately address the key extreme contingencies of interest, but TEP should continue its review of the specific items as noted in the tables above and inform the Staff of their conclusions. It should be noted that the TEP n-2 line outages included in Table 15 are also extreme contingency events.

9. Conclusions

Staff offers the following conclusions for Commission consideration:

1. The electric industry in Arizona has been very responsive to concerns raised in Staff's Third BTA. In particular, the industry has performed studies and advanced projects that address Palo Verde Hub reliability issues, Palo Verde's transmission system capability to handle full generation output, and RMR concerns in the Phoenix and Yuma load areas.

2. The efforts of transmission providers and other stakeholders in the BTA continue to result in an improved work product and more collaborative study processes. Extensive regional studies addressing transmission needs have been conducted in a proactive and collaborative manner. This has also led to numerous jointly sponsored projects and synergies that increase the value of transmission projects to Arizona. The jointly sponsored projects in this 10-year plan are shown in Table 17.

Table 17: Jointly sponsored projects in this 10-year plan

Project	Voltage (kV)	Year in-service (est.)	Participants
Palo Verde-TS5 line	500	2009	APS, SRP & CAWCD
TS5-Raceway	500	2012	APS, SRP & CAWCD
Loop-in Navajo-Westwing at Raceway	500	2010	APS, SRP & CAWCD
Raceway-Pinnacle Peak	500	2010	APS, SRP
Hassayampa-Pinal West	500	2008	SRP, TEP, SWTC, ED2, ED3, and ED4.
Pinal West-Southeast Valley/Browning	500/230	2007-2011	SRP, TEP, SWTC, ED2, ED3, and ED4.
Desert Basin-Pinal South/Santa Rosa	230	2011	SRP, et al
Palo Verde-North Gila #2	500	2012	APS, SRP, IID & WELTON MOHAWK

3. Numerous new transmission and generation projects have been constructed, announced and filed with the Commission since the prior BTAs. Some transmission projects filed in prior BTAs have been cancelled, delayed or advanced based on changes in load, generation and import conditions. Staff finds these changes acceptable.

4. While there have been laudable efforts by stakeholders in support of coordinated regional planning activities, Staff recognizes that not all

transmission projects are regional in nature. In fact many smaller projects which are essential to serve local load areas or generators, by their very nature, do not require the participation of other stakeholders.

5. Transmission providers have performed updated RMR studies for each local transmission import constrained area (except Santa Cruz County and Mohave County) and have addressed the Third BTA RMR requirements. Uncertainty exists regarding RMR requirements in Santa Cruz County beginning 2008 and Mohave County beginning 2012, which should be addressed in filings due January 2008 for the 5th BTA.

6. In general, the existing and proposed Arizona transmission system meets the load serving requirements of the state in a reliable manner:

   a. Many planned Extra High Voltage (EHV) and High Voltage (HV) projects will increase transmission system capability to support increased interstate power transfers and provide reliable transfers within the state of Arizona.

   b. The EHV system appears to be adequate throughout the study period and the planned facilities identified in the ten-year planning process appear to be consistent with good utility practice. As is often the case, plans for the later years of the period are less well defined than those in the early years. As requested in the Third BTA, this new round of reports includes more discussion of alternate additions considered for the final five years of the study period. Given the number of alternative projects identified in the longer range plans it should be possible to supply future Arizona electric system loads in an economical and reliable fashion. Early identification of such alternatives in the BTA process allows the Staff and public to be better informed regarding future possibilities and should continue in future filings.

   c. The RMR studies show that the RMR areas will have load-serving capacity sufficient to provide reliable supply during the next ten-year period (with the exceptions noted in Conclusion 5.) Problems identified during the Third BTA in the Yuma area in 2004 and the Phoenix area in 2013 are addressed and resolved in the 2006 RMR study.

   d. For the Phoenix and Yuma areas, based upon the study results reported for the two years examined (2008 and 2015), Staff concludes that the RMR costs and emission impacts should be negligible throughout the 2006-2015 period. For the Phoenix metropolitan area, Staff concludes the SIL and MLSC increases are

attributable to the transmission improvements described in the 2006 BTA filings by APS and SRP. Installation of a second North Gila 500/69 kV transformer in 2005, along with the proposed Yucca 100 MW generation addition and second 500 kV Palo Verde-North Gila line appear to effectively meet RMR requirements in the Yuma area.[1] It is possible that Tucson area RMR requirements could be eliminated and the load area could have unlimited access to lower cost resources from the outside market if incremental upgrades are economically justified. Staff requests that TEP provide an economic analysis of this option in its 2008 BTA filing.

e. The planned Arizona transmission system meets the WECC and NERC single contingency criteria (n-1). Satisfactory performance of the system has also been demonstrated during the Fourth BTA for significant overlapping contingencies (n-1-1 and n-2) as requested in the Third BTA.

f. Arizona transmission providers are doing an effective job of planning transmission upgrades and additions that improve access to capacity from merchant plants at Palo Verde in a reliable manner, which in the past has been stranded to some extent when the market has desired access. Some improvement has already been achieved in 2006 and significant improvement is expected with the addition of the Hassayampa-Pinal West-Santa Rosa 500 kV and Palo Verde-TS5 500 kV line additions in 2008 and 2009, respectively. In conjunction with other proposed transmission upgrades, these projects should significantly mitigate market limitations between Arizona, California and southern Nevada.

g. The Fourth BTA also concludes that after the addition of Hassayampa-Pinal West-Santa Rosa 500 kV and Palo Verde-TS5 500 kV lines the need for load shedding in Arizona following a common corridor outage of 500 kV lines leaving the Palo Verde Hub will be eliminated.

7. Studies investigating transmission expansion options between Arizona, southern Nevada and New Mexico continue to explore the scope, participation and timing of alternative projects. Other transmission expansion projects proposed in Nevada may bring additional resources closer to the borders of Arizona. APS has also initiated regional

[1] It should be noted that APS's Yucca generation solicitation is the subject of a separate proceeding before the Commission.

stakeholder discussions for a conceptual TransWest Express 500kV Project that could significantly increase import capability into Arizona from future coal and wind resources in Wyoming. Such regional projects may provide both economic and reliability benefits to Arizona consumers and increase import/export capabilities between Arizona and surrounding markets. Staff welcomes such proposals which could bring significant benefits to Arizona in the 2006-2015 timeframe or beyond.

8. Some new power plants have interconnected to Arizona's bulk transmission system via a single transmission line or tie rather than using Arizona's best engineering practices of multiple lines emanating from power plants. As interconnection of new transmission lines are considered for the Palo Verde Hub, the concerned parties should be encouraged to terminate at these new power plant switchyards in order to mitigate this regional reliability concern.

9. The SWAT-CATS-EHV study participants conducted a joint 2015 "Tenth Year Snap-Shot (N-1) Study" for Central Arizona to assess the collective impact of individual transmission owner plans for the area. The study determined that there are no n-1 violations in the planned EHV system. Some problems were identified in lower voltage systems, however. These will need to be addressed in the respective planning processes of the individual transmission owners. Certain n-1 contingency violations occurring in the SWTC 2015 planning study and certain n-2 and extreme contingency results in TEP's 2016 case still need to be resolved. These issues occur at or beyond the last year of the current 10-year plan and there is still sufficient time to satisfactorily resolve these concerns.

10. The Commission Staff concludes that the direction of collaborative planning processes by transmission providers and stakeholders in Arizona is consistent with the spirit of the requirements for transmission planning described in EPAct-05 and FERC Order 888. This collaborative planning processes is reinforced by the recent decision of the WECC to form a Transmission Expansion Planning Policy Committee to provide a transparent West-wide stakeholder process for related data and studies.

11. Regarding the CATS-HV interim study; since the rate of population and load growth in the area of study could be quite rapid, revisiting the study every 3-5 years would be preferable to the 5-10 year cycle suggested in the report.

12. Based on the 2006 RMR study results Staff recommends that:

- Arizona utilities should continue performing RMR studies for all transmission import constrained local areas:
  - Utilizing a collaborative study forum;
  - Improving economic analysis of RMR mitigation;
  - Clarifying projected system peak load and supply conditions in Mohave County beyond 2012 and appropriate mitigation measures, if any;
  - Clarify anticipated generation retirements in each constrained load area and the impact of such retirements on the RMR requirements.
- RMR 10-year study results are to be filed with ten-year transmission plans by January 31, of even number years, to coincide with the associated ACC obligation to perform a Biennial Transmission Assessment.

10. Recommendations

Concerns outlined by Staff in the above conclusions are not easily or quickly resolved. The public's best interest warrants effective and decisive remedies. Therefore, Staff offers the following recommendations for Commission consideration and action:

1. Continue to support use of:
    a. "Guiding Principles for ACC Staff Determination of Electric System Adequacy and Reliability" to aid Staff in its determination of adequacy and reliability of power plant and transmission line projects,
    b. NERC and WECC criteria and FERC policies regarding the transmission system reliability, and
    c. Collaborative study activities between transmission providers and merchant plant developers for the purpose of:
        1. Ensuring consumer benefits of generation additions and cost-effective transmission enhancements and interconnections, and
        2. Facilitating restructuring of the electric utility industry to reliably serve Arizona consumers at just and reasonable rates via a competitive wholesale market.

2. Endorse Staff's recommendations that:
    a. RMR studies continue to be performed and filed with ten year plans in even numbered years for inclusion in future BTA reports and that
        1. Future RMR studies continue to provide more transparent information on input data and economic dispatch assumptions,
        2. More stringent study criteria and assumptions be explored and implemented for RMR areas as has been done in other jurisdictions for recognized load pocket areas,
    b. Accept the results of the following studies provided as part of the Fourth BTA filings:
        1. Compliance with single contingency criteria overlapped with the bulk power system facilities maintenance (n-1-1) for the first year of the BTA analysis period as required by WECC and NERC.
        2. Extreme contingency outages studied for Arizona's major generation hubs and major transmission stations and associated risks and consequences documented if mitigating infrastructure improvements are not planned.

3. TEP should file comments by June 30, 2007, to resolve concerns inside neighboring New Mexico and WAPA facilities identified in its preliminary study results for 2016.

c. Generation interconnections should be granted a Certificate of Environmental Compatibility by the Commission only when they meet regional and national reliability criteria and the requirements of the Commission's decisions in the 2004 BTA and Track A related to power plant interconnections.

d. Grant SWTC an extension to January 2008 to resolve certain n-1 contingency violations in its 2015 planning study and to file expansion plans to resolve these issues as part of its 2008-2017 plan.

e. Regarding potential RMR requirements in Santa Cruz County beginning 2010 and Mohave County beginning 2012, UNS and SWTC should be directed to file updated RMR studies in their filings due January 2008 for the 5th BTA.

Appendices

Appendix A: Guiding principles for ACC staff determination of electric system adequacy and reliability

This document serves the dual purpose of providing the guiding principles for Staff determination of electric system adequacy and reliability in the two areas of transmission and generation.

A.1 Transmission

A.R.S §40-360.02E obligates the ACC to biennially make a determination of the adequacy and reliability of existing and planned transmission facilities in the state of Arizona. Current state statutes and ACC rules do not establish the basis upon which such a determination is to be made. Therefore, Staff will use the following guiding principles to make the required adequacy and reliability determination until otherwise directed by state statutes or ACC rules.

1. Transmission facilities will be evaluated using WECC, or its successor's, Reliability Criteria for System Planning and Minimum Operating Reliability Criteria.
2. Transmission planning and operating practices traditionally utilized by Arizona electric utilities will apply when more restrictive than WECC criteria.
3. Compliance with A.C.C. R14-2-1609.B[1] will be established by analysis of power flow and transient stability simulation of single contingency outages (n-1) of generating units, EHV and local transmission lines of greater than 100 kV nominal system voltage, and associated transformers. Relying on remedial actions such as generator unit tripping or load shedding for single contingency outages will not be considered an acceptable means of complying with this rule.

A.2 Generation

Pursuant to A.R.S. §40-360.07, the ACC must balance, in the broad public interest, the need for adequate, economical, and reliable supply of electric power with the desire to minimize the effect on the environment and ecology of the state when considering the siting of a power plant or transmission line. The laws of physics dictate that generation and transmission facilities are inextricably linked when considering the reliability of service to consumers. Therefore, it is appropriate that both components must be considered when siting a power plant. Staff will

[1] R14-2-1609.B refers to the obligation of Utility Distribution Companies to assure that adequate transmission import capability and distribution system capacity are available to meet the load requirements of all distribution customers within their service area.

use the following guiding principles to make the required adequacy and reliability determination for siting generation until otherwise directed by state statutes or ACC rules.

The best utility practices historically exhibited in the evolution of Arizona's generation and transmission facilities should be continued in order to promote development of a robust energy market. Non-discriminatory access to transmission and fair and equitable business practices must also be maintained and the service reliability to which the state is accustomed must not be compromised. Therefore, Staff support of power plant Certificate of Environmental Compatibility applications will be conditioned as set forth below.

Staff support of power plant Certificate of Environmental Compatibility applications will be contingent upon the applicant providing, either in the application or at the hearing, evidence of items 1-3 below:

1. Two or more transmission lines must emanate from each power plant switchyard and interconnect with the existing transmission system. This plant interconnection must satisfy the single contingency outage criteria (n-1) without reliance on remedial action such as generator unit tripping or load shedding.
2. A power plant applicant must provide technical study evidence that sufficient transmission capacity exists to accommodate the plant and that it will not compromise the reliable operation of the interconnected transmission system.
3. All plants located inside a transmission import limited zone "must offer" all Electric Service Providers and Affected Utilities serving load in the constrained load zone, or their designated Scheduling Coordinators, sufficient energy to meet load requirements in excess of the transmission import limit.

Staff support of power plant Certificate of Environmental Compatibility applications will further be contingent upon the Certificate of Environmental Compatibility being conditioned as provided in items 4-6 below:

4. The Certificate of Environmental Compatibility is conditioned upon the plant applicant submitting to the ACC an interconnection agreement with the transmission provider with whom they are interconnecting.
5. The Certificate of Environmental Compatibility is conditioned upon the plant applicant becoming a member of WECC, or its successor, and filing a copy of its WECC Reliability Criteria Agreement or Reliability Management System (RMS) Generator Agreement with the ACC.
6. The Certificate of Environmental Compatibility is conditioned upon the plant applicant becoming a member of the Southwest Reserve Sharing Group, or

its successor, thereby making its units available for reserve sharing purposes.

Approved by:

(Original Signed by Deborah R. Scott)

Deborah R. Scott
Director
Utilities Division This date: (2/8/00)RS/jds:ESAR.doc

Appendix B: 2006 BTA Workshops 1 and 2 list attendees

	Name		Representing	Phone number	E-mail address	Workshops attended[1]
1	Jerry D.	Smith	ACC	(602) 542-7271	jsmith@cc.state.az.us	1
2	Ken	Bagley	Genesee	(480) 367-4282	kbagley@cox.net	1 & 2
3	Prem	Bahl	ACC	(602) 542-7269	pbahl@cc.state.az.us	1 & 2
4	Ed	Beck	TEP	(520) 745-3276	ebeck@tep.com	1 & 2
5	Steven C.	Begay	Dine Power Authority		dpasteve@citlink.net	1
6	Patrick	Black	Fennemore Craig		pblack@felaw.com	1 & 2
7	Jane	Brandt	SRP		jkbrandt@srpnet.com	1 & 2
8	Ian	Calkins	Copper State Consulting Group		ian@copperstate.net	1
9	Jim	Charters	Retired	(623) 572-7972	j_charters@msn.com	1 & 2
10	Brian	Cole	APS		Brian.Cole@aps.com	1 & 2
11	David	Couture	TEP		dcouture@tep.com	1 & 2
12	Michael	Curtis	Mohave Electric	(602) 248-0392	mcurtis401@aol.com	1
13	Cary	Deise	APS	(602) 250-1232	cary.deise@aps.com	1 & 2
14	Chris Clark	DeSchene	Dine Power Authority		clarkdeschene@att.net	1
15	Mark	Etherton	SWAT/AZNM	(602) 809-0707	mle@krsaline.com	1
16	Bruce	Evans	SWTC	(520) 586-5336	bevans@swtransco.coop	1 & 2
17	Linda	Fisher	Corp. Commission - Legal		Lfisher@AZCC.gov	1
18	Commissioner	Gleason				1
19	Charles	Hains	Corp. Commission - Legal		Chaines@AZCC.gov	1 & 2
20	Thomas A.	Hine	Mohave Electric		thineesq@yahoo.com	1
21	Chairman	Hutch-Miller				1
22	Gary T.	Ijams	CAWCD	(623) 869-2362	gijams@cap-93.com	2
23	Joshua	Johnston	Western Area Power Admin.		jjohnston@wapa.gov	1
24	Robert	Kondozoilka	SRP	(602) 236-0971	rekondzi@srpnet.com	1 & 2
25	David M.	Korinek	KEMA		David.Korinek@kema.com	1 & 2
26	Peter	Krzykos	APS		Peter.Krzykos@aps.com	1 & 2
27	Steven	Mavis	sce	(626) 302-8175	steven.mavis@sce.com	1
28	Gary	Minich	Energy Strategies	(602) 369-4368	greg@azcpa.org	2
29	Jeff	Palermo	KEMA	(703) 631-6912	jpalermo@kema.com	1 & 2
30	Greg	Patterson	AZCPA		greg@azcpa.org	1 & 2
31	Milt	Percival	WSES for 3M	(602) 352-2794	mperc7439@aol.com	1 & 2

[1] Workshop I was held on June 6, 2006; Workshop II was held on September 8, 2006

	Name		Representing	Phone number	E-mail address	Workshops attended[1]
32	Harlow	Peterson	USE Consulting		harlowpeterson@useconsulting.com	1
33	Karilee	Ramaley	APS		KSR@pinnnaclewest.com	1 & 2
34	Jim	Rein	WTC	(520) 586-5116	jrein@swttransco.coop	2
35	Charles	Reinhold	WESTCONNECT	(520) 253-6916	reinhold@globalcrossing.net	2
36	Gary T.	Romero	SRP	(602) 236-0974	gtromero@srpnet.com	1 & 2
37	Joe	Rossignoli	National Grid	(508) 389-2866	Joseph.Rossignol@US.ngrid.com	2
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41	Jason	Spitzkoff	APS		Jason.Spitzkoff@aps.com	1 & 2
42	LeeAnn	Torkelson	SWAT(CATS) HV		LVT@krsaline.com	1 & 2
43	Kevin	Torrey	acc	(602) 542-6031	Ktorrey@azcc.gov	2
44	Rebecca	Turner	Gila River Power, L.P		Rturner@entegrapower.com	1
45	Jennie	Vega	APS		Jennie.Vega@aps.com	1 & 2
46	Scott	Wakefield	RUCO		swakefield@azruco.gov	1
47	Ray	Williamson	AZ.Corp.Comm.	(602) 542-0828	rwilliamson@cc.state.az.us	1
48	Laurie	Woodal	AZ Atty. General		Laurie.Woodall@azag.gov	1
49	Tom	Wray	swpg	(602) 808-2004	twray@southwesternpower.com	2
50	Leonard	York	Western Area Power Admin.		York@wapa.gov	1 & 2

Appendix C: Existing Arizona power plants

Plant name	Switchyard voltage (kV)	No. units	Primary energy source	Total summer capacity (MW)	AZ capacity under contract (MW)	AZ capacity share (%)	2005 annual net generation (MWh)
Abitibi Consolidated Snowflake		1	SUB	27.2	0	0%	411,664
		1	SUB	43.3	0	0%	
Agua Fria		1	NG	113	113	100%	141,617
		1	NG	113	113	100%	
		1	NG	181	181	100%	
		1	NG	73	73	100%	
		1	NG	73	73	100%	
		1	NG	73	73	100%	
		1	SUN	0.2	0.2	100%	
Apache Station		1	NG	10.2	10.2	100%	2,876,049
		1	NG	18.5	18.5	100%	
		1	NG	60	60	100%	
		1	NG	40	40	100%	
		1	NG	72	72	100%	
		1	SUB	175	175	100%	
		1	SUB	175	175	100%	
Arlington Valley Energy Facility		1	NG	165	165	0%	1,336,932
		1	NG	165	165	0%	
		1	NG	250	250	0%	
Biosphere 2 Center		1	DFO	1.5	0	0%	n/a
		1	NG	1.6	0	0%	
Cholla		1	SUB	110	110.0	100%	7,577,568
		1	SUB	260	260.0	100%	
		1	SUB	260	260.0	100%	
		1	SUB	380	0	0%	
Cogeneration 1		1	NG	8.3	0	0%	n/a
Coronado		1	SUB	395	395	100%	6,070,915
		1	SUB	390	390	100%	
Davis Dam		1	WAT	51.7	51.7	100%	992,230
		1	WAT	51.7	51.7	100%	
		1	WAT	48	48	100%	
		1	WAT	51.7	51.7	100%	
		1	WAT	51.7	51.7	100%	
Demoss Petrie		1	NG	72.2	72.2	100%	18,762
Desert Basin		1	NG	161	161	100%	2,446,371
		1	NG	161	161	100%	
		1	NG	253	253	100%	
Douglas		1	DFO	15	15	100%	n/a

Plant name	Switchyard voltage (kV)	No. units	Primary energy source	Total summer capacity (MW)	AZ capacity under contract (MW)	AZ capacity share (%)	2005 annual net generation (MWh)
Gila River Power Station		1	NG	146	0	0%	4,546,967
		1	NG	146	0	0%	
		1	NG	146	0	0%	
		1	NG	146	0	0%	
		1	NG	146	0	0%	
		1	NG	146	0	0%	
		1	NG	146	0	0%	
		1	NG	146	0	0%	
		1	NG	223	0	0%	
		1	NG	223	0	0%	
		1	NG	223	0	0%	
		1	NG	223	0	0%	
Glen Canyon Dam		1	WAT	165	0	100%	3,299,429
		1	WAT	157	0	100%	
		1	WAT	165	0	100%	
		1	WAT	157	0	100%	
		1	WAT	165	0	100%	
		1	WAT	165	0	100%	
		1	WAT	157	0	100%	
		1	WAT	165	0	100%	
Harquahala		1	NG	206.4	0	0%	461,267
		1	NG	200	0	0%	
		1	NG	200	0	0%	
		1	NG	148.8	0	0%	
		1	NG	148.8	0	0%	
		1	NG	137.6	0	0%	
Headgate Rock		1	WAT	6.5	6.5	100%	n/a
		1	WAT	6.5	6.5	100%	
		1	WAT	6.5	6.5	100%	
Hoover Dam		1	WAT	2.7	2.7	100%	1,879,235
		1	WAT	130	130	100%	
		1	WAT	130	130	100%	
		1	WAT	130	130	100%	
		1	WAT	130	130	100%	
		1	WAT	127	127	100%	
		1	WAT	130	130	100%	
		1	WAT	130	130	100%	
		1	WAT	61.5	61.5	100%	
		1	WAT	68.5	68.5	100%	

Plant name	Switchyard voltage (kV)	No. units	Primary energy source	Total summer capacity (MW)	AZ capacity under contract (MW)	AZ capacity share (%)	2005 annual net generation (MWh)
Horse Mesa		1	WAT	10	10	100%	63,065
		1	WAT	10	10	100%	
		1	WAT	10	10	100%	
		1	WAT	119	119	100%	
Kyrene		1	NG	34	34	100%	828,589
		1	NG	72	72	100%	
		1	NG	59	59	100%	
		1	NG	53	53	100%	
		1	NG	53	53	100%	
		1	NG	144	144	100%	
		1	NG	107	107	100%	
Mesquite Generating Station		1	NG	146.2	0	0%	6,724,135
		1	NG	144.5	0	0%	
		1	NG	146.2	0	0%	
		1	NG	146.2	0	0%	
		1	NG	245.1	0	0%	
		1	NG	245.1	0	0%	
Mormon Flat		1	WAT	11	11	100%	27,229
		1	WAT	57	57	100%	
Navajo		1	BIT	750	506.2	67.49%	17,030,674
		1	BIT	750	506.2	67.49%	
		1	BIT	750	506.2	67.49%	
North Loop		1	NG	25	25	100%	n/a
		1	NG	25	25	100%	
		1	NG	23	23	100%	
		1	NG	23	23	100%	
Ocotillo		1	NG	110	110	100%	145,500
		1	NG	110	110	100%	
		1	NG	50	50	100%	
		1	NG	50	50	100%	
		1	SUN	0.1	0.1	100%	
		1	SUN	0.1	0.1	100%	
		1	SUN	0.4	0.4	100%	
Palo Verde		1	NUC	1243	775.5	62.39%	25,807,446
		1	NUC	1314	819.8	62.39%	
		1	NUC	1247	778.0	62.39%	
PPL Griffith Energy Project		1	NG	148	0	0%	786,882
		1	NG	148	0	0%	
		1	NG	292	0	0%	
Sundance Energy		1	NG	41	41	100%	63,993
		1	NG	41	41	100%	

Plant name	Switchyard voltage (kV)	No. units	Primary energy source	Total summer capacity (MW)	AZ capacity under contract (MW)	AZ capacity share (%)	2005 annual net generation (MWh)
		1	NG	41	41	100%	
		1	NG	41	41	100%	
		1	NG	41	41	100%	
		1	NG	41	41	100%	
		1	NG	41	41	100%	
		1	NG	41	41	100%	
		1	NG	41	41	100%	
		1	NG	41	41	100%	
Prescott Airport		1	SUN	2.1	0	100%	n/a
Red Hawk		1	NG	163.5	0	100%	3,849,124
		1	NG	163.5	0	100%	
		1	NG	163.5	0	100%	
		1	NG	163.5	0	100%	
		1	NG	183	0	100%	
		1	NG	183	0	100%	
Roosevelt		1	WAT	36	36	100%	n/a
Saguaro		1	NG	110	110	100%	50,334
		1	NG	110	110	100%	
		1	NG	76	76	100%	
		1	NG	50	50	100%	
		1	NG	50	50	100%	
Santan		1	NG	92	92	100%	2,078,088
		1	NG	92	92	100%	
		1	NG	92	92	100%	
		1	NG	92	92	100%	
		1	NG	525	525	100%	
		1	NG	290	290	100%	
South Consolidated		1	WAT	1.4	1.4	100%	n/a
South Point Energy Center		1	NG	180	0	0%	1,481,306
		1	NG	180	0	0%	
		1	NG	190	0	0%	
Springerville		1	SUB	400	400	100%	5,577,373
		1	SUB	400	400	100%	
		1	SUN	5.1	5.1	100%	
Stewart Mountain		1	WAT	13	13	100%	n/a
Sundt		1	SUB	156	156	100%	1,152,849
		1	NG	24	24	100%	
		1	NG	25	25	100%	
		1	NG	81	81	100%	
		1	NG	81	81	100%	
		1	NG	105	105	100%	

Plant name	Switchyard voltage (kV)	No. units	Primary energy source	Total summer capacity (MW)	AZ capacity under contract (MW)	AZ capacity share (%)	2005 annual net generation (MWh)
Tri Cities		1	LFG	0.8	0.8	100%	n/a
		1	LFG	0.8	0.8	100%	
		1	LFG	0.8	0.8	100%	
		1	LFG	0.8	0.8	100%	
		1	LFG	0.8	0.8	100%	
Valencia		1	NG	14.7	14.7	100%	n/a
		1	NG	14.7	14.7	100%	
		1	NG	14.7	14.7	100%	
Waddell		1	WAT	10	10	100%	n/a
		1	WAT	10	10	100%	
		1	WAT	10	10	100%	
		1	WAT	10	10	100%	
West Phoenix		1	NG	80	80	100%	2,299,621
		1	NG	80	80	100%	
		1	NG	80	80	100%	
		1	NG	71	71	100%	
		1	NG	36	36	100%	
		1	NG	172	172	100%	
		1	NG	172	172	100%	
		1	NG	186	186	100%	
		1	NG	50	50	100%	
		1	NG	50	50	100%	
Yucca		1	NG	18	18	100%	245,392
		1	NG	18	18	100%	
		1	DFO	20	0.0	0%	
		1	NG	52	52	100%	
		1	DFO	51	51	100%	
		1	NG	75	0	56.65%	
Yuma Axis		1	DFO	22	22	100%	n/a
Yuma Cogeneration Associates		1	NG	35.14	0	0%	n/a
		1	NG	17.12	0	0%	
46 Plants Total		**191**		**24,593**	**13,884**	**70.6%**	**100,270,606**

Source: U.S. Department of Energy, Energy Information Administration, Form EIA-860, Form EIA-906, Form EIA-920.

Primary energy sources:

- BIT Anthracite Coal, Bituminous Coal
- DFO Distillate Fuel Oil (includes all Diesel and No. 1, No. 2, and No. 4 Fuel Oils)
- LFG Landfill Gas
- NG Natural Gas
- NUC Nuclear (Uranium, Plutonium, Thorium)
- SUB Subbituminous Coal
- SUN Solar (Photovoltaic, Thermal)
- WAT Water (Conventional, Pumped Storage)

Appendix D: Information resources

Transmission Planning Studies and related documents, used to develop this Third BTA report, were assembled from the following reports, presentations, and dockets:

D.1 Utilities' 2005 and 2006 Ten-Year Transmission Plans

1. Arizona Public Service Company (APS)
2. Salt River Project (SRP)
3. Southwest Transmission Cooperative (SWTC)
4. Southwestern Power Group II (SWPG)
    a. Toltec
    b. Bowie
5. Southern California Edison (SCE)
6. Texas – New Mexico Power Company (TNMP)
7. Tucson Electric Power Company (TE")
8. El Paso Electric Company
9. UniSource Electric (UNS)

D.2 Generation interconnection studies and related FERC interconnection standards and compliance documents

10. FERC Order 2003 and 2003-A, Standard Interconnection Agreements & Procedures for Large Generators
11. Arizona Utilities Compliance Documents regarding FERC Order 2003 and 2003-A

D.3 Arizona Corporation Commission documents

12. ACC Docket No. E-0000A-02-0051, Decision 65743, Track B

D.4 Reliability Must-Run workshop

13. ACC 2006 RMR Workshop Presentations and Reports
14. FERC Related orders (PL04-2 policy related to bid based market)

D.5 Transmission projects reports

15. Central Arizona Transmission System (CATS) Phase 3 Report[1]

16. Southwest Transmission Expansion Plan (STEP) 2003 Final Report[2]

D.6 Regional committees and working groups materials

17. Southwest Area Transmission (SWAT) subcommittee organization and study plans[3]

18. Seam Steering Group – Western Interconnection (SSG-WI) Planning Work Group 2003 Transmission Report[4]

D.7 North America Electric Reliability Council (NERC) assessments studies and reliability standards related materials

19. NERC Reliability Standards[5]

20. 2004 SUMMER ASSESSMENT Reliability of the Bulk Electricity Supply in North America[6]

21. Reliability Readiness Audit Reports for the relevant Control Areas

D.7.1 Western Electricity Coordinating Council (WECC) Standards and studies

The standards can be found on the WECC website (www.wecc.biz) under "Click here for library".

D.7.2 First, Second, and third BTA Reports

These reports can be found on the Arizona Corporation Commission website (www.cc.state.az.us/utility/electric/index.htm).

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[1] http://www.azpower.org/cats/

[2] http://www.caiso.com/docs/2004/03/08/2004030814004810105.doc

[3] http://www.azpower.org/swat/

[4] http://www.ssgwi.com/documents/316-ferc_Filing__103103__FINAL_TransmissionReport.pdf

[5] http://www.nerc.com/standards/

[6] ftp://www.nerc.com/pub/sys/all_updl/docs/pubs/summer2004.pdf

Appendix E: List of new projects and project changes

In service date	Project	Voltage	Status
2005	Gavilan Peak	230kV	Completed
2005	TS3 230/69kV substation	230/69kV	Named Palm Valley
2005	Irvington Station - Vail Substation #1 loop-in through Robert Bills -Wilmot (formerly Littletown) Substation.	138-kV	Placed in-service August 26,2005
2005	Irvington Station - Vail Substation #1 loop-in through Robert Bills -Wilmot (formerly Littletown) Substation.	138-kV	Completed
2006	Southeast Valley 500kV project—Hassayampa-Pinal West & Pinal West-Santa Rosa-Browning	500kV	Removed from APS plan - APS no longer participating
2007	Dinosaur (RS19)	230kV	Advanced from 2008
2007	Rudd-Palm Valley-TS4 230kV	230kV	Changed to I/S date of 2007
2007	Hassayampa to Pinal West	500 kV	Delayed from 2007 to 2008
2007	Hackberry 230/69 kV Substation	230/69 kV	New Project
2007	Vail - East Loop cut-in of line through future Pantano and Los Reales Substations.	138-kV	2006 (Phase II, Phase I completed)
2007	West Ina Substation - Tucson Station cut-in through Del Cerro (formerly Sweetwater) Substation.	138-kV	New Project
2008	Southeast Valley 500kV project—Palo Verde Pinal West	500 kV	Delayed from 2006
2008	Southeast Valley 500kV project—Pinal West – Santa Rosa	500 kV	Delayed from 2007
2008	PV Hub-TS5 500kV	500kV	Changed to I/S date of 2009 and added interconnection options
2008	Naviska to Saguaro	230 kV	Scope change; in-service date changed to 2008; 30 kV changed to 115 kV; Red Rock changed to Naviska 115 kV Projects
2008	Gordon Sloan 230/69 kV Substation	230/69 kV	New Project
2008	Southeast Valley 500kV project—Pinal West to Santa Rosa	500 kV	New SWTC participation
2009	Second Knoll	500 kV	SRP/APS
2009	Second Knoll 500/69kV	500/69kV	Interconnect moved from CO-SK line to CO-CH line
2009	Flagstaff 345/69kV interconnection	345/69kV	Changed to I/S date of 2009
2009	TS5-TS1 230kV	230kV	Changed to I/S date of 2009
2009	Raceway-Avery 230kV	230kV	Changed to I/S date of 2009
2009	TS5-TS1 230kV	230kV	Changed to I/S date of 2009
2009	VV1 500/69kV	500/69kV	New Project
2009	Naviska to Thornydale 115 kV Line	115 kV	New Project
2009	Southeast Valley 500kV project—Pinal West - Southeast Valley 500 kV	500 kV	New Project
2009	Devers-Palo Verde No. 2	500 kV	Delayed from 2008 to 2009
2009	Rancho Vistoso Substation to future Catalina Substation	138 kV	New Project
2010	Raceway – Pinnacle Peak	500 kV	New project
2010	TS1-TS2-Palm Valley 230kV w/TS2 I/S of 2012	230kV	Changed to I/S date of 2010
2010	Pinnacle Peak -TS6-AV 230kV	230kV	Changed to I/S date of 2010
2010	TS9-Pinnacle Peak 500kV	500kV	New Project
2010	Palo Verde Hub to IID Service area, Northern (Reference SCE DPV2 Line Designation)	500kV	New Project
2010	Palo Verde Hub to IID Service area, Southern (Reference APS Palo Verde to Yuma Project)	500kV	New Project
2010	Moenkopi –Eldorado capacitor upgrade	500 kV	Delayed from 2006 to 2010
2010	Vail - Wentworth 138 kV - two circuits	138 kV	New Project
2011	Pinal South	500 kV	Additional facility to SEV Project
2011	Desert Basin – Pinal South	230kV	New project
2011	Desert Basin – Santa Rosa	230kV	New project
2011	Jojoba cut-in of TS4-Panda 230kV	230kV	Changed to I/S date of 2011
2011	Mazatzal 345/69kV	345/69kV	Changed to I/S date of 2011
2011	Thornydale to CAP Twin Peaks 115 kV Line	115 kV	New Project

In service date	Project	Voltage	Status
2011	Valencia to CAP Black Mountain	115 kV	Delayed from 2008 to 2011
2011	Sundt Station - Vail Substation #2 loop-in line through future University of Arizona Tech Park Substation.	138 kV	Delayed from 2010 to 2011; construction to start 2010
2012	TS5 – Raceway	500 kV	Delayed from 2010
2012	Gila Bend-TS8 230kV	230kV	Replaced with second PV Hub-N.G. 500kV
2012	N.G.-TS8 230kV	230kV	New Project
2012	Sandario to CAP Brawley 115 kV Line	115 kV	New Project
2012	Picture Rocks to Twin Peaks	115 kV	In-service date changed from 2013 to 2012
2012	Pinal West – Tortolita	500 kV	now under review; was 2012
2012	Upgrade existing 115kV transmission line to Nogales	138 kV	New Project
2012	Sandario to San Joquin	115 kV	New Project. Bopp changed to San Joaquin
2013	Adonis 115/24.9 kV Substation	115 kV	New Project
2013	Naviska to Picture Rocks	115 kV	Scope change – name change and new project
2014	Fountain Hills	230kV	Delayed from 2012
2014	New Tucson 230/24.9 kV Substation	230/24.9 kV	New Project
2015	Camino de Manana 115/24.9 kV Substation	115 kV	New Project
2015	Upgrade of Marana-Avra Line	115 kV	Delayed from 2010 to 2015
TBD	South substation to future Gateway substation (2 ckts.) TEP-UES- 345 kV Interconnection Line	345-kV	Depends on permitting
Phase 3 - under review	Vail -East Loop (through Houghton Loop Switching Station*, Spanish Trail and Roberts Substations).	138-kV	Construction started 1976 Phase 1 - 1977 (Completed) Phase 2 - 1983 (Completed)
TBD	West Wing-Raceway 230kV	230kV	Changed to I/S date of TBD
TBD	West Wing-EEstrella 230kV	230kV	Changed to I/S date of TBD
TBD	Yucca-TS8 230kV	230kV	New Project
TBD	Sana Rosa-Pinal South 230kV	230kV	New Project
TBD	Riviera Two Substation to Riviera	230 kV	Delayed indefinitely
TBD	Greenlee Switching Station through Hidalgo to Luna (Deming area)	345 kV	Postponed indefinitely
Under review	Green Valley - Cyprus-Sierrita loop-in line through Canoa Ranch (formerly Desert Hills) Substation.	138 kV	New Project
Under review	Pinal South Substation to Tortolita Substation	500-kV	New Project
Under review	South Substation to Cyprus Sierrita Extension Switchyard through future Canoa Ranch (formerly Desert Hills) Substation and Green Valley Substation.	138 kV	New Project
Under review	South Substation to DeMoss Petric Substation	138-kV	New Project
Under review	Springerville Substation to Greenlee Substation - 2nd circuit	345-kV	New Project
Under review	Tortolita Substation to South Substation.	345-kV	New Project
Under review	Tortolita-Rillito 138 kV	138 kV	New Project
Under review	Westwing Substation to South Substation (2nd circuit)	345-kV	New Project
Under review	Griffith-North Havasu Transmission	230 kV, 69 kV	New Project
Under review	Vail-Nogales Transmission Line #2	138 kV	New Project

Appendix F: Arizona planned EHV transmission additions

Status	Project	Justification	CEC needed
2006 completion			
2005 construction start	Palo Verde-Devers #1 and Hassayampa–North Gilla 500 kV line upgrades	The upgrading of the series capacitors allows for the increase in transfer capability among Arizona, Southern Nevada and Southern California and has an economic value from an adequacy stand point.	Not required
2008 completion			
2007 construction start	Hassayampa-Pinal West 500 kV line	Southeast Valley Project—To accommodate load growth and access to energy sources in the central Arizona area. To provide access to resources from the Palo Verde area generation to the future (beyond this Ten-Year Plan) 500/69 kV station located at the Pinal West substation.	CEC Ordered in Case 124, Issued May 24, 2004
	Pinal West-Santa Rosa 500 kV		CEC Ordered in Case 126, Issued August 25, 2005
	Pinal West - Southeast Valley 500 kV		
2007 construction start	Interconnection of Westwing - South 345 kV via new Pinal West 500/345 kV Substation	To reinforce Tucson Electric Power Company's EHV system and to provide a higher capacity link for the flow of power from the Palo Verde area into TEP's service territory. SWTC, ED2, ED3, and ED4 are also participants.	Included in Siting Case #124
2009 construction start	EOR 9300MW Upgrade Project	To increase East of River (Path 49) transfer capability by 1250MW by upgrading series compensation on Mead-Perkins & Navajo-Crystal 500kV lines, by-passing Perkins phase-shifting transformer, etc. SRP is project sponsor representing multiple owners.	Not required
2009 completion			
2008 construction start	Flagstaff 345/69kV Interconnection	This project will serve projected need for electric energy in APS' northern service area. The project will improve reliability and continuity of service for the growing communities in northern Arizona.	A Certificate of Environmental Compatibility is not needed for this project.
2009 construction start	Palo Verde-TS5 500kV line	This line will serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area as well as increase the export capability from the Palo Verde hub. This is an APS/SRP joint participation project with APS as the project manager.	Certificate of Environmental Compatibility issued 8/17/05 (Case No. 128, Decision No. 68063, Palo Verde Hub to TS5 500kV Transmission project). APS, as project manager, holds the CEC.
2009 construction start	Second Knoll loop-in of Coronado-Cholla 500kV line	This project will be needed to serve projected need for electric energy in Show Low and the surrounding communities.	A Certificate of Environmental Compatibility is not needed for this project.
2009 construction start	VV1 loop-in of Navajo-Westwing 500kV line	This project will serve projected electrical needs and provide support to the existing subtransmission system in the Verde Valley and Prescott areas.	A Certificate of Environmental Compatibility is not needed for this project.
2009 construction start	Devers-Palo Verde No. 2 500 kV Line	This 500 kV line will increase transfer capability between Arizona and Southern California.	Application #L-00000A-06-0295-00130 filed May 2006

Status	Project	Justification	CEC needed
2008 construction start	Upgrade Coronado 500kV Transmission System	Add series compensation to Coronado-Silverking 500kV line.	Not required
2010 completion			
2008 construction start	Raceway-Pinnacle Peak 500kV line	This line is a result of joint planning through the SWAT forum. The project is needed to increase the import capability to the Phoenix Metropolitan area and strengthen the transmission system on the east side of the Phoenix Metropolitan valley. This will be an APS/SRP joint participation project with APS as the project manager. The loop-in of a Navajo-Westwing 500kV transmission line into the Raceway 500kV substation will be part of this project.	An application for a Certificate of Environmental Compatibility was filed in 2006.
2008 construction start	Series Capacitor Upgrade Project on Navajo Southern 500 kV Transmission System	The upgrading of the series capacitors allows for the increase in transfer capability from northern Arizona to central Arizona and has an economic value from an adequacy stand point. APS, SRP, TEP, WAPA are participating.	No information filed
2011 completion			
2009 construction start	Pinal West - Southeast Valley/Browning 500 kV line (Reference SRP Ten-Year Plan 2006 filing)	Southeast Valley Project—To accommodate load growth and access to energy sources in the central Arizona area. To provide access to resources from the Palo Verde area generation to the future (beyond this Ten-Year Plan) 500/69 kV station located at the Pinal West substation.	CEC Ordered in Case 126, Issued August 25,2005
2010 construction start	Mazatzal loop-in of Cholla-Pinnacle Peak 345kV line	This substation will serve projected need for electric energy in the area of Payson and the surrounding communities. Additionally, improved reliability and continuity of service will result for the growing communities in the Payson area.	A Certificate of Environmental Compatibility is not needed for this project.
2012 completion			
2008 construction start	Palo Verde-North Gila #2 500kV	This line is expected to be an APS/SRP joint project. As a new transmission path to Yuma area, this 500kV line will provide transmission capacity required to supplement limited transmission and generation resources in the Yuma area.	An application for a Certificate of Environmental Compatibility has not yet been filed.
2010 construction start	TS5-Raceway 500kV line	This line will be needed to serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area as well as increase the export capability from the Palo Verde hub and provide support for multiple Westwing 500/230kV transformer outages. This will be a joint participation project with APS as the project manager.	An application for a Certificate of Environmental Compatibility has not yet been filed.

Status	Project	Justification	CEC needed
Undetermined during 2006-2015 period			
Dependent upon permitting	TEP-Unisource Energy Services 345 kV Interconnection Line--South Substation to future Gateway Substation (2 ckts.)	To provide an alternate transmission path to Unisource Energy Services in Nogales, Arizona pursuant to ACC order.	Siting Case #111
Dependent upon permitting	Gateway Substation to Comision Federal de Electricidad (CFE) (2 ckts.) 345 kV	To interconnect to the Comision Federal de Electricidad in Sonora, Mexico.	Siting Case #111
Postponed indefinitely	Greenlee Switching Station through Hidalgo to Luna (Deming area) 345 kV	To provide additional interconnection with the Arizona Utilities and into southern New Mexico	Issued in October, 1975
TBD	Palo Verde-Saguaro 500kV line	This line is the result of the joint participation CATS study. The line will be needed to increase the adequacy of the existing EHV transmission system. It is anticipated the line will be a joint participation project.	Certificate of Environmental Compatibility issued 01/23/1976 (Case No. 24, Decision No. 46802).
Under Review	Pinal West Substation to Tortolita Substation 500 kV	To reinforce Tucson Electric Power Company's EHV system and to provide a higher capacity link for the flow of power from the Palo Verde area into TEP's northern service territory.	Yes
Under Review	Pinal South Substation to Tortolita Substation 500 kV	To reinforce Tucson Electric Power Company's EHV system and to provide a higher capacity link for the flow of power from the Palo Verde area into TEPs northern service territory.	Yes
Under Review	Tortolita Station to Winchester Station 500 kV	To reinforce Tucson Electric Power Company's EHV system and to provide a higher capacity link for the flow of power from the Palo Verde area into TEPs eastern transmission system.	Siting Case No. 23
Under Review	Winchester Substation to Vail Substation - 2nd circuit 345 kV	To reinforce Tucson Electric Power Company's EHV system and to provide additional transmission capacity from the future Winchester Station into Tucson	Yes
Under Review	Vail Station to South Station - 2nd circuit 345 kV	To reinforce Tucson Electric Power Company's EHV system and to provide additional transmission capacity between Vail and South Substations	No
Under Review	Springerville Substation to Greenlee Substation - 2nd circuit 345 kV	To deliver power and energy from major TEP interconnections in the Four Corners and Eastern Arizona regions.	Issued in 1975,1977,1982 and 1986
Under Review	Tortolita Substation to South Substation.	To reinforce Tucson Electric Power Company's EHV system and to provide a high capacity link for the flow of power in Southern Arizona.	Siting Case #50
Under Review	Westwing Substation to South Substation (2nd circuit) 345 kV	To deliver power and energy from major TEP interconnections in the Northwest Phoenix region.	Siting Case # 15

Status	Project	Justification	CEC needed
Under Review	Gateway 345/115 kV Substation	The proposed substation facilities provide an interconnection and source for UNS Electric's second transmission line to UNS Electric's Santa Cruz Service Area and a future distribution substation.	Yes

Appendix G: Arizona planned HV transmission additions

Status	Project	Justification	CEC needed
2006 completion			
Construction completed in 2006	Sandario Substation loop-in of Avra Valley to Three Points 115 kV line	To provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc. in Northwest Tucson	Yes. The Commission in Case 125 issued a Certificate of Environmental Compatibility for the project (Decision No. 67432) on December 3, 2004
Construction start 2006	Saddlebrooke Ranch 115 kV Substation	To provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc. in Southern Pinal County	No
2007 completion			
Construction start 2006	Browning-Dinosaur 230kV line	Serves new substation at Dinosaur, a key source to new load development in the Apache Junction area. Line will be installed in the extra conductor position on Pinal West-Browning 500/230kV towers.	Siting Case #124
Construction start 2006	Orme-Anderson 230kV line	Reconfigure existing parallel-circuit tower line into a double-circuit arrangement to relieve 230kV transmission overloads.	Not required. Original construction of this line predates the siting statute
Construction start 2006	Loop-in of Liberty-Orme 230kV line into Rudd Substation	Loop-in of Libert-Orme into existing Rudd Substation to relieve 230kV transmission overloads.	Not required. Predates siting statute and loop-in is contained within the station site.
Construction start 2006	Loop existing West Ina Substation to Tucson Station line through Del Cerro (formerly Sweetwater) Substation. 138 kV	To provide additional electric service to the western part of Tucson Electric Power Company's service area and to reinforce the local distribution system.	Siting Case #62
Construction start 2006	Hackberry 230/69 kV Substation	To provide transmission service to PD's Safford mining operations in Graham County and to provide for enhanced service reliability to the existing Graham County 69 kV system.	No
Construction start 2007	Rudd-Palm Valley-TS4 230kV line	This project will provide a source for the Palm Valley 230/69 kV substation and 69 kV substations planned in the western and southwestern Phoenix Metropolitan area to accommodate the growing need for electric energy in the area. Increased reliability and quality of service will result for customers served by the 230/69 kV substation.	Certificate of Environmental Compatibility issued 2/12/02 (Case No. 11 5, Decision No. 64473, Southwest Valley Project). Revised on 4/9/02, Decision No. 64704. This CEC is for the 230kV line, Rudd-Liberty, running east and west on the same poles as the Palo Verde-Rudd 500kV line. The portion of line running from the existing Rudd-Liberty line to the Palm Valley substation and Project and a Certificate of Environmental Compatibility was issued 12/24/03 (Case No. 122, Decision No. 66646, West Valley South 230kV Transmission Line Project).

Status	Project	Justification	CEC needed
Construction start 2007	Marana 115 kV Line Upgrade	To mitigate various thermal overloads and/or voltage criteria violations due to n-1outages on the 115 kV system between Bicknell and Marana and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	No
Construction start 2006 (Phase II, Phase I completed)	Loop existing Vail Substation to East Loop Substation line through future Pantano and Los Reales Substations. 138 kV	To provide additional electric service to the eastern part of Tucson Electric Power Company's service area and to reinforce the local distribution system.	No
2008 completion			
Construction start 2007	Naviska to Saguaro 115 kV	To provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc. in Northern Pima and Southern Pinal Counties	Yes
Construction start 2008	Valencia to CAP Black Mountain 115 kV Line	To provide an additional source to the SWTC 115 kV system and for the Valencia Substation which is currently served by a radial 115 kV line from Three Points Substation	Yes
Construction start 2008	Gordon Sloan 230/69 kV Substation	To provide for anticipated load growth in the certificated service area of Sulphur Springs Valley Electric Cooperative, Inc	No
Construction start 2008	Apache to Hayden 115 kV line to APS San Manual Substation	Provide for increased transfer capability and voltage support in Southern Pinal County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes
2009 completion			
Construction start 2008	Naviska to Thornydale 115 kV Line	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes
Construction start 2007	TS5-TS1 230kV line	This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area, providing more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities such as El Mirage, Surprise, Youngtown, and Buckeye. The first circuit is scheduled to be in-service for the summer of 2009 and the in-service date for the second circuit will be evaluated in future planning studies.	Certificate of Environmental Compatibility issued 5/5/05 (Case No. 12 7, Decision No. 67828, West Valley North 230kV Transmission Line project).

Status	Project	Justification	CEC needed
Construction start 2008	Raceway-Avery 230kV line	This line will serve projected need for electric energy in the area immediately north of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for the area's growing communities such as Anthem, Desert Hills and New River. The first circuit is scheduled to be in-service for the summer of 2009 and the in-service date for the second circuit will be evaluated in future planning studies by SRP as part of their planned Westwing-Pinnacle Peak 230kV project.	Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley Project).
Construction start 2008	Rancho Vistoso Substation to future Catalina Substation 138 kV	To provide additional electric service to the south-central part of Tucson Electric Power Company's service area.	Under Review
Construction start 2008	Valencia to San Joaquin 115 kV Line	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes
2010 completion			
Construction start 2004	Pinnacle Peak-TS6-Avery 230kV line	This project will serve projected need for electric energy in the area immediately north of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for the growing communities in the areas of Anthem, Desert Hills, New River, and north Phoenix. The first circuit is scheduled to be in-service for the summer of 2010 and the in-service date for the second circuit will be evaluated in future planning studies by SRP as part of their planned Westwing-Pinnacle Peak 230kV project.	Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley Project).
Construction start 2008	Palm Valley-TS2-TS1 230kV line	This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area, providing more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities such as El Mirage, Surprise, Youngtown, and Buckeye. The first circuit is scheduled to be in-service for the summer of 2010 and the in-service date for the second circuit will be evaluated in future planning studies.	The Palm Valley-TS2 230kV line portion was sited as part of the West Valley South 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 12/24/03 (Case No. 122, Decision No. 66646). The TSI -TS2 230kV line portion was sited as part of the West Valley North 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 5/5/05 (Case No. 127, Decision No. 67828).
Construction start 2009	Raceway 500kV to 230kV substation 230kV line	The Raceway 500kV substation will be located north of the existing Raceway 230kV substation due to physical/geographic constraints. The 500/230kV transformers will be located at the Raceway 500kV substation, therefore 230kV lines are needed between the 500/230kV transformers and the Raceway 230kV substation.	An application for a Certificate of Environmental Compatibility has not yet been filed. It is anticipated that this project will be filed with the Raceway-Pinnacle Peak 500kV Transmission project.

Status	Project	Justification	CEC needed
Construction start 2010	Vail - Wentworth 138 kV - two circuits	Required to serve load at the new Wentworth 138/13.8 kV Substation locate approximately 7.5 miles due east of the Vail Substation Circuit 1: utilize conductor that was installed in the past but left de-energized, install - 3.0 miles of new conductor east from Vail on existing structures to make connection to this existing conductor Circuit 2: tap the existing Vail-Fort Huachuca or Vail- Spanish Trail line	Yes
2011 completion			
Construction start 2009	Desert Basin-Pinal South 230kV line	Will provide capacity for the delivery of Desert Basin power plant output to the valley and allow for possible capacity expansion at the plant. Majority of line to be strung in vacant position of 500kV towers.	SRP will file a CEC application in Fall 2006 fort the tap or loop-in Desert Basin, but the authority for the portion of the line strung on the 500kV structures is provided for in Case No. 126 granted in 2005.
Construction start 2008	Western Parker-Davis 115 kV Upgrades to 230 kV (Reference Western Ten-Year Plan 2003 filing)	Expected to deliver lower cost energy via additional capacity over the upgraded 230 kV System, and to provide redundancy to bulk receiving stations.	No. Western will upgrade existing 115 kV facilities to 230 kV.
Construction start 2010	Jojoba loop-in of TS4-Panda 230kV line	This substation will be needed to serve projected need for electric energy for the growing communities in the areas of Buckeye, Goodyear, and Gila Bend.	Certificate of Environmental Compatibility issued 1 0/16/00 (Case No. 102, Decision No. 62960, Gila River Transmission Project).
Construction start 2010	Loop existing Irvington Station to Vail Substation #2 line through future University of Arizona Tech Park Substation.	To provide additional electric service to the south-central part of Tucson Electric Power Company's service area.	Yes
Construction start 2010	Thornydale to CAP Twin Peaks 115 kV Line	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes
2012 completion			
Construction start 2009	Upgrade existing 115kV transmission line to Nogales	The upgrade of the transmission line increases transmission system reliability and provides additional load serving capacity to UNS Electric Santa Cruz Service Area.	
Construction start 2010	North Gila-TS8 230kV line	This project is required to serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.	An application for a Certificate of Environmental Compatibility has not yet been filed.

Status	Project	Justification	CEC needed
Construction start 2011	Sandario to San Joaquin 115 kV Line	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes
Construction start 2011	Picture Rocks to CAP Twin Peaks 115 kV Line	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes
Construction start 2011	Sandario to CAP Brawley 115 kV Line	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes
2013 completion			
Construction start 2012	Adonis 115/24.9 kV Substation	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	No
2014 completion			
Construction start 2013	New Tucson 230/24.9 kV Substation	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	No
2015 completion			
Construction start 2014	Camino de Manana 115/24.9 kV Substation	Provide for increased transfer capability and voltage support in Southern Pima County and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	No
Construction start 2015	Upgrade of Marana to Avra Valley 115 kV Line	To mitigate various thermal overloads and/or voltage criteria violations due to n-1 outages on the 115 kV system between Bicknell and Marana and to provide for anticipated load growth in the certificated service area of Trico Electric Cooperative, Inc.	Yes

Status	Project	Justification	CEC needed
Undetermined			
Construction started 1985 Phase 1 - 1994 (Completed) Phase 2 - 2000 (Completed)	Irvington Substation to East Loop Substation (through 22nd Street Substation).	To provide additional electric service to the central area of Tucson Electric Power Company's service area and to reinforce the local transmission system.	Siting Case #66
Construction started 1985 Phase 1 - 1987 (Completed)	East Loop Substation to Northeast Substation (through Snyder Substation)	To provide additional electric service to the northeastern area of Tucson Electric Power Company's service area.	Siting Case #47
Construction started 1976 Phase 1 - 1977 (Completed) Phase 2 - 1983 (Completed)	Vail Substation to East Loop Substation (through Houghton Loop Switching Station*, Spanish Trail and Roberts Substations).	To provide additional electric service to the eastern portion of Tucson Electric Power Company's service area and to reinforce the local transmission system.	Siting Case #8
TBD	Santa Rosa-Pinal South 230kV line	This line will serve increasing loads in Pinal County and will improve reliability and continuity of service for the rapidly growing communities.	Authority for the 230kV line strung on the 500kV structures was granted in the Certificate of Environmental Compatibility issued in 2005, Case No. 126, Decision Nos. 68093 and 68291.
TBD	Westwing-El Sol 230kV line	This line will increase system capacity to serve growing demand for electric energy in the Phoenix Metropolitan area, while maintaining system reliability and integrity for delivery of bulk power from Westwing south into the APS Phoenix Metropolitan area 230kV transmission system.	Certificate of Environmental Compatibility issued 7/26/73 (Case No. 9, docket No. U-1345). Note that this Certificate authorizes two double-circuit lines. Construction of the first double circuit line was completed in March 1975. Construction of the second line, planned to be built with double-circuit capability but initially operated with a single circuit, is described above.
TBD	Westwing-Raceway 230kV line	This line will serve increasing loads in the far north and northwest parts of the Phoenix Metropolitan area and provide contingency support for multiple Westwing 500/230kV transformer outages. The in-service date for the first circuit will continue to be evaluated in future planning studies by APS and the in-service date for the second circuit will be evaluated in future planning studies by SRP.	Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley 230kV Transmission Line Project).
TBD	Yucca-TS8 230kV line	This project would serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.	An application for a Certificate of Environmental Compatibility has not yet been filed.

Status	Project	Justification	CEC needed
Under Review	Extend 138-kV line from Midvale Substation through future Spencer Switchyard to future San Joaquin Substation.	To provide additional electrical service to the far western portion of Tucson Electric Power Company's service area and to reinforce the local distribution system.	Under Review (dependent upon use of federal and/or Tohono r/w)
Under Review	South Substation to DeMoss Petric Substation 138 kV	To provide additional electrical service to the far western portion of Tucson Electric Power Company's service area and to reinforce the local distribution system.	Yes
Construction started 1995 Phase I completed 1997; phase 2a completed 2006; phase 2b under review	South Substation to Cyprus Sierrita Extension Switchyard through future Canoa Ranch (formerly Desert Hills) Substation and Green Valley Substation. 138 kV	To provide additional electrical service to southern area of Tucson Electric Power Company's service area and to reinforce the local transmission & distribution system.	Siting Case #84 (Extension to Certificate being sought due to delayed load growth and condemnation issues)
Under Review	Loop Green Valley to Cyprus-Sierrita line through Canoa Ranch (formerly Desert Hills) Substation. 138 kV	To provide additional electric service to the south-central part of Tucson Electric Power Company's service area.	No
Under Review	Tortolita-Rillito 138 kV	Required to fully utilize increased import capability of additional EHV capacity into Tortolita Substation (Pinal West - Tortolita).	Yes
Under Review	Griffith-North Havasu Transmission 230 kV, 69 kV	Reinforce the existing transmission grid and provide interconnection between UNS Electric load centers in Mohave County.	
Under Review	Nogales Transmission Line #2 115 kV	The additional transmission line increases transmission system reliability and provides additional load serving capacity to UNS Electric Santa Cruz Service Area.	
Under Review	Valencia 115 kV Substation Expansion	The proposed substation facilities provide an interconnection and source for UNS Electric's second transmission line to UNS Electric's Santa Cruz Service Area and a future distribution substation as provided for in CEC.	

Appendix H: Federal government regulatory actions

H.1 Energy Policy Act of 2005

Signed into law on August 8, 2005, H.R. 6, the Energy Policy Act of 2005 (EPAct-05), this legislation encourages investment in the nation's energy infrastructure, was intended to establish a comprehensive, long-range energy policy. The Act is meant to enhance protections for electricity consumers, and to encourage energy efficiency and conservation. It provides incentives for conservation, traditional energy production, and newer, more efficient, energy production technologies. EPAct-05 is more than 1,700 pages long and contains hundreds of provisions.

The major provisions that impact directly on electricity transmission siting include:

1. Title XII – Electricity, Subtitle A – Reliability Standards
   - Section 1211. Reliability – creates a new Federal Power Act Section 215. Electric reliability. This section gives FERC jurisdiction within the United States over an electric reliability organization (ERO), any regional entities and all users and operators of the "bulk power system," including the entities listed in FPA Section 201(f) (i.e., government-owned utilities and certain electric cooperatives), for purposes of approving and enforcing reliability standards.
   - Section 215(d) Reliability Standards – The ERO must file proposed reliability standards with FERC. FERC may approve the standard if it is just, reasonable, not unduly discriminatory, and in the public interest. If FERC disapproves a standard, it is to remand it to the ERO for reconsideration. FERC can also order an ERO to submit a proposed standard on a specific matter.
2. Title XII – Electricity, Subtitle B – Transmission Infrastructure Modernization
   - Section 1221. Siting of Interstate Electric Transmission Facilities – creates a new Federal Power Act Section 216.
   - Section 216(a) Designation of National Interest Electric Transmission Corridors – Within one year of enactment, and every three years thereafter, DOE in consultation with affected states, is to conduct a study of transmission congestion. After input from interested parties, appropriate regional reliability entities and comment from the states, DOE may designate "any geographic area experiencing transmission capacity constraints or congestion that adversely affects consumers" as a "national interest electric transmission corridor."

- Section 216(b) Construction Permit – FERC is authorized, after notice and an opportunity to comment, to issue permits for the construction or modification of transmission facilities in a national interest electric transmission corridor if FERC finds that:

  (1) (A) a state in which the facilities are to be constructed is without authority to approve the siting of the facilities or to consider the interstate benefits expected to be achieved by the project; (B) the applicant for a permit is a transmitting utility under the FPA but does not qualify for a permit under state law because it does not serve end-use customers; or (C) the state has siting authority but (i) has withheld approval for the later of one year after the filing of an application or one year after the designation of the relevant national interest electric transmission corridor; or (ii) conditioned approval in such a way that the proposed construction will not significantly reduce transmission congestion or is not economically feasible.

  (2) the facilities covered by the permit will be used for interstate electric transmission;

  (3) the proposed project is consistent with the public interest;

  (4) the proposed project will significantly reduce interstate transmission congestion and protects or benefits consumers;

  (5) the proposed project is consistent with sound national energy policy and will enhance energy independence; and

  (6) the proposed modification will maximize, to the extent reasonable and economical, the transmission capacity of existing towers or structures.

- Section 216(h)(1)-(4) Coordination of Federal Authorizations for Transmission Facilities – DOE shall act as lead agency to coordinate all federal authorizations and environmental reviews required to site a transmission facility, including coordination with state siting authorities and Indian tribes. "Federal authorizations" means permits, authorizations or other approvals needed to site a transmission facility under federal law. DOE is required to set deadlines for the review and authorization decisions. DOE is to ensure that once an application with all data considered necessary by the Secretary has been submitted, all permit decisions and environmental reviews under federal laws shall be completed within one year, or if another requirement of federal law makes this impossible, as soon thereafter as is practicable. DOE shall provide an expeditious pre-application mechanism for prospective applicants to confer with agencies involved.

- Section 1222. Third Party Finance. For both existing and new facilities, DOE, acting through WAPA or Southwest Power Authority (SWPA), may participate with other entities in designing, developing, constructing, operating, maintaining or owning an electric power transmission facility and related facilities needed to upgrade existing transmission facilities owned by WAPA and Southwest Power Authority.
- Section 1223. Advanced Transmission Technologies. FERC shall encourage advanced transmission technologies that increase the capacity, efficiency or reliability of existing or new transmission facilities. These technologies include energy storage devices, controllable load, distributed generation and mobile transformers and mobile substations.

3. Title XII – Electricity, Subtitle C – Transmission Operation Improvements
   - Section 1231. Open Non-Discriminatory Access – creates a new Section 211A of the Federal Power Act – Open Access by Unregulated Transmitting Utilities.
   - Section 211A(a) An "unregulated transmitting utility" means an entity that owns or operates facilities used for the transmission of electric energy in interstate commerce and is an entity described in FPA section 201(f) (a government-owned utility or electric cooperative that owns or operates facilities used for transmission of electric in interstate commerce).
   - Section 211A(b) Transmission Operation Services – Subject to Section 212(h) (which prohibits mandatory retail wheeling), FERC may, by rule or order, require an "unregulated transmitting utility" to provide transmission service at rates that are comparable to those it charges itself and on terms and conditions that are comparable to those under which the unregulated transmitting utility provides transmission service to itself and that are not unduly discriminatory or preferential.
   - Section 1232. Federal Utility Participation in Transmission Organizations. Federal Power marketing agencies and Tennessee Valley Authority are authorized to voluntarily join a Transmission Organization.

Additional provisions that have an impact on Electricity include Subtitle D – Transmission Rate Reform, Subtitle E – Amendments to PURPA, Subtitle F – Repeal of PUHCA, Subtitle G – Market Transparency, Enforcement, and Consumer Protection, Subtitle J – Economic Dispatch, and Title XVIII – Studies.

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H.2 Relevant FERC Orders and actions

H.2.1 Electric reliability – Docket No. RM05-30-000

The EPAct-05 required FERC to issue a final rule implementing the new reliability provisions within 180 days of EPAct-05 enactment.

The Commission issued a Notice of Proposed Rulemaking (NOPR) on September 1, 2005 that contained proposed regulations concerning ERO certification, the process for developing and enforcing reliability standards, delegation of ERO authority to regional reliability entities, ERO funding and other matters necessary to implement FPA section 215. The Commission received approximately 1,700 pages of comments on the NOPR and made a number of changes to its proposed regulations based on these comments. On February 3, 2006 the Commission issued its final rule, which has been designated Order No. 672.

The regulations adopted by Order No. 672 establish:

- Criteria that an entity must satisfy to qualify as the ERO;
- Procedures for the ERO to propose new or modified reliability standards for Commission review;
- Procedures for timely resolution of any conflict between a reliability standard and a Commission-approved tariff or order;
- Procedures for resolving an inconsistency between a state action and a reliability standard;
- Regulations pertaining to ERO funding;
- Procedures governing an enforcement action by the ERO, regional entity or the Commission;
- Criteria for delegating ERO authority to regional entities;
- Regulations governing the issuance by the ERO of periodic reports assessing the reliability and adequacy of the North American bulk-power system; and
- Procedures for creating regional advisory bodies composed of representatives of state governments and formed to advise the Commission, the ERO or regional entities on reliability matters.

On March 30, 2006, the Commission issued an order on rehearing in which it clarified certain aspects of the regulations issued in Order No. 672. The Commission received no comments on this order, and the rulemaking process initiated on September 1, 2005 is now complete. The formal implementation process began on April 4, 2006.

On that date NERC filed an application for certification as the ERO and a petition seeking approval of its current voluntary reliability standards as the mandatory standards specified in FPA section 215. The Commission received no other requests for ERO certification or standards approval. On July 20, 2006, NERC was certified as Electric Reliability Organization (ERO), pursuant to the Energy Policy Act of 2005, and accepted, with some modifications and clarifications, NERC's proposed governance structure, funding, reliability standards development process, enforcement program and pro forma Regional Entity delegation agreement.

The Commission reviewed NERC's April 4, 2006, application according to criteria spelled out in Order No. 672, the Commission's February 2, 2006, final rule outlining the requirements for certification of the ERO established under EPAct-05. As the ERO, NERC will be responsible for developing and enforcing mandatory electric reliability standards under the Commission's oversight. The standards will apply to all users, owners and operators of the bulk-power system.

On April 20, 2006, the Commission also granted a petition from the governors of Arizona, California, Colorado, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming to establish a regional advisory body, as provided for under the Energy Policy Act. The Western Interconnection Regional Advisory Body may provide advice to the Commission, the ERO and a Regional Entity on specified issues affecting that region, and the Commission may give deference to the advice of the regional advisory body. The Commission agreed that the Western Interconnection Regional Advisory Body may receive funding for the reasonable costs of activities it pursues under section 215(j) of the Federal Power Act.

The specific conditions, revisions and clarifications spelled out in the ERO certification order will require NERC to make a compliance filing. The Commission directed NERC to make several improvements to its proposed standardized agreement for delegating enforcement authorities to Regional Entities, including clarification of due process and other steps associated with enforcement of reliability standards. The Commission also directed NERC to make changes to the ERO's procedural rules, and to speed the process for developing new reliability standards in response to a Commission-imposed deadline.

Both the ERO and Regional Entities will be reviewed periodically to assure the statutory qualifying criteria are maintained on an ongoing basis. This will entail a self-assessment of performance three years after certification and every five years thereafter. Regional entities can recommend performance improvements for the ERO.

All proposed reliability standards must be submitted by the ERO to the Commission for its approval. Only reliability standards approved by the Commission are enforceable under the new section 215 of the Federal Power Act. The Commission may approve a proposed reliability

standard if it determines the standard is just, reasonable, not unduly discriminatory or preferential, and in the public interest.

The Commission expects to undertake a rulemaking later in 2006 as part of its review of the 102 reliability standards submitted by NERC for Commission review (RM06-16-000). The rulemaking will determine which of NERC's standards meet statutory requirements and which require further development. In anticipation of the pending reliability standards rulemaking, the Commission on May 11, 2006, released a preliminary staff assessment of NERC's standards and convened a technical conference on July 6, 2006.

The ERO and Regional Entities must monitor compliance with the reliability standards. They may direct violators to comply with the standards, and impose penalties for violations, subject to review by, and appeal to, the Commission. While the ERO is responsible for compliance and enforcement under Commission oversight, the statute provides that the Commission can investigate compliance and impose penalties independently of the ERO.

H.2.2 Submitted Transmission Monitoring report to Congress

Within 180 days of the enactment of EPAct-05, the Department of Energy (DOE) and FERC were to issue a report to Congress on Transmission System Monitoring, i.e., the steps which must be taken to establish a system to make available to all transmission owners and regional transmission organizations (RTOs) in the Eastern and Western interconnections real-time information on the functional status of all transmission lines within the interconnections. The report was issued on February 2, 2006.

The study was to assess technical means for implementing a transmission information system and to identify the steps the Commission or Congress would need to take to require implementation of such a system.

The report found that:

- Technology currently exists that could be used to establish a real-time transmission monitoring system to improve the reliability of the nation's bulk power system; and
- Emerging technologies hold the promise of greatly enhancing transmission system integrity and operator situational awareness, thereby reducing the possibility of regional and inter-regional blackouts.

The analysis identified nine steps that could be taken to establish, and two steps that could be taken to implement, an interconnection-wide real-time monitoring system that could give a near-instant picture of the transmission system's health.

The report recommended that the following nine steps should be taken if an interconnection-wide real-time monitoring system is to be pursued:

1. Define what a real-time monitoring system is, what it should accomplish, and how to accomplish this goal, including an explanation of the terms "real-time information" and "functional status."
2. Evaluate existing real-time monitoring technologies and their limitations.
3. Identify the communications infrastructure required and related security and operating issues.
4. Define data requirements.
5. Identify promising emerging technologies.
6. Decide what data should be shared, with whom, and when.
7. Decide who should operate, use, and maintain the system.
8. Identify potential participants involved in establishing a real-time monitoring system.
9. Consider cost and funding issues.

The Commission identified two steps that could be followed if an interconnection-wide real-time monitoring system is to be implemented, as noted below.

1. Research and study efforts to determine feasibility, cost, and benefits of a real-time transmission monitoring system for the Eastern and Western Interconnections.
2. Based on the findings from Step 1 above, possible development of real-time monitoring system reliability standards.

H.2.3 Long-term transmission rights – Docket Nos. RM06-8-000 & AD05-7-000

Within one year, by rule or order, FERC was required to implement the subsection which requires FERC to exercise its authority under the FPA in a manner that facilitates planning and expansion of transmission facilities to meet the reasonable needs of load-serving entities (LSEs) to satisfy their native load obligations and enables LSEs to secure firm transmission rights on a long-term basis for long-term power supply to meet their service needs. In response, on July 20, FERC adopted the following seven guidelines:

1. The long-term firm transmission right should specify a source (injection node or nodes) and sink (withdrawal node or nodes), and a quantity;
2. The long-term firm transmission right must provide a hedge against day-ahead locational marginal pricing congestion charges or other direct assignment of congestion costs for the period covered and quantity specified. Once allocated,

the financial coverage provided by a financial long-term right should not be modified during its term (the "full funding" requirement) except in the case of extraordinary circumstances or through voluntary agreement of both the holder of the right and the transmission organization.

3. Long-term firm transmission rights made feasible by transmission upgrades or expansions must be made available upon request to any party that pays for such upgrades or expansions in accordance with the transmission organization's prevailing cost allocation methods for upgrades or expansions.
4. Long-term firm transmission rights must be made available with term lengths (and/or rights to renewal) that are sufficient to meet the needs of load serving entities to hedge long-term power supply arrangements made or planned to satisfy a service obligation. The length of term of renewals may be different from the original term. Transmission organizations may propose rules specifying the length of terms and use of renewal rights to provide long-term coverage, but must be able to offer firm coverage for at least a 10-year period.
5. Load-serving entities must have priority over non-load serving entities in the allocation of long-term firm transmission rights that are supported by existing transmission capacity. The transmission organization may propose reasonable limits on the amount of existing transmission capacity used to support long-term firm transmission rights;
6. A long-term transmission right held by a load-serving entity to support a service obligation should be re-assignable to another entity that acquires that service obligation;
7. The initial allocation of the long-term firm transmission rights shall not require recipients to participate in an auction.

The final rule requires independent transmission organizations such as regional transmission organizations and independent system operators that oversee organized electricity markets to make long-term firm transmission rights available to all transmission customers. The availability of such rights will provide an added measure of certainty to load-serving entities that wish to enter into long-term power supply arrangements to serve their load, which in turn should allow load-serving entities to more readily obtain financing for new infrastructure. Consistent with current practice, the guidelines also require that long-term firm transmission rights be available to entities that pay for upgrades or build expansions.

The final rule, "Long-Term Firm Transmission Rights in Organized Markets," takes effect 30 days after publication in the *Federal Register*. Transmission organizations subject to the rule are required to make compliance filings within 180 days of the final rule's publication in the Federal Register.

H.2.4 Promoting transmission investment – Docket No. RM06-4-000

EPAct-05 directed the Commission to develop incentive based rate treatments for transmission of electric energy in interstate commerce, adding a new section 219 to the Federal Power Act. The final rule was adopted on July 20, 2006. The final rule implements this new statutory directive.

For the most part, the final rule adopts the proposals put forth in the Commission's November 2005 proposed rulemaking. Key provisions of the rule include:

- Incentive rates of return on equity for new investment by public utilities (both traditional utilities and stand-alone transmission companies, or transcos);
- Full recovery of prudently incurred construction work in progress;
- Full recovery of prudently incurred pre-operations costs;
- Full recovery of prudently incurred costs of abandoned facilities;
- Use of hypothetical capital structures;
- Accumulated deferred income taxes for transcos;
- Adjustments to book value for transco sales/purchases;
- Accelerated depreciation;
- Deferred cost recovery for utilities with retail rate freezes; and
- A higher rate of return on equity for utilities that join and/or continue to be members of transmission organizations, such as (but not limited to) regional transmission organizations and independent system operators.

All rates approved under the rules would be subject to Federal Power Act rate filing standards, the Commission noted. The rule does not grant utilities all of the listed incentives, but rather allows utilities on a case-by-case basis to select and justify the package of incentives needed to support new investment. Additionally, the rule provides expedited procedures for the approval of incentives to provide utilities greater regulatory certainty and facilitate the financing of projects.

The Commission is adopting an annual reporting requirement, FERC Form 730, which will be required from utilities that have received incentive rate treatment for specific transmission projects. The annual reporting requirement would include projections and related information that detail the level of transmission investment.

The final rule, "Promoting Transmission Investment through Pricing Reform," takes effect 60 days after publication in the Federal Register.

H.2.5 Regional joint boards – Docket No. AD05-13-000

Within one year, FERC was required to convene regional joint boards under sec. 209 of the FPA to study security constrained dispatch in various market regions and submit to Congress a report on the recommendations of the joint boards. A member of the Commission was to chair each board and participate.

On September 30, 2005, the Commission issued an order that designated the market regions for the joint boards, established the joint boards, designated a Commissioner to chair each board, requested that each state nominate a board representative to the appropriate joint board and submit their name and contact information to the Commission, targeted November 2005 for the first meetings of the joint boards, recommended that the joint boards take into account the Department of Energy's report on the benefits of economic dispatch and required the joint boards to submit their recommendations to the Commission no later than May 2, 2006. The Canadian provinces, Canada and Mexico were also invited to participate, as observers, on the appropriate joint boards.

In the September 30, 2005 order, the Commission identified four regions: the South (Texas and the states in the southeast and Southwest Power Pool); the West (states in the Western Interconnection); the Northeast (New York and the states in New England); and PJM/MISO (states that are served primarily by PJM Interconnection, LLC and Midwest Independent Transmission System Operator, Inc.).

The West region consists of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota (a portion of this state is in the Western Electricity Coordinating Council), Utah, Washington and Wyoming.

In order for the Commission to submit a report to Congress regarding the recommendations of the joint boards on or before August 7, 2006, the boards were requested to submit their reports and recommendations to the Commission no later than May 2, 2006.

The initial joint board meetings for the West and South regions were held on November 13, 2005; the PJM/MISO region on November 21, 2005; and the Northeast Region on November 29, 2005. On January 6, 2006, the Commission announced that it planned to hold further joint board meetings. Additional meetings were held on February 12 and 13, 2006.

Studies and recommendations were submitted to FERC by each of the regional joint boards between May 12, 2006 and July 11, 2006. A final report to Congress has yet to be issued.

H.2.5.1 West Region report

The West Region analysis of security constrained economic dispatch (SCED) began with the Commission's definition in the Order: "the operation of generation facilities to produce energy at the lowest cost to reliably serve consumers, recognizing any operational limits of generation

and transmission facilities." The West Region Report discusses the basics of SCED and how it functions in the Western Interconnection. It also addresses three recommendations made to the Joint Boards by the DOE in *The Value of Economic Dispatch, A Report to Congress Pursuant to Section 1234 of the Energy Policy Act of 2005.*

Short summaries of the nine major issues considered by the West Region Joint Board and its recommendations to the Commission are:[1]

1. **Independence of dispatcher.** The Board examined the suggestion that independent transmission dispatch was needed to ensure fairness and the full integration of the all generation facilities into the dispatch without regard to ownership of those facilities.

   Recommendation: It was recommended that independent dispatch entities not be created for their own sake. The Board did not recommend further analysis at the time of the report, but did note that if any further analysis is deemed warranted, it must include an investigation of the potential benefit to consumers. If further work appears justified on the facts, the affected states and relevant utilities should determine the nature of the dispatching entity to be considered. Where public, cooperative and privately owned entities serve the market under consideration, their participation should be encouraged.

2. **Utility dispatch of third party power through contracts.** The Board examined the question of whether the relationship between dispatching utilities and IPPs should be governed by contract to ensure the high level of reliability and responsiveness needed for the dependable dispatch of contract units as fully functional integrated grid resources.

   Recommendation: The Board encouraged, but did not wish to duplicate, the efforts of EPSA and EEI in developing standard contractual language addressing reliability, dispatchability and other issues. The Joint Board recommended the use of contractual commitments by IPPs to provide capacity, energy and ancillary services in a manner consistent with an LSE's dispatch needs. Integrating IPPs into the dispatch in the Western Interconnection should be overseen by WECC on an interconnection-wide basis, or subregionally by an appropriate entity.

3. **Transparency of dispatch information and processes.** The Board examined the question of whether a central entity, dispatching all of the resources in a

[1] Taken in whole or in part from *Study & recommendation regarding security constrained economic dispatch by the joint board for the West Region under AD05-13.* Submittal 20060526-0064, Docket Number AD05-13-000. Submitted 5/19/2006.

region, that had more timely access to high quality information could function more efficiently and better realize the value of SCED. For competitive reasons, some entities are reticent about sharing confidential dispatch and load information with a non-independent dispatching entity.

Recommendation: Achieving transparency is not sufficient by itself to justify the creation of an independent dispatch entity. The Board recommended that the Department of Energy study ways to improve the accuracy of forecasting to improve economic dispatch and identify savings that could be achieved thereby.

4. **Consolidation of control areas in a region.** The Board looked at the question of whether consolidation of control areas might yield better information which might, in turn, enable more efficient dispatch than would be the case if several control areas simply shared information. The benefits of larger control areas for renewable technologies such as wind were discussed as was the range of information available from WECC and otherwise to smaller control areas.

   Recommendation: The Board recommended that the states, individually or jointly, consider further consolidation of control areas. Further studies should take into account [i] the value of larger control areas for renewables such as wind, and [ii] solving the problems of large control areas in scheduling within the hour. The Board further stated that any consolidation decision should be based on the needs of consumers and the region's economy for reliable and affordable power; and recommended that consolidation not be thought of as a goal in itself. Enlargements should be approached on a case-by-case basis with the assistance of WECC and possibly the WSPP.

5. **Import/export schedule changes within an hour.** The Board learned that large changes in load and large amounts of imported power make it difficult to schedule efficiently for the hour in some markets. Slow ramp rates can cause imbalances when scheduling for the hour.

   Recommendation: The Board recommended that the WECC develop a standard west-wide protocol to address the need for scheduling before, during and after the hour.

6. **Some practical limitations on economic dispatch.** The Board recognized that the physical makeup of the grid, the demands placed on it and the available generation resources sometimes impose cost, reliability and other limitations on economic dispatch to assure that the needs of the public are accommodated. Various state and regional policies also emphasize goals that go beyond "pure" economic dispatch.

Recommendation: The Board recommended that the definition of security constrained economic dispatch be flexible and broadened to include other public policies, values and physical and operational constraints as well as costs.

7. **First DOE Recommendation: review dispatch practices.** The DOE recommended that the Joint Boards review selected dispatching entities to determine how they conduct economic dispatch and document the rationale for deviations from "pure" least-cost economic dispatch.

   Recommendation: The Board recommended that this study not be pursued. "Such a study would take us deeply into variables and deviations from "pure" economic dispatch without providing much value. It is at odds with our fundamental conclusion that economic dispatch must remain a flexible concept."

8. **Second DOE Recommendation: standardize dispatch contract terms.** The DOE recommends that it and FERC encourage stakeholders to develop more standard contract terms concerning price stability, dispatchability, reliability, and penalties for not meeting performance standards.

   Recommendation: The Board recommended that the standardization of dispatch contract terms be pursued on a regional basis rather than on a national basis. The regional variances in transmission grid operating parameters throughout the Western Interconnection make a strong case for allowing development to go forward on a regional basis.

9. **Third DOE Recommendation: review dispatch tools.** Existing economic dispatch technology, including software and data used and the underlying algorithms and assumptions, deserve scrutiny.

   Recommendation: The Board recommended the development and refinement of technological tools to make the best use of existing and proposed facilities.

H.2.6 Demand response and advanced metering survey – Docket No. AD06-2-000

FERC was required to publish an annual report, by region, that assesses demand response resources. The Commission was charged to prepare a report that reviews and identifies on a regional basis, the following issues: saturation and penetration of advanced metering communication systems; existing demand response and time based rate programs; annual resource constitution of demand resources; potential for demand response as a quantifiable, reliable resource for regional planning purposes; steps taken to ensure that demand resources are provided equitable treatment in regional transmission expansion planning and operations;

and, finally, regulatory barriers to improved customer participation in demand response, peak reduction, and critical peak pricing programs. The report is to be filed within one year of ratification of the EPAct-05.

A survey on the saturation and penetration of advanced meters was proposed and implemented on March 16, 2006, and a technical conference, with comments, on issues raised by EPAct-05 section 1252(e)(3) was held on January 25, 2006. Additionally, comments were filed in response to early requests for comments.

The Staff assessment of demand response and advanced metering was presented on July 20, 2006. The main conclusions of the Staff's assessment are: demand response is important for both wholesale and retail markets; current demand response capability represents between 3% to 7% of peak demand in most regions; and there is a low penetration of enabling technologies. A report to Congress will be published on August 7, 2006.

H.2.7 Electric energy market competition – Docket No. AD05-17-000

Within one year, a five-member inter-agency task force (the "Electric Energy Market Competition Task Force"), which will include one employee from FERC appointed by the Chairman, shall submit to Congress a final report on competition within wholesale and retail markets for electric energy in the U.S. The Draft *Report To Congress On Competition In The Wholesale And Retail Markets For Electric Energy* was issued on June 5, 2006. Comments on the report were due into FERC on June 26, 2006.

H.2.8 MOU to ensure timely and coordinated review and permitting of electric transmission facilities

Not later than one year, DOE and heads of all federal agencies with authority to issue federal authorizations for electric transmission facilities shall enter into an MOU to ensure timely and coordinated review and permitting of electric transmission facilities. FERC states on its website that this action has been initiated, however there is no additional information as to the progress or current status of this action.

H.2.9 Issue Rules for applications for national transmission corridor permits

Section 1221 of EPAct-05 2005 adds a new section 216 to the Federal Power Act (FPA), providing for federal siting of electric transmission facilities under certain circumstances. On June 16, 2006, FERC issued a NOPR on Regulations for Filing Applications for Permits to Site Interstate Electric Transmission Corridors.

The Energy Policy Act provides for federal backstop siting authority of certain electric transmission facilities in order to increase transmission capacity and maintain system reliability. Upon the Secretary of Energy's designation of national interest electric transmission corridors experiencing electric transmission capacity constraints or congestion that adversely

affects consumers, the Commission may issue permits to construct or modify electric transmission facilities if the Commission finds:

(1) a state in which a facility is located does not have siting authority, or state law precludes consideration of interstate benefits;

(2) the applicant for the facility does not qualify to apply for siting approval in the state because the applicant does not serve end-use customers in the state;

(3) the state with siting authority takes longer than one year after the application is filed to act; or

(4) the state imposes conditions on a proposal such that it will not significantly reduce transmission congestion or it is not economically feasible.

The Secretary of the Department of Energy, effective May 16, 2006, determined that the Commission's expertise in siting energy facilities would prove beneficial to this process and, as a result, delegated to the Commission certain aspects of the coordination of federal authorizations and related environmental review.

A proposal to build or expand electric transmission facilities brought before the Commission must be used for interstate commerce, be consistent with the public interest, significantly reduce transmission congestion in interstate commerce, be consistent with national energy policy, and maximize as much as possible existing towers and structures.

In the proposed rule, the Commission seeks to facilitate maximum participation from all interested stakeholders through a Public Participation Plan and an extensive pre-application and post-application process. The proposed participation plan would provide all interested parties, including affected landowners, with information on all aspects of the proposed project, including national and local benefits and environmental impacts. The participation plan ensures ample opportunity for public involvement during the pre-filing and application processes. The participation plan would be accessible in a central location in each county through which the proposed project would be located.

The proposed pre-filing process includes a consultation with the Director of the Office of Energy Projects (OEP), the start of environmental review under the National Environmental Policy Act, numerous public participation opportunities, and a determination by the Director of OEP that an application is ready to be filed for Commission consideration. Once an application is filed, the proposed rule calls for notifying the public of the application, issuing and soliciting comments on the draft environmental document, preparing and issuing a final environmental document, reviewing the record and issuing a final decision by the Commission.

Comments on the proposed rule are due 60 days from publication of the NOPR in the Federal Register.

H.2.10 FERC Open Access Transmission Tariff (OATT) reform

FERC may by rule or order require comparable open access to be provided by non-regulated (FPA sec. 201(f)) transmission utilities. (sec. 1231) Docket No. RM05-25-000 (Order 888 Reform) a Notice of Inquiry (NOI) regarding pro forma open access transmission tariff needs reform was issued on September 15, 2005. There were 23 topics requested industry response:

1. ***Undue Discrimination Generally:*** In Order No. 888, the Commission adopted a functional unbundling approach as a remedy for undue discrimination. Since that time, the Commission has found that the incentive and opportunity for undue discrimination nonetheless continues to exist. The Commission therefore encouraged the structural separation of generation from transmission through RTOs, ISOs and similar organizations. The Commission is interested in receiving comments on whether there are remedies other than structural separation that would adequately address undue discrimination.

2. ***Transmission Pricing:*** The Commission is interested in receiving comments on whether any reforms to the Commission's transmission pricing policies should be considered as part of OATT reform.

3. ***Network and Point-to-Point Transmission Service:*** In Order No. 888, the Commission required each public utility to offer transmission services that it is reasonably capable of providing, not just those services that it is currently providing to itself or others. In this NOI the Commission invited comments on whether reforms to the Commission's transmission pricing policies should be considered as part of OATT reform.

4. ***Untimely Processing of Requests for Transmission Service:*** Some of the deadlines for transmission provider responses to requests for transmission service are not clearly specified and have been implemented in different ways. FERC asked whether reforms are needed to better define the obligations of public utility transmission providers, whether current time frames are adequate, and whether transmission customers have encountered delays that were unduly discriminatory or preferential.

5. ***Remedies, Penalties and Enforcement:*** The EPAct of 2005 gives FERC civil penalty authority for violations of the Federal Power Act. The Commission is interested in receiving comments on whether it should address the issue of remedies or penalties as part of OATT reform.

6. ***Hourly Firm Transmission Service:*** The pro forma OATT provides that the minimum term for firm point-to-point transmission service be one day, but some transmission providers have filed to allow for one hour service. FERC asks whether transmission providers should be required to offer hourly firm point-to-point transmission service and how it should be implemented if so required.

7. ***Changes in Receipt and Delivery Points (Redirects):*** FERC asked if transmission customers had been unduly discriminated against in attempting to modify receipt and delivery points, and whether there were problems with the pro forma OATT section 22.2 that needed correction, or if it were a matter of enforcement.

8. ***Rollover Rights:*** FERC asked if the rollover rights provisions of the pro forma OATT section 2.2 need to be revised, clarified, or reconsidered.

9. ***Rules, Standards and Practices Governing the Provision of Transmission Service:*** FERC noted that many of the "rules, standards, and practices" affecting transmission service were not specified in the OATT. FERC asks whether such rules, standards, and practices should be included in a public utility's OATTs. Additionally, FERC asked if rules, standards and practices not required to be included in OATTs be required to be posted on public utilities' OASIS to increase transparency.

10. ***Joint Transmission Planning:*** FERC asks if the requirement to pay credits for jointly planned facilities paid for by transmission customers has the effect of discouraging joint planning. Additionally, FERC asked if joint transmission planning should be mandatory, and what reporting obligations should accompany joint transmission planning. FERC also asked if credits should be paid for transmission facilities built by point-to-point transmission customers and if the credits should be provided only for point to point of a longer term, such as five years.

11. ***Obligation to Expand Capacity:*** The pro forma OATT requires public utility transmission providers to expand capacity, if necessary, to satisfy the needs of network transmission customers and point-to-point transmission service customers. FERC asks whether these requirements are meeting transmission customer needs, what changes are needed if not, and if there are other changes needed to encourage the building of transmission.

12. ***Joint Ownership:*** In Order No. 888-A, the Commission required each public utility that owns interstate transmission facilities with a non-jurisdictional entity to offer open access transmission service over its share of the joint facilities. Order No. 888 did not address the possibility of existing transmission customers participating with the transmission provider in the joint ownership of new transmission facilities FERC asks if public utility transmission providers should be required to offer customers the opportunity to participate in the joint ownership of new transmission facilities and network upgrades?

13. ***Tariff Compliance Reviews:*** The Commission has relied on transmission customer complaints and staff audits to identify OATT violations. The Commission asks whether it should establish a systematic tariff review process

to monitor compliance, or continue to rely on transmission customer complaints and staff audits to identify violations.

14. ***Hoarding of Transmission Capacity:*** FERC asks if there is evidence of hoarding of transmission capacity or anticompetitive practices, and if changes in pricing policies would encourage transmission providers to make additional non-firm transmission service available.

15. ***Curtailments:*** FERC stated that complaints have been made regarding improper curtailment of service by transmission providers and FERC has found cases of improper curtailment in the past. FERC asks if there is evidence of improper curtailment and if OATT provisions governing curtailments require reform.

16. ***Reservation Priority:*** FERC if the "first-come, first-served" approach to capacity reservation has been fair and equitable when the transmission systems are oversubscribed and if there are alternative approaches that should be implemented.

17. ***Designation of Network Resources:*** The Commission described some of the OATT features governing designation of network resources, and asked if there are problems with designating network resources and if better alternatives are available.

18. ***Queuing for Long-Term Transmission Service:*** The pro forma OATT did not explicitly address queuing issues. FERC asked if there are problems associated with queuing procedures for long-term interconnection and transmission delivery services and if reform is needed. FERC also asks whether clustering of transmission requests should be required, and if customers try to manipulate the queuing processes.

19. ***Ancillary Services:*** FERC noted that it generally adopted the NERC recommendations for ancillary services, and asked if the current set of required ancillary services are the correct services needed to provide open access transmission. FERC also asked if ancillary service pricing issues should be addressed in OATT reform.

    - ***i). Energy Imbalances:*** The current pro forma OATT allows the Commission to approve energy imbalance service pricing provisions on a case-by-case basis. FERC asked if penalty charges should be revised based on the level of threat to reliability. Additionally, FERC asked if changes are needed to the energy imbalances requirements, and if energy imbalance practices have resulted in unduly discriminatory or preferential treatment.

    - ***ii). Generator Imbalances:*** The Commission did not include generator imbalance provisions in the pro forma OATT. FERC asked whether such provisions should be incorporated into the OATT to ensure comparable

treatment of transmission customers, and how generator imbalances should be priced.

20. ***Pro Forma OATT Definitions:*** FERC asked whether existing pro forma OATT terms and definitions are sufficient to ensure not unduly discriminatory transmission, or whether reforms and additional terms are needed. FERC also asked if there was any reason to not include the definition of reliable operation provided by EPAct of 2005 in the pro forma OATT.

21. ***ISO, RTO, and ITC Tariffs:*** FERC asked which issues raised in the NOI, if any, did not need to be applied to ISO, and RTO tariffs. FERC also asked which issues raised in the NOI, if any, did not need to be applied to ITCs (Independent Transmission Company).

22. ***Open Access by Unregulated Transmitting Utilities:*** The Section 1231 of EPAct authorizes FERC to require non-public utilities ("unregulated transmitting utilities") to provide open access transmission service. FERC invited comments on how best to implement this authority.

H.2.10.1 NOI comments and reply comments

Response to the NOI included over 4,000 pages of comments and reply comments from all types of industry stakeholders. FERC allowed reply comments to be filed. A total of 47 parties filed reply comments in the proceeding. The comments received were taken under consideration, and FERC released a NOPR for OATT reform.

H.2.10.2 NOPR released May 18, 2006 – Docket nos. RM05-25-000 and RM05-17-000

On May 18, 2006 FERC released a NOPR with comments due by August 7, 2006. Reply Comments due by September 20, 2006. The following summary of the NOPR is from the FERC NOPR Fact Sheet:

> The Commission proposes amendments to its regulations and to the pro forma open access transmission tariff (pro forma OATT), adopted in Order Nos. 888 and 889, to address deficiencies in the pro forma OATT that have become apparent since the issuance of Order Nos. 888 and 889.
>
> **The purpose of the proposed rule**
>
> To strengthen the pro forma OATT to ensure that it achieves its original purpose of remedying undue discrimination.
>
> To provide greater specificity in the pro forma OATT to reduce opportunities for the exercise of undue discrimination, make undue discrimination easier to detect, and facilitate the Commission's enforcement.

To increase transparency in the rules applicable to planning and use of the transmission system.

Brief overview

Major proposed reforms:

- Greater consistency and transparency in ATC calculation
- Open, coordinated and transparent planning
- Reform of energy imbalance penalties
- Reform of rollover rights policy
- Clarify tariff ambiguities
- Increase transparency and customer access to information
- Core elements of Order No. 888 being retained:
- Comparability requirement
- Protection of native load
- States jurisdiction over bundled retail load
- Functional unbundling to address undue discrimination
- Reciprocity

The applicability of the proposed rule

The proposed rule applies to all public utility transmission providers, including RTOs and ISOs.

As with Order No. 888, a public utility may propose terms and conditions of open access service that are consistent with or superior to the pro forma OATT.

The purpose of the proposed rule is not to redesign approved, fully-functional RTO or ISO markets. The Commission does not expect that substantial changes to those markets would be required as a result of this NOPR.

Significant proposed reforms

Available Transfer Capability (ATC)

ATC is the transfer capability remaining on a transmission provider's transmission system that is available for further commercial activity over and above already committed uses. Transmission providers currently calculate the ATC for their systems using different assumptions and methodologies. After concluding that the absence of a consistent ATC methodology increases the discretion of transmission providers and the opportunities for undue discrimination in application of the pro forma OATT, the Commission proposes:

To ensure consistency in the ATC calculation components, data inputs and modeling assumptions as well as consistency in the exchange of data between transmission providers

To order public utilities, working through NERC and the North American Energy Standards Board, to develop appropriate standards within 6 months of the final rule

To increase the transparency of ATC calculations through the inclusion in each transmission provider's OATT of its specific ATC calculation methodology, and through posting of relevant data and models on each transmission provider's open access same-time information system (OASIS)

To order transmission providers to post on OASIS metrics relating to transmission requests that are approved and rejected

Coordinated, open and transparent transmission planning

The Nation has experienced a decline in transmission investment relevant to load growth since Order No. 888 was issued, which has increased congestion and reduced access by customers to alternative sources of energy. The Commission concludes that transmission providers have a disincentive to remedy transmission congestion on a nondiscriminatory basis and that the current pro forma OATT does not adequately address these problems. Therefore, the NOPR proposes to require that:

Transmission providers participate in a coordinated, open and transparent planning process

Each transmission provider's planning process meet the Commission's eight planning principles, which are set forth in the NOPR and include coordination (regular meetings), openness, transparency, information exchange (including review of draft plans), comparability (plan must meet service requests and treat customers comparably), dispute resolution, regional coordination, and congestion studies (each transmission provider must prepare studies annually)

Each transmission provider must describe its planning process in its tariff.

The Commission will allow regional differences in planning processes

Transmission pricing

Pricing of imbalances – The Commission proposes to reform the pricing of imbalances (i.e., energy and generator imbalances) to ensure that it is

related to the cost of correcting the imbalance, to encourage efficient scheduling behavior, and to account for the special circumstances presented by intermittent generators, such as by waiving the higher ends of the imbalance penalties.

Credits for customer-owned transmission facilities – With respect to credits available to customers that own network transmission facilities that are integrated with the transmission provider's facilities, the NOPR proposes to clarify that the transmission provider, in designing its rates for OATT service, must treat its own facilities on a comparable basis, and proposes to eliminate the requirement that new facilities can receive credits only if they are "jointly planned" because this requirement may provide a disincentive to coordinated planning.

Capacity reassignment – For capacity reassignments by transmission customers, the NOPR proposes to eliminate the price cap (which currently is the higher of the original rate, the maximum tariff rate or the customer's opportunity cost capped at the cost of expansion) and allow negotiated rates between the customer and its assignee, but not for capacity reassigned by the transmission provider or its affiliates.

Non-Rate Terms and Conditions

Redispatch obligation – The Commission proposes to clarify that when a transmission provider determines that its system lacks capacity to fulfill a request for point-to-point service, a transmission provider must use all of its available redispatch options to satisfy a request for firm point-to-point service and, at the transmission customer's option, these redispatch options must be studied before the customer is obligated to incur the costs and time delays associated with a study of system-expansion options. The Commission also seeks comment on whether, alternatively, it should modify the nature of point-to-point service to require that transmission providers offer a "conditional firm" service that would be subject to curtailment prior to firm service only a limited number of hours of the year.

Rollover rights (right of first refusal) – The Commission proposes to revise the rollover provision in the pro forma OATT, which grants an ongoing right to transmission customers to renew or "rollover" their contracts, to apply to contracts that have a minimum term of five years, rather than the current minimum term of one year. The NOPR proposes that a customer must exercise its right of first refusal to renew the contract no less than one year prior to the expiration date of the transmission service agreement, rather than within the current 60-day period.

Hourly firm point-to-point service – The Commission proposes to require transmission providers to offer hourly firm point-to-point service under the pro forma OATT.

Designated network resources – The NOPR makes a number of clarifications related to the types of agreements that may be designated as network resources, the process for verifying whether agreements meet the requirements in the pro forma OATT, and the requirement for transmission providers to designate and undesignated network resources on OASIS.

Reservation priority – The Commission proposes to change the reservation priority rules to give priority to pre-confirmed transmission service requests submitted in the same time period as non-confirmed requests.

Examples of proposed increases in transparency

In addition to the increased transparency included in the ATC and planning reforms described above, the Commission proposes to require transmission providers to post on OASIS all business rules, practices and standards that relate to transmission services provided under the pro forma OATT, and to include credit review procedures in their OATTs.

The Commission proposes to require transmission providers and their network customers to use the transmission provider's OASIS to request designation of a new network resource and to terminate the designation of an existing network resource.

Proposed reforms to facilitate enforcement of the pro forma OATT:

The Commission proposes a number of posting and reporting requirements that will provide the Commission and market participants with information about each transmission provider's performance of pro forma OATT obligations. For example, the Commission proposes to require transmission providers to post specific performance metrics related to their completion of studies required to evaluate certain transmission requests under the pro forma OATT.

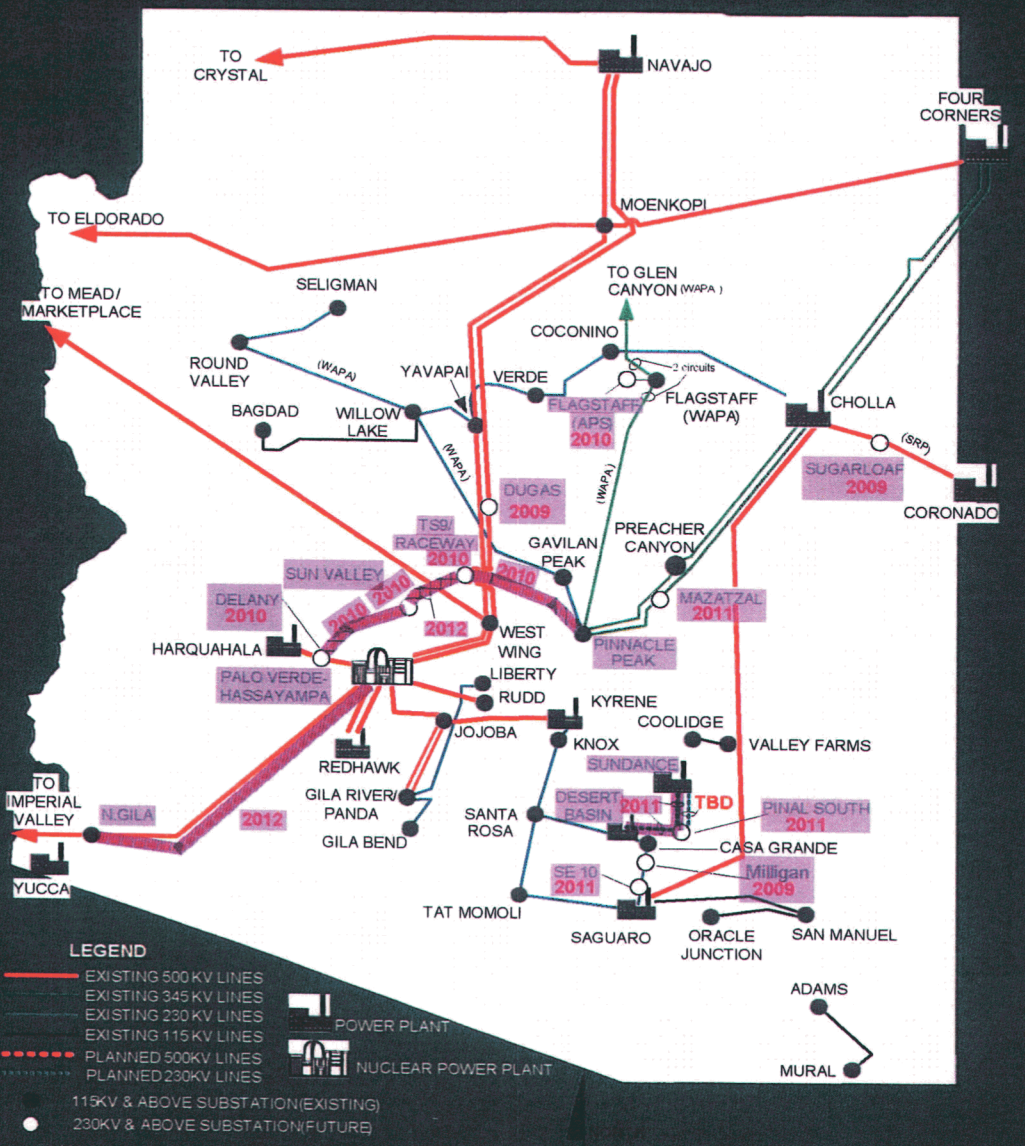
Comments on this NOPR are due by August 7, 2006. Reply Comments are due by September 20, 2006.

10-W4

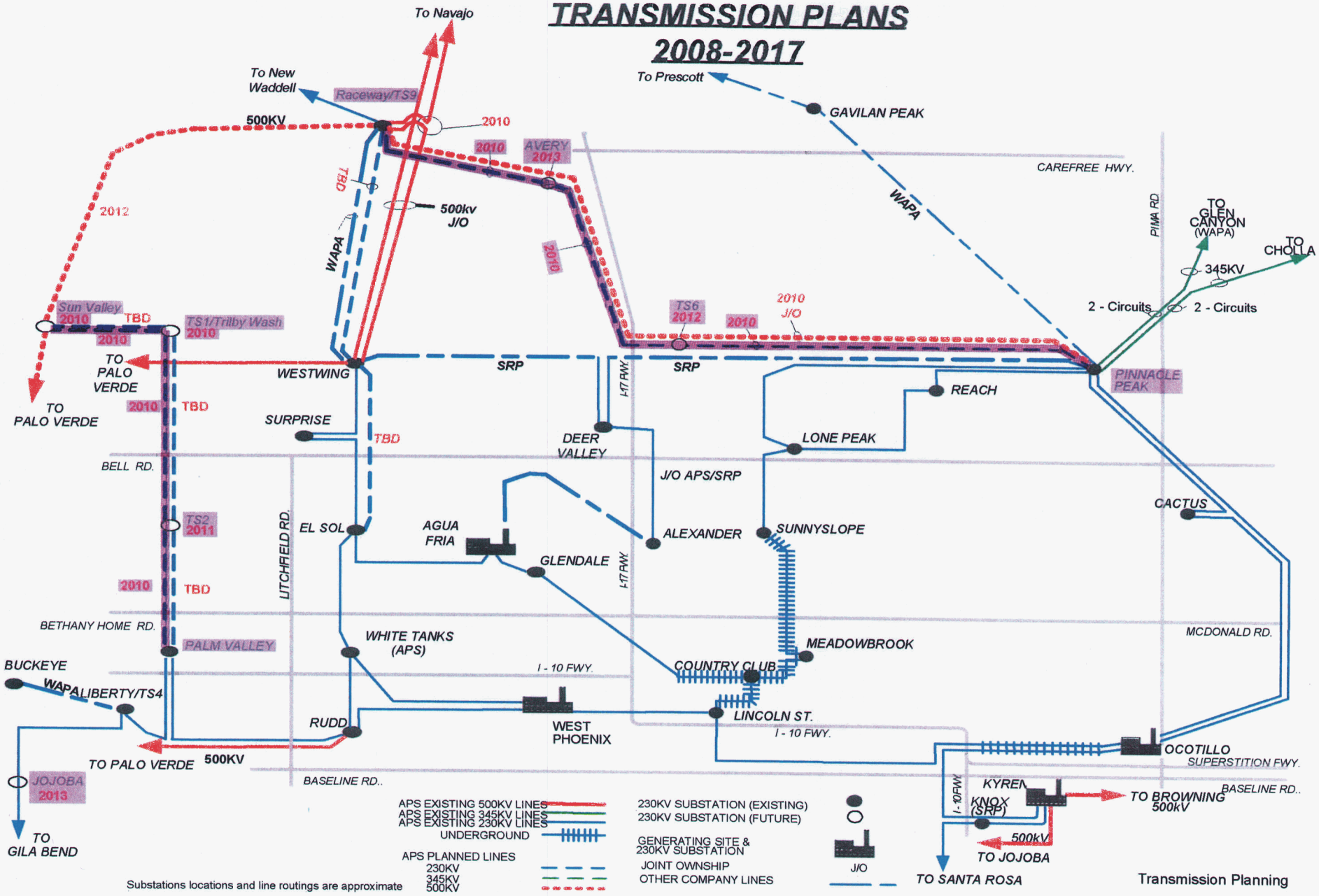
APS Ten-Year Plans 2008-2017 5th BTA Presentation

John Lucas
Manager Transmission Planning
May 22, 2008

APS EHV & OUTER DIVISION 115/230 KV TRANSMISSION PLANS 2008 - 2017



PHOENIX METROPOLITAN AREA TRANSMISSION PLANS 2008-2017



Changes from 2006 to 2008

Project	Status
Palm Valley 230/69KV Substation	Completed
Rudd-Palm Valley-TS4 230KV	Completed
Jojoba cut-in of TS4-Panda 230kV	Changed to I/S date of 2013
PV Hub-Sun Valley(TS5) 500kV	Changed to I/S date of 2010
Flagstaff 345/69kV interconnection	Changed to I/S date of 2010

Changes from 2006 to 2008

Project	Status
Sun Valley(TS5)- Trilby Wash(TS1) 230kV	Changed to I/S date of 2010
Pinnacle Peak-TS6-Avery-Raceway-TS9 230kV	Changed to I/S date of 2010
Milligan 230/69 kV Substation	New Project - 2009

Changes from 2006 to 2008

Sundance-Pinal South 230 kV	New Project - 2011
Desert Basin-Pinal South 230 kV	New Project - 2011
SE10 230/69 kV Sub	New Project - 2011
N.Gila-Yucca 230 kV	New Project - TBD
Sun Valley – TS9 230kV line	New Project - TBD
SunValley-TS11-Buckeye 230 kV	New Project - TBD
SunValley-TS10-TS11 230 kV	New Project - TBD

Technical Studies and Stakeholders

- All projects with in service dates have had technical studies and are included in the 10 Year Plan that has been filed:
  - Thermal and Post-Transient analysis (all 10 years)
  - Transient Stability analysis (2011 & 2016)
  - RMR Studies
  - SWAT studies (N-1-1 and Extreme Contingency)
- All transmission projects with an in-service date listed as To Be Determined have not had power flow studies performed

Technical Studies and Stakeholders

- All projects are included in common, jointly built base cases
- Plans are presented to SWAT and WestConnect
  - Participation in projects are open to all stakeholders
  - Project updates are regularly given at SWAT and WestConnect meetings
- WECC
  - Transmission projects seeking a WECC rating go through the WECC 3-phase rating process

Technical Studies and Stakeholders

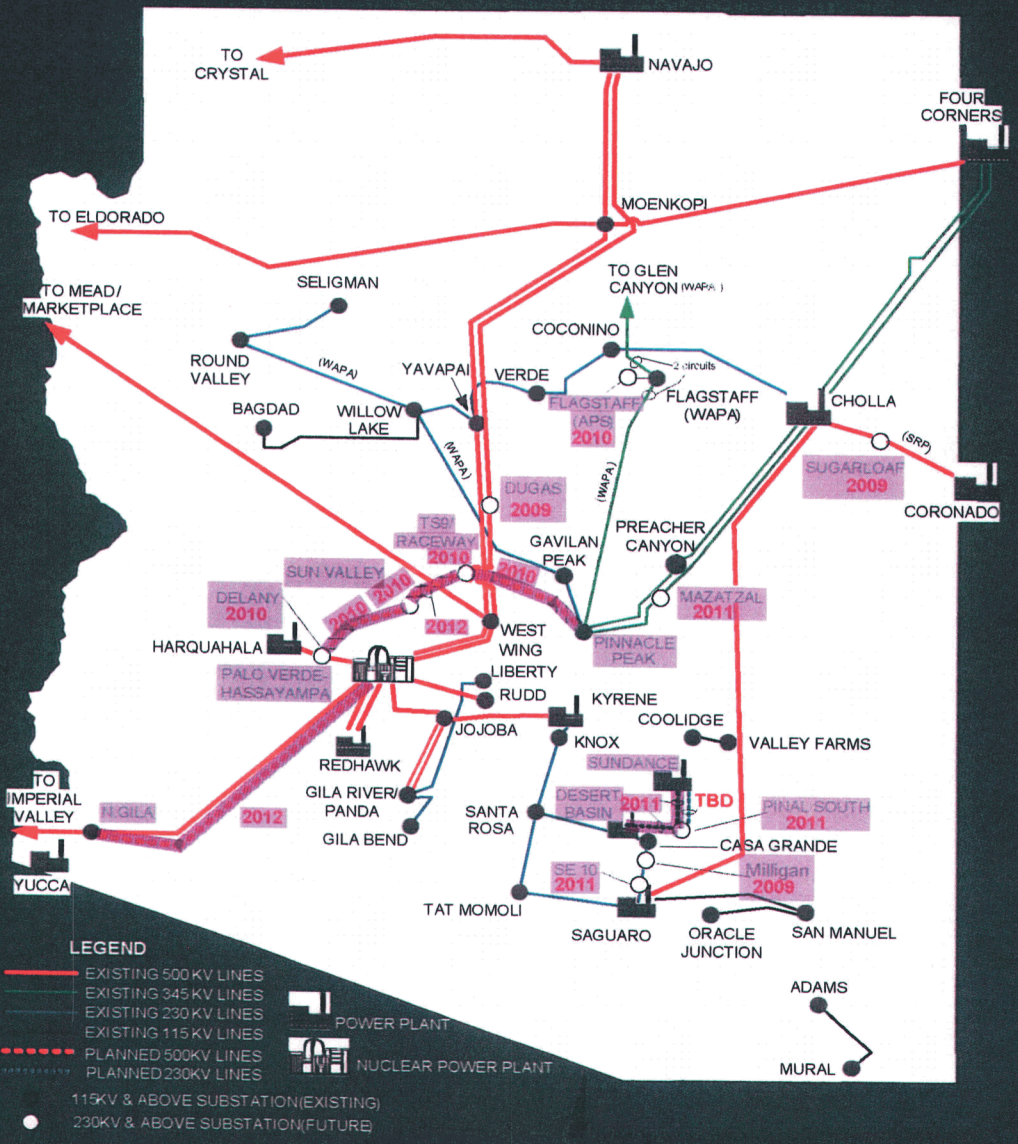
- APS holds regular coordination meetings with SRP and WAPA
- Project(s) interconnecting into jointly owned facilities undergo interconnection process and review by appropriate technical review group; i.e. WATS
- Plans included in all WECC, WestConnect, and SWAT base cases

Questions ?

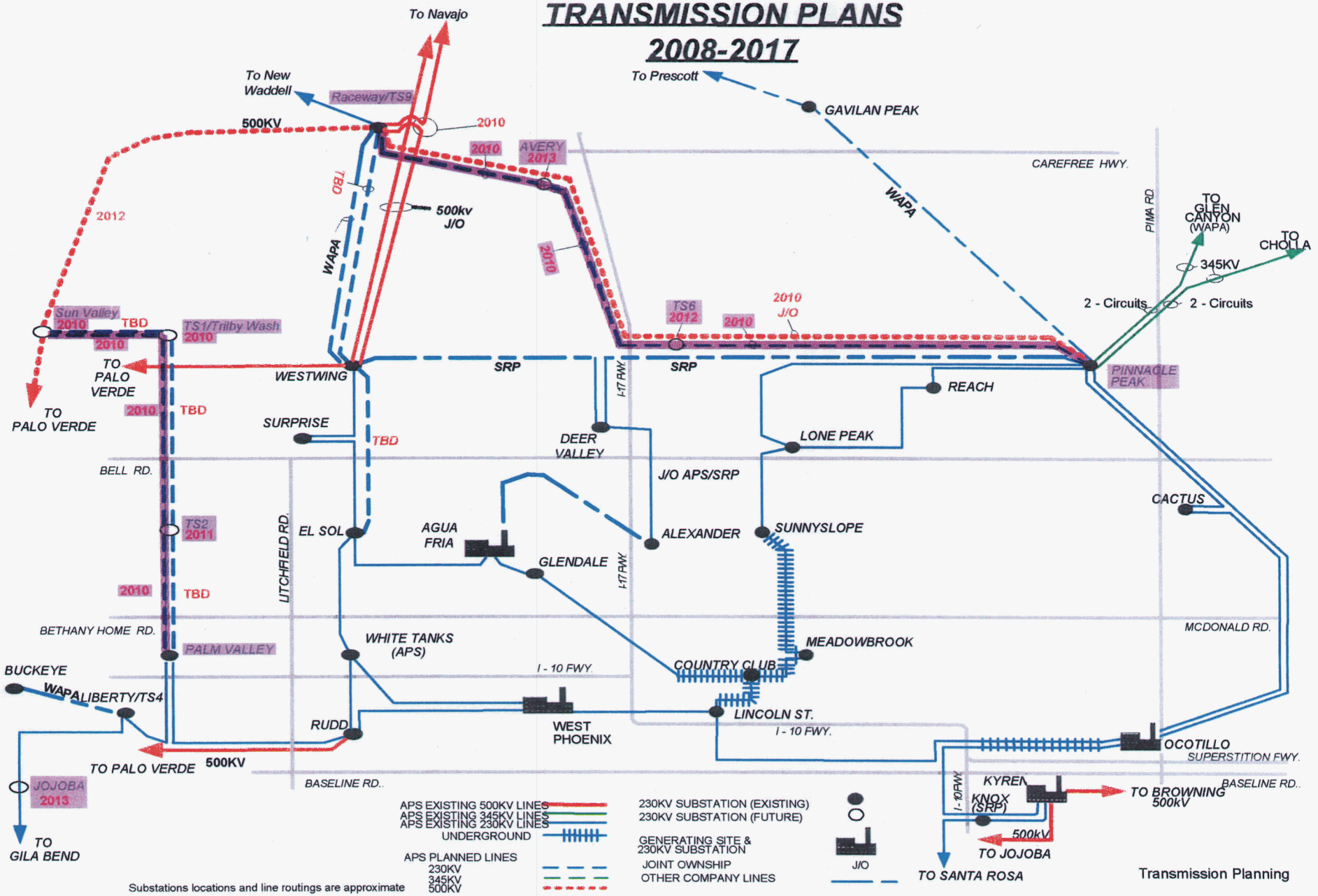
APS Ten-Year Plans 2008-2017 5th BTA Presentation

John Lucas
Manager Transmission Planning
May 22, 2008

APS EHV & OUTER DIVISION 115/230 KV TRANSMISSION PLANS 2008 - 2017



PHOENIX METROPOLITAN AREA TRANSMISSION PLANS 2008-2017



Changes from 2006 to 2008

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Changes from 2006 to 2008

Project	Status
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Pinnacle Peak-TS6-Avery-Raceway-TS9 230kV	Changed to I/S date of 2010
Milligan 230/69 kV Substation	New Project - 2009

Changes from 2006 to 2008

Sundance-Pinal South 230 kV	New Project - 2011
Desert Basin-Pinal South 230 kV	New Project - 2011
SE10 230/69 kV Sub	New Project - 2011
N.Gila-Yucca 230 kV	New Project - TBD
Sun Valley – TS9 230kV line	New Project - TBD
SunValley-TS11-Buckeye 230 kV	New Project - TBD
SunValley-TS10-TS11 230 kV	New Project - TBD

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- Plans included in all WECC, WestConnect, and SWAT base cases

Questions ?

10-W5

GATEWAY SOUTH AND TRANSWEST EXPRESS
CONCEPTUAL TECHNICAL REPORT

APPENDIX - MAPS OF STUDIED ALTERNATIVES

Prepared for:

National Grid
Arizona Public Service Company
PacifiCorp
Wyoming Infrastructure Authority

Prepared by:

Black & Veatch

January 23, 2008

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

Gateway South
Gateway West
500KV Double Circuit
345KV Single Circuit
Power Plant
Substation

Approx. Scale

200 Miles

CASE 1

Gateway South Facilities

- Aeolus – Mona 500KV Double Circuit
- Sigurd – Red Butte – Crystal 345KV Single Circuit

TransWest Express Facilities

- None

Transfer Capacity

3000 MW Leaving Wyoming
3000 MW Aeolus – Mona
800 MW Sigurd – Crystal
0 TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

Gateway South
Gateway West
500KV Double Circuit
500KV Single Circuit
Power Plant
Substation

Approx. Scale

200 Miles

CASE 2

Gateway South Facilities

- Aeolus – Mona 500KV Double Circuit
- Mona – Red Butte – Crystal 500KV Single Circuit

TransWest Express Facilities

- None

Transfer Capacity

3000 MW Leaving Wyoming
3000 MW Aeolus – Mona
1500 MW Mona – Crystal
0 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 3

Gateway South Facilities

- None

TransWest Express Facilities

- Dave Johnson – Pinnacle Peak 500KV HVDC

Transfer Capacity

3000 MW Leaving Wyoming
0 MW Aeolus – Mona
0 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 4

Gateway South Facilities

- None

TransWest Express Facilities

- Wyoming – Marketplace 500KV HVDC

Transfer Capacity

3000 MW Leaving Wyoming
0 MW Aeolus – Mona
0 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
Gateway South
Gateway West
500KV Double Circuit
500KV HVDC
500KV Single Circuit
Power Plant
Substation

Approx. Scale

200 Miles

CASE 5

Gateway South Facilities

- Aeolus – Mona 500KV Double Circuit
- Mona – Red Butte – Crystal 500KV Single Circuit

TransWest Express Facilities

- Wyoming – Marketplace 500KV HVDC

Transfer Capacity

6000 MW Leaving Wyoming
3000 MW Aeolus – Mona
1500 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

CASE 6

Gateway South Facilities

- Aeolus – Mona 500KV Double Circuit
- Mona – Red Butte – Crystal 500KV Double Circuit
- Dave Johnston – Mona 500KV Single Circuit

TransWest Express Facilities

- None

Transfer Capacity

4500 MW Leaving Wyoming
4500 MW Aeolus/Dave Johnston – Mona
3000 MW Mona – Crystal
0 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
Gateway South
Gateway West
500KV Double Circuit
500KV Single Circuit
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 7

Gateway South Facilities

- Dave Johnston – Mona 500KV Single Circuit
- Aeolus – Mona – Red Butte – Crystal 500KV Double Circuit

TransWest Express Facilities

- Wyoming – Pinnacle Peak 500KV HVDC

Transfer Capacity

7500 MW Leaving Wyoming
4500 MW Aeolus/Dave Johnston – Mona
3000 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
500KV Single Circuit
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 8

Gateway South Facilities

- None

TransWest Express Facilities

- Wyoming – Marketplace 500KV HVDC
- Marketplace – Pinnacle Peak 500kv Single Circuit

Transfer Capacity

3000 MW Leaving Wyoming
0 MW Aeolus – Mona
0 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
Gateway South
Gateway West
500KV Double Circuit
500KV Single Circuit
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 9

Gateway South Facilities

- Aeolus – Mona 500KV Double Circuit
- Mona – Red Butte – Crystal 500KV Single Circuit

TransWest Express Facilities

- Wyoming – Pinnacle Peak 500KV HVDC

Transfer Capacity

6000 MW Leaving Wyoming
3000 MW Aeolus – Mona
1500 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
Gateway South
Gateway West
500KV Double Circuit
500KV Single Circuit
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 10

Gateway South Facilities

- Aeolus – Mona 500KV Double Circuit
- Mona – Red Butte – Crystal 500KV Single Circuit

TransWest Express Facilities

- Wyoming – Marketplace 500KV HVDC
- Marketplace – Pinnacle Peak 500KV Single Circuit

Transfer Capacity

6000 MW Leaving Wyoming
3000 MW Aeolus – Mona
1500 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
Gateway South
Gateway West
500KV Double Circuit
500KV Single Circuit
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 11

Gateway South Facilities

- Aeolus – Mona 500KV Double Circuit
- Mona – Red Butte – Crystal 500KV Single Circuit

TransWest Express Facilities

- Wyoming – Marketplace – Pinnacle Peak 500KV HVDC
- Third Terminal at Marketplace

Transfer Capacity

6000 MW Leaving Wyoming
3000 MW Aeolus – Mona
1500 MW Mona – Crystal
3000 MW TransWest Express

(Routes shown are for illustration only and will be selected only following a comprehensive environmental review process)

TransWest Express
Gateway South
Gateway West
500KV Double Circuit
500KV Single Circuit
500KV HVDC
Power Plant
Substation

Approx. Scale

200 Miles

CASE 12

Gateway South Facilities

- Dave Johnston – Mona 500KV Single Circuit
- Aeolus – Mona – Red Butte – Crystal 500KV Double Circuit

TransWest Express Facilities

- Wyoming – Marketplace 500KV HVDC
- Marketplace – Pinnacle Peak 500KV Single Circuit

Transfer Capacity

7500 MW Leaving Wyoming
4500 MW Aeolus/Dave Johnston – Mona
3000 MW Mona – Crystal
3000 MW TransWest Express

10-W6

WEST CONNECT

Enhancing wholesale electricity markets in the southwest

2007
WestConnect Transmission Plan

A Report Detailing the
Electrical Transmission System Expansion Plan
Within the WestConnect Planning Area
During the 2008-2017 Timeframe

January 5, 2008

A Report Prepared by:

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FOREWORD

This report has been prepared on behalf of the WestConnect subregional planning participants. It was prepared in accordance with a contract agreement between K.R. Saline and Associates, PLC ("KRSA") and WestConnect. It is considered a public document. However, use of the report by other parties shall be at their own risk. Neither KRSA nor WestConnect accepts any duty of care to such third parties.

KRSA is appreciative of the cooperation and support of the WestConnect planning participants throughout the inaugural WestConnect subregional planning process. Their attendance at subregional planning meetings, performance of technical studies, and contribution of data and information for this report has been exemplary. This indicates their continued commitment to improve and perfect an open, transparent and stakeholder driven subregional planning process that was in place prior to formation of the WestConnect planning process.

In conducting this report, KRSA has exercised due and customary care but has not, save as specifically stated, independently verified information provided by others. No other warranty, express or implied is made in relation to the conduct of KRSA or any specific content of this report. Therefore, KRSA assumes no liability for any loss resulting from errors, omissions or misrepresentations made by others.

Any recommendations, opinions or findings stated in this report are based on circumstances and facts as they existed at the time the work was performed. Any changes in such circumstances and facts upon which this report is based may adversely affect any recommendations, opinions or findings contained herein. No part of this report may be modified or deleted to change the content or context, without the express written permission of WestConnect and KRSA.

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OVERVIEW

This 2007 WestConnect Transmission Plan ("Plan") is the first subregional transmission plan coordinated and assembled on behalf of WestConnect subregional planning participants and stakeholders. The authority and purpose of this WestConnect Transmission Plan is derived from the May 2, 2007 WestConnect Project Agreement for Subregional Transmission Planning ("STP Agreement").[1] The subregional planning process utilized to develop and coordinate the transmission plans contained in this Plan is documented in a complimentary companion report entitled "2007 WestConnect Transmission Planning Report."[2]

This Plan includes the ten-year transmission plans of the parties that have signed the WestConnect STP Agreement. The 2007 Plan also includes transmission plans of other parties that have proposed, studied, presented and sought stakeholder comments on their respective transmission projects during the 2007 subregional planning processes active within the WestConnect Planning Area depicted in Figure 1. A Transmission Plan Guide has been developed to establish the prerequisite requirements for inclusion of transmission projects in future WestConnect Transmission Plans. That guide is enclosed as Exhibit A to this document.

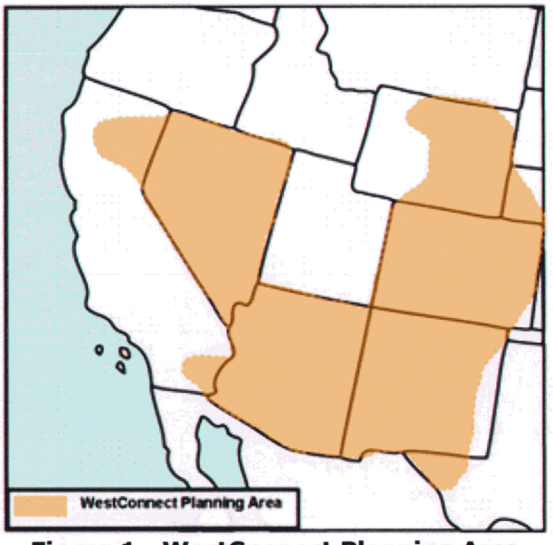

Figure 1 - WestConnect Planning Area

Each proposed transmission project contained in this Plan is separate and stands on its own merit. A description of each proposed transmission project is provided in the appendix of the project's respective sponsor and participating parties. However, the nature of the WestConnect Transmission Plan is to looks at the aggregation of all of the proposed projects as a coordinated transmission system expansion plan for the entire WestConnect planning area. Therefore this document presents the transmission projects contained in the Plan from a system perspective without regard to sponsorship or ownership.

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[1] http://www.westconnect.com/filestorage/050207RegionalPlanningProjectAgreementExecutionCopy.pdf
[2] http://www.westconnect.com/filestorage/WestConnect_Planning_Report__FINAL.pdf

The first annual WestConnect Transmission Plan is supported by the planning processes and stakeholder involvement described in the 2007 WestConnect Transmission Planning Report. The Plan has been assembled into three sections: Summary of WestConnect Transmission Plan, Exhibits and Appendices. Each section is integral to deriving an understanding of how the Plan was compiled and incorporated within this report.

The summary of the WestConnect Transmission Plan looks at the assembled transmission plans and draws generalities and cumulative totals for the entire WestConnect planning area. This first section is primarily a narrative describing the Plan with supporting summary tables and charts. It also provides of a summation of the Plan from a voltage classification, in service date and state perspective.

The second section of the Plan consists of a variety of Exhibits. Exhibit A is a WestConnect Transmission Plan Guideline[3] developed to establish prerequisites for inclusion of transmission projects in future WestConnect Transmission Plans. Exhibits B through D provide a tabular listing of the WestConnect Transmission Plan sorted respectively by voltage class, in service date and state traversed. Exhibit E consists of a series of maps that depicts the WestConnect Transmission Plan in a geographical form. Many of the proposed transmission projects have not yet been through a siting process to establish a specific route. Therefore the maps do not provide route specific information regarding the projects.

The third section of this report consists of appendices that depict the material supplied by individual utilities or transmission project sponsors in support of this WestConnect Transmission Plan. Each appendix contains a short summary of the utility's projects followed by a data form for each project as described by that utility. Sponsored projects can either be planned projects or projects that are only in the conceptual stages. Projects are listed within each utility's appendix in order of expected in-service date without consideration to whether the project is planned or conceptual although they are dually noted. The last appendix contains material for projects still in search of a sponsor. Non-sponsored projects are projects that are identified as general areas of need within the transmission system and follow the sponsored projects in the Appendix. Each non-sponsored project is preceded by a brief introduction describing the identified need and if the project had a potential staged roll-out the stages are depicted.

[3] http://www.westconnect.com/filestorage/Transmission_Plan_Guide.pdf posted on the WestConnect website on October 24, 2007 and presented at the WestConnect Planning Workshop on November 1, 2007.

SUMMARY OF WESTCONNECT TRANSMISSION PLAN

The following summary of the WestConnect Transmission Plan includes an overview of the entire WestConnect planning area from a transmission planning perspective. Included in this summary is the total new and upgraded transmission lines planned for the next ten years and the total estimated capital cost of the transmission plans. A complete detailed listing of each transmission project by name, estimated cost, length in miles is provided and sorted by voltage class, year of planned in-service and state traversed in corresponding Exhibits B through D. A series of maps provided in Exhibit E depict the Plan in geographical form.

The 2007 WestConnect Transmission Plan includes 106 planned new or rebuilt/upgraded transmission projects with a combined approximate length of 4636 miles, 46 planned transmission substations and 6 planned transmission class transformers at an estimated 7 billion dollar capital cost. Additionally, the 2007 WestConnect Transmission Plan includes 22 conceptual new or rebuilt/upgraded transmission projects with a combined approximate length of 1756 miles and 3 conceptual transmission substations at an estimated 6.2 billion dollar capital cost. These numbers include transmission lines and substations being built and transformers being installed in portions of Arizona, California, Colorado, Nebraska, New Mexico, Nevada, Texas and Wyoming. Some projects do not have accurate cost estimates or line length data at this point in the planning process but have been included in the total number of projects.

PLAN SORTED BY VOLTAGE CLASS

Transmission lines projects contained in the 2007 WestConnect Transmission Plan are listed in Exhibit B and are sorted in tabular form by voltage class and grouped by either "planned" or "conceptual". The following table summarizes the transmission line projects, sorted by voltage class showing the number of projects, miles of transmission line and the estimated capital cost.

Voltage Class	Number of Planned Transmission Projects	Length (Miles)	Estimated Cost (2008 Dollars)
500 kV(AC/DC)	12	1896	$4,386,400,000
345 kV	6	423	$417,000,000
230 kV	51	1930	$1,826,200,000
Below 230 kV	37	387	$339,253,209
Totals	**106**	**4636**	**$6, 968,853,209**

Table 1 – WestConnect Plan Voltage Class Summary – Planned Transmission Projects

Voltage Class	Number of Conceptual Transmission Projects	Length (Miles)	Estimated Cost (2008 Dollars)
500 kV (AC/DC)	7	4062	$5,870,000,000
345 kV	2	71	$122,000,000
230 kV	9	106	$212,000,000
Below 230 kV	4	17	TBD
Totals	**22**	**4256**	**$6,204,000,000**

Table 2 – WestConnect Plan Voltage Class Summary – Conceptual Transmission Projects

Currently there are 19 planned or conceptual 500 kV transmission projects within the WestConnect planning area. The WestConnect planning participants will build or upgrade a total of 5958 miles of 500 kV AC or 500 kV DC transmission lines at an estimated cost of 10.4 billion dollars over the next ten years. This portion of the Plan accounts for 78% of the Plan's total transmission investment. This voltage class is predominately shaped by two mega projects. The 500 kV AC conceptual High Plains Express Transmission Project originates in Wyoming and is routed thru Colorado and New Mexico to an undetermined terminus in Arizona. The TransWest Express 500 kV DC Project is of comparable length with the same states of origin and terminus but is routed through Utah and Nevada. The remaining 17 projects are of the more traditional 500 kV transmission project variety. A complete breakdown of all 500 kV projects is depicted on Exhibit B-1 and Exhibit B-2.

At the time of this report, there are 8 planned or conceptual 345 kV transmission projects within the WestConnect planning area. The WestConnect planning participants plan to construct or upgrade a total of 494 miles of 345 kV transmission lines at an estimated cost of 539 million dollars over the next ten years accounting for 5% of the Plan's total estimated transmission investment. A majority of the 345 kV lines will be built in Colorado to help serve local load and interconnect new generation and renewable resources and export excess resources to load growth areas outside of Colorado. It is anticipated that some of these projects may serve as the Colorado collector system for the High Plains Express Project. A complete breakdown of all 345 kV projects is depicted on Exhibit B-3 and Exhibit B-4.

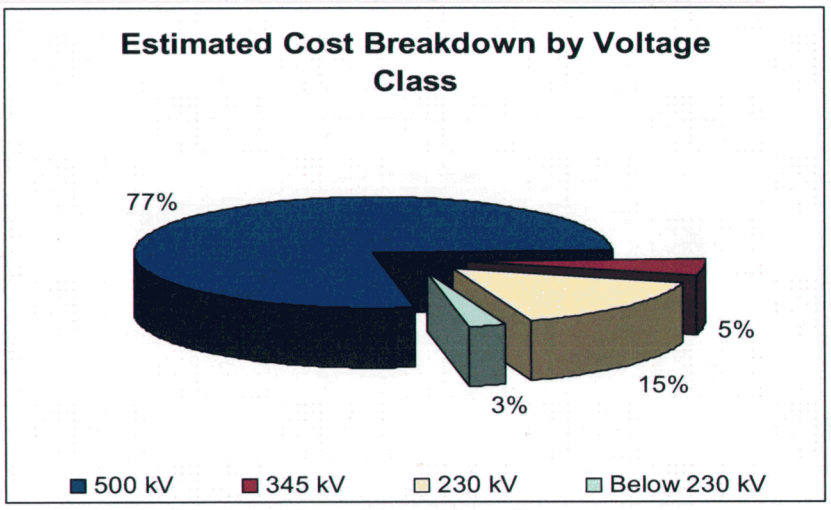


Figure 2 – Cost Distribution by Voltage Class

There are currently 60 planned or conceptual 230 kV transmission projects and 41 planned or conceptual transmission projects below 230 kV within the WestConnect planning area.

Approximately 2036 miles of new or rebuilt/upgraded 230 kV transmission lines are in planned or conceptual stages with to be built within the next ten years at an estimated cost of just over 2.0 billion dollars accounting for 15% of the Plan's total estimated transmission investment. A majority of the 230 kV lines will be built in Arizona, California and Colorado to serve local load growth. A complete breakdown of all 230 kV projects is depicted on Exhibit B-4 thru B-6.

Approximately 404 miles of new or rebuilt/upgraded 115 and 138 kV transmission lines are in planned and conceptual stage for construction within the next ten years at an estimated cost of 398 million dollars accounting for 3% of the Plan's total transmission investment. A majority of the 115-161 kV transmission lines will be built in Southern Arizona to help serve local load growth. Exhibit B-7 and Exhibit B-8 display a detailed breakdown of the WestConnect 138 kV and 115 kV transmission projects for the WestConnect planning area.

PLAN SORTED BY IN-SERVICE DATE

The 2007 WestConnect Transmission Plan transmission line projects are listed in Exhibit C and are sorted in tabular form by in-service date and grouped by either "planned" or "conceptual". The following table summarizes the transmission line projects by in-service date showing the number of projects, miles of line and estimated capital cost. Projects reported with a "to be determined" or "TBD" date are grouped together with the projects planned for the year 2018. The following tables and charts show the planned transmission line projects:

In-Service Year	Number of Planned Projects	Length (Miles)	Estimated Cost (2008 Dollars)
2008	9	245	$71,401,359
2009	14	425	$459,252,341
2010	20	1068	$2,012,399,509
2011	8	316	$640,000,000
2012	18	734	$1,323,400,000
2013	9	1406	$2,277,700,000
2014	7	193	$25,000,000
2015	5	87	$59,500,000
2016	1	22	TBD
2017	1	56	$0
2018 or TBD	14	84	$100,200,000
Totals	**106**	**4636**	**$6, 968,853,209**

Table 3 – WestConnect In-Service Date Summary – Planned Transmission Projects

The chart in Figure 3 graphically displays the number of projects and planned transmission investment (in millions of dollars) by the planned in-service date of the project. Also notable is the large number of projects without specific in service dates ("TBD") that are grouped in the final column. The projects are generally projects with an identified long term need and plan, but without specific timelines associated with the projects.

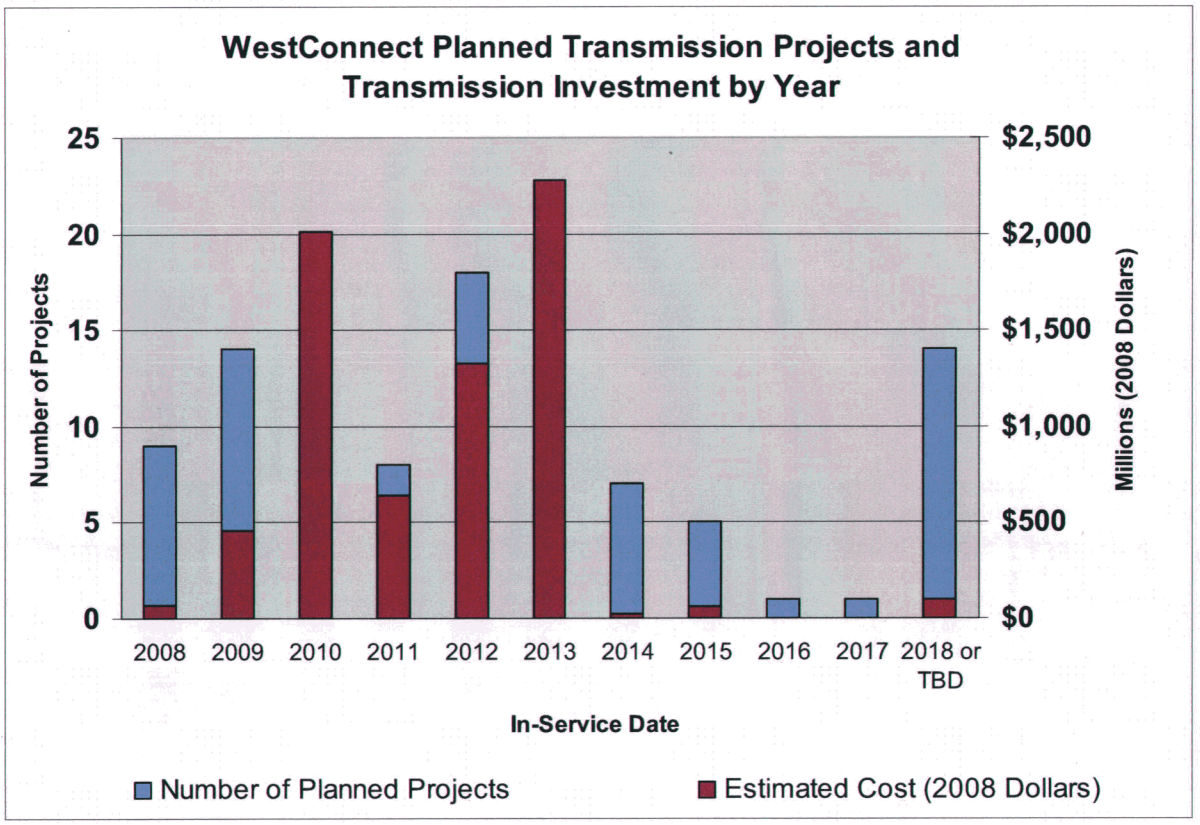


Figure 3 – Number of Planned Transmission Projects and Investment Cost by Year

The following table summarizes the transmission line projects by in-service date showing the number of projects, miles of line and estimated capital cost. Projects reported with a "to be determined" or "TBD" date are grouped together with the projects planned for the year 2018. The following tables and charts show the conceptual transmission projects:

In-Service Year	Number of Conceptual Projects	Length (Miles)	Estimated Cost (2008 Dollars)
2008	0	0	$0
2009	0	0	$0
2010	0	0	$0
2011	3	68	TBD
2012	1	.2	TBD
2013	3	372	$800,000,000
2014	2	102	$192,000,000
2015	3	1043	TBD
2016	2	42	$27,000,000
2017	1	2500	$5,000,000,000
2018 or TBD	7	130	$185,000,000
Totals	**22**	**4256**	**$6,204,000,000**

Table 4 – WestConnect In-Service Date Summary – Conceptual Transmission Projects

The chart in Figure 4 graphically displays the number of projects and conceptual transmission investment (in millions of dollars) by the planned in-service date of the project. Notably, the large conceptual transmission investment in 2013 is the SunZia project that will cost an estimated eight hundred millions dollars. Also notable is the large planned transmission investment in 2017 is the High Plains Express project that will cost an estimated five billions dollars. Also notable is the large number of projects without specific in service dates ("TBD") that are grouped in the final column. The projects are generally projects with an identified long term need and plan, but without specific timelines associated with the projects.

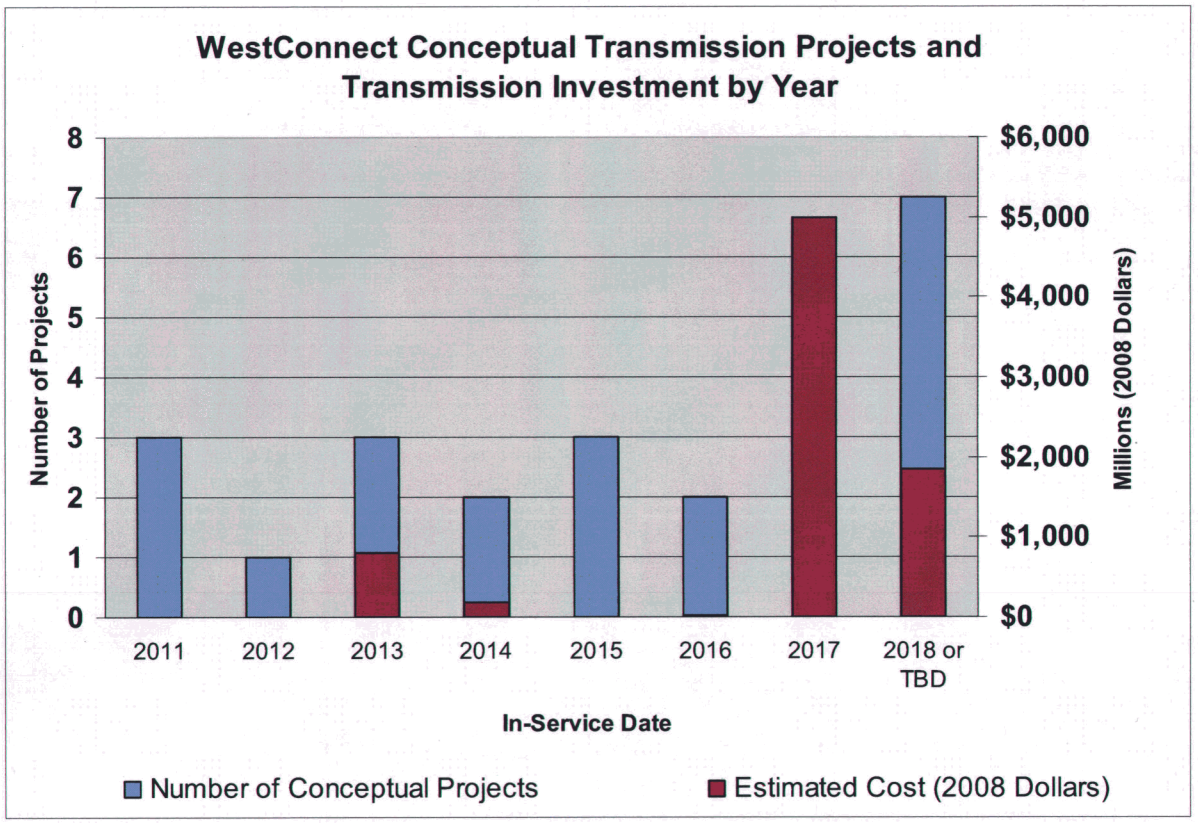


Figure 4 – Number of Conceptual Transmission Projects and Investment Cost by Year

PLAN SORTED BY STATE TRAVERSED

The 2007 WestConnect Transmission Plan transmission line projects are listed in Exhibit D-1 thru Exhibit D-8 and are sorted in tabular form by state(s) traversed and grouped by either "planned" or "conceptual". The following tables summarize the transmission line projects by state traversed showing the number of projects, miles of transmission lines and the estimated capital cost. Projects that traverse multiple states are listed as interstate transmission projects requiring siting within multiple states. States impacted by such interstate projects are identified in a separate category in Exhibit D-9.

State	Number of Planned Projects	Length (Miles)	Estimated Cost (2008 Dollars)
Arizona	66	1403	$2,331,353,209
California	10	759	$1,593,200,000
Colorado	16	1892	$2,015,600,000
Nevada	5	415	$864,000,000
New Mexico	4	117	$140,500,000
Texas	5	50	$24,200,000
Wyoming	0	0	$0
Multi-State	0	0	$0
Totals	**106**	**4636**	**$5,968,853,209**

Table 5 – WestConnect State Location Summary – Planned Transmission Projects

State	Number of Conceptual Projects	Length (Miles)	Estimated Cost (2008 Dollars)
Arizona	15	286	$185,000,000
California	1	18	$27,000,000
Colorado	0	0	$0
Nevada	1	31	$70,000,000
New Mexico	2	71	$122,000,000
Texas	0	0	$0
Wyoming	0	0	$0
Multi-State	3	3850	$5,800,000,000
Totals	**22**	**4256**	**$6,204,000,000**

Table 6 – WestConnect State Location Summary – Conceptual Transmission Projects

WestConnect Transmission Projects in Arizona

There are 81 planned or conceptual transmission projects within Arizona. Approximately 1689 miles of new or rebuilt/upgraded transmission lines are listed to be in-service in Arizona in the next ten years at an estimated cost of 2.5 billion dollars. Maps provided as Exhibits D-1 thru D-4 depict these transmission projects.

WestConnect Transmission Projects in California

There are 11 planned or conceptual transmission projects within California. Approximately 777 miles of new or rebuilt/upgraded transmission lines are listed to be in-service in California by 2017 at an estimated cost of 1.6 billion dollars. Details are provided as Exhibit D-5 show the WestConnect transmission projects located within California.

WestConnect Transmission Projects in Colorado

There are 14 transmission projects within Colorado. Approximately 1760 miles of new or rebuilt/upgraded lines are listed to be in-service in Colorado in the next ten years at an estimated cost of just under 2 billion dollars. Exhibit D-6 show the details of the WestConnect transmission projects located within Colorado.

WestConnect Transmission Projects in Nevada

There are currently 6 planned or conceptual transmission projects located within Nevada. Approximately 446 miles of new or rebuilt/upgraded transmission lines are listed to be in-service in Nevada in the next ten years at an estimated cost of 934 million dollars. Exhibit D-7 shows the details of the WestConnect transmission projects located within Nevada.

WestConnect Transmission Projects in New Mexico

There are 6 planned or conceptual transmission projects located in New Mexico. Approximately 188 miles of new or rebuilt/upgraded transmission lines are listed to be in-service in New Mexico in the next ten years at an estimated cost of 262 million dollars. Exhibit D-7 shows the details of the WestConnect transmission projects within New Mexico.

WestConnect Transmission Projects in Texas

There are currently 5 planned or conceptual transmission projects in west Texas. Approximately 50 miles of new or rebuilt/upgraded transmission lines are listed to be in-service in west Texas in the next ten years at an estimated cost of 24.2 million dollars. Exhibit D-8 shows the details of the WestConnect transmission projects located in west Texas.

WestConnect Transmission Projects in Wyoming

There are currently 2 planned or conceptual transmission projects in Wyoming. Approximately 132 miles of new or rebuilt/upgraded transmission lines are listed to be in-service in Wyoming in the next ten years at an estimated cost of 60 million dollars. Exhibit D-8 shows the details of the WestConnect transmission projects located in Wyoming.

WestConnect Transmission Projects in Multiple States

There are currently 3 planned or conceptual transmission projects that span multiple states. Approximately 3850 miles of new or rebuilt/upgraded transmission lines are listed that will span multiple states within the WestConnect planning area in the next ten years at an estimated cost approximately 5.8 billion dollars. Exhibit D-9 show the details of the WestConnect transmission projects spanning multiple states

EXHIBIT B- WESTCONNECT TRANSMISSION PROJECTS SORTED BY VOLTAGE CLASS

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
500 kV	Planned	Arizona	45	Palo Verde Hub - Sun Valley 500kV line	2009	$115,000,000
500 kV	Planned	Arizona	51	Hassayampa - Pinal West	2009	$46,000,000
500 kV	Planned	Arizona	26	TS9-Pinnacle Peak 500kV line.	2010	$263,000,000
500 kV	Planned	Arizona	100	Pinal West – Southeast Valley/Browning	2011	$182,000,000
500 kV	Planned	Arizona	38	Pinal South-Tortolita 500 kV Project	2011	$159,000,000
500 kV	Planned	Arizona	40	Sun Valley (formerly TS5) – TS9 500kV	2012	$118,000,000
500 kV	Planned	Arizona	117	Palo Verde Hub - North Gila 500kV #2 line	2012	$547,000,000
500 kV	Planned	California	450	Project Zeta	2010	$1,100,000,000
500 kV	Planned	Colorado	676	Eastern Plains Transmission Project - 500 kV Section	2013	$1,125,000,000
500 kV	Planned	Arizona	52	Pinal West 500/345 kV Project	2008	$32,400,000
500 kV	Planned	Nevada	16	Sunrise 500 kV Substation and Line fold	2012	$76,000,000
500 kV	Planned	Nevada	285	Ely Energy Center and Eastern Nevada Transmission	2013	$623,000,000

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
500 kV	Conceptual	Arizona	51	Pinal West to Pinal South 500 kV Line	2011	TBD
500 kV	Conceptual	Arizona	130	Palo Verde - Saguaro 500kV line	TBD	TBD
500 kV	Conceptual	Arizona	TBD	Cholla - Phoenix 500kV line	TBD	TBD
500 kV	Conceptual	Arizona and New Mexico	350	SunZia Southwest Project	2013	$800,000,000
500 kV DC	Conceptual	Arizona, Nevada, Utah and Wyoming	1000	TransWest Express Project	2015	TBD
500 kV	Conceptual	Nevada	31	Harry Allen to Northwest 500 kV Line # 2	2014	$623,000,000
500 kV	Conceptual	Arizona, Colorado, New Mexico and Wyoming	2500	High Plains Express Transmission Project	2017	$5,000,000,000

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
345 kV	Planned	Colorado	82	Midway – Waterton 345kV Transmission Project	2010	$24,000,000
345 kV	Planned	Colorado	125	Comanche – Daniels Park 345kV Transmission Project	2010	TBD
345 kV	Planned	New Mexico	33	Pajarito 345 kV Station	2012	$130,000,000
345 kV	Planned	Colorado	95	Pawnee – Smoky Hill 345kV Transmission Project	2013	$120,000,000
345 kV	Planned	Nevada	42	East Tracy to Black Hawk to Mira Loma 345 kV Line	2012	$65,000,000
345 kV	Planned	Nevada	46	East Tracy to Fort Sage 345 kV Line	2012	$78,000,000

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
345 kV	Conceptual	New Mexico	71	Northern New Mexico Transmission Line	2014	$122,000,000
345 kV	Conceptual	New Mexico	TBD	North-South Tie	TBD	TBD

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
230 kV	Planned	Arizona	60	Mead – Davis	2008	TBD
230 kV	Planned	Arizona	20	Golden Valley 230kV Transmission Line	2008	$9,000,000
230 kV	Planned	Colorado	11	Timnath - Ault rebuild	2009	$4,000,000
230 kV	Planned	Arizona	15	Sun Valley - TS1 230kV line	2009	$58,000,000
230 kV	Planned	Colorado	180	Miracle Mile - Ault	2009	$82,000,000
230 kV	Planned	Colorado	80	Walsenburg-San Luis Valley 230 kV Line	2010	$50,000,000
230 kV	Planned	Arizona	27	TS9-Raceway-Avery-TS6-Pinnacle Peak 230kV line	2010	$263,000,000
230 kV	Planned	California	80	Project Alpha	2010	$137,000,000
230 kV	Planned	Arizona	12	Palm Valley - TS2 - TS1 230kV line	2010	$40,000,000
230 kV	Planned	California	8	Midway – Geothermal Area 230kV line Phase 1	2010	$15,700,000
230 kV	Planned	California	8.5	IV Sub - Dixieland Sub 230kV transmission line	2010	$15,000,000
230 kV	Planned	Colorado	70	Boone-Stem Beach-Walsenburg 230 kV Line	2010	$50,000,000
230 kV	Planned	Arizona	5	Sundance - Pinal South 230kV line.	2011	$42,000,000
230 kV	Planned	Arizona	30	Pinal South – Southeast Valley	2011	$49,000,000
230 kV	Planned	California	35	O'Banion – Elverta/Natomas Double Circuit 230-kV	2011	$74,000,000
230 kV	Planned	Arizona	52	Headgate Rock – Blythe	2011	TBD
230 kV	Planned	Arizona	21	Desert Basin - Pinal South 230kV line	2011	$48,000,000
230 kV	Planned	California	35	CV – Devers II Sub 230kV transmission line	2011	$86,000,000
230 kV	Planned	Arizona	20	RS17 - RS24 – RS22/Southeast Valley	2012	$38,000,000
230 kV	Planned	California	50	Project Delta	2012	$120,000,000
230 kV	Planned	Arizona	13	Parker – Headgate Rock	2012	TBD
230 kV	Planned	California	65	North Gila- Highline, 230 kV transmission line	2012	TBD
230 kV	Planned	Arizona	15	North Gila - TS8 230kV line	2012	$51,000,000
230 kV	Planned	Wyoming	85	Miracle Mile - Dave Johnston Project	2012	$30,000,000

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
230 kV	Planned	California	8	Midway – Geothermal Area; 230kV Line Phase 2	2012	$16,000,000
230 kV	Planned	Arizona	17	Casa Grande – Empire	2012	TBD
230 kV	Planned	Arizona	79	Bouse – Kofa	2012	TBD
230 kV	Planned	Arizona	7	Kofa – Dome Tap	2013	TBD
230 kV	Planned	Colorado	311	Eastern Plains Transmission Project - 230 kV Portion	2013	$375,000,000
230 kV	Planned	Arizona	11	Dome Tap – Welton Mohawk	2013	TBD
230 kV	Planned	Arizona	22	Parker – Bouse	2014	TBD
230 kV	Planned	Arizona	64	Parker – Blythe	2014	TBD
230 kV	Planned	Arizona	20	Gila-Knob	2014	TBD
230 kV	Planned	Colorado	28	Flatiron - Weld	2014	$25,000,000
230 kV	Planned	Arizona	9	Empire – ED5	2014	TBD
230 kV	Planned	Arizona	8	Dome Tap-Gila	2014	TBD
230 kV	Planned	Arizona	42	Blythe – Goldmine Tap	2014	TBD
230 kV	Planned	Wyoming	47	Yellowtail - South	2015	$30,000,000
230 kV	Planned	Arizona	4	Signal-ED2	2015	TBD
230 kV	Planned	Arizona	8	ED2-Coolidge	2015	TBD
230 kV	Planned	California	19.5	ECSS – Highline, 230kV transmission line	2015	$29,500,000
230 kV	Planned	Arizona	8	Coolidge - Signal	2015	TBD
230 kV	Planned	Arizona	22	Goldmine Tap - Knob	2016	TBD
230 kV	Planned	Arizona	56	Griffith - N. Havasu 69/230kV Transmission Line	2017	TBD
230 kV	Planned	Arizona	9	ED5-ED4	2018	TBD
230 kV	Planned	Arizona	9	ED2-ED4	2018	TBD
230 kV	Planned	Colorado	80	Beaver Creek - Erie	2009	$67,000,000
230 kV	Planned	Arizona	7	Westwing - Raceway 230kV line	TBD	TBD
230 kV	Planned	Arizona	11	Westwing - El Sol 230kV line	TBD	TBD
230 kV	Planned	Arizona	TBD	Sun Valley - TS11- Buckeye 230kV line	TBD	TBD
230 kV	Planned	Nevada	26	Two Sunrise - Equestrian 230 kV Lines	2012	$22,000,000

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
230 kV	Conceptual	Arizona	21	CS1 to Bicknell 230 kV Line	2013	TBD
230 kV	Conceptual	Arizona	36	Pantano to Kartchner 115 kV Line Upgrade	2015	TBD
230 kV	Conceptual	Arizona	7	Kartchner to San Rafael 230 kV Line	2015	TBD
230 kV	Conceptual	Arizona	24	Sloan to Huachuca 230 kV Line	2016	TBD
230 kV	Conceptual	California	18	Dixieland - ECSS 230kV transmission line	2016	$27,000,000
230 kV	Conceptual	Arizona	TBD	Yucca - TS8 230kV line	TBD	TBD
230 kV	Conceptual	Arizona	TBD	Sun Valley - TS9 230kV line	TBD	$185,000,000
230 kV	Conceptual	Arizona	TBD	Sun Valley - TS10 230kV loop	TBD	TBD
230 kV	Conceptual	Arizona	TBD	North Gila - Yucca 230kV line	TBD	TBD

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
138 kV	Planned	Arizona	14.3	Tortolita-North Loop 138 kV Quad-Circuit	2009	$46,000,000
138 kV	Planned	Arizona	5	Green Valley-Canoa Ranch 138 kV	2009	$8,100,000
138 kV	Planned	Colorado	12	Granby - Windy Gap	2009	$12,000,000
138 kV	Planned	Arizona	2	Naranja 138/13.8 kV Substation	2010	$4,700,000
138 kV	Planned	Arizona	28.2	Cienega 138/13.8 kV Substation	2010	$7,500,000
138 kV	Planned	Arizona	4	Catalina 138/13.8 kV Substation	2010	$7,200,000
138 kV	Planned	Arizona	59	Vail to Valencia 115 - 138kV Upgrade	2012	$27,000,000
138 kV	Planned	Arizona	3	Kino 138/13.8 kV Substation	2012	$5,400,000
138 kV	Planned	Arizona	7	Spencer 138/13.8 kV Substation	2013	$9,400,000
138 kV	Planned	Arizona	4	Marana 138/13.8 kV Substation	2013	$7,900,000
138 kV	Planned	Arizona	10	Canoa Ranch - PD Sierrita 138 kV Circuit Extension	2013	$17,400,000
138 kV	Planned	Arizona	3.8	SS NO6 138/13.8 kV Substation	2018	$7,200,000
138 kV	Planned	Arizona	1.3	SS NO4 138/13.8 kV Substation	2018	$3,100,000
138 kV	Planned	Arizona	5.5	SS NO29 138/13.8 kV Substation	2018	$13,400,000
138 kV	Planned	Arizona	2	SS NO27 138/13.8 kV Substation	2018	$4,600,000
138 kV	Planned	Arizona	3	SS NO20 138/13.8 kV Substation	2018	$7,100,000
138 kV	Planned	Arizona	11	SS NO17 138/13.8 kV Substation	2018	$21,200,000
138 kV	Planned	Arizona	14.6	SS NO14 138/13.8 kV Substation	2018	$27,800,000
138 kV	Planned	Arizona	4	SS NO1 138/13.8 kV Substation	2018	$9,500,000
138 kV	Planned	Arizona	3.5	Downtown 138/13.8 kV Substation	2018	$6,300,000

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
115 kV	Planned	Texas	10	Santa Teresa-Montoya 115 kV line	2008	$5,900,000
115 kV	Planned	New Mexico	74	KM/MA 115 kV Line Upgrade	2008	$3,800,000
115 kV	Planned	Texas	13.6	Coyote-Montwood 115 kV line	2008	$5,400,000
115 kV	Planned	Arizona	4.5	Apache/Hayden to San Manuel 115 kV Line	2008	$4,201,359
115 kV	Planned	Colorado	5	Animas - LaPlata	2008	$7,600,000
115 kV	Planned	New Mexico	6	Alamogordo Third Source	2008	$3,100,000
115 kV	Planned	Arizona	0.2	Western 115 kV Line Loop-in to Pantano	2009	$1,296,673
115 kV	Planned	Colorado	5	Sandown – Leetsdale 115kV Transmission Project	2009	$14,000,000
115 kV	Planned	Arizona	3.2	Saguaro to Naviska 115 kV Line	2009	$2,589,110
115 kV	Planned	Arizona	2.6	CAP to Valencia 115 kV Line	2009	$2,235,423
115 kV	Planned	Arizona	0.6	CAP 115 kV Line Loop-in to Sandario	2009	$1,031,135
115 kV	Planned	Texas	13	Sparks-Felipe 115 kV line	2010	$2,300,000
115 kV	Planned	Texas	11	Pipeline-Picante 115 kV line	2010	$6,600,000
115 kV	Planned	Arizona	26	Naviska to Rattlesnake 115 kV Line	2010	$15,292,159
115 kV	Planned	Arizona	8.75	Marana to Avra Valley 115 kV Line Upgrade	2010	$3,507,350
115 kV	Planned	Texas	2.8	Biggs-Global Reach 115 kV line	2010	$4,000,000
115 kV	Planned	New Mexico	4	Pajarito 345 kV Station (115 kV Section)	2010	$3,600,000

Voltage	Planning Stage	State(s)	Length (Miles)	Project Name	In-Service Date	Estimated Cost
115 kV	Conceptual	Arizona	13.71	Sandario Tap to Three Points 115 kV Line Upgrade	2011	TBD
115 kV	Conceptual	Arizona	2.8	Avra Valley to Sandario Tap 115 kV Line Upgrade	2011	TBD
115 kV	Conceptual	Arizona	0.2	Marana Tap to Marana 115 kV Line Upgrade	2012	TBD
115 kV	Conceptual	Arizona	0.5	CS1 to Three Points 115 kV Line	2013	TBD

APPENDIX A – ARIZONA PUBLIC SERVICE

Project Name	In-Service Date	Planning Stage	Length (miles)	Project Participants	Estimated Cost
Milligan loop-in of Saguaro-Casa Grande 230kV line	2009	Planned	0	APS	$25,000,000
Palo Verde Hub - Sun Valley 500kV line	2009	Planned	45	APS, SRP, CAWCD	$115,000,000
Sugarloaf loop-in of Coronado-Cholla 500kV line	2009	Planned	0	APS	$55,000,000
Sun Valley - TS1 230kV line	2009	Planned	15	APS	$58,000,000
VV 01 loop-in of Navajo-Westwing 500kV line	2009	Planned	0	APS	$52,000,000
Flagstaff 345kV Interconnection	2010	Planned	0	APS	$28,000,000
Palm Valley - TS2 - TS1 230kV line	2010	Planned	12	APS	$40,000,000
SE10 loop-in of Saguaro-Casa Grande 230kV line	2010	Planned	0	APS	$10,000,000
TS9-Pinnacle Peak 500kV line.	2010	Planned	26	APS, SRP	$263,000,000
TS9-Raceway-Avery-TS6-Pinnacle Peak 230kV line	2010	Planned	27	APS	$263,000,000
Desert Basin - Pinal South 230kV line	2011	Planned	21	SRP, APS	$48,000,000
Jojoba loop-in of TS4-Panda 230kV line	2011	Planned	0	APS	$16,000,000
Mazatzal loop-in of Cholla-Pinnacle Peak 345kV	2011	Planned	0	APS	$22,000,000
Sundance - Pinal South 230kV line.	2011	Planned	5	APS, ED2	$42,000,000
North Gila - TS8 230kV line	2012	Planned	15	APS	$51,000,000
Palo Verde Hub - North Gila 500kV #2 line	2012	Planned	117	APS, SRP, IID, WMIDD	$547,000,000
Sun Valley - TS9 500kV line	2012	Planned	TBD	APS, SRP, CAWCD	$118,000,000
TransWest Express project	2015	Conceptual	1000	APS, National Grid, WIA	TBD
Sun Valley - TS11 - Buckeye 230kV line	TBD	Conceptual	TBD	APS	TBD
Westwing - El Sol 230kV line	TBD	Planned	11	APS	TBD
Westwing - Raceway 230kV line	TBD	Planned	7	APS	TBD
Cholla - Phoenix 500kV line	TBD	Conceptual	TBD	APS	TBD
Palo Verde - Saguaro 500kV line	TBD	Conceptual	130	N/A	TBD
Sun Valley - TS10 - TS11 230kV line	TBD	Conceptual	TBD	APS	TBD
Sun Valley - TS9 230kV line	TBD	Conceptual	TBD	APS	$185,000,000
Yucca - TS8 230kV line	TBD	Conceptual	TBD	APS	TBD
North Gila – Yucca 230 kV line	TBD	Conceptual	TBD	APS	TBD
Utility Totals			**1431**		**$1,938,000,000**

Table 1 – Summary of Arizona Public Service Projects

APS EHV & OUTER DIVISION 115/230 KV TRANSMISSION PLANS 2008 - 2017

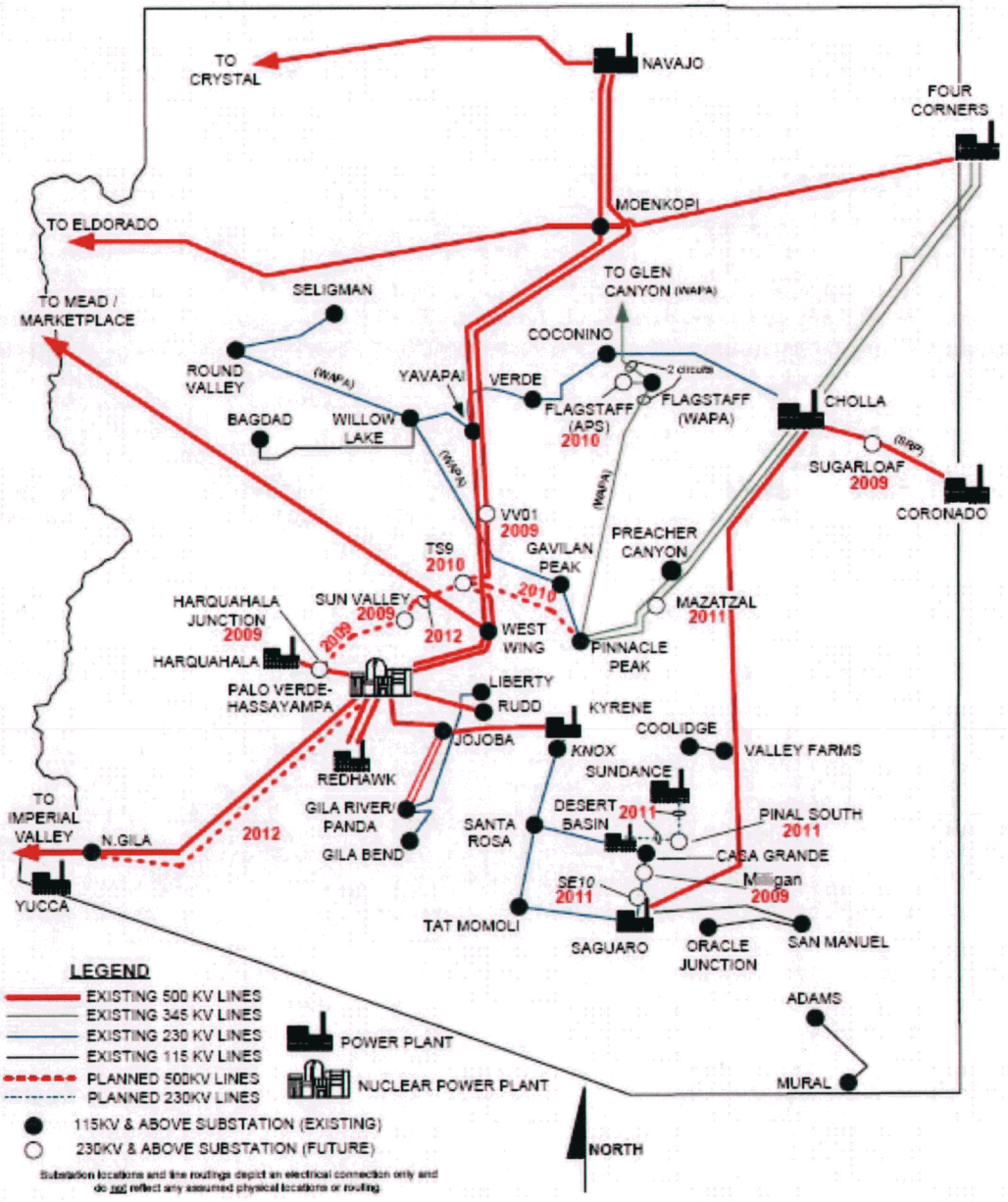


Figure 1 – Map of Arizona Public Service Projects (1)

PHOENIX METROPOLITAN AREA TRANSMISSION PLANS 2008-2017

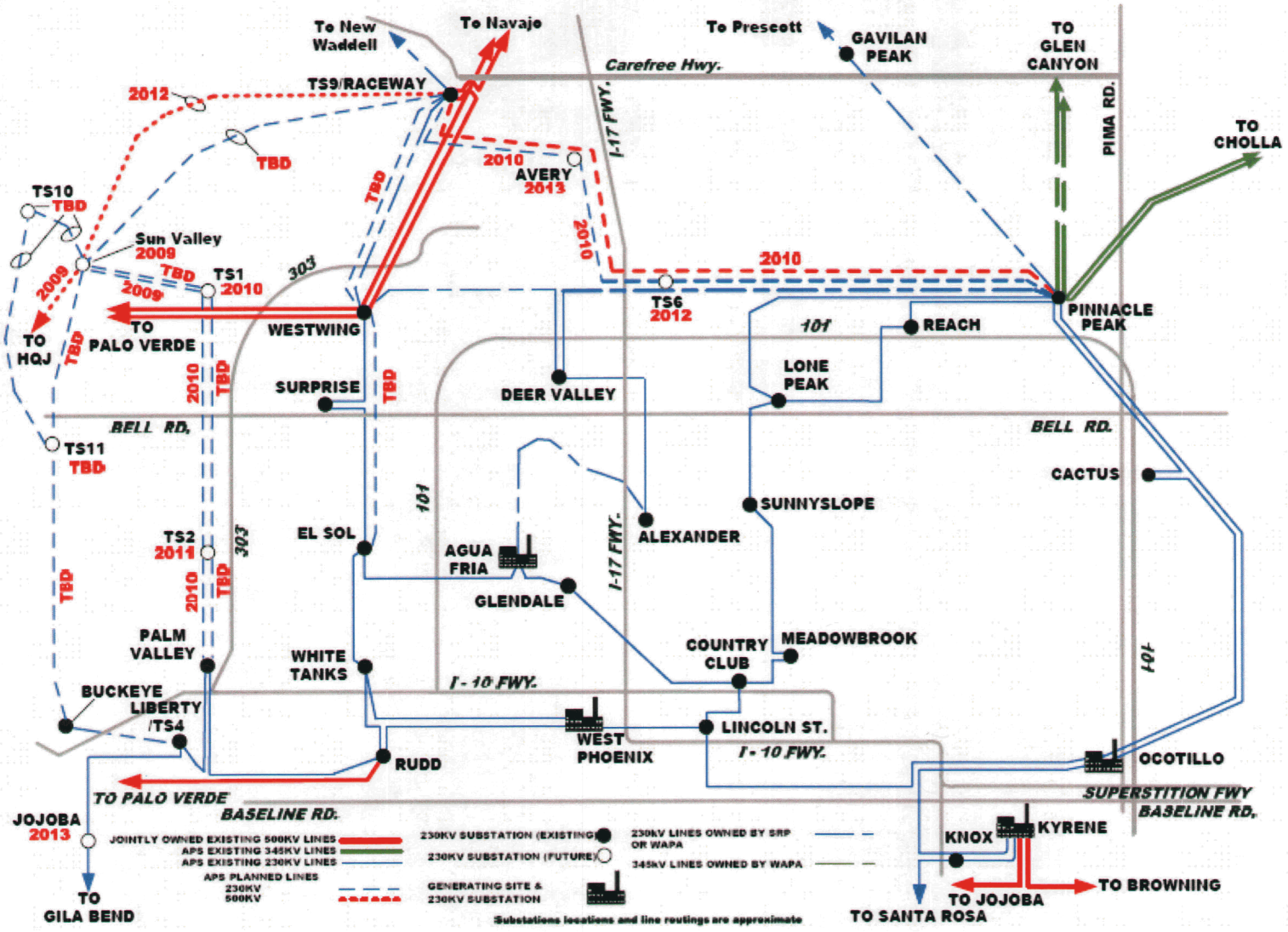


Figure 2 – Map of Arizona Public Service Projects (2)

10-W7

Witnesses

- Mike DeWitt – Project Description
- Randall L. Simpson – Environmental Studies
- Bob Smith – Transmission System

APS-WVN000684

Project Description

Mike DeWitt

Arizona Public Service Company
Project Manager
Transmission and Facility Siting

APS

APS-WVN000685

Witness Background

- BS Civil Engineering, Purdue University
- Project Manager for *West Valley-North Power Line and Substation Project*
- Professional Background
  - 23 years of experience in electric utility industry
  - 18 years of experience with APS
    - Senior Engineer
    - Substation Construction Project Engineer and Construction Coordinator
    - Project Engineer for fossil and nuclear betterment projects
  - Prior testimony before the Arizona Power Plant and Transmission Line Siting Committee in Case Numbers 120 and 122

APS

APS-WVN000686

Outline of Testimony

- Project description
- Project need and benefits
- Selection process
- Public participation

APS-WVN000687

Project Description

- Preferred System Option
- Alternatives
- Jurisdiction and surface management
- Two substation sites
  - TS1 Substation Site (230/69kV)
  - TS5 Substation Site (500/230/69kV)

APS

APS-WVN000688

Jurisdiction

	Town of Buckeye (miles)*	City of Surprise (miles)*	City of Glendale (miles)*	Unincorporated Maricopa County (miles)*	Total (miles)*
Preferred System Option	5.5	8.7	0	10.9	25.1
East-West Alternative Option 1 (Olive Avenue)	5.5	8.2	0	11.5	25.2
East-West Alternative Option 2 (Peoria Avenue)	5.5	9.2	< 0.1	10.4	25.2
East-West Alternative Option 3 (Waddell Road)	5.5	8.7	0	10.9	25.1
North-South Alternative Option 1 (Cotton Lane)	5.5	8.7	0	10.9	25.1
North-South Alternative Option 2 (Beardsley Canal / McMicken Dam)	5.5	8.7	0	11.6	25.8
500kV Corridor Alternative Option 1 (parallels existing 500kV transmission line)	5.5	7.6	0	10.9	24.0

NOTE: Portions of the transmission line, while in unincorporated Maricopa County, would lie within the municipal planning areas of the Town of Buckeye, City of Surprise, and/or City of Glendale.

* Mileages are approximate.

APS

APS-WVN000689

Surface Management

	State Trust Land (miles)*	Bureau of Reclamation (miles)*	Private (miles)*	Total (miles)*
Preferred System Option	5.2	4.5	15.4	25.1
East-West Alternative Option 1 (Olive Avenue)	7.2	4.5	13.5	25.2
East-West Alternative Option 2 (Peoria Avenue)	6.2	4.5	14.4	25.1
East-West Alternative Option 3 (Waddell Road)	5.2	4.5	15.4	25.1
North-South Alternative Option 1 (Cotton Lane)	5.2	4.5	15.4	25.1
North-South Alternative Option 2 (Beardsley Canal/McMicken Dam)	3.3	4.5	18.0	25.8
500kV Corridor Alternative Option 1 (parallels existing 500 kV transmission line)	5.2	2.4	16.4	24.0

* Mileages are approximate.

APS

APS-WVN000690

Project Description

Facilities

- Substations
  - Landscaping, including fencing, in accordance with building permit requirements
  - Land use (acreage)
- Transmission Structures
  - Monopole and lattice
  - Special structures
  - Typical height
  - Typical span
  - Materials
  - 69kV underbuild

APS

APS-WVN000691

Project Description

Schedule

- Right-of-way acquisition 2005 – 2006
- Begin construction 2006
- Construction completed and commercial operation phased in between 2007 and 2008

APS

APS-WVN000692

Project Description

Cost

	Number of New Substations Needed for Connections	Total Length of Transmission Line (distance in miles*)	Right-of-way Costs ($ million)	Construction Costs ($ million)	Total Costs ($ million)
Preferred System Option	2	25.1	$25.6	$51.9	$77.5
East-West Alternative Option 1 (Olive Avenue)	2	25.2	$24.7	$51.8	$76.5
East-West Alternative Option 2 (Peoria Avenue)	2	25.1	$25.4	$52.0	$77.4
East-West Alternative Option 3 (Waddell Road)	2	25.1	$26.8	$51.9	$78.7
North-South Alternative Option 1 (Cotton Lane)	2	25.1	$25.3	$52.5	$77.8
North-South Alternative Option 2 (Beardsley Canal/ McMicken Dam)	2	25.8	$26.4	$52.5	$78.9
500kV Corridor Alternative Option 1 (parallels existing 500 kV transmission line)	2	24.0	$27.9	$50.2	$78.1

* Mileages are approximate.

APS-WVN000693

Project Benefits and Need

- Population growth
- Increases reliability
- Increases import and export capability

APS

APS-WVN000694

Population Growth Projections

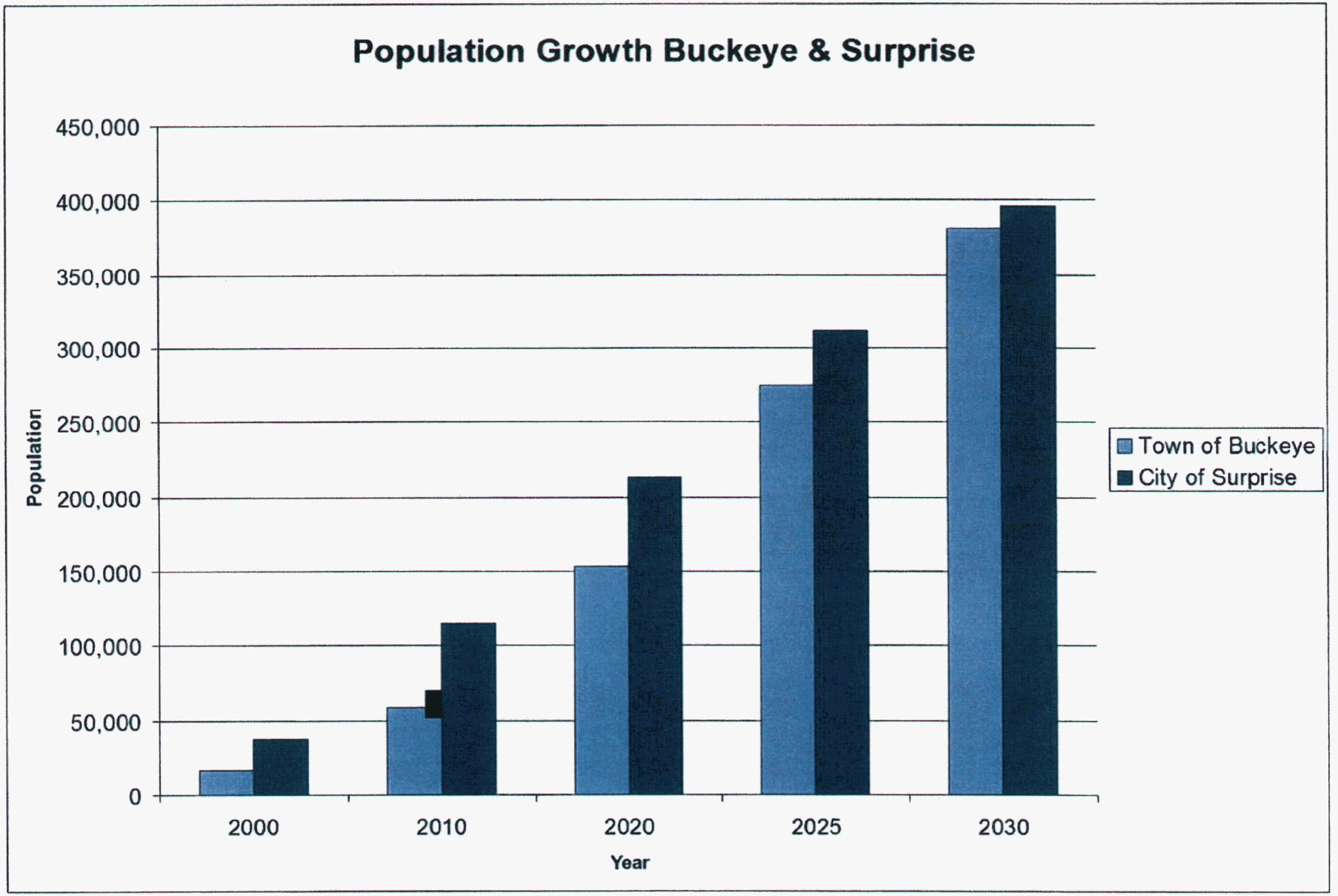
Interim Population Projections

	2000	2010	2020	2025	2030
Town of Buckeye	16,700	58,600	153,400	275,500	380,600
City of Surprise	37,700	115,200	213,300	312,300	395,500
Maricopa County	3,096,600	4,134,400	5,164,100	5,664,000	6,140,000

Sources:
Maricopa Association of Governments 2002 and 2003
Arizona Department of Economic Security 1997

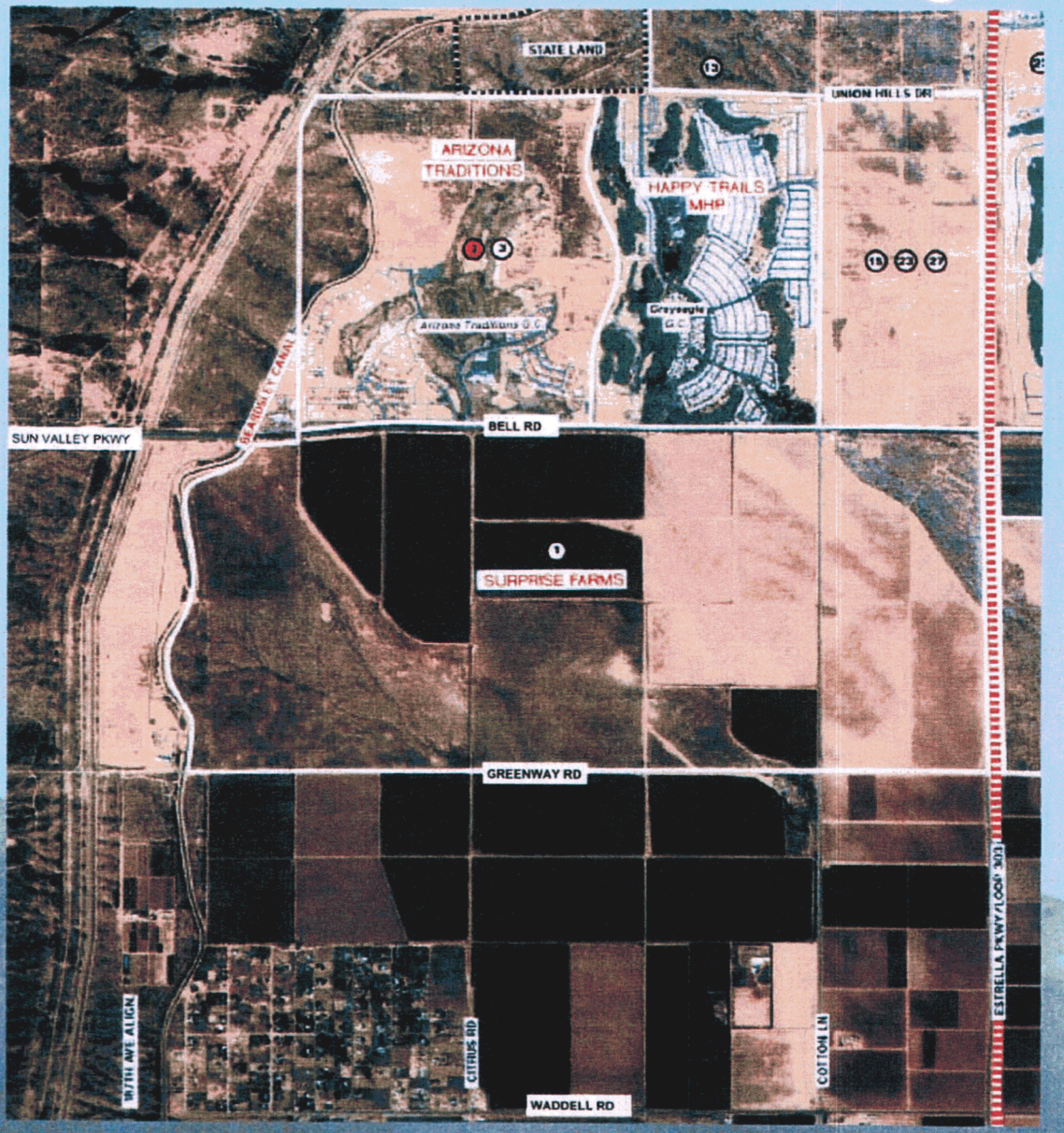
APS

APS-WVN000695



APS-WVN000696

1998

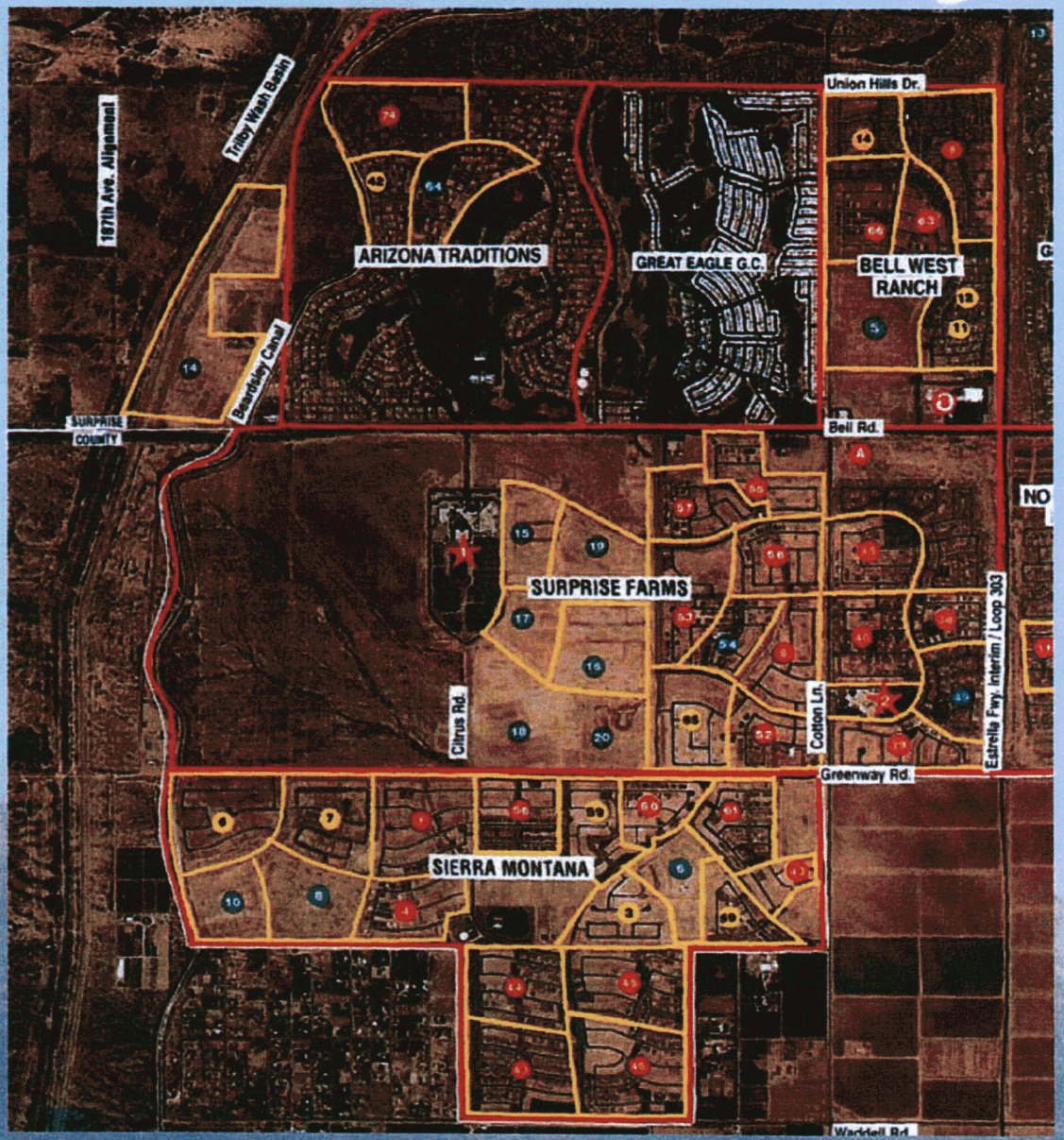


Source: Landiscor Phoenix Real Estate Photo Book, Third Quarter, 1998

APS

APS-WVN000697

2004



Source: Landiscor Phoenix Real Estate Photo Book, Second Quarter, 2004

APS-WVN000698

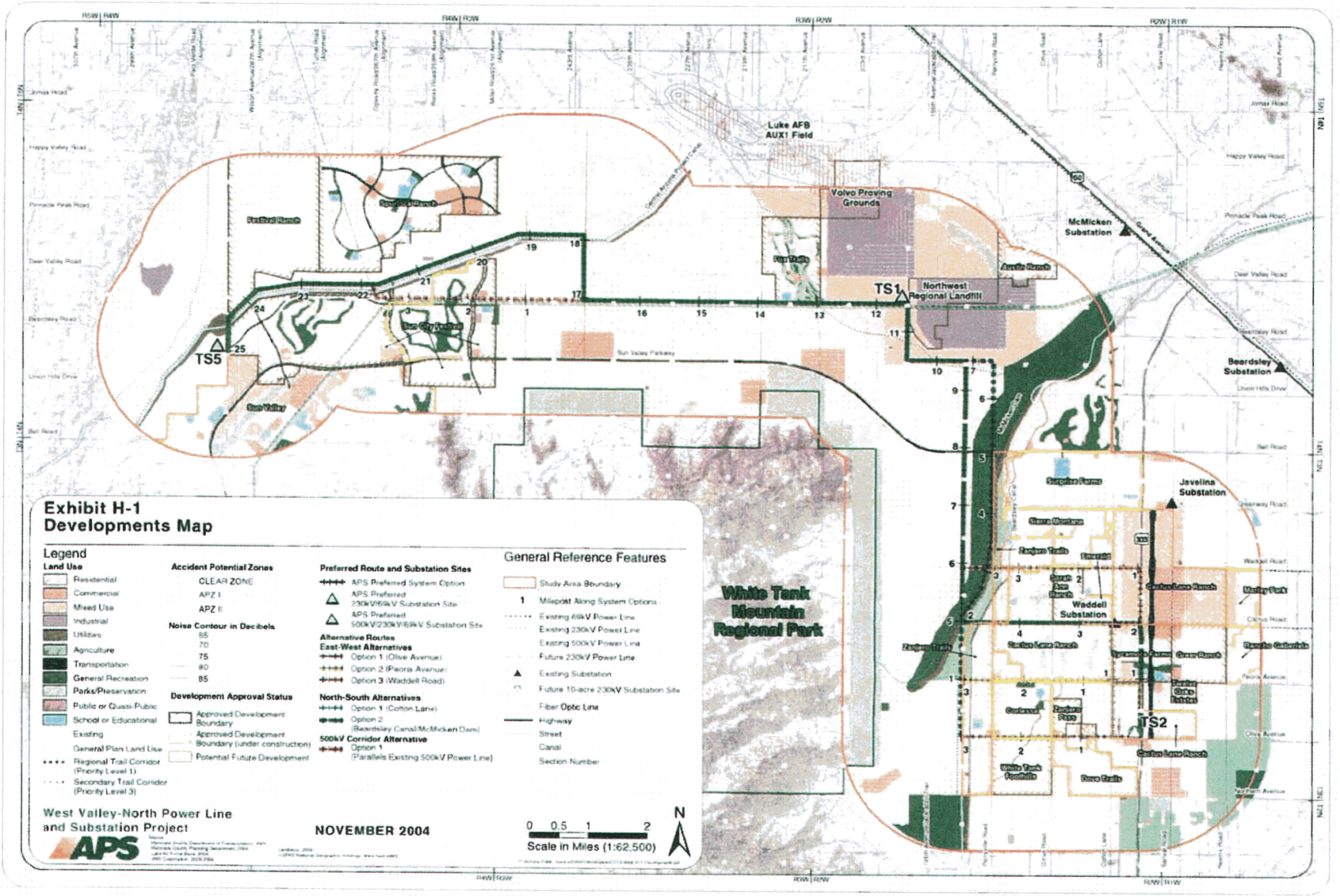
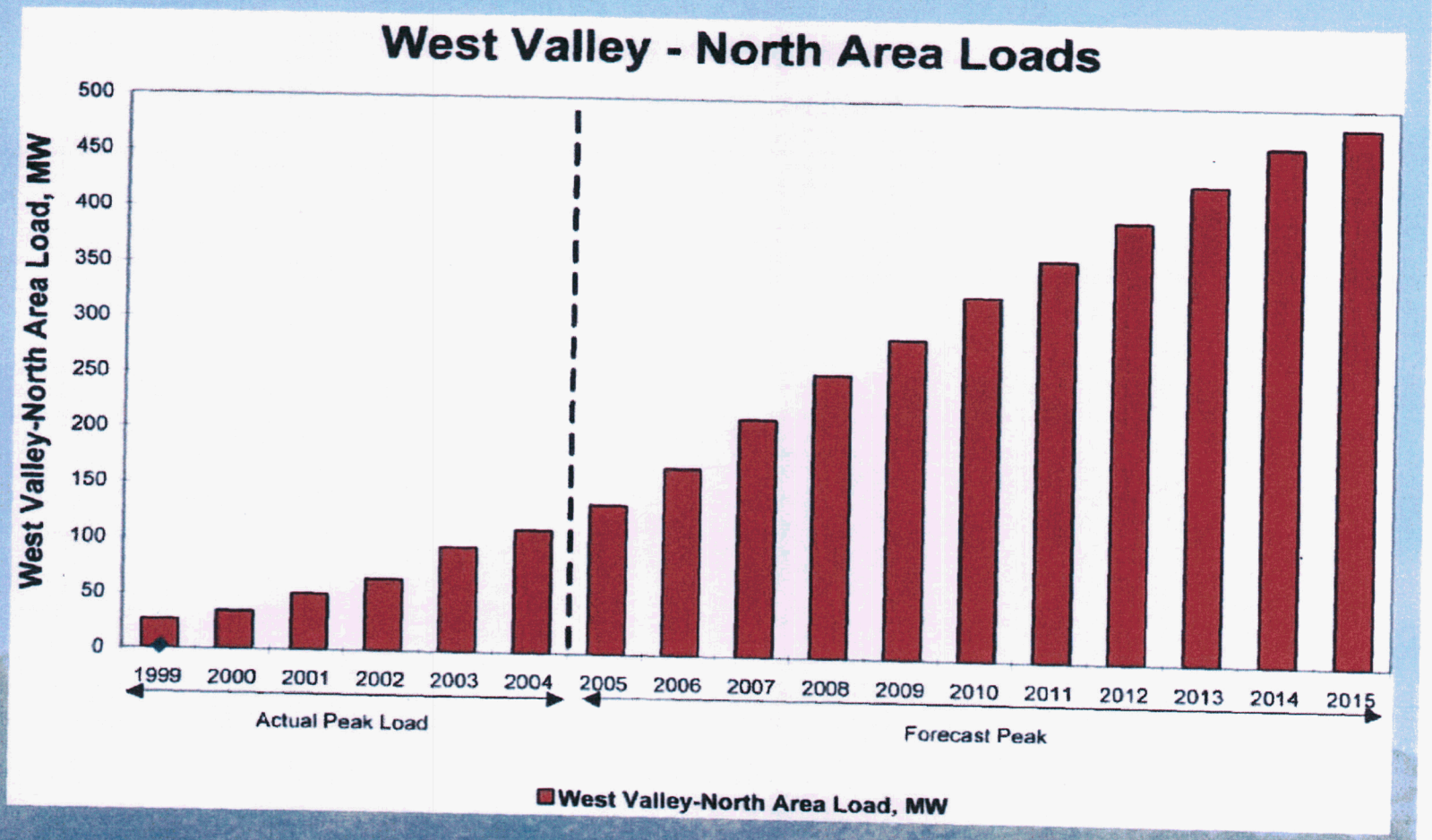


Exhibit H-1
Developments Map
Legend
Land Use
Residential
Commercial
Mixed Use
Industrial
Utilities
Agriculture
Transportation
General Recreation
Parks/Preservation
Public or Quasi-Public
School or Educational
Existing
General Plan Land Use
Regional Trail Corridor (Priority Level 1)
Secondary Trail Corridor (Priority Level 3)
Accident Potential Zones
CLEAR ZONE
APZ I
APZ II
Noise Contour in Decibels
65
70
75
80
85
Development Approval Status
Approved Development Boundary
Approved Development Boundary (under construction)
Potential Future Development
Preferred Route and Substation Sites
APS Preferred System Option
APS Preferred 230kV/69kV Substation Site
APS Preferred 500kV/230kV/69kV Substation Site
Alternative Routes
East-West Alternatives
Option 1 (Olive Avenue)
Option 2 (Peoria Avenue)
Option 3 (Waddell Road)
North-South Alternatives
Option 1 (Cotton Lane)
Option 2 (Beardsley Canal/McMicken Dam)
500kV Corridor Alternative
Option 1 (Parallels Existing 500kV Power Line)
General Reference Features
Study Area Boundary
Milepost Along System Options
Existing 69kV Power Line
Existing 230kV Power Line
Existing 500kV Power Line
Future 230kV Power Line
Existing Substation
Future 10-acre 230kV Substation Site
Fiber Optic Line
Highway
Street
Canal
Section Number
West Valley-North Power Line and Substation Project
APS
NOVEMBER 2004
0 0.5 1 2
Scale in Miles (1:62,500)
N
Luke AFB AUX1 Field
Volvo Proving Grounds
McMicken Substation
Northwest Regional Landfill
TS1
TS2
TS5
Beardsley Substation
Javelina Substation
Waddell Substation
White Tank Mountain Regional Park



APS-WVN000700

Selection Criteria

- Public acceptability
- Environmental compatibility
- Regulatory approvals
- Engineering
- Right-of-way acquisition
- Cost

APS

APS-WVN000701

Public Participation

- Meetings
  - Jurisdictional/agency
  - Landowner/developer
  - Individual
- Public open houses
  - February 27, 2004
  - July 29, 2004
  - July 30, 2004

APS

APS-WVN000702

TABLE A -1
AGENCY/JURISDICTION MEETING ATTENDEES

Agency/Jurisdiction Invited to the Three Meetings	Agency/Jurisdiction Represen ted on December 10, 2003	Agency/Jurisdiction Represented on February 19, 2004	Agency/Jurisdiction Represented on July 7, 2004
Arizona State Land Department		X	X
Central Arizona Project	X	X	X
City of Glendale	X	X	X
City of Surprise	X	X	X
Luke Air Force Base	X	X	X
Maricopa County Department of Transportation	X	X	X
Maricopa County Flood Control District	X	X	X
Maricopa County Planning	X	X	X
Maricopa County Parks and Recreation	X	X	X
Maricopa Water District	X	X	X
Town of Buckeye	X		
Waste Management of Arizona/Northwest Regional Landfill*			X

NOTE: * Representatives of the Northwest Regional Landfill were not invited to the December 10 and February 19 meetings; however, as a result of a meeting between APS, URS, and Northwest Regional Landfill representatives on April 12, 2004, they were invited to attend the July 7, 2004, agency/jurisdiction meeting.

10-W8

Utilities report lower customer growth rate, power use

BY PATRICK O'GRADY
pogrady@bizjournals.com

Customer growth rates are down sharply for Arizona Public Service Co. and Salt River Project, as fewer people are moving to the Valley and more empty homes are appearing on the local landscape.

After enjoying sustained growth for several years, the area's two electric providers are cutting their forecasts for new residential and business customers.

Brandt

"Our customer growth in the second quarter of this year was 1.6 percent, down considerably from the 3.5 percent growth rate in the second quarter of last year," said Donald Brandt, CEO of APS. "We currently expect customer growth to continue declining to a rate of about 1 percent by the end of this year. Furthermore, we expect to grow at around 1 percent per year for the next several years."

SRP projects customer growth of between 1 percent and 2 percent for at least the next year, then ramping up between 3 percent and 4 percent, said SRP spokesman Jeffrey Lane. The company is developing its next forecast, so Lane said these estimates are preliminary.

SRP's customer growth rate for the first six months of this year was about 1.3 percent.

The lower growth rates could present

SEE **POWER** | **38**

POWER: APS continues battle for rate hike despite significantly lower growth projections

FROM PAGE 1

problems for the APS rate case before the Arizona Corporation Commission. The company is in the early stages of a request for an 8.5 percent increase and hopes to implement a 4 percent interim adjustment by November.

In an investor call last week for APS' parent company, Pinnacle West Capital Corp., officials said they were looking to cut at least $500 million in capital costs during the next three years. That move, balanced with the rate increase, should avert the need for an equity offering at least through 2009, officials said.

How the lower growth rates and the cut in capital spending will play among the state commissioners may be the determining factor. Commission Chairman Mike Gleason, who will preside over the interim rate case before his term ends, said more capital costs likely should be cut given the drop in APS' growth rate.

'Our current electric prices do not reflect our costs of doing business.'

Bill Post
Pinnacle West Capital Corp.

"It seems to me that's pretty low," he said.

SRP, which is not regulated by the commission, raised its rates by 3.9 percent in March as its board approved several measures to deal with higher fuel costs. The company also OK'd higher summer billing and an off-peak-use pilot program.

In addition to lower growth rates, power use across both utilities' territory dropped for the first six months of the year despite the slight uptick in customers — a result of unseasonably cool weather and people pushing their thermostat settings upward in the wake of an economic downturn.

Brandt cited cooler weather in the winter and spring for the lower energy use APS saw. The slowing economy accounted for about 0.5 percent of the overall 6.5 percent reduction in power use APS recorded in the first half of 2008, he said.

"May of this year was one of the coolest in the last 15 years," Brandt said. "On Memorial Day alone, Phoenix temperatures hit a high of only 82 degrees, with a mean of only 72 degrees. We would have to go back to 1965 to find a similar period."

Pinnacle West announced its second-quarter results last week, posting a $133 million profit, largely benefiting from two one-time items, a tax credit and the sale of a building by its SunCor division. Without those factors, the company's revenue likely would have been flat, Brandt said.

The company's average use for a residential customer was down 227 kilowatt-hours during the second quarter, while it added 17,500 customers.

A kilowatt-hour is the electricity it takes to power 1,000 watts for an hour.

SRP saw similar results, but its power use dropped by 0.3 percent. Lane said weather was a primary driver, but that economic conditions also played a part.

"Our history shows years in which our accounts are higher, but generated energy needs are lower due to just milder weather conditions," he said.

For example, in 2005, cooler weather contributed to a 2 percent drop in power use despite SRP having a 5 percent increase in customers, Lane said.

APS also is tracking decreases in power use related to the mortgage crisis. The company estimates there are more than 40,000 vacant houses in the Phoenix metro area, about half of which are in the company's service territory. In a normal year, only about 10,000 homes would be vacant, Brandt said.

Most agree the power drop will be temporary. Brandt and Pinnacle West Chairman Bill Post reiterated the company's need for increased rates to meet the demand, which still is growing in the Phoenix market.

"Our current electric prices do not reflect our costs of doing business," Post said.

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Salt River Project: www.srpnet.com
Arizona Public Service Co.: www.aps.com

10-W9

Tribune
EAST VALLEY · SCOTTSDALE

June 15, 2008

Arizona dealing with inflated population counts

By Not Applicable
The Associated Press

The three-year housing boom in Arizona that ended in 2006 skewed the state's population figures, leading to projections that planners, economists and government officials agree are inflated.

Accurately tracking and projecting population numbers is crucial to financial development plans across Arizona. Taxes, freeways, commercial and residential projects all are based on how many people are expected to move here.

"Population growth is the beginning of the food chain of Arizona's economy," said Ioanna Morfessis, founding chief executive of the Greater Phoenix Economic Council. "But if the numbers are wrong, and I think the state's population numbers are inflated, it's going to be a house of cards for the economy."

State and census estimates showed a record 196,000 people moved to the Phoenix area during the height of the housing boom. The startling figure led to projections for the metro area's population to more than double to 12 million as soon as 2030.

Those figures were based largely on housing permits and occupancy numbers.

But the number of building permits exceeded the number of houses actually sold. For example, a record 62,000 new homes went up in metro Phoenix during 2005 but only about 40,000 of those were bought by people who moved into them.

The housing market began to slow in mid-2006 and by early 2007, the economy had begun to contract. Municipalities began cutting services, schools started closing, home builders walked away from subdivisions, retailers closed stores, businesses laid off workers, and foreclosures started to soar.

That's when it became clear that Arizona would not grow at the expected pace, and attention turned to adjusting population projections.

Six months ago, projection estimates showed 105,000 people moving to metro Phoenix in 2008. That figure recently was adjusted to 85,000 - 19 percent lower.

The drop translates to about $24 million less in tax revenue for the state. Each Arizona resident contributes $1,200 in state income tax and net sales-tax revenue, according to an estimate from Marshall Vest, a University of Arizona economist.

Problems from inaccurate population projections also ripple through Arizona's towns and cities, which receive their share of state taxes and other funds based on their populations.

"Arizona is very dependent on its population numbers because we have a revenue-sharing system," said Kent Ennis, deputy director of the Arizona Department of Commerce. "A municipality's growth determines how much they get of sales and income taxes and highway funds. Billions of dollars are riding on how much an area grows and how good population estimates are for that area."

Now, some of the area's top economists and the Arizona Department of Commerce are working on a better way to calculate projections without relying so much on housing.

Gov. Janet Napolitano in 2006 called for a state task force to investigate Arizona's population numbers.

The Arizona Data Estimates and Projection Task Force includes various state agencies, municipalities and economists. Last fall, the group came back with its recommendations to create a new model for population forecasts.

The model called for moving the state's population and job data collection and forecasting from the Department of Economic Security to the Commerce Department. The department is now working to get data on driver's licenses, school enrollments, hospital stays, more detailed job records and tax-return data.

The department also is working with local governments to track how many homes were actually built out of all the housing permits issued. And to figure out many homes and apartments are vacant, it's working with utilities to gather information on new hookups and power usage.

The state will need a demographer to launch the new projection model. But because of Arizona's more than $1 billion budget shortfall, the Commerce Department can't yet hire one.

Central Arizona Governments, which plans for Pinal County, can't wait. It has already hired economists to create the recommended new model. New population forecasts for Maricopa, Pinal and Pima counties are due out this fall.

"Everyone wants a population number they can count on, even if it's not the number we want to hear," Morfessis said.

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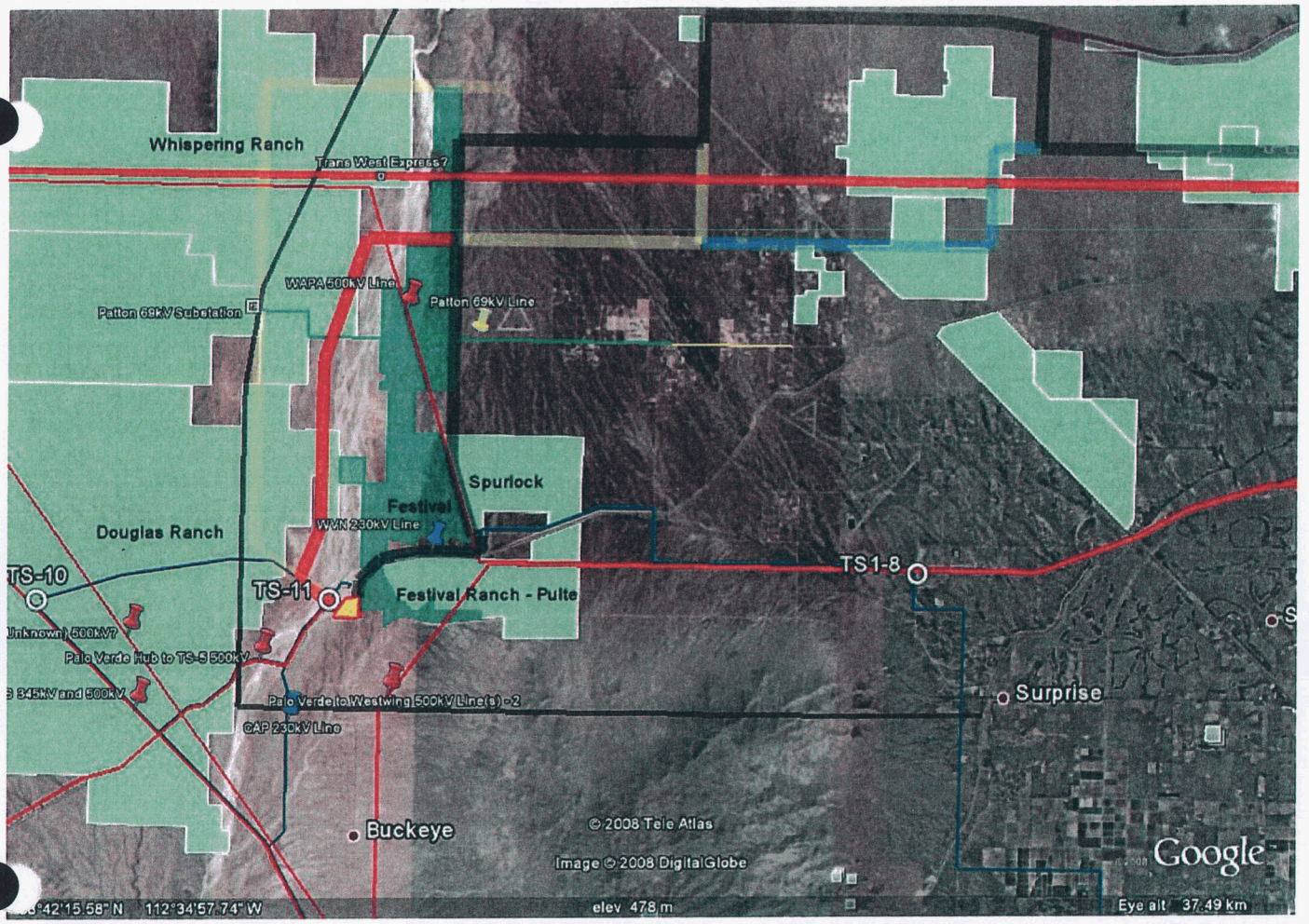
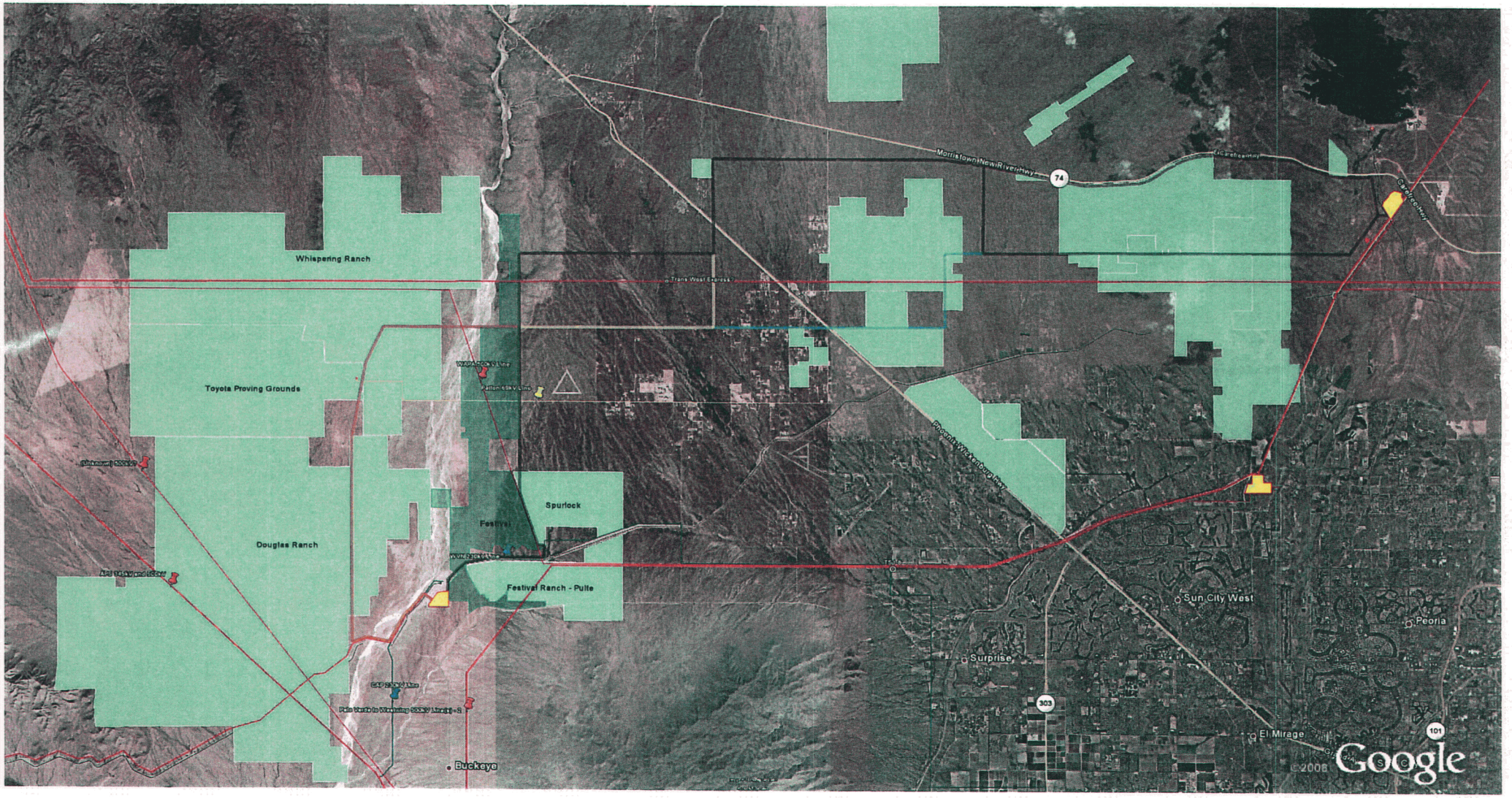
10-W10


Whispering Ranch
Trans West Express?
WAPA 500kV Line
Patton 69kV Substation
Patton 69kV Line
Spurlock
Festival
WVN 230kV Line
Douglas Ranch
TS-10
TS-11
TS1-8
Festival Ranch - Pulte
Unknown 500kV?
Palo Verde Hub to TS-8 500kV
345kV and 500kV
Palo Verde to Westwing 500kV Line(s) - 2
CAP 230kV Line
Surprise
Buckeye
© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Google
elev 478 m
Eye alt 37.49 km


Whispering Ranch
Trans West Express
Toyota Proving Grounds
Douglas Ranch
Spurlock
Festival
Festival Ranch - Pulte
Morristown New River Hwy
74
Sun City West
Peoria
Surprise
303
El Mirage
101
Buckeye
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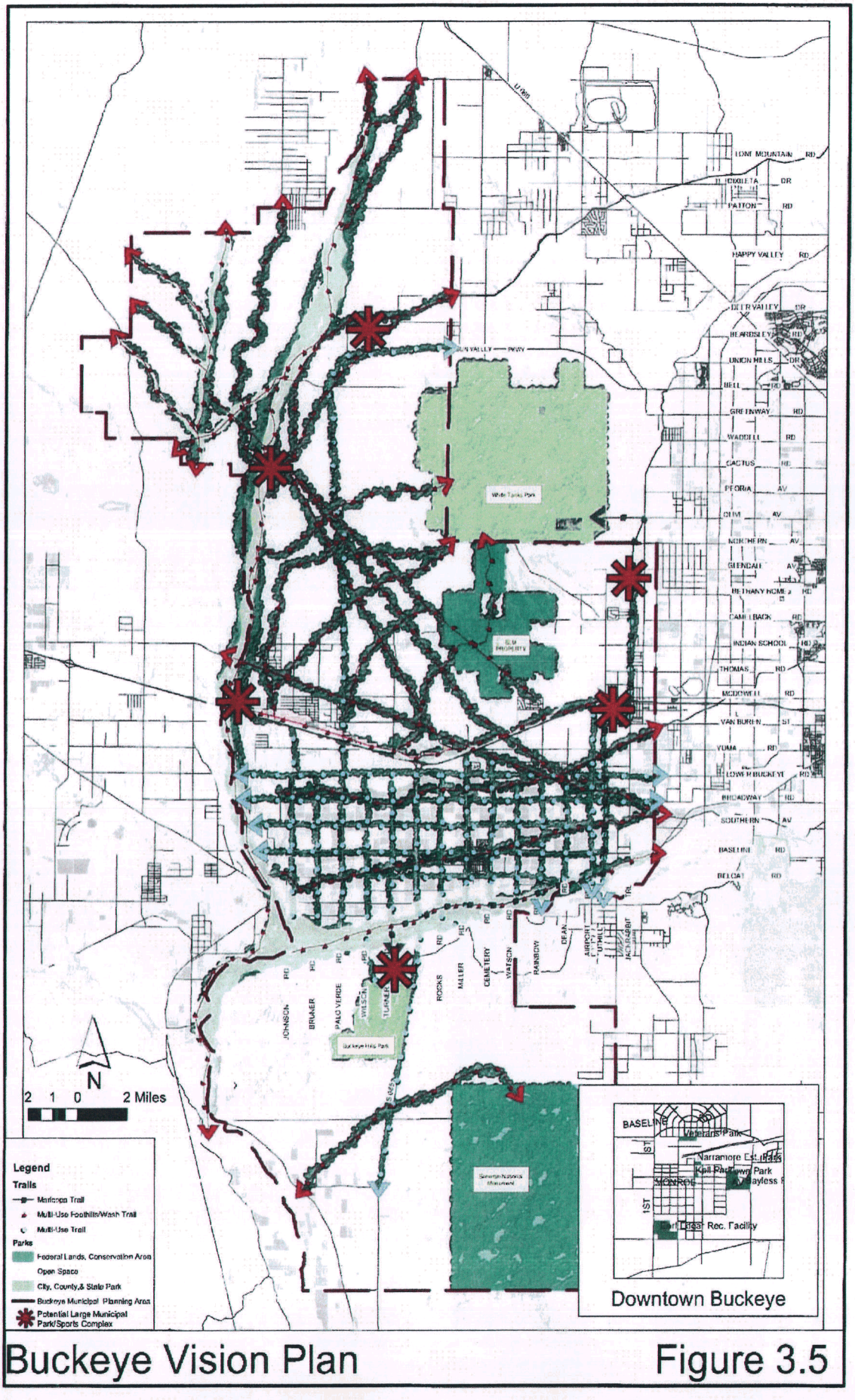
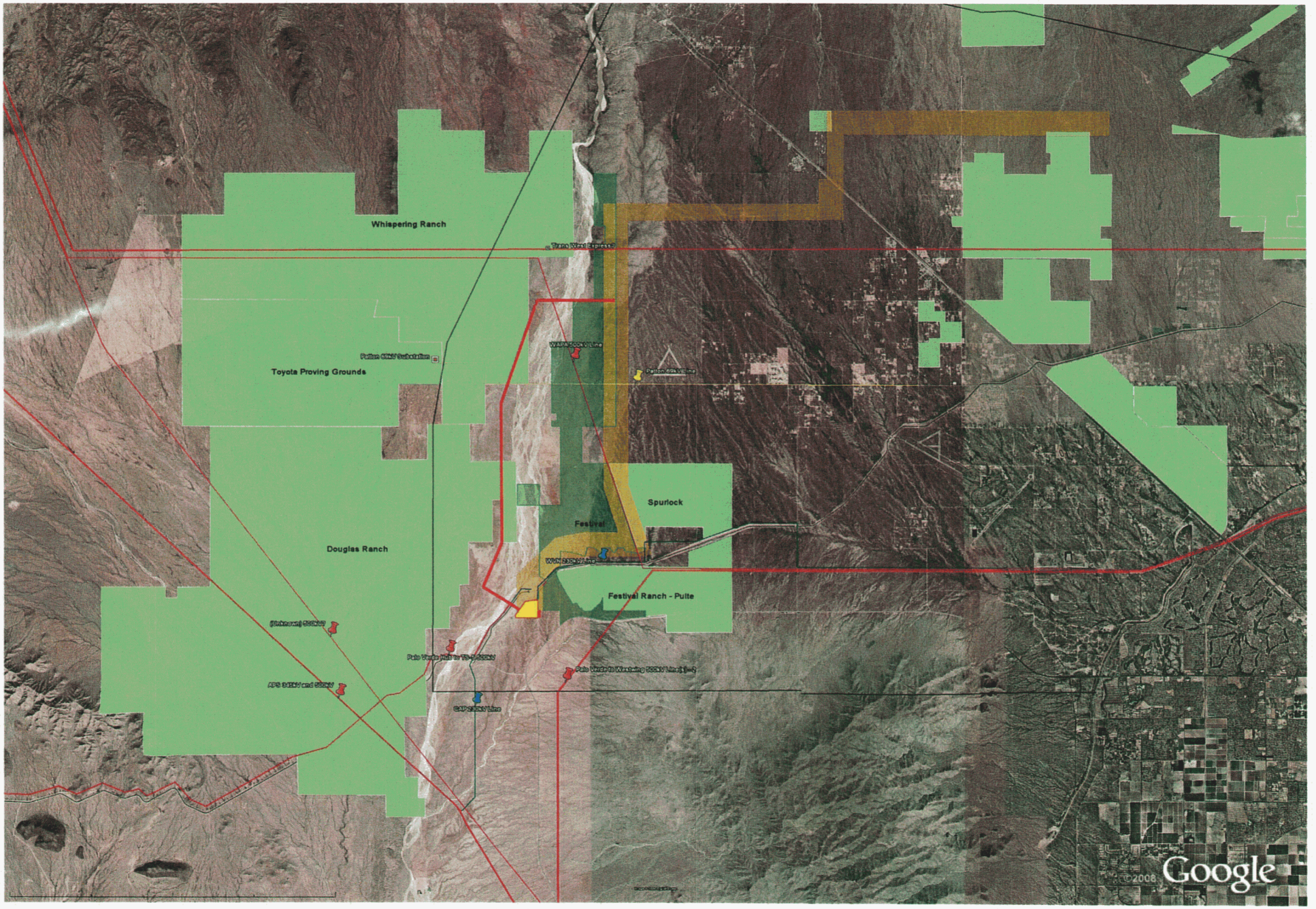


Buckeye Vision Plan Figure 3.5

10-W11


Whispering Ranch
Toyota Proving Grounds
Douglas Ranch
Spurlock
Festival
Festival Ranch - Pulte
Google

10-W12

10-W13

Interstate 10 – Hassayampa Valley Roadway Framework Study

Chapter 2

Future Land Use, Development and Environmental Conditions

September 2007

Prepared for

MARICOPA ASSOCIATION of GOVERNMENTS

Prepared by

DMJM HARRIS | AECOM

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2.1 Introduction

This report presents an inventory and analysis of land use issues and related findings of studies that are pertinent to the development of the Interstate 10-Hassayampa Valley Roadway Framework Study (the "Hassayampa Study"). Previous and current planning studies were gathered from the municipalities and agencies coordinating the studies.

The project area extends from approximately SR-74 on the north to the Gila River on the south and from 459th Avenue on the west to SR-303L on the east, covering an area of roughly 1,430 square miles (Figures 2-1 and 2-2).

Figure 2-3 depicts the boundaries of all the jurisdictions and their municipal planning areas (MPA) within the study area, as well as generalized land ownership. An MPA is defined as the geographic area in which the jurisdictional planning process must be carried out. It includes, but is not necessarily limited to, the incorporated territory of the city or town. Four municipalities have planning authority over their incorporated areas: the Town of Buckeye, City of Surprise, City of Goodyear, and City of Glendale, with Maricopa County having planning and zoning authority over the unincorporated areas. Within these unincorporated areas, the county has planning authority over privately owned land as well as land owned by the Arizona State Land Department (ASLD). Approximately one-third of the study area is not under any local planning jurisdiction, but under control of the federal Bureau of Land Management (BLM).

Much of the BLM land is located west of the Buckeye MPA. BLM-designated lands are under an extra layer of federal protection, meaning that any transportation infrastructure planned for this area will have to go through an added level of review. Much of the eastern half of the study area is in the planning areas of Buckeye, Surprise, Goodyear, and Glendale. Transportation infrastructure planned for an MPA should be compatible with the city's or town's land use and transportation plans.

2.2 Study Area Land Use Issues

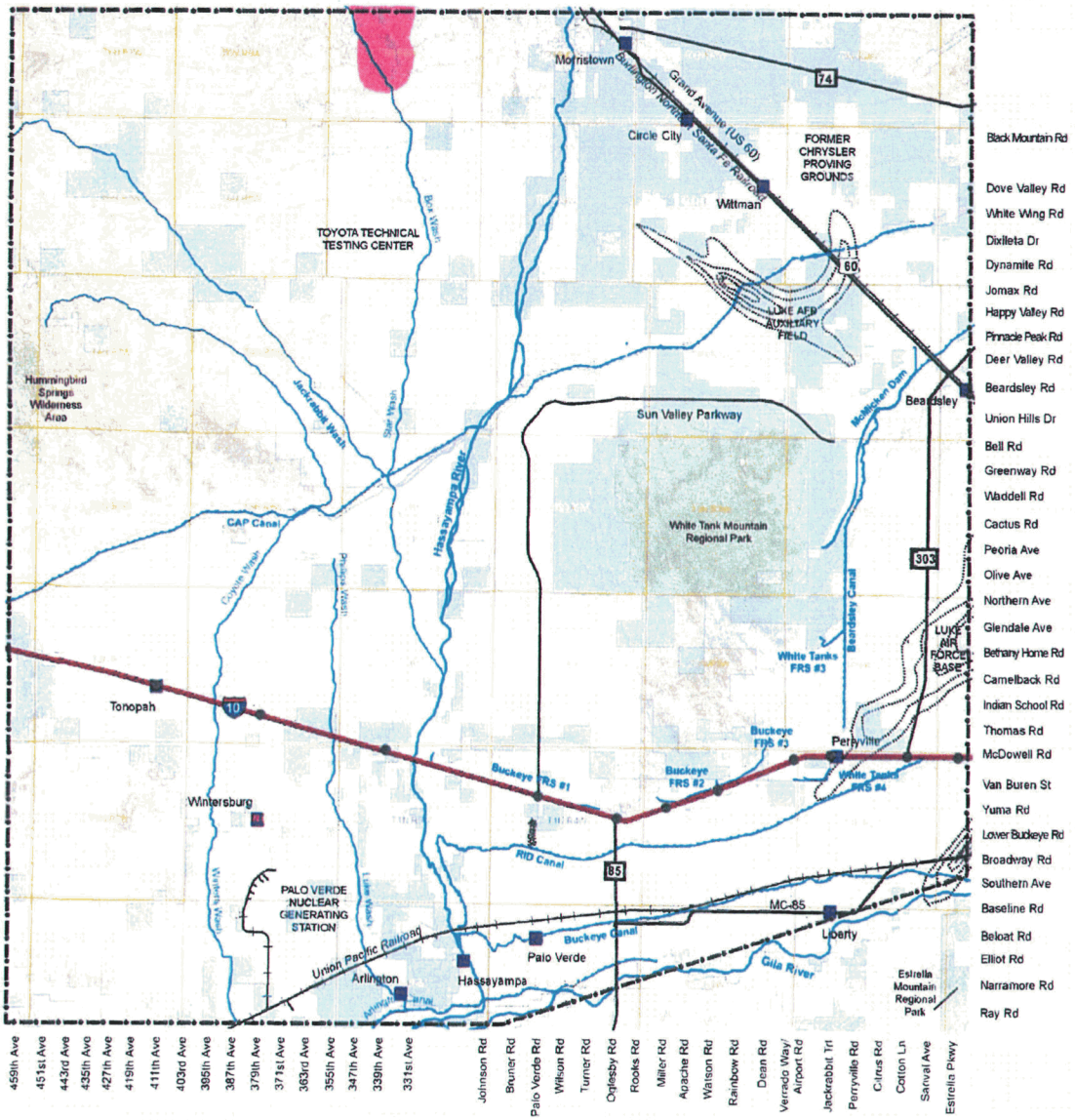
This section presents an inventory of land use issues and implications that are pertinent to the development of this Study. The inventory resulted in a series of detailed maps that have been included in this chapter, along with descriptive text, under the following categories:

- Population and Employment
- Revised Buildout Study Area Socioeconomic Forecasts and East Valley Comparison
- Environmental Context
- Existing Land Use
- Future Land Use
- Public Land Management
- Master-Planned Communities

2.2.1 Population and Employment

Population and employment statistics from the 2003 MAG publication, "Interim Projections of Population, Housing, and Employment by Municipal Planning Area and Regional Analysis Zone" show the study area to have 30,076 dwelling units and 34,411 jobs in the year 2000. Current MAG projections show these numbers increasing to 394,000 dwelling units and 388,000 jobs in the year 2030.

Figure 2-1 Study Area



STUDY AREA

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- Topography (100' contours)
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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2-1

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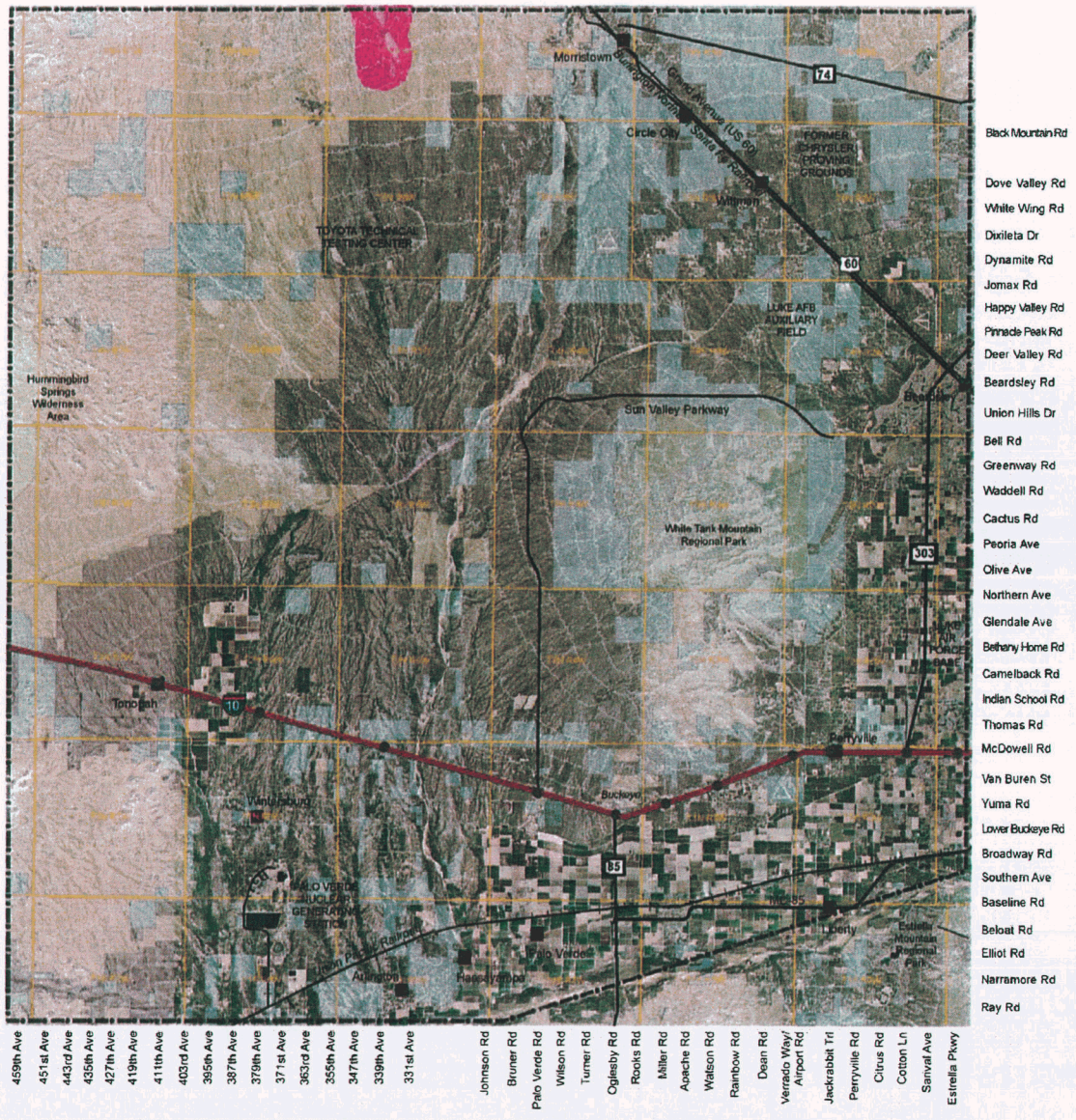
AUGUST 30, 2006

Figure 2-2 Study Area with Aerial Base



STUDY AREA WITH AERIAL BASE

Legend

- Railroads
- Roads
- Highways
- Freeways
- Township/Range
- Towns
- Existing Traffic Interchanges
- Topography (100' contours)
- BLM Raptor Protection Area
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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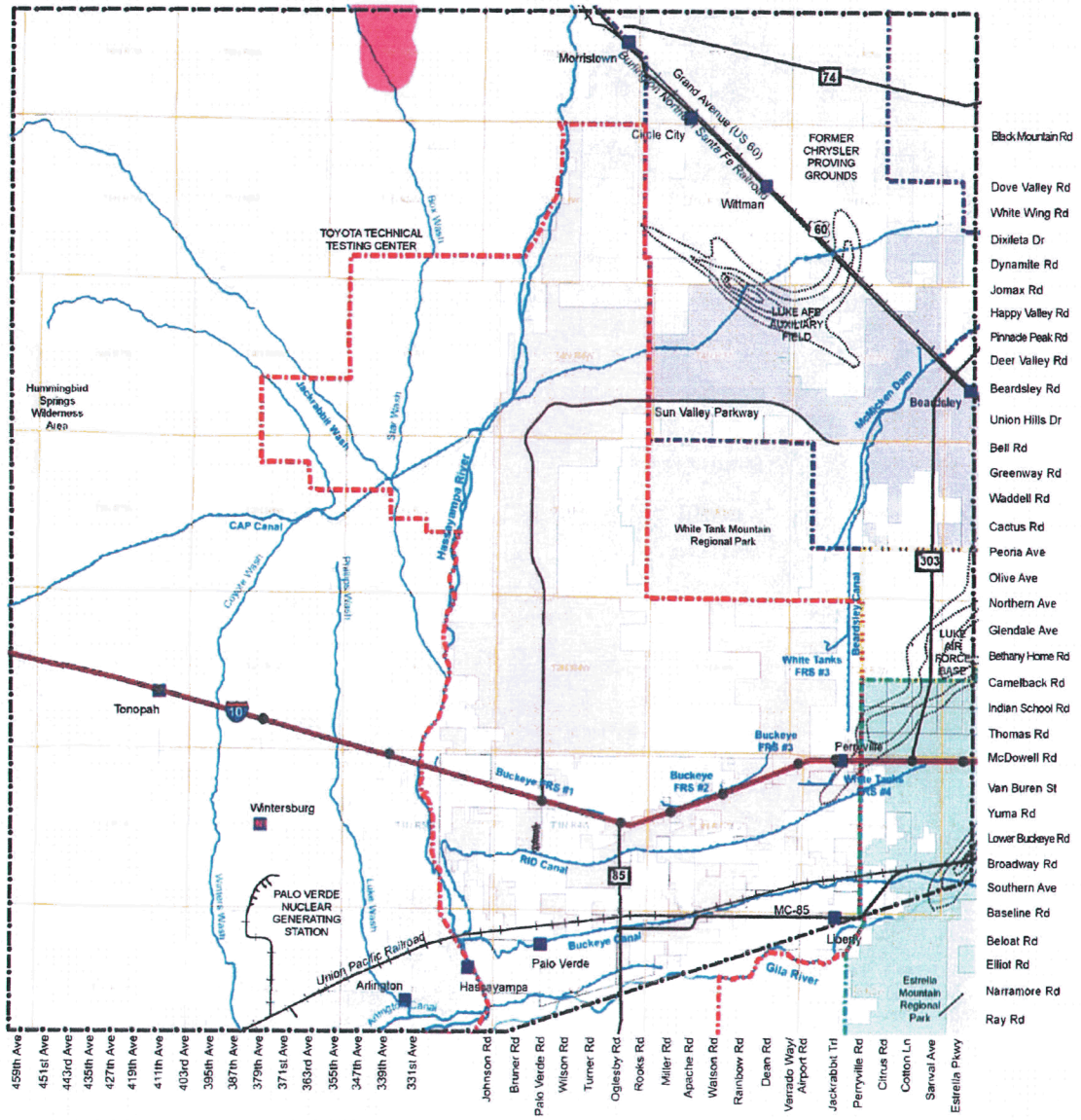
Figure 2-3 Jurisdictions and Planning Areas



JURISDICTIONS AND PLANNING AREAS

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Township/Range
- Towns
- Existing Traffic Interchanges
- Noise Contours
- BLM Raptor Protection Area
- Study Area Boundary

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Jurisdictions
- Buckeye
- Goodyear
- Surprise

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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Figures 2-4 through 2-7 illustrate the year 2030 projections. Population densities will be highest within the city and town MPA boundaries, especially adjacent to high-capacity transportation corridors like I-10, US-60, SR-303L, SR-74, SR-85, and the Sun Valley Parkway. Densities are projected to remain low near the Luke Air Force Base Auxiliary Field, the White Tank Mountains, and west of the Town of Buckeye, where much of the land belongs to the BLM and is not available for residential development.

Year 2030 employment will be generally much more concentrated than housing, with employers located along transportation corridors such as I-10, US-60, SR-303L, and SR-85, as well as near the Luke Air Force Base Auxiliary Field and in scattered employment pockets in the Buckeye MPA. These pockets in the Buckeye area can be attributed to the high–density, mixed-use town center developments proposed in many master planned communities, such as Sun Valley South, Douglas Ranch, and (in unincorporated Maricopa County) Belmont. Again, densities will remain low in the BLM land west of the Buckeye MPA.

2.2.2 Revised Buildout Study Area Socioeconomic Forecasts and East Valley Comparison

As part of its update of the Regional Transportation Plan, MAG is preparing revised population and employment forecasts for the entire region. The first step in preparing these projections is to establish Buildout population and employment estimates. To support this study, MAG "fast–tracked" development of Buildout socioeconomic estimates for jurisdictions within the study area. The study is using Buildout population and employment forecasts to identify the transportation infrastructure needed to satisfy the region's long-range travel demand.

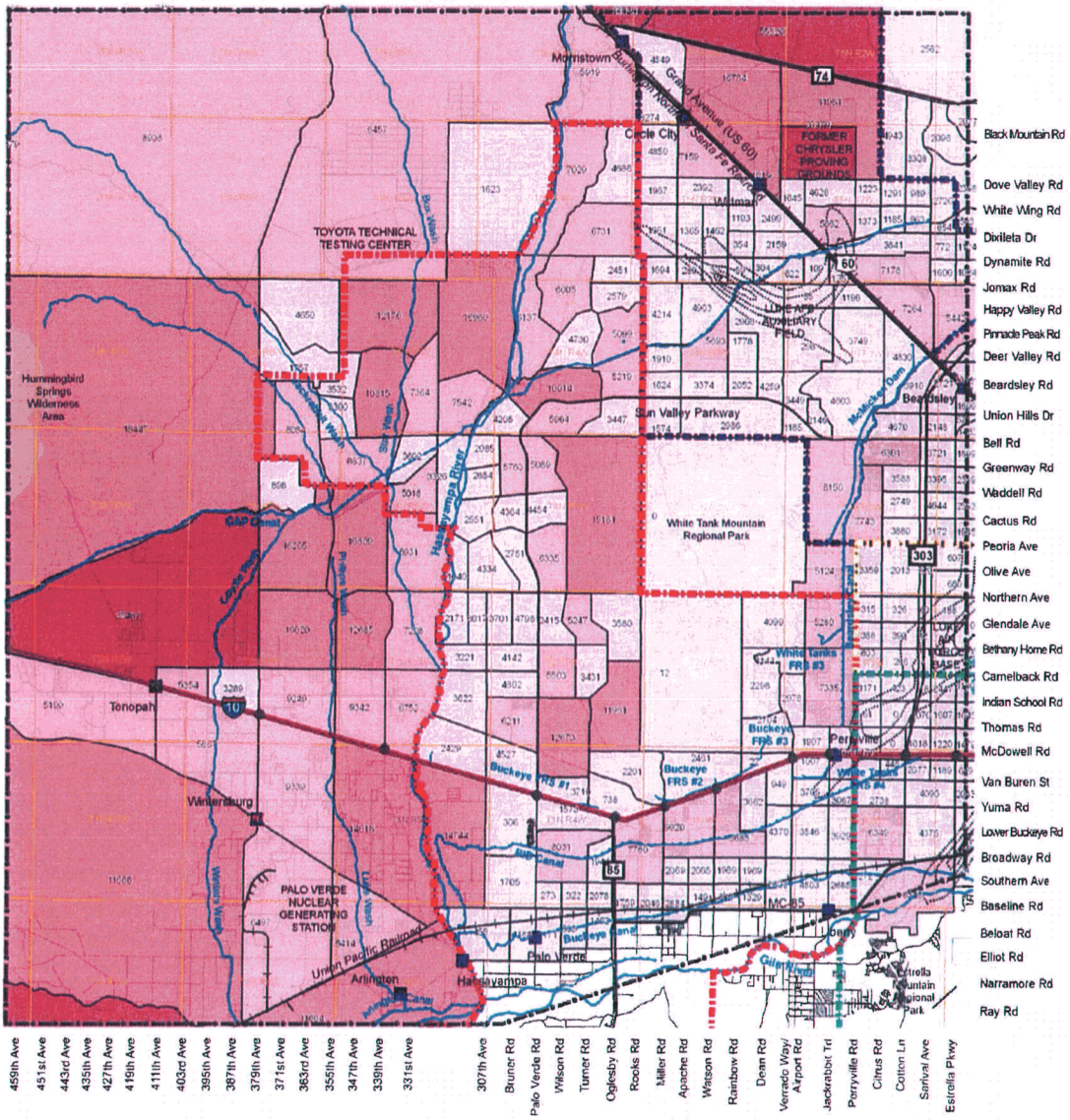
The Buildout analysis is based primarily on the current general and comprehensive plans of MAG member agencies: the Town of Buckeye, City of Surprise, City of Goodyear, City of Glendale, City of Peoria, and Maricopa County. These general plan estimates have been enhanced by information on current land use and development. State trust lands cover much of the study area. The ASLD works with the above jurisdictions to develop and agree on conceptual development plans that are reflected in each general plan.

MAG's analysis projects a Buildout population of 2.778 million people, with 1.047 million jobs (one job for every 2.65 residents) in the study area. To confirm that this Buildout dataset adequately accounts for expected future development, the study team performed a reasonableness check that compared the MAG Buildout land use projections for the study area with MAG year 2030 population projections for portions of the East Valley. The study team believes that the MAG year 2030 forecast for the East Valley area represents full Buildout of this portion of the MAG region. These projections for the East Valley can therefore be directly compared with the long-range Buildout forecast that MAG recently developed for the Hassayampa study area.

The purpose of this socioeconomic data comparison is to confirm that the recently developed general plan Buildout dataset will generate reasonable long-range travel demand forecasts for the study area. This land use comparison provides a point of reference between the Hassayampa study area and a portion of the MAG region under Buildout conditions, as represented by the MAG 2030 projections for the East Valley.

Within the Phoenix metropolitan area, the East Valley communities of Chandler, Gilbert, Guadalupe, Mesa, Queen Creek and Tempe are mature or maturing cities that are already approaching Buildout or expect to reach it in the near- to mid-term. At Buildout, the Hassayampa study area land use intensity is expected to be similar to what is seen now (2006) in these East Valley cities and towns.

Figure 2-4 Build Out Total Population



BUILD OUT TOTAL POPULATION (SAZ*)

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- XXX Total Dwelling Units
- Existing Traffic Interchanges
- Study Area Boundary
- Planning Areas
  - Buckeye
  - Glendale
  - Goodyear
  - Surprise

Total Population (dwelling units)

- 0 - 5,000
- 5,001 - 10,000
- 10,001 - 20,000
- 20,001 - 60,000
- 60,001 - 110,000

Notes to Figure X:

*SAZ = Socioeconomic Analysis Zone

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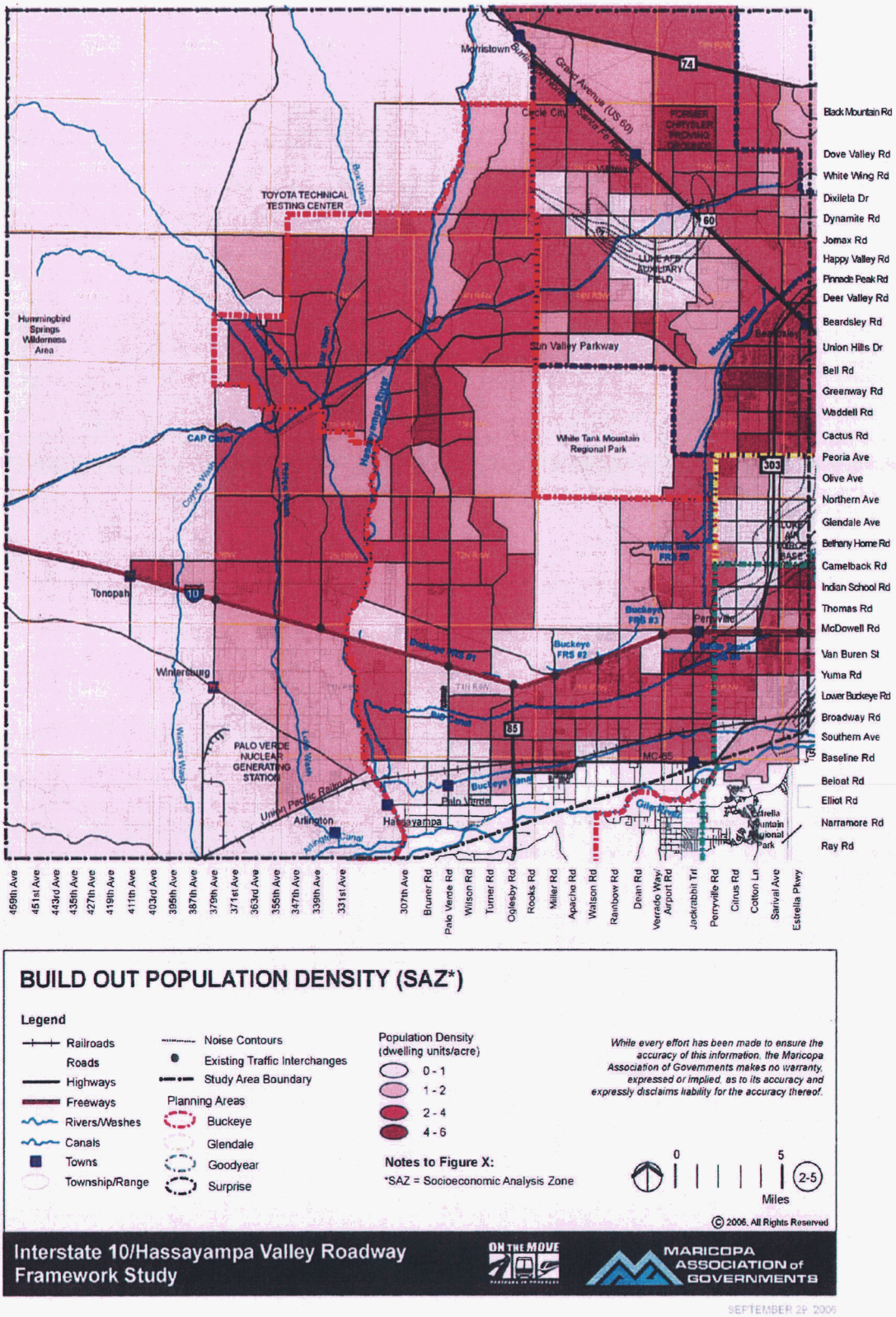
SEPTEMBER 29, 2006

Figure 2-5 Build Out Population Density



BUILD OUT POPULATION DENSITY (SAZ*)

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- Existing Traffic Interchanges
- Study Area Boundary

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

Population Density (dwelling units/acre)

- 0 - 1
- 1 - 2
- 2 - 4
- 4 - 6

Notes to Figure X:

*SAZ = Socioeconomic Analysis Zone

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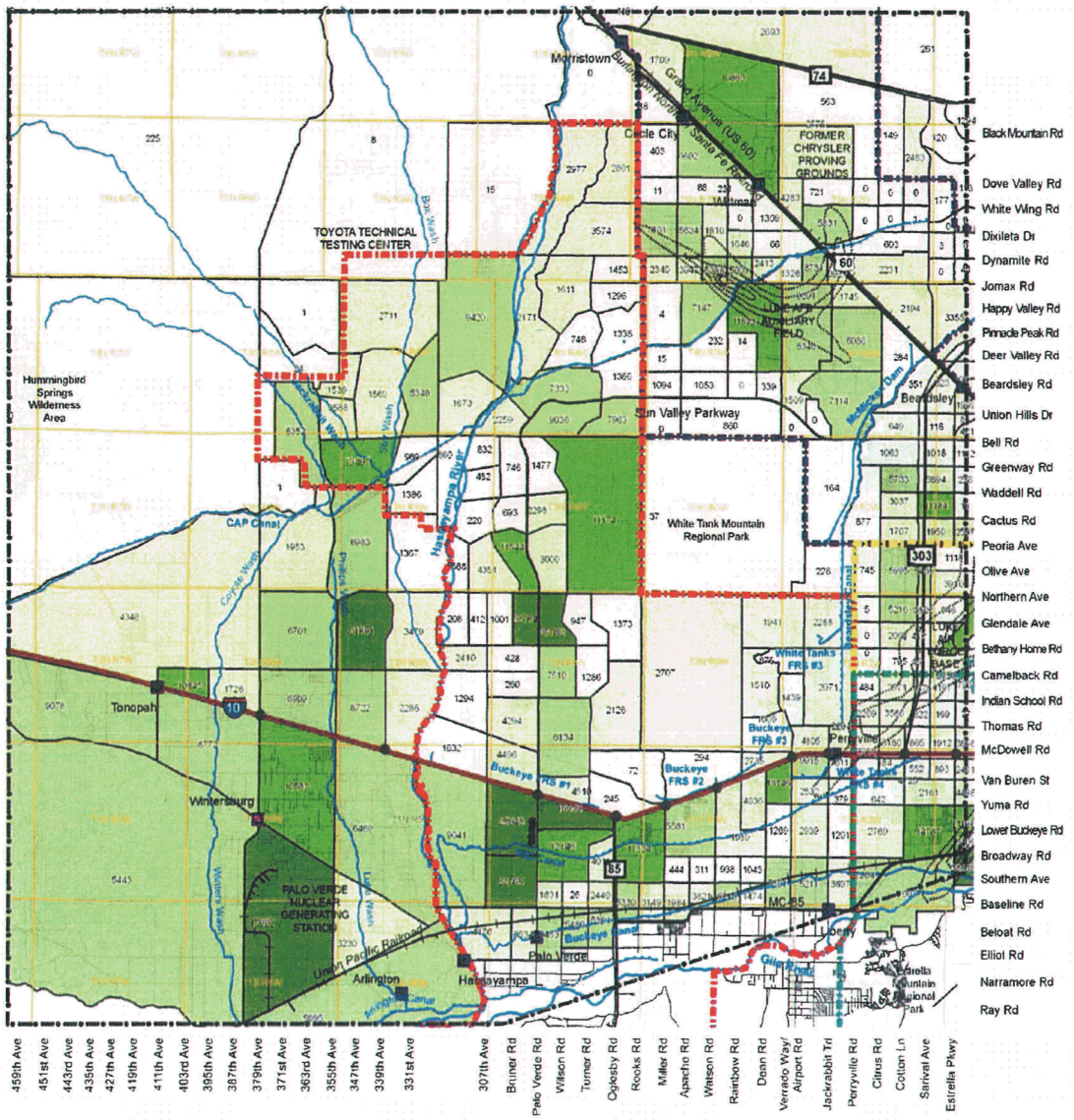
Figure 2-6 Build Out Total Employment



BUILD OUT TOTAL EMPLOYMENT (SAZ*)

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- XXX Total Jobs
- Existing Traffic Interchanges
- Study Area Boundary

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Total Employment (jobs)
- 0 - 1,500
- 1,501 - 5,000
- 5,001 - 10,000
- 10,001 - 15,000
- 15,001 - 30,000

Notes to Figure X:
*SAZ = Socioeconomic Analysis Zone

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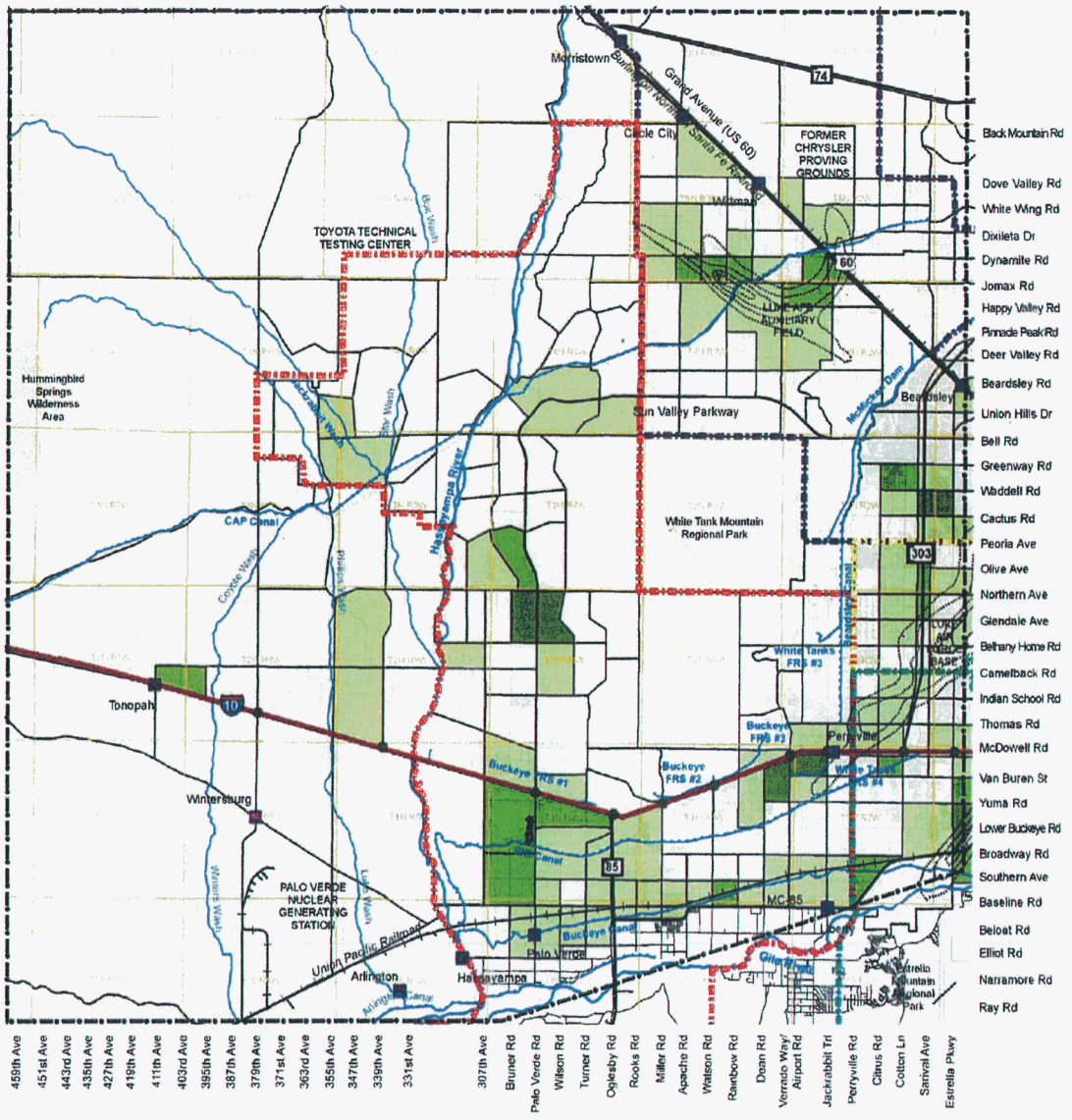
SEPTEMBER 29, 2006

Figure 2-7 Build Out Employment Density



BUILD OUT EMPLOYMENT DENSITY (SAZ*)

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- Existing Traffic Interchanges
- Study Area Boundary

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

Employment Density (jobs/acre)

- 0 - 2
- 2 - 6
- 6 - 12
- 12 - 20

Notes to Figure X:

*SAZ = Socioeconomic Analysis Zone

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2-7

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Interstate 10/Hassayampa Valley Roadway Framework Study

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SEPTEMBER 29 2006

The Hassayampa study area is a mosaic of public and private land ownership. State Trust Lands held by the ASLD may eventually transfer to private interests, through either sale or lease, for residential and commercial development. On the other hand, federal lands, such as those managed by the BLM, are unlikely to transfer. Figure 2-8 shows a map of study area land ownership patterns in the Hassayampa study area. Figure 2-9 shows a similar map of land ownership patterns in the East Valley comparison area. Table 2.1 provides a breakdown of land ownership by acreage, both within the study area and in the East Valley.

Table 2.1 Existing Land Ownership Summary

Land Category	I-10/Hassayampa Valley Study Area		East Valley	
	Acres	Pct Total	Acres	Pct Total
Bureau of Land Management	263,631	29%	1,343	1%
Bureau of Reclamation	918	0%	1,480	1%
County	46	0%	1,454	1%
Local and State Parks	29,200	3%	4,163	2%
Military	1,977	0%	2	0%
Private Lands	460,375	50%	235,523	95%
State Trust Lands	163,201	18%	3,950	2%
State Wildlife Area	42	0%	40	0%
U.S. Fish & Wildlife Service	-	0%	6	0%
Total	**919,390**	**100%**	**247,961**	**102%***

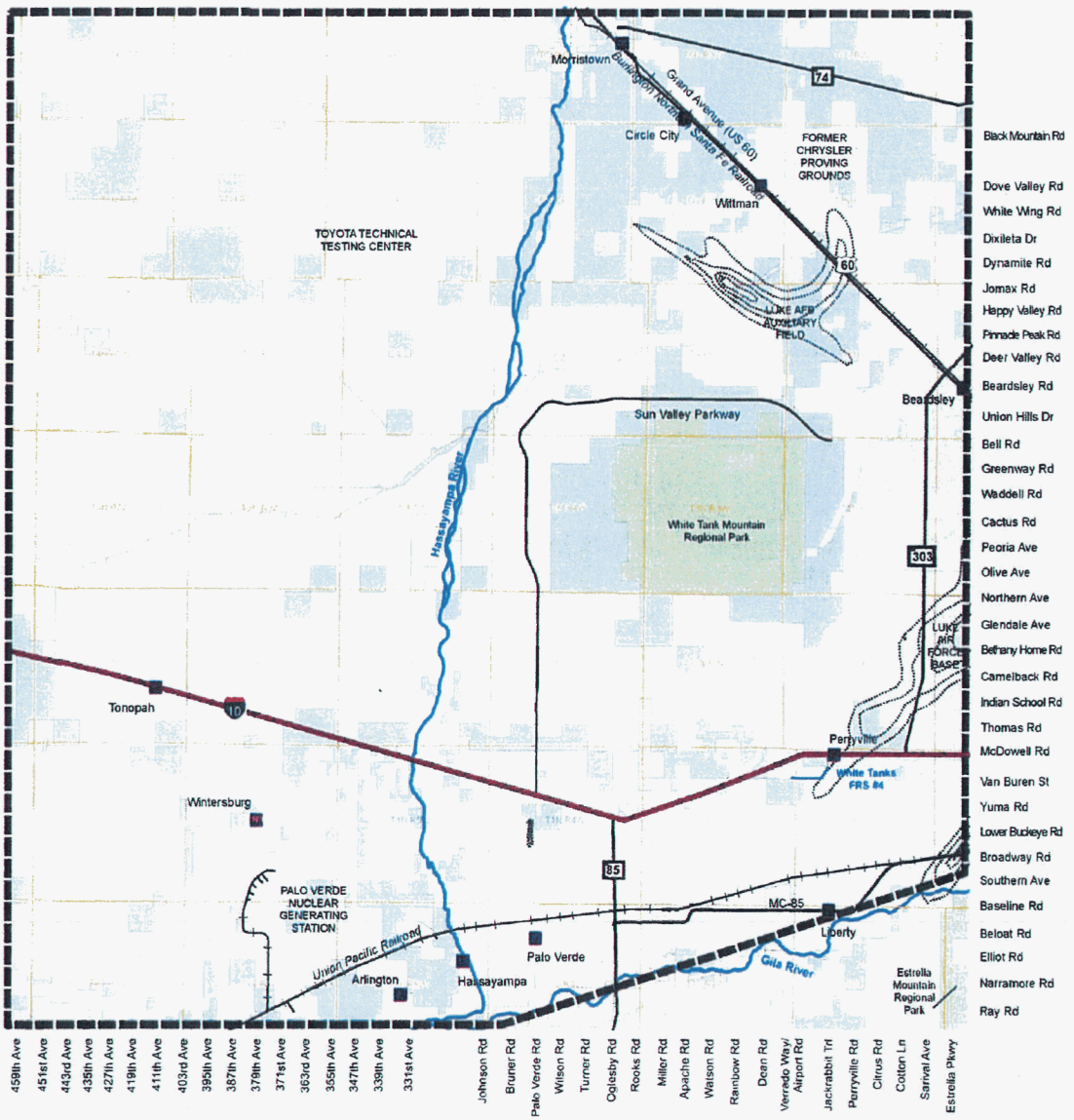
*Percents do not add precisely to 100 due to rounding.

Source: Arizona State Land Department, Arizona Land Resource Information System (ALRIS), 1988.

Significant differences exist between the distribution of land ownership in the East Valley and in the Hassayampa Valley. The vast majority of land in the East Valley is privately owned, but half the land in the Hassayampa Valley is publicly held, primarily by BLM and ASLD. However, land ownership in the East Valley may have been distributed differently several decades ago when the area was mostly undeveloped.

The study team prepared a comparison of land use intensity at Buildout between the study area and the East Valley. Table 2.2 includes both private and state lands (most of which are likely to develop someday) in the universe of total developable land. The average general plan Buildout density of dwelling units (DU) for the Hassayampa study area is 1.75 per (net) acre. This is 24 percent lower than the 2.31 dwelling units per acre in the MAG year 2030 East Valley data. The Hassayampa Valley Buildout employment density, in jobs per net acre, is well under half of that projected for 2030 Buildout conditions in the East Valley.

Figure 2-8 I-10/Hassayampa Study Area Land Ownership



I-10/HASSAYAMPA STUDY AREA LAND OWNERSHIP

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Towns
- Township/Range
- Noise Contours
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation
- Private

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2-8

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OCTOBER 19, 2006

Figure 2-9 Phoenix East Valley Land Ownership

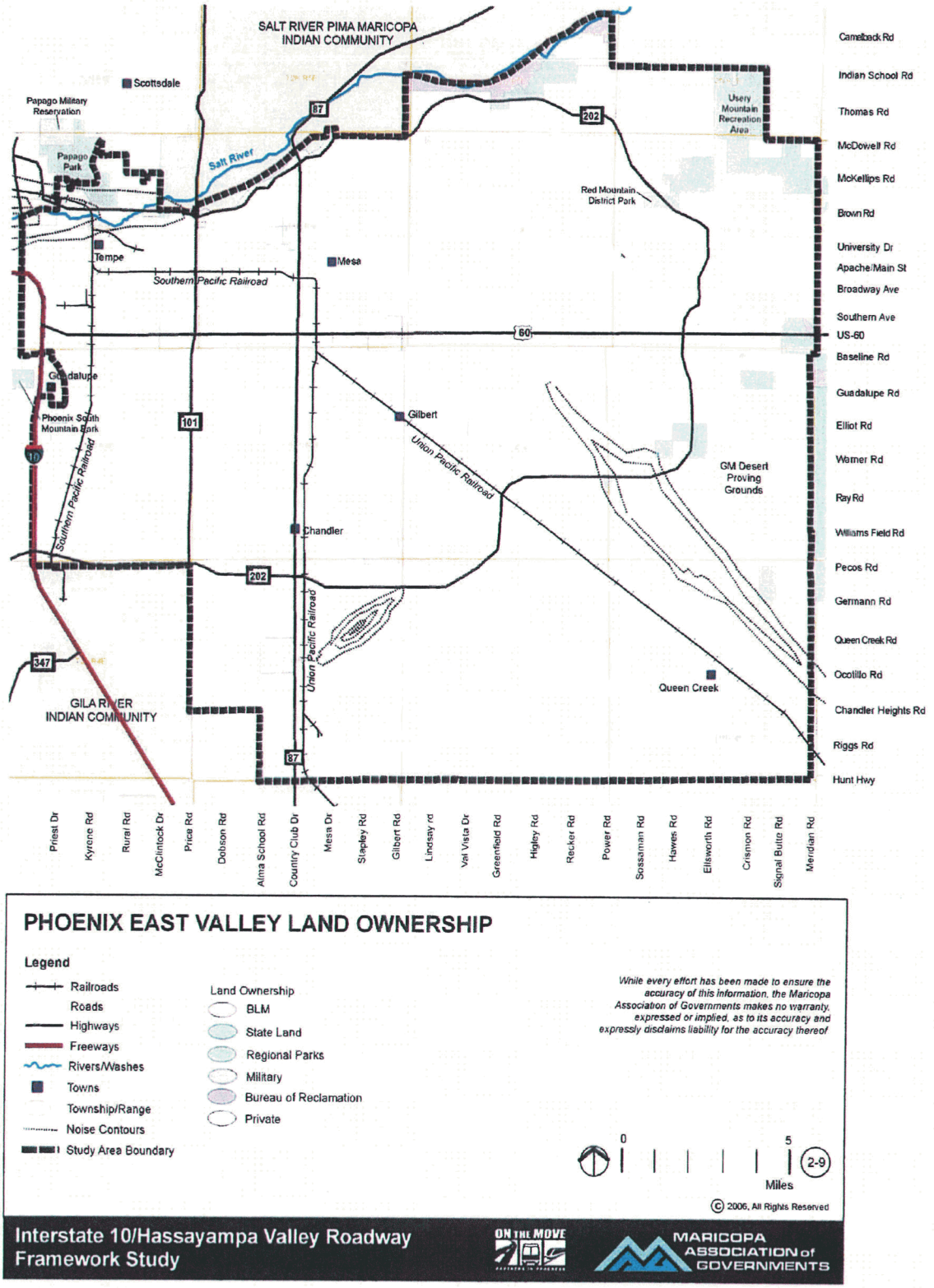


Table 2.2 I-10/Hassayampa Socioeconomic Data Comparison Land Use Summary with Private and State Land Holdings

Analysis Area	Gross Acres	Net Acres	POP	DU	DU/Net Acre	EMP	EMP/DU
I-10/Hassayampa Study Area (Buildout)	919,000	624,000	2,778,000	1,094,000	1.75	1,047,000	0.96
East Valley (2030)	248,000	239,000	1,512,000	552,000	2.31	899,000	1.63

Notes:

Gross acres represents the total land area of each analysis area. Net acres in both the study area and the East Valley are based on the sum of private and state lands from the ALRIS database.

Sources: MAG Buildout population and employment estimate for the I-10/Hassayampa Valley Study Area, September 2006; MAG 2030 population and employment estimates, July 2003 for the East Valley area.

According to the table, the East Valley Buildout population density (per net developable acre) is 42 percent higher than the Buildout density projected for the Hassayampa study area. The general plan Buildout scenario in the Hassayampa Valley region represents the initial vision for future urbanization, however, and could change in future decades as urban densification continues. To put this in context, the East Valley has had decade upon decade of general plan revisions and updates, rezonings, redevelopment, and infill development, which have shaped and will continue to shape land use.

Another key item is the projected jobs per dwelling unit. As shown in Table 2.2, the latest Buildout projections show employment per dwelling unit in the study area to be only 59 percent of that projected for the East Valley in 2030. However, a socioeconomic sensitivity analysis could be conducted to determine how a more favorable jobs/housing balance (i.e., a higher ratio) would affect the number of trips leaving the region, and ultimately the number of lanes needed on key regional, high-capacity facilities. The results of the jobs/housing balance sensitivity analysis could also affect anticipated infrastructure investment levels.

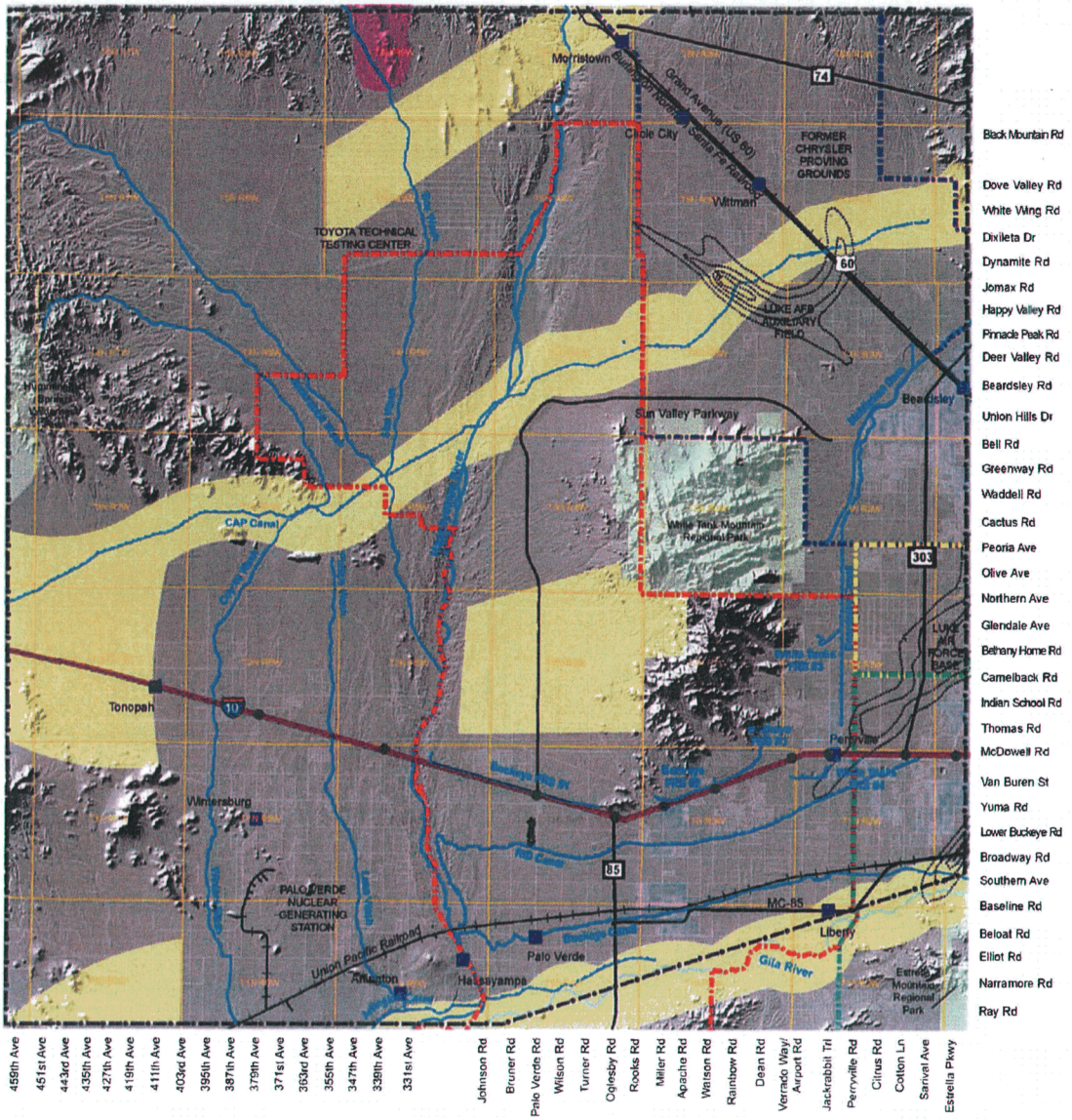
The MAG Buildout projections for the Hassayampa area reflect the low population and employment densities of initial suburban development. These densities are considerably lower than those projected for the East Valley in 2030. The East Valley projects reflect historic development trends and include the effects of full urbanization. In contrast, the initial set of MAG Buildout projections for the Hassayampa Valley reflect a mixture of rural and early-stage suburban development. Thus, as the Hassayampa Valley matures, and as general plans are revised and updated in future decades, population estimates are expected to be raised to reflect continuing and denser urbanization.

While this analysis indicates that the Hassayampa Valley at Buildout will be less densely developed and have fewer jobs per household than the East Valley, at least initially, the potential impact to regional transportation infrastructure needs could be offset by an improved subregional employment balance (i.e., more jobs per household in the study area). An improved jobs/housing balance would result in an increased level of trip capture within the Hassayampa Valley, thereby potentially reducing the needed lane miles of new regional highways.

2.2.3 Environmental Context

The study area includes such significant environmental features as topography, cultural resources, natural resources, drainage, and public utilities. These features are illustrated in Figures 2-10 through 2-15.

Figure 2-10 Environmental Context



ENVIRONMENTAL CONTEXT

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Potential Wildlife Linkage Zone
- Urban Areas
- Hillshade
- Noise Contours
- Study Area Boundary

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

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Figure 2-11 Drainage Features

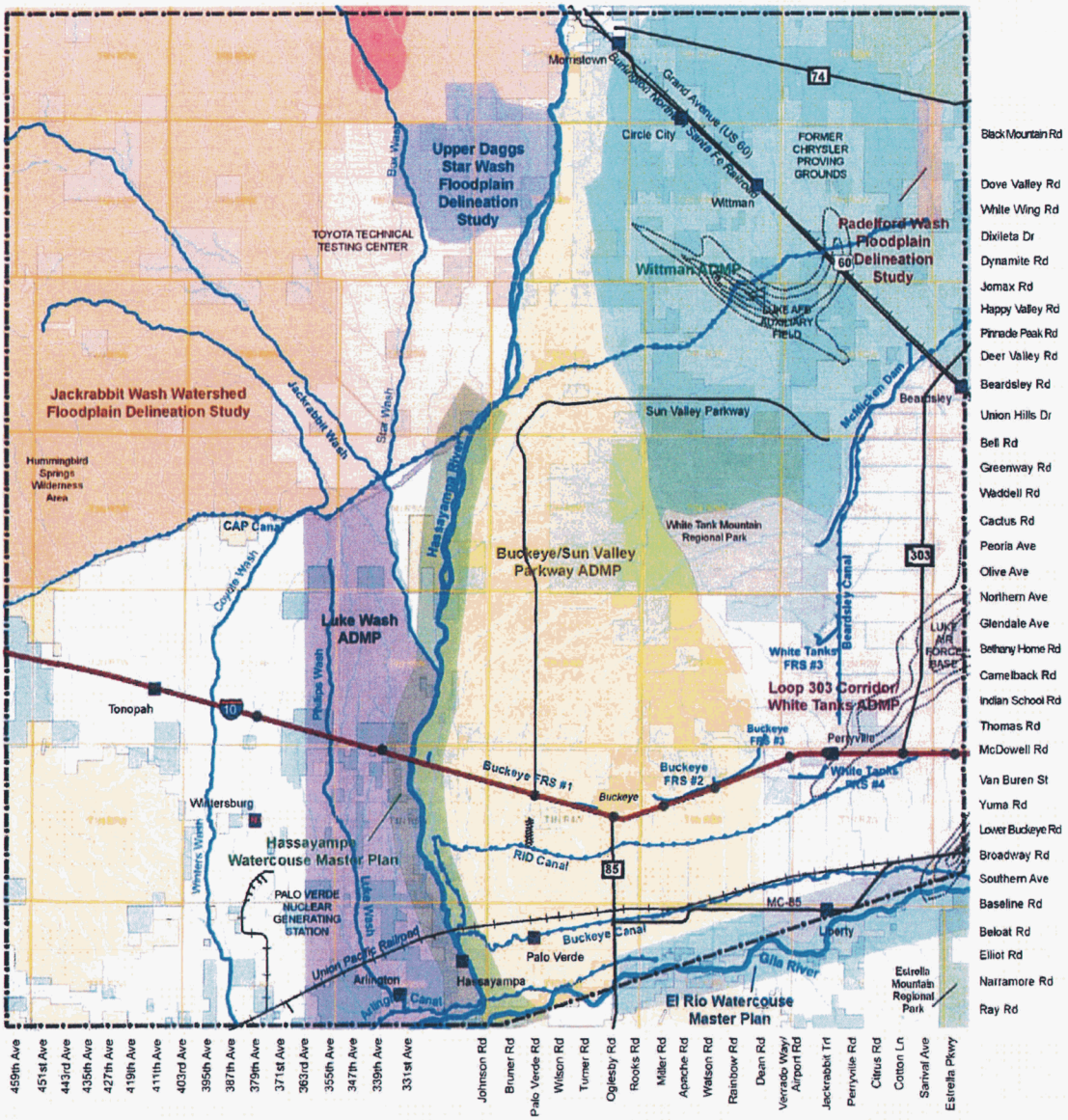
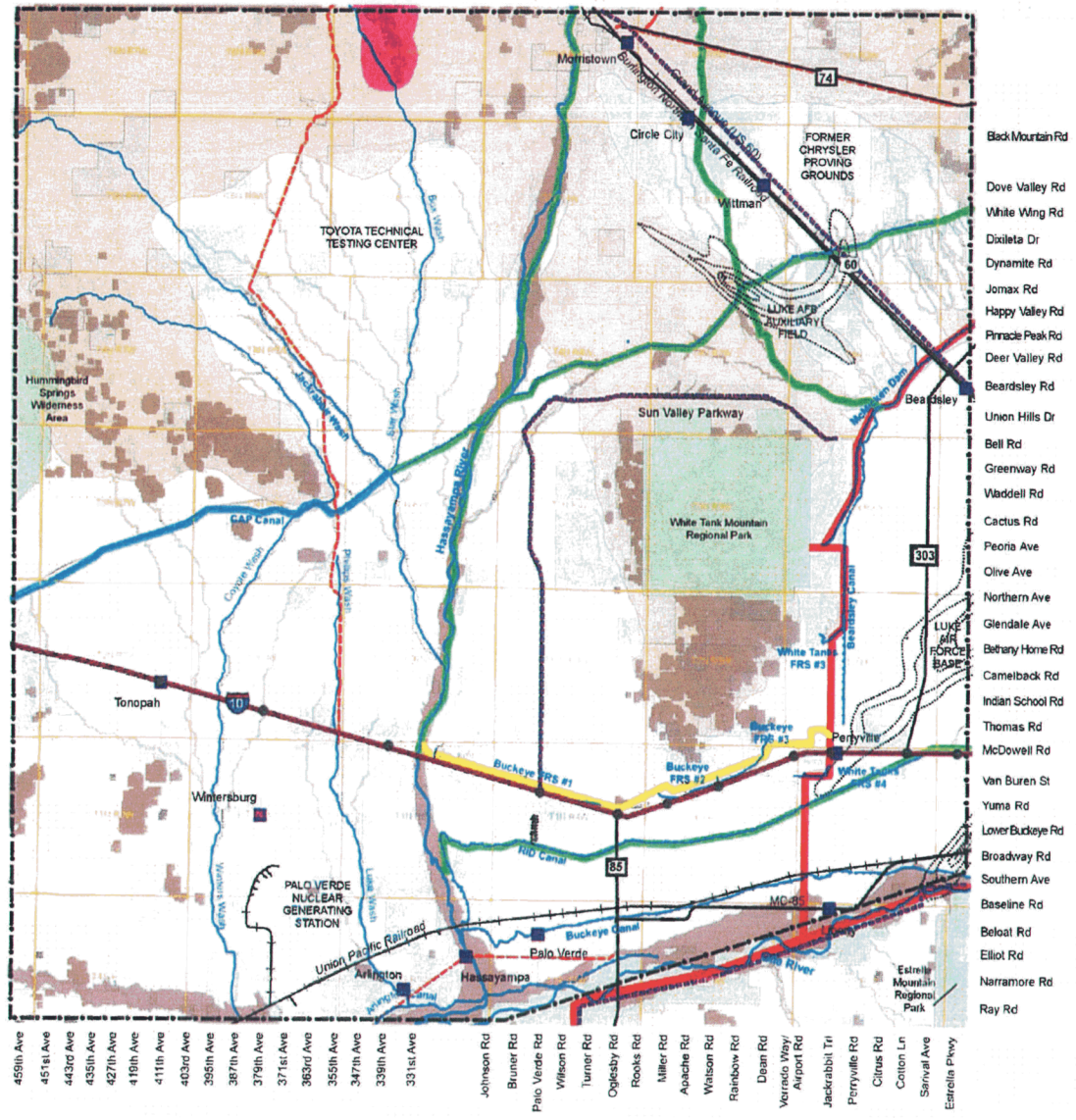


Figure 2-12 Recreational Opportunities



RECREATIONAL OPPORTUNITIES

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Topography (100' contours)
- Study Area Boundary

MAG Desert Spaces Plan
- Conservation Areas
- Retention Areas
- Secured Open Space
- Scenic Travelways
- Bikeways

Maricopa County Trails Plan
- Priority 1 Segments
- Priority 2 Segments
- Priority 3 Segments
- Priority 4 Segments

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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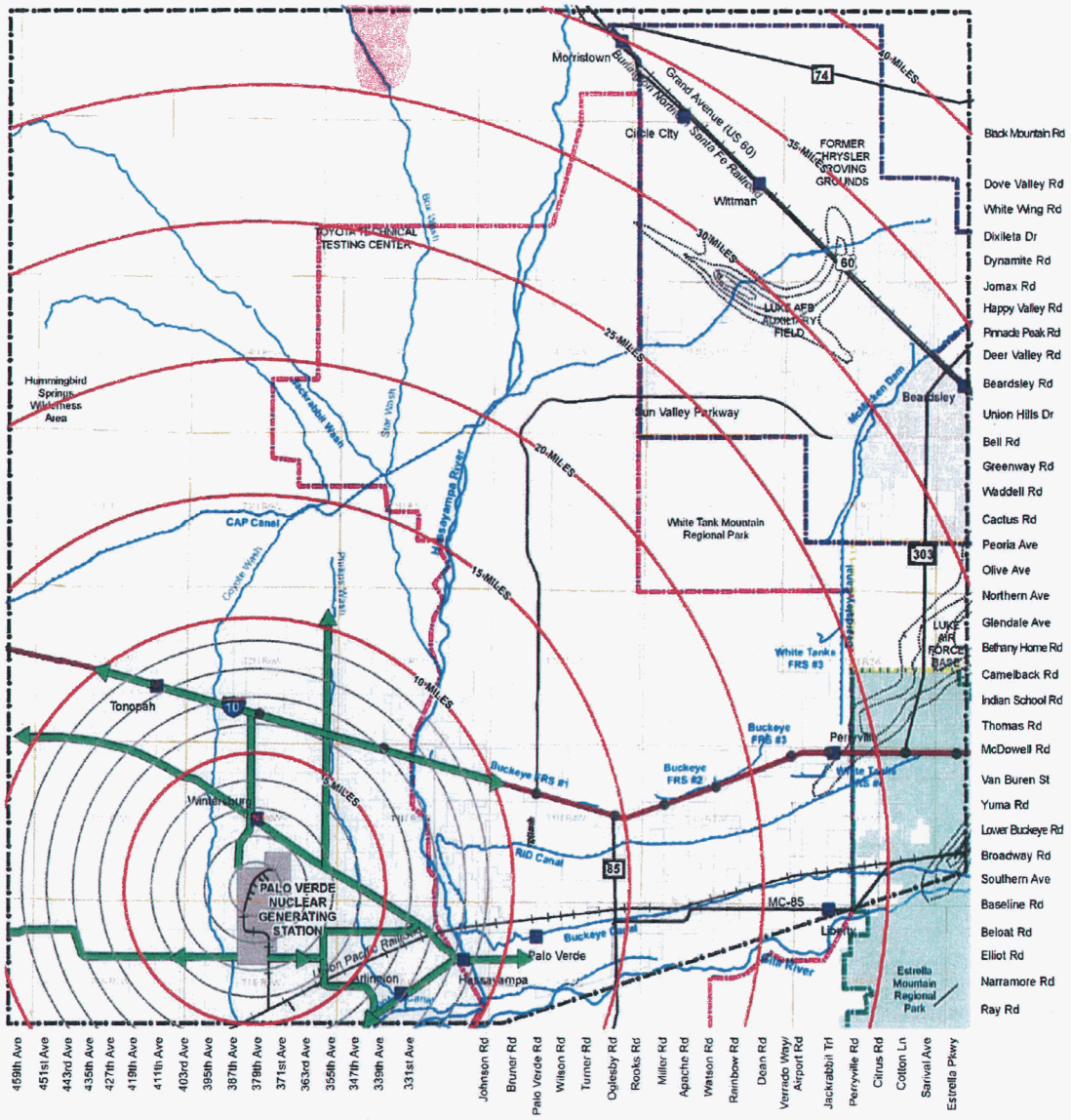
Figure 2-13 Palo Verde Nuclear Generating Station Emergency Planning



PALO VERDE NUCLEAR GENERATING STATION - EMERGENCY PLANNING

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- Existing Traffic Interchanges

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Jurisdictions
- Buckeye
- Goodyear
- Surprise

- 10-mile radius Emergency Planning Zone
- 50-mile radius Ingestion Pathway Zone
- Evacuation Routes
- Study Area Boundary

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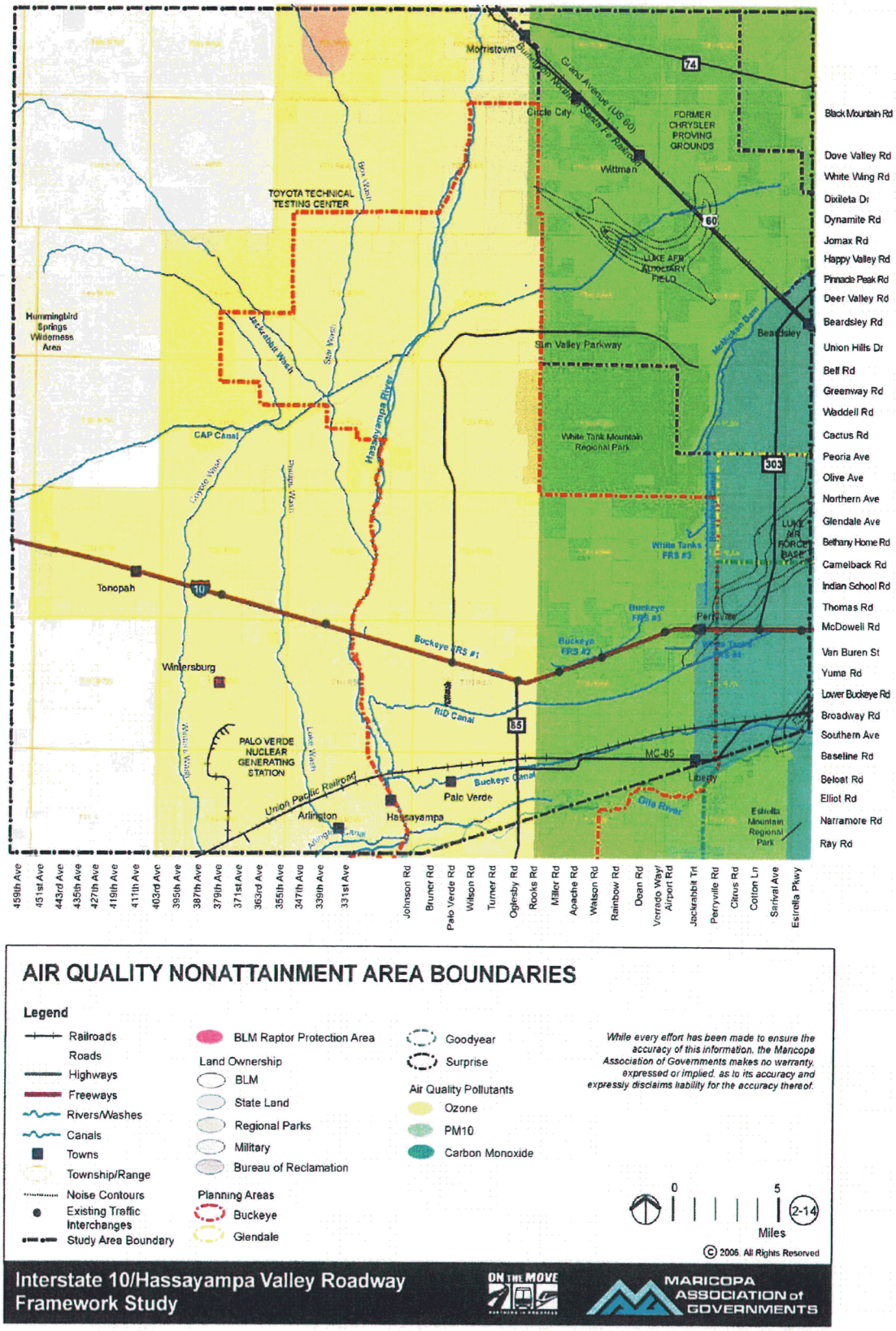
Figure 2-14 Air Quality Nonattainment Area Boundaries



AIR QUALITY NONATTAINMENT AREA BOUNDARIES

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- Existing Traffic Interchanges
- Study Area Boundary
- BLM Raptor Protection Area

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Air Quality Pollutants
- Ozone
- PM10
- Carbon Monoxide

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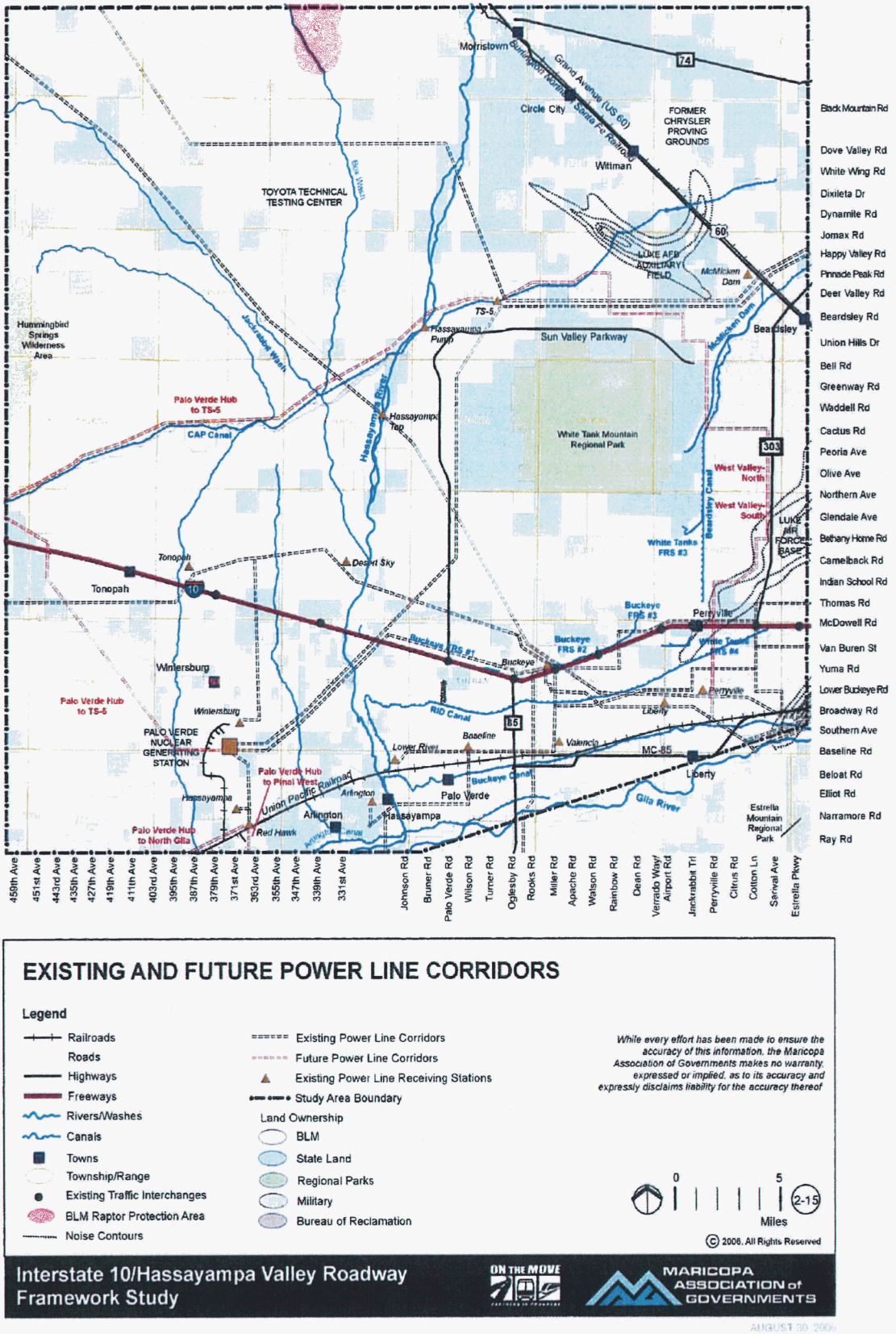
Figure 2-15 Existing and Future Power Line Corridors



EXISTING AND FUTURE POWER LINE CORRIDORS

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Existing Power Line Corridors
- Future Power Line Corridors
- Existing Power Line Receiving Stations
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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The environmental features outlined below are based on readily available information that has not been field-verified. This information was obtained from various sources such as public agencies, municipalities, and web pages and databases based on Geographic Information Systems (GIS). On-site "ground truthing" and field investigation are recommended at the Corridor Improvement Study and Design Concept Report levels, to verify these environmental considerations.

Natural Resources

Figure 2-10 illustrates the existing environmental conditions of the study area. To begin with, this map shows the jurisdictions and urbanized areas. As described above, the study area is composed of (portions of) the Town of Buckeye, City of Surprise, City of Goodyear, City of Glendale, and unincorporated Maricopa County. Urbanized area is defined by the U.S. Census Bureau as the collective combination of urban areas and urban clusters, referring to a geographic area consisting of a central core and adjacent territory that contains at least 50,000 people, generally with an overall population density of at least 1,000 per square mile. Urban clusters, generally found at the edge of the urbanized area, are based on census block and block group density, do not coincide with official municipal boundaries, and need not be adjacent to the urban area boundary. The Phoenix urbanized area currently extends west across SR-303L and north of Bell Road as far as McMicken Dam. Downtown Buckeye is an urban cluster that spans MC-85 between Rooks and Watson roads.

Several topographic features stand out on the landscape. White Tank Mountain Regional Park, the largest unit of the Maricopa County park system, is located entirely within the study area. The highest peak in the White Tank Mountains is more than 4,000 feet tall. Hills and mountains associated with this landform, and ranging from 1,400 to 2,800 feet in height, extend south of the park for approximately five miles.

Part of Hummingbird Springs Wilderness Area is located within the study area. This wilderness extends from approximately Happy Valley Road to Waddell Road, and east to approximately 451st Avenue. The entire wilderness area encompasses 31,200 acres, but only a small eastern portion is located within the study area boundaries. This wilderness is marked by the 3,148 foot Sugarloaf Mountain, located outside the study area. The landscape surrounding the Hummingbird Springs Wilderness Area to the north, east, and northeast is characterized by peaks and hills ranging from 1,800 feet to 2,600 feet tall.

The land within the project area is generally higher in elevation in northern reaches and lower in the southern reaches. The White Tank Mountains are located within the southeastern quadrant of the project area. Several more mountains, peaks and hills are scattered throughout the landscape. There is an expansive range grouped in the northwestern corner of the study area, a smaller one in the southwestern corner, and an even smaller rise in the northeastern corner. Surface bodies of water (natural and man-made) include the Hassayampa River, Gila River, Arlington Canal, Beardsley Canal, Buckeye Canal, Roosevelt Irrigation District (RID) Canal, and Central Arizona Project (CAP) Canal, along with several washes.

Major Watercourses and Drainage

Major Watercourses

The Gila River lies adjacent to the southeast corner of the study area. Its channel flows generally from east to west along the south study area boundary for approximately twelve miles. Approximately two miles west of its confluence with the Hassayampa River, the Gila turns south to roughly parallel Old U.S. Highway 80 and SR-85.

The Hassayampa River, a tributary of the Gila, flows from north to south across the central portion of the project area. The river crosses the northern study area boundary at an elevation of 1,800 to 2,000 feet. It crosses the southern boundary at a lower elevation--approximately 800 to 1,000 feet. Several washes west of the northern reaches of the Hassayampa River flow from these highlands to Jackrabbit Wash, which flows into the river.

The CAP Canal flows from east to west within the study area, crossing the eastern boundary of the study area in its northern reaches, near White Wing Road. Within the project study area, the CAP canal is also referred to as the Hayden-Rhodes Aqueduct. This canal is managed and operated by the Central Arizona Water Conservation District. Its elevation in the study area is approximately 1,400 feet. The CAP canal extends

southwest from its intersection with the eastern study area boundary to the western boundary, crossing the western boundary approximately two miles north of I-10.

The Arlington Canal also flows from east to west, traversing the southern boundary of the study area. This canal parallels the Gila River for most of its length within the study area. Its elevation in the study area ranges from 800 to 880 feet. This canal crosses several roadways, including Johnson Road, Bruner Road, and SR-85.

The Beardsley Canal flows from north to south, traversing the east side of the White Tank Mountains. Its elevation in the study area ranges from 1,100 to 1,340 feet. The canal crosses many roadways, including Indian School Road, Olive Avenue, Sun Valley Parkway/Bell Road, and US-60. It begins near Lake Pleasant south of the New Waddell Dam, and crosses the Agua Fria River as it heads generally south and west to cross US-60 northwest of SR-303L. It then parallels Trilby Wash Basin for several miles before turning due south midway between the Perryville Road and Jackrabbit Trail alignments, terminating near Indian School Road. The Maricopa Water District owns this facility.

The Buckeye Canal flows from east to west through the southern portion of the study area. Its elevation ranges from 860 to 890 feet. This canal parallels the Gila River, Maricopa County Route 85 (MC-85) and the Union Pacific Railroad throughout the study area. It crosses many roadways, including Cotton Lane extension (dirt road), Jackrabbit Trail, Perryville Road, Estrella Parkway and Bullard Avenue.

The RID Canal flows from east to west, traversing Buckeye and Goodyear. This canal runs parallel to I-10 between that highway and MC-85 through most of the study area. Its elevation ranges from 950 feet near the Hassayampa River to 1,010 feet near I-10. This canal crosses many roadways, including Miller Road, Rainbow Road, Jackrabbit Trail, Cotton Lane and Estrella Parkway.

Trilby Wash traverses the study area generally from northwest to southeast, crossing US-60 near Circle City and continuing south and east to enter the Trilby Wash Detention Basin in Surprise. This wash is located north of Sun Valley Parkway and west of the Citrus Road alignment.

Drainage Features

Figure 2-11 shows current drainage structures, and completed and current drainage studies performed through the Flood Control District of Maricopa County (FCDMC). The Gila River and its tributary, the Hassayampa River, are the two major waterways in the study area. Jackrabbit Wash runs through the northwest portion of the study area, flowing into the Hassayampa River north of I-10. There are five canals (Arlington, Beardsley, Buckeye, CAP and RID), five flood retardant structures, and one major dam. All of these structures support the larger drainage system.

FCDMC is analyzing almost the entire project area. Three types of studies are or have been conducted: area drainage master plans (ADMP), watercourse master plans, and floodplain delineation studies. An ADMP generally estimates flood potential for a watershed, maps watercourses, identifies existing and potential drainage problems, and develops preliminary solutions and standards for floodplain and stormwater management. Watercourse master plans identify and develop a plan and technical guidance for managing flood hazards, lateral migration of the watercourse, and the cumulative impacts of existing and future development. Floodplain delineation studies demarcate floodplains within the project area.

Because the described waterways constitute obstacles to construction of transportation infrastructure, the results of the above studies will help determine the most cost-effective and accessible transportation alignments throughout the study area. These studies are also being used by the development community; therefore, planned developments along significant drainage corridors should have incorporated any findings or resulting construction issues into their master plans.

Land Subsidence and Earth Fissures

Land subsidence has been identified in several south-central Arizona locations. This phenomenon occurs when water is removed from underground reservoirs and the weight of the overlying material compresses, causing the land to settle. Once compressed, alluvial deposits take up less space than before and the ground surface sinks. The amount of subsidence varies by location. Land subsidence also creates another potential problem: earth fissures. These are cracks in the ground surface that occur because of uneven or differentiated

land subsidence. Depending on circumstances, fissures can form gullies as much as 50 feet wide and 10 to 15 feet deep. Once fissures start to form, they tend to increase in number and length, spreading at uneven speeds and directions for several miles.

The effects of land subsidence and earth fissures can be significant, because they may cause significant damage to infrastructure, increase flooding potential, worsen groundwater pollution, and accelerate soil erosion.

The land between SR-303L and the White Tank Mountains have been identified as having land subsidence and earth fissure problems. Land subsidence and the accompanying earth fissures will probably occur in this area as long as groundwater overdraft continues, although since earth fissures can occur in previously unnoticed areas, when or where new fissures will occur is unpredictable. With the exception of the White Tank Mountains, most the study area is known to have some degree of groundwater depletion, with the greatest depletion occurring on both sides (north and south) of I-10 in the Tonopah area.

Cultural Resources

The study area is located along the Hassayampa River Valley, on the north side of the Gila River drainage west of Phoenix. The environment includes river valley bottoms, desert and uplands, and river terraces above the Gila and Hassayampa Rivers.

This area was likely intensively occupied by the Hohokam between ca. AD 350 and AD 1500. The site of Las Colinas, a late prehistoric "large urban center," is east of the study area. Trade routes west along the Gila River passed along the southern edge of the study area. Likely site types include villages, year-round settlements with populations of more than 100, ball courts, central plazas, and platform mounds; hamlets and smaller year-round settlements; farmsteads (seasonal occupations of small social groups tied closely to larger settlements); and field houses (short-term agricultural sites consisting of a single structure). Hohokam settlement was organized in part into irrigation communities in major drainages, so there would have been irrigation facilities, including canals, and other water control features.

Historic-period sites are likely numerous as well, including farms, irrigation canals and dams, industrial sites such as mines, and transportation-related sites (e.g., the existing railroads). Conservatively, the number of registered sites in the area is likely be in the hundreds, with many more unregistered sites in areas that have been less intensively surveyed.

The locations of cultural sites are protected to prevent vandalism of these resources. Information on these locations is available to qualified specialists through the Arizona State Museum.

Recreational Opportunities

A review of the Maricopa County Trails Plan and the MAG Desert Open Spaces Plan found several trail and land conservation types. Maricopa County defines segments by construction priority for the ultimate Buildout of the interconnected county trail system. MAG identifies scenic trailways and bikeways, and the MAG Open Spaces Plan locates conservation, retention, and secured open space areas. These elements can be found in Figure 2-12. The City of Surprise is currently (January 2007) updating its Alternate Modes Plan, which includes trails, bikeways and pedestrian facilities.

Threatened and Endangered Species

A review of the U.S. Fish and Wildlife Service (FWS) and Arizona Game and Fish Department (AGFD) threatened and endangered species lists for Maricopa County was conducted to determine those species that potentially occur within the project study area. The AGFD provided a Special Species Status letter on July 28, 2006, regarding listed species known to occur within the project study area. Table 2.3 provides a summary of this review.

The general habitat types available within the study area were compared to those species that are known to occur within Maricopa County. A ranking of HIGH, MODERATE, or LOW was assigned to each species based on potential habitat availability. A ranking of LOW means that the species is rare or unlikely to occur within the study area; MODERATE means that the species has a reasonable probability to occur within the

study area; and HIGH means that the species is likely to occur or occurrences have been reported and documented.

Species of Concern and Candidate species are not afforded protection under the Endangered Species Act and have no regulatory listing status. Generally, these categories are identified during listed species reviews, as these species have potential to become listed in the future.

The BLM and U.S. Forest Service (USFS) have identified Sensitive species known to occur on BLM or forest lands in Arizona. Coordination with the BLM and USFS is required to identify potential impacts to these species. The AGFD has identified certain species as Wildlife of Special Concern in Arizona; these species are known to be or may be in jeopardy or face known or perceived threats, including population decline. The Arizona Department of Agriculture Native Plant Law (1993) protects certain plant species from being collected or harvested. This listing includes Highly Safeguarded (HS) species, Harvest Restricted (HR) species, Salvage Restricted (SR) species, Export Restricted (ER) species, and Salvage Assessed (SA) species. The following restrictions apply to species in these categories:

- HS No collection permitted
- HR Permit required for removal of plant by-products
- SR Permit required for collection
- ER Out-of-state transport prohibited
- SA Permit required for live tree removal

Of the species listed in Table 2.3, 11 are federally endangered, 3 are federally threatened, 2 are federally listed candidate species, 27 are Species of Concern, 28 are Wildlife of Special Concern in Arizona, 37 are sensitive BLM or USFS species, and 19 are listed under Arizona's Native Plant Law. (Many belong to more than one category.) The Cactus Ferruginous Pygmy Owl (CFPO) and the Arizona Agave have been delisted by the FWS, but the CFPO listing status is currently being contested in the federal courts. The Bald Eagle was proposed for delisting in February 2006, but is still afforded protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Coordination with USFWS and AGFD will be required prior to any type of development (e.g., land use, transportation infrastructure).

Table 2.3 Species Known to Occur within Maricopa County and Potentially within the Project Study Area

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
BIRDS							
American Peregine Falcon	*Falco peregrinus anatum*	SC	WSC	S		Prefers areas near rocky cliffs and permanent water sources. Transient.	MODERATE
Bald Eagle	*Haliaeetus leucocephalus*	T (PDL)	WSC	S		Large trees or cliffs near water with abundant prey.	MODERATE
Belted Kingfisher	*Ceryle alcyon*		WSC			Transient and winter resident of lakes, ponds and rivers.	LOW TO MODERATE
Black-bellied Whistling-duck	*Dendrocygna autumnalis*		WSC			Prefers low edges of lakes, oxbow ponds, wetlands and slow flowing rivers and creeks. Cottonwood, willow and velvet mesquite are usually favored vegetated areas.	MODERATE
Cactus Ferruginous Pygmy-Owl	*Glaucidium brasilianum cactorum*	E (DL)*	WSC			Well-vegetated Sonoran desertscrub and adjacent to densely wooded dry washes. Saguaros and large thorny trees (ironwood, palo verde and velvet mesquite are preferred).	MODERATE
California Brown Pelican	*Pelecanus occidentalis californicus*	E				Coastal land and islands; species found around many Arizona lakes and rivers. Uncommon transient in Arizona.	LOW
Common Black-Hawk	*Buteogallus anthracinus*		WSC	S		Riparian obligates associated with perennial drainages with mature gallery forests of broadleaved deciduous trees.	MODERATE
Great Egret	*Ardea alba*		WSC			Lowland riparian areas with hydrophytic emergent vegetation and cottonwood, willow, mesquite and/or tamarisk areas.	MODERATE
Least Bittern	*Ixobrychus exilis*		WSC			Larger marshes with dense, tall growth of emergent vegetation interspersed with water.	MODERATE
Mexican Spotted Owl	*Strix Occidentalis lucida*	T (CH)	WSC	S		El. 4,100 – 9,000 ft. Nests in canyons and generally dense older forests of mixed conifer or ponderosa pine/gambel oak.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
BIRDS							
Mississippi Kite	*Ictinia mississippiensis*		WSC			Lowland riparian woodlands; cottonwoods	LOW TO MODERATE
Osprey	*Pandion haliaetus*		WSC			Open bodies of water containing fish. Wetlands and shorelines of ponds, lakes, reservoirs and rivers. Drainages containing ponderosa pine, fir, cottonwood, maple, box elder, alder and willow.	LOW TO MODERATE
Snowy Egret	*Egretta thula*		WSC			Shallow protected backwaters of lakes, rivers, canals or other wetlands with roosting in nearby trees and shrubs.	LOW TO MODERATE
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E (CH)	WSC	S		Cottonwood/willow and tamarisk vegetation communities along rivers and streams. Distribution in range restricted to riparian corridors.	HIGH
Western Burrowing Owl	*Athene cunicularia hypugaea*	SC			S	Variable in open, well-drained grasslands, steppes, deserts, prairies and agricultural lands. Sometimes in open areas such as vacant lots, golf courses and airports.	MODERATE
White Snowy Plover	*Charadrius alexandrinus nivosus*		WSC	S		Sparsely vegetated alkali flats and drying shores of shallow water impoundments. Generally migrants observed along open shorelines, mudflats, sandbars of reservoirs, ponds and/or rivers.	LOW
Yellow-billed Cuckoo	*Coccyzus americanus*	C	WSC	S		Large blocks or riparian woodlands (cottonwood, willow, or tamarisk galleries).	MODERATE
Yuma Clapper Rail	*Rallus longirostris yumanensis*	E	WSC			Freshwater and brackish marshes. Generally associated with dense emergent riparian vegetation. Requires wet substrate with dense herbaceous or woody vegetation for nesting/burrowing.	MODERATE

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
FISH							
Bonytail Chub	*Gila elegans*	E	WSC			Main stream portions of mid-sized to large rivers, usually over mud or rocks. Can utilize ponded or inundated terrestrial habitats.	LOW TO MODERATE
Desert Pupfish	*Cyprinodon macularius*	E (CH)	WSC			Shallow springs, small streams, and marshes. Tolerate saline and warm water.	LOW TO MODERATE
Desert Sucker	*Catostomus clarki*	SC			S	Gila River basin. Found in rapids and flowing pools of streams and rivers.	LOW TO MODERATE
Gila Chub	*Gila intermedia*	E (CH)				Pools, springs, cienegas, and streams.	LOW TO MODERATE
Gila Longfin Dace	*Agosia chrysogaster chrysogaster*	SC			S	Gila River basin. Intermittent hot low-desert streams to clear/cool brooks at higher elevations.	LOW TO MODERATE
Gila Topminnow	*Poeciliopsis occidentalis occidentalis*	E	WSC			Small streams, springs, and cienegas vegetated shallows.	LOW TO MODERATE
Little Colorado Sucker	*Catostomus sp. 3*	SC	WSC	S	S	Creeks, small to medium rivers and impoundments.	LOW TO MODERATE
Razorback Sucker	*Xyrauchen texanus*	E (CH)	WSC	S		Riverine and lacustrine areas, generally not in fast moving water and may use backwaters. Found in Horseshoe Reservoir.	LOW TO MODERATE
Roundtail Chub	*Gila robusta*	SC	WSC	S		Cool to warm water, mid-elevation streams and rivers. Known to occur in the mainstem and tributaries of the Verde and Salt Rivers, as well as, canals in metropolitan Phoenix.	LOW TO MODERATE
Sonoran Sucker	*Castostomus insignis*	SC			S	Gila River basin. Warm water rivers to trout streams.	LOW TO MODERATE
Speckled Dace	*Rhinichthys osculus*	SC		S		Gila river basin. Bottom dweller in rocky riffles, runs and pools of headwaters, creeks and small to medium rivers.	LOW TO MODERATE

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
AMPHIBIANS							
Great Plain Narrow-mouthed Toad	*Gastrophryne olivacea*		WSC			Mesquite semi-desert grassland to oak woodland in close proximity to streams, springs and rain pools.	LOW TO MODERATE
Lowland Burrowing Treefrog	*Pternohyla fodiens*		WSC			Xeric environments, burrowing in low open mesquite grasslands, usually associated with major washes and arroyos.	LOW TO MODERATE
Lowland Leopard Frog	*Rana yavapaiensis*		WSC	S		Aquatic systems in desert grasslands to pinyon juniper.	LOW TO MODERATE
REPTILES							
Red-back Whiptail	*Aspidoscelis burti xanthonota*	SC		S	S	Santank and Sauceda Mts. in Maricopa Co. Canyons and hills in juniper-oak woodlands, down to Sonoran upland desert habitats.	LOW
Desert Rosy Boa	*Charina trivirgata gracia*	SC		S	S	Rocky areas in desert ranges, especially in canyons with permanent or intermittent streams.	LOW TO MODERATE
Mexican Rosy Boa	*Charina trivirgata trivirgata*	SC			S	Maricopa Mts in Maricopa Co. Rocky mountains or hillsides in desert ranges – granite outcroppings.	LOW
Arizona Skink	*Eumeces gilberti arizonensis*	SC	WSC	S	S	Documented along riparian habitats along perennial reaches of the Hassayampa River and its tributaries below Wickenburg. Rocks, leaf littler near permanent or semi-permanent streams.	HIGH
Sonoran Desert Tortoise	*Gopherus agassizii*	SC	WSC			Primarily on rocky slopes and bajadas of Sonoran desertscrub. Category 3 habitat identified in study area.	HIGH
Arizona Chuckwalla	*Sauromalus ater*	SC			S	Near cliffs, boulders, or rocky slopes. Rocky desert, lava flows, hillsides and outcrops.	LOW TO MODERATE
Northern Mexican Garter Snake	*Thamnophis eques megalops*	SC	WSC	S		Known from the Agua Fria River and the Verde River. Densely vegetated habitats including cienegas, cienega streams, and stock tanks.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
INVERTEBRATES							
Maricopa Tiger Beetle	*Cicindela oregona maricopa*	SC		S	S	Sandy stream banks and gravels/clays along streambanks. May occur in seeps or reservoir banks.	LOW
MAMMALS							
California Leaf-nosed Bat	*Macrotus californicus*	SC	WSC	S		Desert below 4,000 ft. elevation. Caves and tunnels. Sonoran desert scrub.	MODERATE
Cave Myotis	*Myotis velifer*	SC		S		Desert scrub of creosote, brittlebush, palo verde and cacti. Roosts in caves, tunnels and mineshafts and under bridges.	MODERATE
Yuma Myotis	*Myotis yumanensis*	SC				Variety of upland and lowland habitats. Prefers cliffs and rocky walls near water. Can have nursery colonies in buildings, caves, mines and under bridges.	MODERATE
Lesser Long-nosed Bat	*Leptonyceteris curasoae yerbabuenae*	E	WSC	S		Desert scrub habitat with agave and columnar cacti. Day roosts in caves and abandoned tunnels.	MODERATE
Greater Western Bonneted Bat	*Eumops perotis californicus*	SC				Lower and upper Sonoran desertscrub near cliffs, preferring rugged rocky canyons with abundance crevices.	LOW TO MODERATE
Pale Townsend's Big-eared Bat	*Corynorhinus townsendii pallescens*	SC				Day roosts in caves and mines from desertscrub up to woodlands and conifer forests.	LOW TO MODERATE
Pocketed Free-tailed Bat	*Nyctinomops femorosaccus*			S		Arid lower elevations usually around high cliffs and rugges rock outcrops.	LOW TO MODERATE
Sonoran Pronghorn	*Antilocapra Americana sonoriensis*	E	WSC	S		Broad intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations.	LOW TO MODERATE
Western Red Bat	*Lasiurus blossevillii*		WSC			Riparian and other wooded areas. Generally roosts in trees.	LOW TO MODERATE
Western Yellow Bat	*Lasiurus xanthinus*		WSC			May be associated with Washingtonian fan palm, other palms or sycamores, hackberries and cottonwoods.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
PLANTS							
Acuna Cactus	*Echinomastus erectocentrus* var. *acunensis*	C	HS			Well-drained knolls and gravel ridges between major washes; granite soils in Sonoran desert scrub association.	LOW
Arizona Agave	*Agave arizonica*	E (DL)	HS			El. 3,000-6,000 ft. Transition zone between oak-juniper woodland & mountain mahogany-oak scrub.	LOW
Arizona Cliffrose	*Purshia subintegra*	E	HS			White soils of tertiary limestone lakebed deposits.	LOW
Arizona Rosewood	*Vauquelinia californica* ssp. *sonorensis*				S	Desertscrub and desert grassland, in woodland or forest at base of cliffs, along canyon bottoms and on moderate to steep slopes.	LOW
Bigelow Onion	*Allium bigelovii*		SR			Gentle slopes from 2,000 – 5,000 ft elevation. Open, dry rocky soil in grassland and open chaparral, and desert scrub.	LOW
California Barrel Cactus	*Ferocactus cylindraceus* var. *cylindraceus*		SR			Gravelly or rocky hillsides, canyon walls, alluvial fans, and wash margins. Known to occur in the White Mountains, Maricopa Co.	LOW TO MODERATE
Emory's Barrel-cactus	*Ferocactus emoryi*		SR			(None Noted.)	LOW TO MODERATE
Flannel Bush	*Fremontodendron californicum*		SR		S	Known to occur within the Four Peaks-Mazatzal Mts. and Superstition Mts. in Maricopa Co. Dry, north slopes in canyons. Well-drained rocky hillsides and ridges.	LOW
Fish Creek Fleabane	*Erigeron piscaticus*	SC	SR	S	S	Total range in Maricopa County: Fish Creek Canyon, Superstition Mts. Moist, sandy canyon bottoms associated with perennial streams.	LOW
Fish Creek Rock Daisy	*Perityle saxicola*	SC		S		Found in Gila and Maricopa Cos. Near Tonto National Monument, Roosevelt Lake, above Horse Camp Creek (Sierra Ancha Mts.). Xeric habitat on very steep slopes.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
PLANTS							
Golden Barrel Cactus	*Ferocactus cylindraceus* var. *eastwoodiae*		SR			(None noted.)	LOW TO MODERATE
Hohokam Agave	*Agave murpheyi*	SC	HS	S	S	Verde River drainage, Bradshaw, McDowell, New River and Wickenburg Mts. Benches or alluvial terraces on gentle bajada slopes above major drainages in desert scrub.	LOW
Kofa Barberry	*Barberis harrisoniana*				S	Sand Tank Mts. Bottoms of deep, shady rocky canyons.	LOW
Organ Pipe Cactus	*Stenocereus thurberi*		SR		S	Sonoran desert; adjacent to thorn forests mostly on hills and bajadas.	LOW
Pima Indian Mallow	*Abutilon parishii*	SC	SR	S		Superstition Mts. Mesic situations in full sun with higher elevation Sonoran desert scrub.	LOW
Ripley Wild-buckwheat	*Eriogonum ripleyi*	SC	SR	S		Near Horseshoe Lake and Chalk Mountain, Maricopa Co. Tertiary lakebeds on well-drained powdery soils derived from limestone, sandstone or volcanic tuffs/ashes.	LOW
Straw-top Cholla	*Opuntia echinocarpa*		SR			Flats, slopes and washes.	MODERATE
Cactus Apple	*Opuntia engelmannii* var. *flavispina*		SR			May occur up to 2,500 ft. elevation in sandy bajadas.	MODERATE
Sweet Acacia	*Acacia farnesiana*			S		Rarely grows in the wild. El. 2,500 to 4,000.	LOW
Tonto Basin Agave	*Agave delamateri*	SC	HS	S		Mazatzal Mts near Sunflower. Usually found atop benches, at edges of slopes, on open hilly slopes in desert scrub, overlooking major drainages and perennial streams. 2,190 – 5,100 ft. Elevation.	LOW
Tourmey Agave	*Agave toumeyana* var. *bella*		SR			4,000 – 5,000 ft. elevation. Rocky slopes in chaparral.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
PLANTS							
Tumamoc Globeberry	*Tumamoca macdougalii*		SR	S	S	Xeric situations, in the shade of a variety of nurse plants along gullies and sandy washes of hills and valleys in Sonoran desert scrub.	LOW TO MODERATE
Varied Fishhook Cactus	*Mammillaria viridiflora*		SR			Semidesert grasslands, interior chaparral, pinyon-juniper and oak woodlands, crevices, boulders, canyon sides and gravelly igneous substrates from 4,600-6,600 ft. elevation.	LOW
Zuni Fleabane	*Erigeron rhizomatus*	T				Found in Elevation 7,600–7,700 ft. pinyon-juniper woodlands	LOW

Notes: **E** = Endangered **T** = Threatened **PDL** = Proposed for Delisting **DL** = Delisted
C = Candidate Species **CH** = Designated Critical Habitat **SC** = Species of Concern

WSC = Wildlife of Special Concern **HS** = Highly Safeguarded **SR** = Salvage Restricted
ER = Export Restricted **SA** = Salvage Assessed
HR = Harvest Restricted **S** = Sensitive Plants

*The listing status is being contested in federal court. This species was delisted from the Endangered Species Act in April 2006.

Sources: USFWS. Species list for Maricopa County. Accessed from http://www.fws.gov/arizonaes/Threatened.htm#CountyList. July 25, 2006.
AZGFD. Species in the Arizona HDMS. April 2006. Accessed from http://www.azgfd.gov/w_c/edits/hdms_species_lists.shtml. July 25, 2006 and December 21, 2006.
AGFD. Special Status Species for Interstate 10/Hassayampa Valley Roadway Framework Study. July 28, 2006.

Potential Hazardous Materials Locations

Preliminary information regarding potential hazardous materials in the study area was collected through observation on aerial photographs only. No Initial Site Assessment (ISA) or Phase I Environmental Site Assessment was conducted for any sites within the study area. No properties were identified or evaluated for potential hazardous materials. It is recommended that an ISA, done to ASTM standards, is done for the site of any proposed developments within the Hassayampa Valley Framework Study area.

Four sites in the study area are potential sources of hazardous materials: three vehicle proving grounds and a nuclear power generating station. The vehicle proving grounds are located in the northern portion of the study area. Toyota, DaimlerChrysler and Volvo use them to test new automotive designs and concepts. In reaction to development, DaimlerChrysler has sold its 5,500-acre property to real estate developers. The site, in operation since 1958, will continue to operate as a proving ground until late 2007. The DaimlerChrysler proving ground contains mostly vacant, unimproved land, but also houses office buildings, labs, paved test tracks and other vehicle testing areas. The Volvo facility is located just east of the Luke Auxiliary Airfield, near the alignments of Pinnacle Peak Road and 211th Avenue.

The third proving ground within the study area is owned and operated by Toyota. This facility was established in 1993 and is located sixteen miles west of the DaimlerChrysler proving ground. It covers approximately

12,000 acres and contains a ten-mile paved circular track, ride and handling course, dirt course, straightaway course, brake testing area, steep grade area, and office buildings.

Located in the southwestern portion of the study area is the Palo Verde Nuclear Generating Station (PVNGS). The plant houses three nuclear reactors, all of which are on-line. This makes Palo Verde the second largest power plant in the U.S., while the capacity of reactor unit two makes it the largest nuclear reactor in the U.S. The net capacity of the plant is approximately 4,000 megawatts. The source of coolant water for the three reactors is treated wastewater effluent from neighboring municipalities. The wastewater is stored and treated on-site.

Figure 2-13 displays evacuation routes and planning zones in case of an emergency or nuclear event at the PVNGS. The 10-mile-radius Emergency Planning Zone is illustrated in gray, with the major evacuation routes for all who live or work in this zone. The 50-mile-radius Ingestion Pathway Zone is shown in 10-mile intervals, illustrating the area of potential health effects in case of an event.

Air Quality

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established air quality standards to protect public health and the environment. EPA has set national ambient air quality standards (NAAQS) for the six primary air pollutants. These criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM10 and PM2.5) and sulfur dioxide (SO_2). Gasoline-powered motor vehicles cause more than three-fourths of the Phoenix area's CO emissions. Arizona has adopted the federal NAAQS as the state Ambient Air Quality standards.

EPA designates an area as nonattainment if it has violated, or has contributed to violations of, the NAAQS over a three-year period. If an area is designated as nonattainment, the Clean Air Act requires the state, local and tribal governments to develop and produce a state implementation plan (SIP) to reduce emissions of the pollutants that exceed federal standards. A SIP is an enforceable plan developed at the state and local level that explains how the area will comply with air quality standards according to the Clean Air Act. The SIP is the cumulative record of all air pollution control strategies, state statutes, state and local rules, and local ordinances implemented under Title I of the Clean Air Act by governmental agencies within the state.

Figure 2-14 maps three air quality nonattainment and maintenance areas, as designated by EPA within the study area. Portions of the study area are classified as non-attainment for ozone and PM10, and as maintenance areas for CO, due to past violations of the NAAQS. This ozone non-attainment area must demonstrate attainment with the 8-hour ozone standard by 2009, and with the 24-hour and annual PM10 standards by December 31, 2006. If, for example, the PM10 standards are not met, a five-percent plan will be invoked, whereby the state would need to update the SIP to demonstrate a five percent annual reduction in PM10 concentrations. On January 5, 2005, EPA redesignated the Phoenix metropolitan area to attainment for CO and approved the attainment demonstration and maintenance plan that shows maintenance of the CO standard through 2015. The Phoenix metropolitan area has not had an exceedance of the CO standard since 1998.

As a result of new EPA regulations and guidelines set forth by the Federal Highway Administration (FHWA), future traffic studies will include an assessment of hazardous air pollutants, such as mobile source air toxics, that could adversely affect local communities. Project components, such as changes in traffic volumes, vehicle mix, location of the existing facility, or any other factor that would cause an increase in emissions impacts relative to the no-build alternative, will also be evaluated for the potential to create adverse mobile source air toxics.

Public Utilities

Figure 2-15 displays transmission line locations for both the Arizona Public Service (APS) and Salt River Project (SRP) utility companies. These lines range from 69kV to 500 kV. There are seventeen power line receiving stations located throughout the study area, with the largest being the PVNGS, located in the southeast portion of the area.

Five new power lines have been approved for this area. The West Valley North and West Valley South lines run around the northeast side of White Tank Mountain Regional Park, paralleling SR-303L south to

approximately the Buckeye Canal. The Palo Verde Hub to TS-5 line originates at the PVNGS, looping west and following the CAP Canal back east to the TS-5 receiving station. The Palo Verde to Gila Bend and Palo Verde-Pinal West transmission line corridors both originate at the Red Hawk receiving station, near the southern boundary of the study area, but soon leave the study area.

These power line transmission corridors will need to be considered when choosing future roadway alignments, as they are expensive to build and difficult to move. However, many existing and future power line corridors share right-of-way with major transportation and drainage routes.

2.2.4 Existing Land Use

Figure 2-16 illustrates existing land uses in the study area. The following subsections summarize key land uses and activity centers in the study area portions of Buckeye, Glendale, Goodyear, Surprise, and unincorporated Maricopa County.

Town of Buckeye

Almost the entire MPA of Buckeye lies within the study area. North of I-10, much of this land is undeveloped, except a large expanse of open space and some low-density residential development south of White Tank Mountain Regional Park. A large number of community master plans are approved in this area north of I-10, however. South of I-10, the Buckeye MPA is a combination of open space along the Hassayampa and Gila rivers, agricultural land between the RID Canal and the Gila River, undeveloped land just south of I-10, and scattered industrial uses. The open space category includes all active and passive open space, cemeteries, and golf courses. Small pockets of residential and commercial development exist at major arterial intersections, as well as in the downtown Buckeye area on both sides of MC-85 east of Miller Road.

City of Glendale

A small portion of the Glendale MPA is located within the study area from Perryville Road east, between Peoria Avenue and Camelback Road. This area is a combination of low-density residential development and open space. These uses generally support Luke Air Force Base, located just east of SR-303L.

City of Goodyear

All of the Hassayampa study area south of Camelback Road and east of Perryville Road is located in the northwestern quadrant of the Goodyear MPA. Goodyear has traditionally been an agricultural community and much of its land is still used for agricultural purposes, along with open space near the Gila River and pockets of low-density residential and commercial development dispersed near arterial intersections.

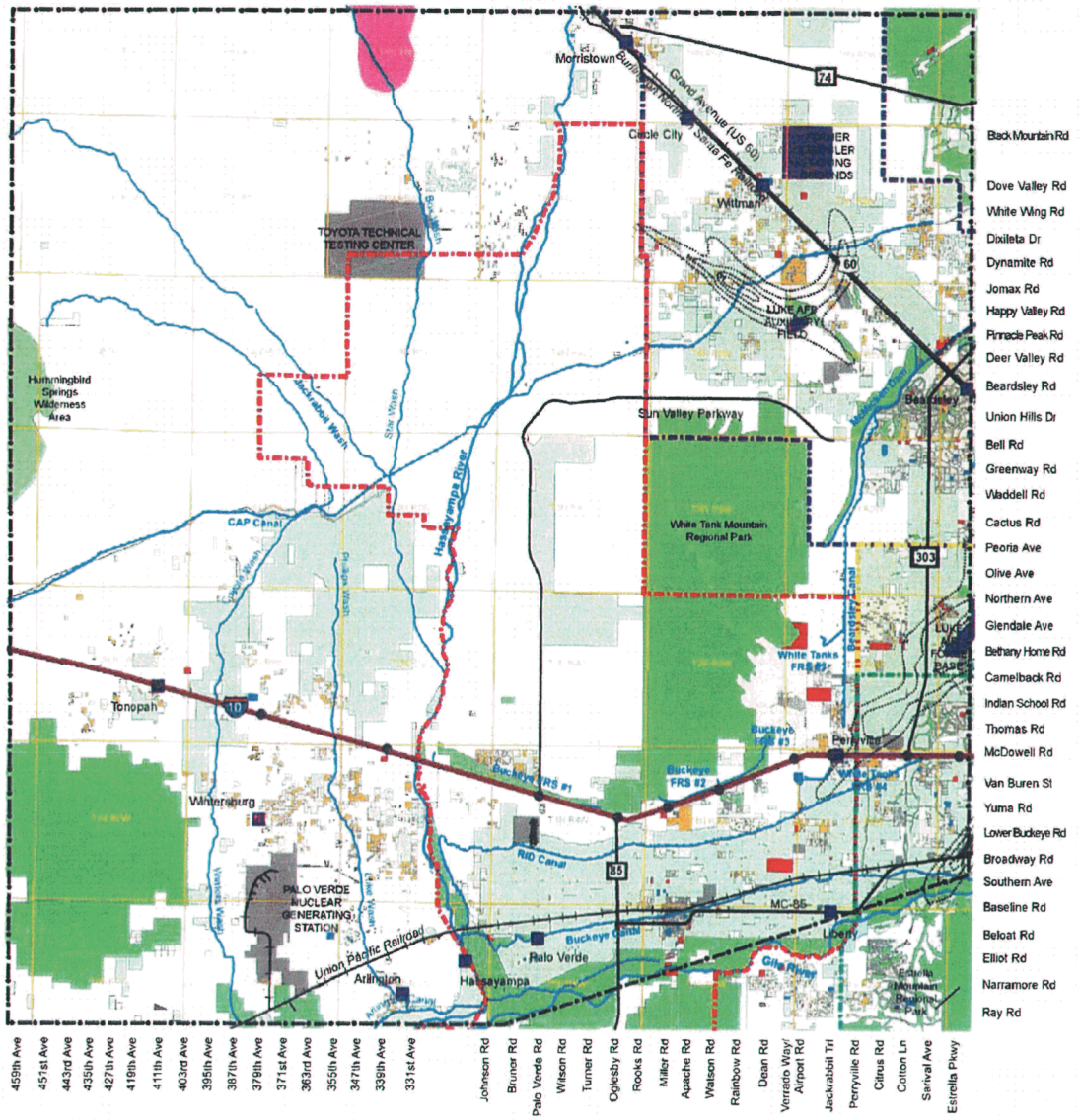
City of Surprise

The western portion of the Surprise MPA is included in the Hassayampa study area, including land east of 255th Avenue and north of Peoria Avenue. North of US-60, much of the land is either devoted to ranching or is undeveloped. A General Plan Amendment has recently been submitted for the former DaimlerChrysler Proving Grounds to convert this facility into a mixed-use center of residential and commercial development. The area south of US-60 spanning SR-303L is intensely developed with residential, commercial and open space. South of US-60, and north and west of the McMicken Dam, the area is a combination of open space, flood retention and undeveloped land, with small pockets of residential and commercial development. A Luke Air Force Base Auxiliary Field is located in this area, at approximately Happy Valley Road and 219th Avenue.

Maricopa County

Areas of unincorporated Maricopa County include White Tank Mountain Regional Park and all land west of the Buckeye MPA. Most of this land is currently undeveloped, with the exception of the Toyota Technical Testing Center and the PVNGS. Some scattered low-density residential development exists south of I-10 near unincorporated Wintersburg. White Tank Mountain Regional Park and Hummingbird Springs Wilderness Area are large tracts of protected open space.

Figure 2-16 Existing Land Use



EXISTING LAND USE

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Study Area Boundary

Land Use
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Multi-Family Residential
- Commercial
- Office/Employment
- Public Facilities
- Industrial
- Open Space
- Agriculture

- Water
- Undeveloped

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

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2.2.5 Future Land Use

Figure 2-17 depicts planned future land use, based on the adopted general plan of each jurisdiction. Each city's general plan covers not just the area within its current limits, but its entire MPA, typically including land currently unincorporated but envisioned for annexation in the future. As Figure 2-17 shows, most of the land east of the Hassayampa River lies within the MPA of a city or town, whereas most of the land west of the river falls outside any MPA. Because this map represents anticipated Buildout conditions, the "undeveloped" category from Figure 2-16 no longer exists. In addition, much of the land shown as "agricultural" under existing conditions is designated as residential, commercial, office/employment, or mixed-use in Figure 2-17. Substantial territory will be preserved as open space, including land along the Hassayampa and Gila rivers south of I-10, White Tank Mountain Regional Park, state land south of the park, Hummingbird Springs Wilderness Area, and a large patch of open space south of Tonopah.

The following subsections summarize key land uses and activity centers in the study area portions of Buckeye, Glendale, Goodyear, Surprise, and unincorporated Maricopa County. All of these jurisdictions have updated (or are updating, in the case of Buckeye) their general plans to reflect the 1998 Growing Smarter and 2000 Growing Smarter Plus legislation, which strengthened general plan requirements by adding four new elements: Open Space, Growth Areas, Environmental Planning, and Cost of Development.

Town of Buckeye

The Town of Buckeye is currently updating the Buckeye General Plan and Development Code. The majority of the land north of I-10 will consist of planned developments (i.e., master-planned communities) which will have a combination of residential, commercial, mixed-use, open space, and office/employment land uses. Many planned developments will exist south of I-10, but greater emphasis will be placed on large employment centers and higher-density residential development, as opposed to self-contained master-planned communities. At the Buckeye General Plan Charrette Visioning Forum on May 13 through May 17, 2006, participants sketched out a vision of Buckeye consisting of several villages, linked through an interconnected system of open space and transit. These connections will occur in the town centers of the villages or master-planned communities. The Buckeye airport will expand as a major employment center, and the majority of existing open space near the confluence of the Hassayampa and Gila rivers will be preserved.

City of Glendale

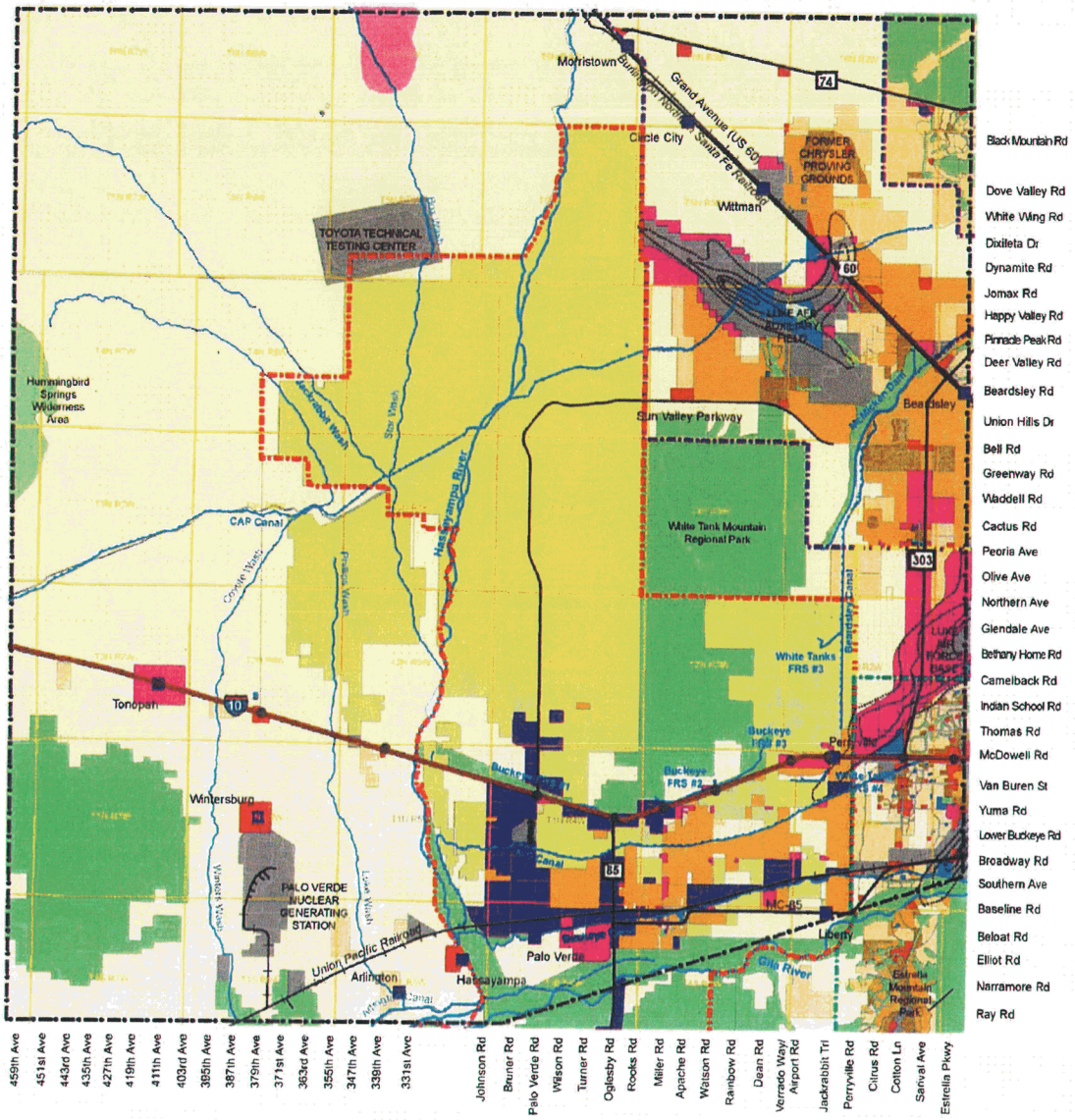
The Glendale General Plan identifies two growth areas pertinent to the project. The Luke Compatible Growth Area seeks to restrict residential and business development around Luke Air Force Base. The area is planned, strategically, to accommodate low concentrations of non-military activity. The SR-303L corridor, west of Luke Air Force Base, is expected to become a hub for commercial and employment activity.

City of Goodyear

The Goodyear MPA will continue developing with a mix of residential and commercial land uses. Land along the Union Pacific Railroad will tend to be industrial, while land along the Gila River will be preserved as open space.

The Goodyear General Plan identifies two growth areas within the project limits, the I-10 corridor and the Gila River corridor. The I-10 corridor spans a zone one mile wide on either side of I-10. This area is expected to include residential, employment, and support services. The corridor is projected to contain a Buildout population of nearly 34,000, with more than 11 dwelling units per acre and an employment base of approximately 28,500 jobs. The Gila River corridor spans an area approximately one-half mile wide on each side of the river. This area is projected to include residential, employment and open space land uses, developed in a manner environmentally compatible with the river. The corridor is projected to contain a Buildout population of over 12,400 and an employment base of approximately 2,500 jobs.

Figure 2-17 Future Land Use



FUTURE LAND USE

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Study Area Boundary

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Multi-Family Residential
- Planned Developments
- Mixed Use
- Commercial
- Office/Employment
- Public Facilities
- Industrial
- Open Space
- Agriculture
- Water

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

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City of Surprise

The Surprise General Plan shows the following growth areas within the Hassayampa project limits:

- Grand Avenue (US-60) – SR-303L: This growth area is designated as an important commercial and employment center, maximizing economic development opportunities at the intersection of these two major transportation corridors. The SR-303L corridor will also be the focus of a future transit local route, providing a connection to and from the economic activity centers along Bell Road.
- Jomax Road – Grand Avenue: This area is almost at the geographic center of the Surprise MPA and is expected to have a high degree of mixed-use development, including a regional commercial and employment center and high-density residential development. Many people are expected to live, work and shop in this area.
- Grand Avenue – 211th Avenue: Planned as a major activity center, with intermodal freight (BNSF Railroad) facilities, commerce, employment and educational institutions.
- Jomax Road – 163rd Avenue: This area is optimal for high-technology firms or the development of a university-type research park. It is the only major employment-designated area in the MPA that does not have any noise or vibration constraints from aircraft or the BNSF railroad.
- Sun Valley Parkway – 211th Avenue: This area is expected to grow as a residential center with a mix of medium, medium-high and high-density residential development. This is an attractive area because of the substantial open space and viewsheds provided by the White Tank Mountains.
- 243rd Avenue – Sun Valley Parkway: Because of its proximity to White Tank Mountain Regional Park, this area is anticipated to become the site for high-end, low-density residential development for residents with higher incomes. Resort development will be targeted for this area, along with high-end retail and commercial activities.
- SR-303L Corridor: Some fairly intense development is expected along this corridor, including medium-density residential, commercial, employment, and mixed-use areas. As in many other portions of the study area, a complete arterial roadway system and other new infrastructure will have to be built to accommodate new residents and businesses. This area will also serve as the southern gateway to Surprise.

According to the future land use map in the Surprise General Plan, north of US-60 Surprise will consist primarily of residential development with small commercial and employment nodes along this highway. South of US-60, a large area of office/employment and mixed-use development will surround the Luke Air Force Base Auxiliary Field, bordered on the north by low-density residential development and on the south by medium- and high-density residential. Land along the McMicken Dam will be retained as open space. The portion of the city south of US-60 on both sides of SR-303L will continue to develop as a relatively dense residential and mixed-use area.

Maricopa County

The Maricopa County Comprehensive Plan indicates three General Plan Development Areas (GPDA), or growth areas. A GPDA is an unincorporated area that is likely to be annexed by a city or town in the future, and is therefore included in an adopted municipal general plan (and in the MPA for that municipality). These areas within the county include all land in the Buckeye MPA south of I-10, land spanning US-60 west of SR-303L in the Surprise MPA, and land spanning Sun Valley Parkway, also in the Surprise MPA. Urban growth area plans have been described for all of these areas in the preceding future land use descriptions for cities and towns.

Based on the Comprehensive Plan, unincorporated Maricopa County west of the Hassayampa River is expected to have mainly low-density residential development, with only small nodes of dense mixed-use development. The Toyota Technical Testing Center and the Palo Verde Nuclear Generating Station are expected to become areas of high employment. Tonopah (unincorporated) will become an area of mixed-use development, while Wintersburg will become a regional commercial center.

2.2.6 Public Land Management

Public lands in the study area are managed by both the ASLD and the BLM. The ASLD has authority over state lands until they are sold or leased, when planning authority is handed over to the appropriate city or county. BLM retains planning authority and control over its lands and rarely sells them to private entities, but will participate in land swaps in order to accumulate larger masses of land or release BLM-owned islands.

Three public land management studies are currently (January 2007) underway in the study area (Figure 2-18). The ASLD is studying land holdings west of the White Tank Mountains for future auction. This project is called the White Tanks Land Use Master Plan and will seek to help guide future development of these lands. The BLM is completing a Resource Management Plan and Environmental Impact Statement for a large portion of land in southwest Maricopa County, including all land south of I-10 in the study area. This study will guide the intensity of human interaction with the land in and around the Sonoran Desert National Monument.

The third study is a BLM project: the Phoenix South Planning Area Resource Management Plan (RMP) and Environmental Impact Statement (EIS). The management plan includes BLM lands bordering the Sonoran Desert National Monument, south of the Hassayampa study limits. The RMP will establish the amount of human interaction with the natural environment and the appropriate and allowable uses. Generally speaking, the overarching vision of the BLM is to retain an open and functioning desert ecosystem while still filling multiple-use needs.

2.2.7 Master Planned Communities

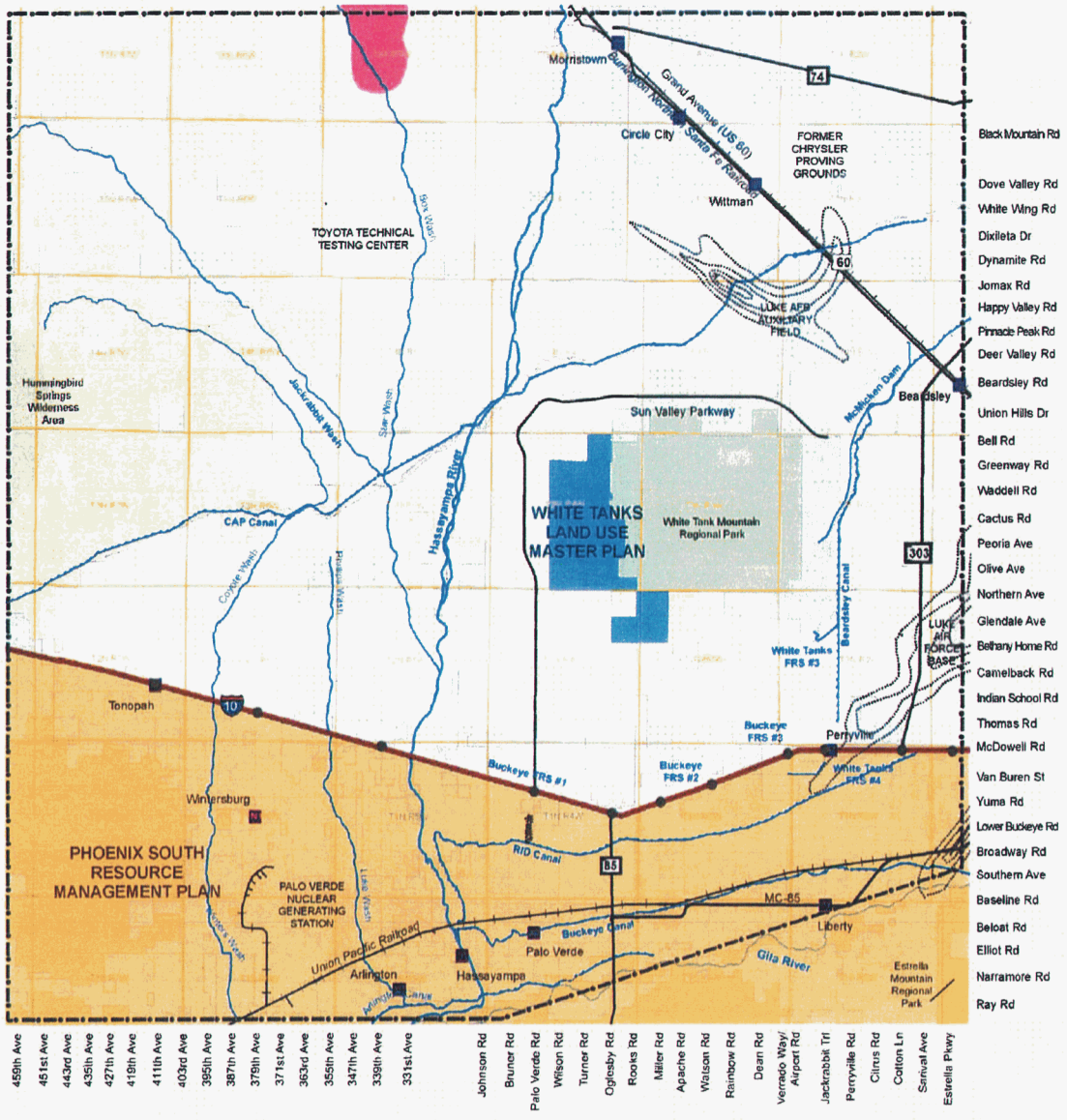
As of August 2006, at least 100 master-planned communities were planned within the study area. These communities are at various stages of development, with a general east-to-west growth pattern. The City of Surprise has an even balance of privately-owned lands and state land. Surprise's planning area has many small communities planned, but much of the private land is still open to new development proposals. North of I-10, the Town of Buckeye is almost entirely entitled with large master-planned communities. South of I-10, on the other hand, many smaller scattered communities are planned.

With the exception of Maricopa County's Belmont and Whispering Ranch master-planned communities, few developments are currently planned outside the municipal planning areas west of the White Tanks. Much of this land is owned by the BLM, which essentially precludes future large-scale development.

Planned Communities Development Overview and Implications

Figure 2-19 shows all of the planned residential developments known within the study area in August 2006. This map depicts approximately 100 planned developments, currently at various planning stages. More detailed information on each of these communities can be found in Table 2.4. Pertinent information was gathered from developers and local jurisdictions. The study team made every effort to obtain accurate and complete information up to August 15, 2006.

Figure 2-18 Public Land Management Studies



PUBLIC LAND MANAGEMENT STUDIES

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation
- ASLD Managment Plan
- BLM Management Plan

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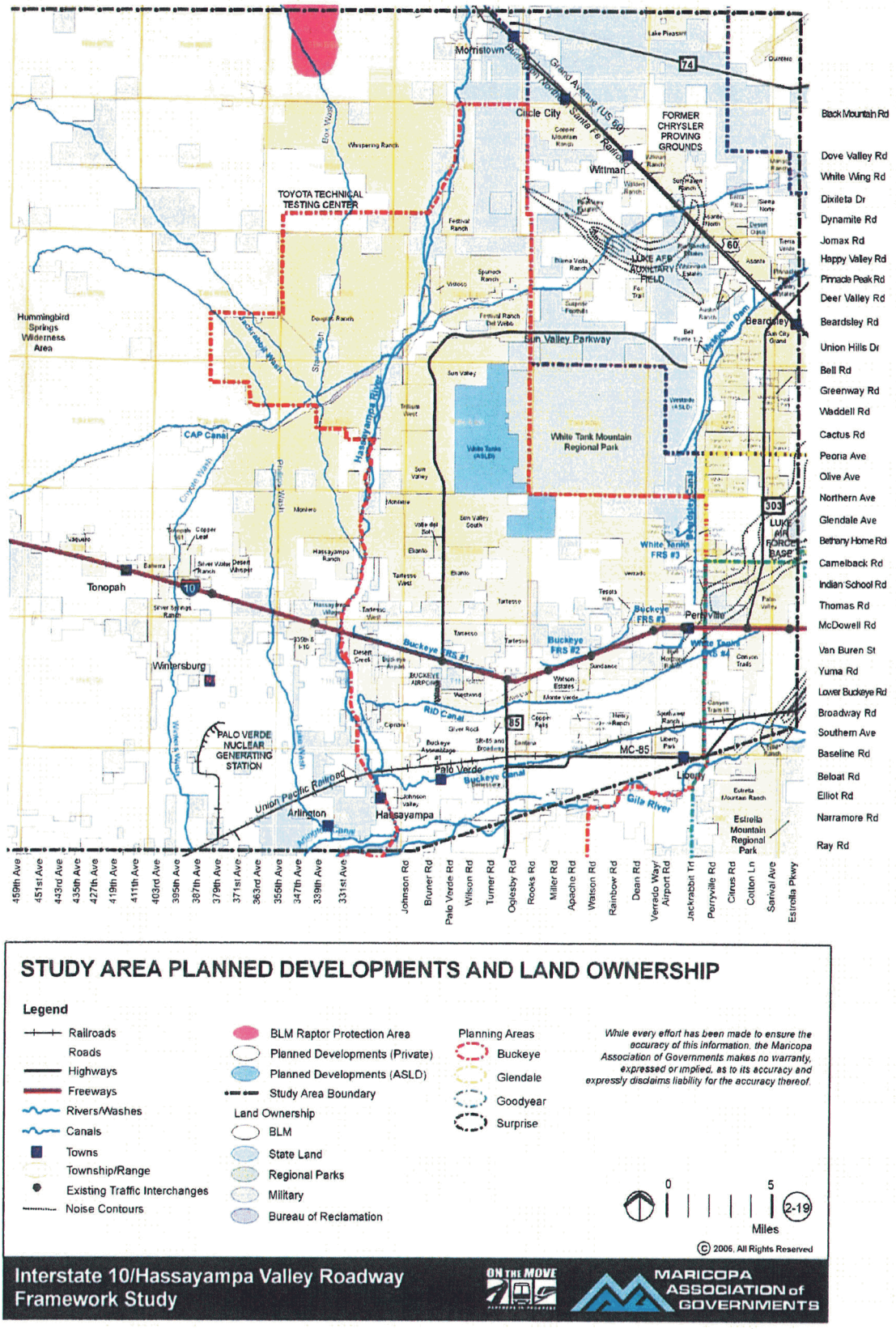
Figure 2-19 Study Area Planned Developments and Land Ownership



STUDY AREA PLANNED DEVELOPMENTS AND LAND OWNERSHIP

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- Noise Contours
- BLM Raptor Protection Area
- Planned Developments (Private)
- Planned Developments (ASLD)
- Study Area Boundary

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

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AUGUST 30, 2006

Table 2.4 Hassayampa Valley Master Planned Communities

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Buckeye MPA								
Benessere	Proposed	1,100	3,800	unknown	unknown	unknown	unknown	unknown
Blue Horizons	Approved	565	2,225	26	1	0	0	3.94
Cipriani	Proposed	2,362	6,453	187	5	0	1	2.73
Copper Falls	Approved	275	857	43	0	0	0	3.12
Desert Creek	Proposed	2,234	8,490	245	3	0	1	5.50
Douglas Ranch	Approved	35,250	84,034	2,472	27	0	6	2.39
Elianto	Approved	3,751	12,501	143	4	0	1	unknown
Festival Ranch	Approved	10,105	24,176	unknown	unknown	unknown	unknown	2.40
Henry Park	Proposed	430	1,655	unknown	unknown	unknown	unknown	3.85
Monte Verde	Proposed	860	2,991	38	0	0	1	3.30
Montierre	Approved	477	2,065	unknown	unknown	unknown	unknown	3.50
Sienna Hills (formerly Tesota Hills)	Approved	444	1,302	3	0	0	0	2.59
Silverock	Approved	1,241	5,397	83	3	0	0	4.35
Southwest Ranch	Approved	457	1,560	126	0	0	0	3.41
Spurlock Ranch	Approved	2,840	7,329	270	4	1	1	2.58
Sun Valley	Approved	16,266	41,370	413	26	0	4	3.26
Sun Valley Villages I, II	Proposed	5,770	17,536	669	11	0	2	3.28
Sun Valley South	Approved	11,200	29,200	1,265	4	0	0	2.93

Table 2.4 - Continued

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Sundance	Approved	2,016	6,862	222	3	0	0	3.40
Tartesso	Approved	13,000	50,000	57	4	0	1	3.56
Tartesso East, Amendment 2	Approved	5,780	23,270	110	4	0	1	4.03
Tartesso West, Amendment 1	Approved	5,124	19,667	189	10	0	1	3.84
Trillium	Approved	3,042	8,762	108	4	0	1	2.88
Valle del Sol	Proposed	320	1,129	40	0	0	0	4.0
Ventana Ranch (Buckeye Farms)	Approved	319	1,050	89	0	0	0	3.34
Verrado	Approved	8,800	14,080	600	1	1	1	1.60
Westpark	Approved	1,060	3,895	165	3	0	0	3.30
Westwind	Proposed	807	3,000	39	2	0	0	3.72
Maracay White Tanks 320	Proposed	318	1,020	0	0	0	0	3.20
Surprise MPA								
Austin Ranch	Future	850	2,240	18	1	0	0	2.64
Austin Ranch II	Proposed	175	674	25	0	0	0	3.84
Arizona Traditions	Under Construction	532	1,769	unknown	0	0	0	3.33
Asante	Future	1,508	6,703	101	2	0	0	4.40
Asante North	Proposed	2,106	6,000	232	3	0	0	4.26
Bell Pointe 1	Under Construction	106	405	unknown	0	0	0	3.82
Bell Pointe 2	Proposed	27	155	3	0	0	0	6.17

Table 2.4 - Continued

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Bell West Ranch	Under Construction	286	1,100	unknown	0	0	0	3.85
Buena Vista Ranch	Proposed	353	10,169	22	unknown	unknown	unknown	3.02
Copper Mountain Ranch	County	unknown	10,000	unknown	unknown	unknown	unknown	unknown
Desert Oasis	Under Construction	890	3,520	unknown	unknown	unknown	unknown	3.96
Fox Trail	Future	877	2,320	30	unknown	unknown	unknown	2.65
Grand Vista	Future	7,500	22,000	unknown	unknown	unknown	unknown	2.90
Lake Pleasant	County	5,000	9,800	unknown	unknown	unknown	unknown	1.96
Marisol Ranch	Approved	634	2,070	unknown	unknown	unknown	unknown	3.26
Peakview Estates	County	483	244	13	unknown	unknown	unknown	1.98
Prasada	Approved	3,355	4,495	1,225	3	0	0	4.51
Rio Rancho Estates	Future	194	863	34	unknown	unknown	unknown	4.44
Sarah Ann Ranch	Imminent	320	960	unknown	unknown	unknown	unknown	3.00
Sierra Montana	Under Construction	776	2,635	unknown	unknown	unknown	unknown	3.40
Sierra Norte	Proposed	160	374	unknown	unknown	unknown	unknown	unknown
Sun City Grand	Completed	3,723	9,510	114	0	0	0	2.55
Sunhaven Ranch	Approved	2,116	8,001	375	3	0	0	3.78
Surprise Farms	Under Construction	1,415	4,405	unknown	1	0	1	3.11
Surprise Foothills	Proposed	1,089	2,129	unknown	unknown	unknown	unknown	1.96
Surprise Ranch	Proposed	200	662	unknown	unknown	unknown	unknown	3.31
Sycamore Farms	Imminent	637	1,177	226	unknown	unknown	unknown	1.85

Table 2.4 - Continued

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Tierra Rico	Proposed	80	177	0	0	0	0	2.21
Walden Ranch	Proposed	520	1,761	29	unknown	unknown	unknown	3.39
Whonnock Estates	Proposed	40	154	unknown	unknown	unknown	unknown	3.85
Witman Ranch	County	577	1,570	unknown	1	0	0	2.72
Zanjero Trails	Proposed	831	3,525	18	1	0	0	4.42
Maricopa County MPA								
Balterra	Proposed	1,110	6,100	161	1	0	0	5.50
Belmont	Approved	20,800	72,800	2,059	16	4	2	3.50
Copper Leaf	Proposed	1,280	3,986	204	2	0	0	3.10
Desert Whisper	Proposed	961	3,505	43	1	0	0	3.88
Hassayampa Ranch	Approved	2,066	5,707	36	2	0	0	2.67
Hassayampa Village	Proposed	160	unknown	96	unknown	unknown	unknown	unknown
Silver Springs Ranch	Proposed	2,389	8,086	152	1	0	1	3.38
Silver Water Ranch	Proposed	529	2,077	37	0	0	0	3.50
Tonopah 561	Proposed	561	2,902	102	1	0	0	5.17
339th & I-10	Proposed	1,290	4,276	180	1	0	0	2.67
Goodyear MPA								
King Ranch	Approved	2,000	5,712	86	2	0	0	2.86

*Does not necessarily equal "Total Dwelling Units" divided by "Total Acres."
Source: Community Master Plans/Land Use Maps 2002-2006; table compilation complete as of August 15, 2006.

Developments east of the White Tank Mountains generally follow existing arterials and section lines, fitting into the larger grid network. Developments west of the White Tanks are typically larger and have created their own internal circulation patterns, not coinciding with any established roadway network or grid (which typically does not exist this far west). A key objective of this study is to develop an arterial roadway framework in this area to allow access between these communities, and between the Hassayampa Valley and other areas. However, the topography west of the White Tank Mountains, with its many washes and hills, will not easily conform to the traditional one-mile arterial grid network that has worked well throughout the Phoenix metropolitan area.

This study will also define access to I-10 and other high-capacity transit corridors. Currently, only Belmont and Douglas Ranch have a defined strategy in their master plans for routing a high-capacity transportation corridor through the community. The developers envision this route as the future CANAMEX Corridor, which will follow the 347th Avenue alignment through the center of the Belmont community, departing to the north over the CAP Canal. North of Belmont, Douglas Ranch has planned its town center and large-scale, mixed-use development along this route.

Major Master Planned Communities Summaries

Adjacent to and west of the White Tank Mountains, the planned developments are much larger than those farther south or east. A more in-depth review of six of the largest developments appears below and in Table 2.5, which uses information from Table 2.4 for a simple comparison of these developments.

Table 2.5 Major Master-Planned Communities Summary

Name	MPA	Total Acres	Total Dwelling Units	Target Density (du/acre)*
Belmont	Maricopa County	20,800	72,800	3.5
Douglas Ranch	Buckeye	35,250	84,034	2.39
Sun Valley	Buckeye	16,266	41,370	3.26
Sun Valley South	Buckeye	11,200	29,200	2.93
Tartesso	Buckeye	13,000	50,000	3.56
Verrado	Buckeye	8,800	14,080	1.6

*Gross area density; does not necessarily equal "Total Dwelling Units" divided by "Total Acres."

Source: Community Master Plans/Land Use Maps 2002-2005.

- Belmont: The master plan for Belmont was developed in 1991, with an expected Buildout timeframe of 40 to 50 years. It is composed of 25 residential villages developed for various market segments. Each village will have a distinct community node, generally focused around a school and a neighborhood park. A village center in the center of Belmont will contain extensive regional employment and service industries. Belmont will have a variety of housing types, with the neighborhoods least dependent on the employment center (i.e., retirement neighborhoods) to be developed first. Later residential development will include suburban-style single-family development, rental, and luxury housing. Belmont has planned for alignment of the proposed CANAMEX route through the village center.

- Douglas Ranch: The master plan for Douglas Ranch was developed in 2001. The development covers approximately 36 square miles with 27 planning areas, each developed around a school and neighborhood park. Many large wash corridors such as Jackrabbit Wash run through the development, leading to a land use plan with ample open space and looping roadways. The majority of the community will be composed of low-density residential development, with higher densities concentrated around the town center, located at the intersection of Douglas Parkway and Wickenburg Highway. This area, as well as the entire Wickenburg Highway corridor, is part of a CANAMEX land use corridor, which will contain much commercial and mixed-use development. The town center will also have a transit center to accommodate eventual bus and rail service.

- Sun Valley/Sun Valley South: The master plans for Sun Valley and Sun Valley South were developed in 2001. These communities span Sun Valley Parkway from approximately Bethany Home Road to Union Hills Drive. Villages will be grouped around school sites, with small areas of neighborhood commercial development. Larger commercial development will be located near arterial intersections, with a large urban center located in Sun Valley South near the intersection of Sun Valley Parkway and Glendale Avenue. Located at the edge of the White Tank Mountains, many open space corridors are planned, including several golf courses. Sun Valley will be composed of primarily medium-density residential development, with slightly lower densities in Sun Valley South.

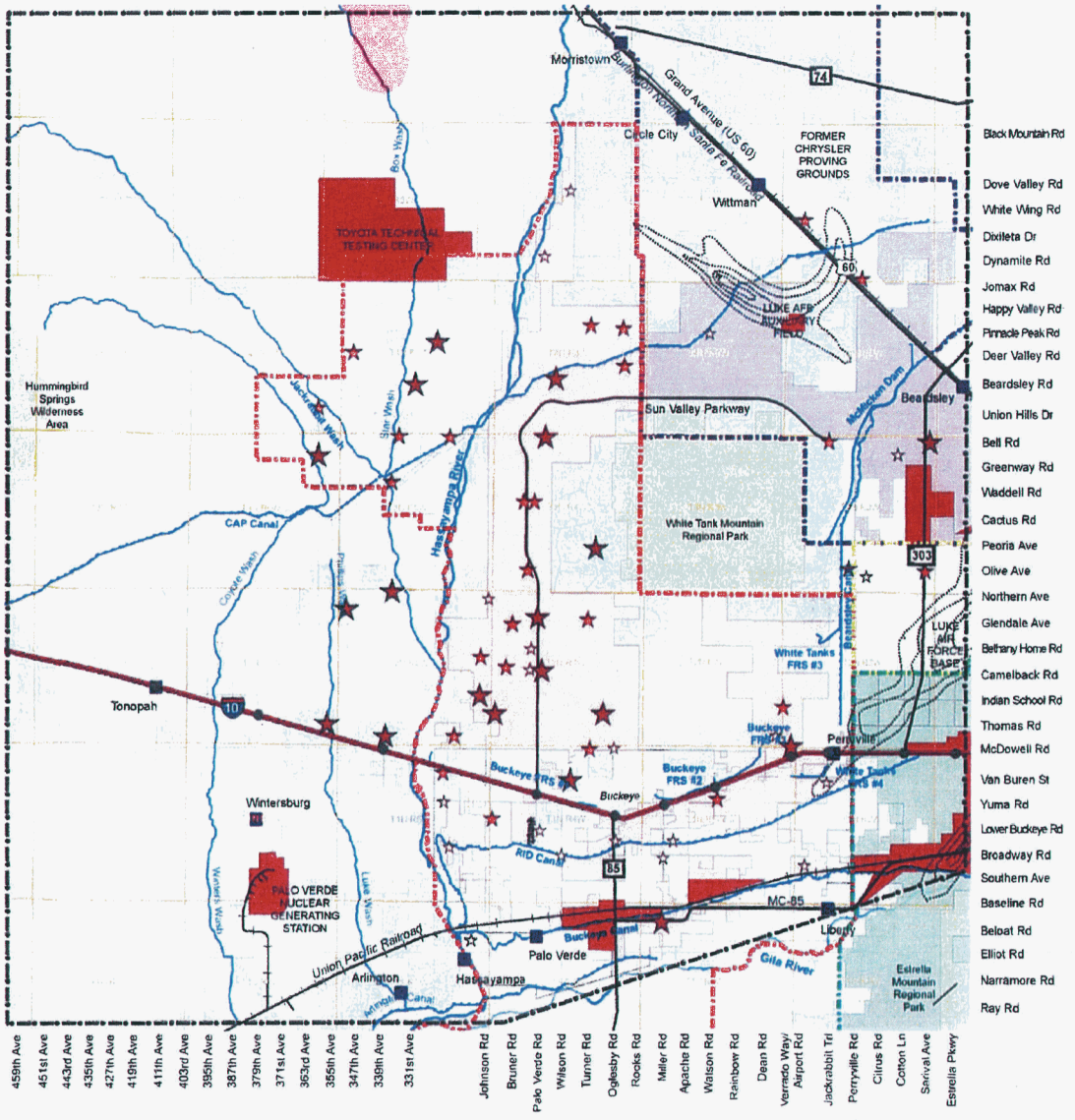
- Tartesso: The master plan for Tartesso was developed in 2002. Tartesso consists of several tracts of land on both sides of Sun Valley Parkway, south of both the Sun Valley and Sun Valley South communities. Development, which will cluster around neighborhood parks and schools, will consist primarily of medium- to high-density residential development, but with lower densities and more open space at the base of the White Tank Mountains. The Tartesso Town Center, to be located just north of I-10 at Sun Valley Parkway, will accommodate several shopping centers, two large employment complexes, a lifestyle center similar to Scottsdale's Kierland Commons, an auto mall, a movie theater, hospital, hotels, and higher-density residential development.

- Verrado: Located at the southern base of the White Tank Mountains, Verrado broke ground in 2002. The community is known for its "neo-traditional" style of architecture and urban development, a style that fosters interaction between neighbors and a quaint atmosphere, achieved through a dense town center, closely spaced houses, front porches and parks. The Verrado Main Street District is located at approximately the Camelback Road alignment and Verrado Way. This walkable area contains loft apartment living, shops, services, and restaurants. Another commercial node is located closer to I-10. Residential development is concentrated in the southern/central part of the development, as the northern portion is too steep because of the White Tank foothills. Much of this more mountainous area will be preserved as open space, with a resort, golf courses, and large estate residential development.

Major Employment Centers

Figure 2-20 maps significant employment centers in the study area. Except for some existing facilities (the Luke Air Force Base Auxiliary Air Field, the Toyota Technical Testing Center and PVNGS), major employment centers will be located along high-capacity transportation corridors such as I-10, SR-303L and MC-85. This pattern is likely to continue west as development spreads. The larger master-planned communities are also likely to have "town centers" serving as hubs of employment and other economic activity.

Figure 2-20 Major Economic Activity Centers



MAJOR ECONOMIC ACTIVITY CENTERS

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Township/Range
- Towns
- Existing Traffic Interchanges
- Noise Contours
- Proposed Arterials
- BLM Raptor Protection Area
- Study Area Boundary
- Major Economic Activity Centers

Future Employment Centers (by community size)

- Over 10,000 acres
- 2,000 - 10,000 acres
- 0 - 2,000 acres

Jurisdictions

- Buckeye
- Goodyear
- Surprise

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Alignments for new freeway, highway, arterial, and light rail/ high capacity transit facilities will be determined following the completion of appropriate design and environmental studies.

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Interstate 10/Hassayampa Valley Roadway Framework Study

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AUGUST 30, 2006

2.3 Related Studies and Reports

This section summarizes 26 studies considered pertinent to the Interstate 10-Hassayampa Valley Roadway Framework Study. They are grouped according to status: completed (within the last ten years), in progress, and future. Transportation studies are summarized in Chapter 4.

2.3.1 Completed Studies

1. West Valley South Power Line and Substation Project

Date Completed: December 2003
Lead Agency: APS
Author: URS Corporation

Purpose of Study: This study sought to respond to the increasing demand for electricity in the West Valley by expanding electrical services in Avondale, Buckeye, Glendale, Goodyear, Litchfield Park and Maricopa County. The goal of the project was to site substations and power lines in locations that minimize impacts to the natural and human environment.

Study Area: The area studied is bounded by approximately Thunderbird Road on the north, Baseline Road on the south, Oglesby Road on the west and 99th Avenue on the east.

Process: A comprehensive and detailed inventory of existing and future land uses, scenic resources, and other environmental factors was conducted. This environmental analysis was done in conjunction with an aggressive community involvement plan. Each alternative substation site and power line route was then evaluated by resource specialists to assess the potential impact of each alternative on land uses, scenic views, historic/archaeological sites and biological resources. After all potential substation sites and power line routes were assessed; they were ranked by level of impact.

Recommendations Relevant to the Study Area: The preferred system will allow APS to consolidate some 69kV and 230kV transmission lines on the same structures. The line will run north along Perryville Road from approximately Southern Avenue to Bethany Home Road, moving west to Tuthill Road and again north to Olive Avenue, where it will run east along Olive Avenue to the SR-303L alignment. The power line will then follow SR-303L south to Campbell Avenue, where it will loop west to meet up with the Perryville Road alignment. This option contains five new power line substations.

2. West Valley North Power Line and Substation Project

Date Completed: May 2005
Lead Agency: APS
Author: URS Corporation

Purpose of Study: This study was an extension of the West Valley South Power Line and Substation Project, also seeking to expand electrical services in the West Valley, while siting substations and power lines in locations that minimize impacts.

Study Area: The study area extended from approximately Jomax Road on the north to Northern Avenue on the south and from Sun Valley Parkway on the west to Reems Road/US-60 on the east.

Process: A comprehensive and detailed inventory of existing and future land uses, scenic resources and other environmental factors was conducted. This environmental analysis was done in conjunction with an aggressive community involvement plan. Each alternative substation site and power line route was then evaluated by resource specialists to assess its potential impact on land uses, scenic views, historic/archaeological sites and biological resources. After all potential substation sites and power line routes were assessed, they were ranked by level of impact.

Recommendations Relevant to the Study Area: The preferred system begins at Olive Avenue, paralleling SR-303L north to Cactus Road, and then proceeds west to one-half mile east of the Jackrabbit Trail

(195th Avenue) alignment. From there, the route continues north to approximately Beardsley Road, where it jogs west three-fourths of a mile, then north to Deer Valley Road, and west again to 243rd Avenue. Finally, it jogs north (following an existing fiber optic installation) to the CAP Canal, which it follows westerly to terminate at the proposed substation.

3. Palo Verde Hub to TS-5 500 kV Transmission Line Project

Date Completed: June 2005
Lead Agency: APS
Author: Environmental Planning Group

Purpose of Study: This study planned electrical transmission infrastructure to bring bulk power into the high growth area west of the White Tank Mountains. The project also will strengthen the entire APS transmission system by providing an additional high-voltage transmission source to the Phoenix metropolitan area, allowing importation of power from generating sources at or around the PVNGS.

Study Area: The study area has an irregularly shaped border that extends approximately four miles north of the CAP Canal, four miles south of the PVNGS, two miles west of Harquahala Valley Road, and two miles east of Sun Valley Parkway.

Process: In addition to general land use and environmental analysis, because this power line was proposed to be partially located on federal land, adherence to the National Environmental Policy Act was required, causing APS to work with the BLM to file right-of-way application and conduct an Environmental Assessment (EA). A public involvement program was conducted simultaneously with the EA.

Recommendations Relevant to the Study Area: The recommended transmission line will begin at the Palo Verde Hub at either the PVNGS or the Arlington Valley Energy Facility, and proceed northwest for approximately 20 miles to the north side of the CAP Canal. The line will then turn east and parallel the canal for approximately 23 miles, terminating at the new TS-5 Substation near the Hassayampa Pumping Plant along the canal.

4. Buckeye Conceptual Planning

Date Completed: June 2000
Lead Agency: Arizona State Land Department (ASLD)
Author: BRW, Inc.

Purpose of Study: This report outlined the needs for state lands within the Buckeye MPA for the year 2020, based on population and employment projections.

Study Area: The MPA of the Town of Buckeye.

Process: The study used several allocation models to predict the amount of employment, residential dwelling units and population in the year 2020. The mapping and socioeconomic analyses were also used to estimate future conditions in the study area.

Recommendations Relevant to Study Area: The Final Conceptual Plan outlines land use for approximately 19,900 acres of developable state lands in Buckeye. There are projected to be approximately 55,000 dwelling units accommodating a population of 128,000 in the year 2020. This future development includes 1,936 acres of commercial and employment uses and areas for potential affordable housing.

5. El Rio Watercourse Master Plan

Date Completed: March 2006
Lead Agency: FCDMC
Author: Stantec Consulting Inc.

Purpose of Study: The plan is intended to examine a range of flood control management plans that will foster maintenance and enhancement of the Gila River.

Study Area: The plan encompasses a segment of the Gila River from its confluence with the Agua Fria River westward to its crossing of SR-85.

Process: Development of the plan entailed identification of flood and erosion hazards, a definition of river characteristics, incorporation of stakeholder concerns, minimization of future spending of public funds, and consideration of environmental characteristics and multiple-use activities. Several plans were considered and evaluated based on public safety, social, economic, and environmental criteria.

Recommendations Relevant to Study Area: The final recommended alternative was a combination of soft-structural and non-structural elements with resource vegetation management. These elements were designed to prevent erosion and follow the 100-year floodway.

6. Padelford Wash Floodplain Delineation Study

Date Completed: 2002
Lead Agency: Flood Control District of Maricopa County (FCDMC)
Author: A-N West, Inc.

Purpose of Study: This study was conducted to create a new detailed floodplain analysis of Padelford Wash.

Study Area: The area of Padelford Wash lies between the CAP Canal on the south and SR-74 on the north, approximately along the 163rd Avenue roadway alignment.

Process: Development of the plan entailed identification and delineation of floodplain corridors within the assigned study area.

Recommendations Relevant to Study Area: This study provided a more detailed drainage analysis for this corridor to assist in development feasibility studies.

7. Offsite Emergency Response Plan for Palo Verde Nuclear Generating Station

Date Completed: Unknown
Lead Agency: Maricopa County
Author: Maricopa County Emergency Management Department

Purpose of Study: This plan was created to ensure a coordinated response to protect the public from the effects of radiation exposure in the event of an incident having offsite consequences.

Study Area: The response plan considers all land within a 50-mile radius of the PVNGS, which is located on 4,080 acres near Wintersburg.

Process: This plan outlines necessary responses and communications in case of a serious event. Two emergency planning zones (EPZ) surround PVNGS: the Plume Exposure Pathway EPZ and the Ingestion Exposure Pathway EPZ. The Plume Exposure Pathway EPZ covers a 10-mile radius around the PVNGS and includes evacuation routes for residents. The Ingestion Exposure Pathway EPZ has a 50-mile radius, denoting the area in which food or potable water could become contaminated as a result of a release of radioactive materials into the atmosphere.

Recommendations Relevant to Study Area: The Plume Exposure Pathway EPZ outlines evacuation routes from the PVNGS in case of a nuclear event. These evacuation routes follow existing arterial and high-capacity roadways within the Hassayampa study area, including I-10, Buckeye-Salome Road, 355th Avenue, Wintersburg Road, Elliot Road and Old US 80.

8. Maricopa County Eye to the Future – White Tank/Grand Avenue Area Plan

Date Completed: 2000
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This plan was compiled to provide one cohesive document in which regional growth and development conditions are addressed and analyzed. It is intended to prepare for growth over the next 15 to 20 years.

Study Area: Boundaries of the planning area encompass 760 square miles and include all or parts of the following communities: Avondale, Buckeye, El Mirage, Glendale, Goodyear, Litchfield Park, Peoria, Surprise, Youngtown, Sun City, Sun City West, Wittman, Circle City and Morristown (the last five are unincorporated). The boundaries extend from approximately SR-74 on the north to the Gila River on the south, and from the eastern limit of the Town of Buckeye on the west to Lake Pleasant Road on the east.

Process: This study is an updated consolidation of two previous sub-area studies: the White Tank/Agua Fria Policy and Development Guide and the Grand Avenue Area Plan, published in 1982 and 1992. They were combined into one document so that regional considerations could be identified, analyzed and addressed.

Recommendations Relevant to Study Area: Goals formulated at the conclusion of the study include integration of land use development with transportation systems and the natural environment; promotion of public health, safety and welfare; roadway improvements to accommodate future needs; and encouragement of the use of transit and alternative transportation modes.

9. Maricopa County Eye to the Future – Tonopah Arlington Area Plan

Date Completed: September 2000
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This study incorporates new and current issues in an update of the previous area plan, which was intended to guide decisions by the Planning and Zoning Commission, Board of Supervisors, policymakers and the private sector.

Study Area: The planning area for this study encompassed the communities of Tonopah and Arlington.

Process: Tonopah and Arlington were addressed as individual planning areas.

Recommendations Relevant to Study Area: Many of the policy recommendations in the area plan evolved from pre-existing plans within Maricopa County that were adapted to fit the Tonopah/Arlington area. The main transportation objective is the establishment of a countywide circulation system providing safe, convenient and efficient movement of goods and people. The plan recommends, among numerous policies, the development of alternative modes of transportation, maintenance of existing roadways, improved Interstate highway access, and provision of all-weather travel over washes.

10. Maricopa County Eye to the Future – State Route 85 Corridor Area Plan

Date Completed: November 2002
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: The plan was intended to prepare for and accommodate growth throughout the SR-85 corridor for the next ten to twenty years.

Study Area: The study area covers approximately 360 square miles and encompasses SR-85 from I-10 to I-8. The corridor also includes land up to five miles east and west of SR-85, stretching into the towns of Buckeye and Gila Bend.

Process: This corridor plan sets goals, objectives and policies in land use, transportation, environment, economics, growth areas, open space, water resources and cost that will be used to guide development along SR-85. The plan will be re-evaluated and updated periodically.

Recommendations Relevant to Study Area: Future land uses of the area within the Hassayampa study area (a six-mile segment of SR-85 from I-10 to the Gila River) will include two commercial centers to the west of SR-85 near the El Paso Natural Gas Line Road; and a mix of dedicated open space, rural residential, large lot residential, and industrial employment centers. Recommendations include upgrading the existing two-lane SR-85 to a four-lane highway, as well as concentrating urban development around the Town of Buckeye.

11. Maricopa County Eye to the Future – Rainbow Valley Area Plan

Date Completed: January 2003
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This study is an update of a previous area study. It was initiated in response to rapid growth in Rainbow Valley, the evolution of new issues, the availability of new mapping data, and legislation that required new planning elements.

Study Area: Rainbow Valley is bounded by Rainbow Road on the west, Citrus Road on the east, Southern Avenue on the north, and El Paso Natural Gas Line Road on the south.

Process: This plan contains a series of goals, objectives, and policies used to define development standards, guide public investment, and guide public and private decision-making. Residents and stakeholders presented new planning objectives and the old study area was expanded to incorporate new development.

Recommendations Relevant to Study Area: Priorities in the plan, reflecting public input, center on preservation of open space and a rural lifestyle. Most of the planning area overlapping with the Hassayampa study area is intended to be used for low-density or large-lot residential development. The public also expressed concern with access across the Gila River and the environmental impacts of growth in general and all-terrain vehicles in particular.

12. Maricopa County Regional Trail System Plan

Date Completed: August 2004
Lead Agency: Maricopa County
Author: Maricopa County Trail Commission

Purpose of Study: This study created a regional planning framework for a 1,521-mile trail network for pedestrians, equestrians, bicyclists, and other non-motorized trail users, expanding upon existing and planned trail systems and seeking to provide connections between municipalities, trails, parks, and neighborhoods, as well as to provide open space corridors to protect natural and cultural resources.

Study Area: Maricopa County.

Process: The Maricopa County Trail Commission was formed in February 2000 to help form a regional trail system, using established trail routes and identifying future trail corridors throughout Maricopa County. The 1,521 miles of the Maricopa County Regional Trail System are organized into segments and priorities that will serve as a guide for implementing the trail plan.

Recommendation Relevant to Study Area: The Hassayampa study area contains portions of various proposed trail systems. The Priority 1 segments, including portions of the Beardsley Canal and Gila River floodplain, are part of the Sun Circle Trail or the Maricopa Trail. Priority 2 segments are important regional corridors that connect to the Maricopa Trail and may provide connections to regional park systems, such as trails along I-10 and Buckeye-Salome Road. Priority 3 segments are regional corridors that are not currently key components of the regional trail system, but may become important future trails. Examples are the RID Canal, the Hassayampa River and the CAP Canal. Most Priority 4 trails are conceptual corridors in outlying areas of Maricopa County, including several in the Hassayampa study area.

13. Estrella Mountain Ranch/Goodyear General Plan Amendment

Date Completed: March 2006
Lead Agency: Newland Communities
Author: DMJM Harris

Purpose of Study: This narrative describes the elements of, and justification for, a Major General Plan Amendment within the City of Goodyear to establish a transportation framework for the master-planned community of Estrella Mountain Ranch, including arterial roadway and transit options, as well as a plan for the extension of SR-303L south of I-10 and across the Gila River.

Study Area: Estrella Mountain Ranch Master-Planned Community in Goodyear.

Process: This document has been submitted to the City of Goodyear for City Council approval in December 2006.

Recommendations Relevant to Study Area: The proposed SR-303L alignment follows the east side of Waterman Wash, south to I-8 through a combination of privately owned and BLM land. This alignment is open to change, however, as the Hidden Valley Regional Transportation Study will begin in early 2007. This study will mirror the Hassayampa study, exploring potential roadway connections south of the Gila River from 459th Avenue to approximately I-10. Alignment possibilities may demonstrate alternative routes for SR-303L, such as creating a north-south connection to I-8 in Pinal County or an east-west connection to I-10 near Maricopa, either north or south of the Ak-Chin Indian Community.

14. Palo Verde to Pinal West Transmission Project

Date Completed: 2004
Lead Agency: SRP
Author: Greystone Environmental Consultants

Purpose of Study: This study is a result of the Central Arizona Transmission System Study to determine new power line transmission capacity for central Arizona. The objective is to analyze system reliability, capacity and increasing demand for energy delivery in Arizona, and to plan for any additional required transmission. The project began as one, but was subsequently divided in two, Palo Verde to Pinal West (PV-PW) and Pinal West to Southeast Valley/Browning (PW-SEV/BRG). The latter is outside the Hassayampa study area.

Study Area: The study area follows the El Paso Natural Gas Line Road alignment on the south, bordering the Sonoran Desert National Monument, and extends for approximately six miles north and east of this alignment, originating at the Hassayampa Substation and terminating at the Pinal West substation.

Process: An extensive siting process was conducted to determine the most appropriate location for the power line, involving a land use and environmental analysis as well as an extensive public outreach program.

Recommendations Relevant to the Study Area: Only a portion of the recommended alternative falls within the Hassayampa study area. The preferred 500 kV transmission line alignment runs south from the Red Hawk substation until it meets El Paso Natural Gas Line Road, and then follows this rural road to the Pinal West Substation.

2.3.2 Current Studies

15. Palo Verde Hub to North Gila 500 kV Transmission Line Project

Lead Agency: APS
Author: Environmental Planning Group

Purpose of Study: This project will site a new 500 kV transmission line that will provide the electrical transmission infrastructure to import additional generation resources from the power plants in and around the Palo Verde Hub (agglomeration of the PVNGS and Hassayampa, Red Hawk, Arlington, and Mesquite substations) into the Yuma area, which is experiencing high growth. The project will also improve the reliability of the APS electric system in the Yuma area by providing an additional high-voltage transmission source to that region

Study Area: The study area extends from the La Paz/Yuma County line on the north to the Barry M. Goldwater Air Force Range on the south, and from the Colorado River on the west to the Palo Verde Hub on the east.

Implications for the Hassayampa Study Area: The recommended alternative in the EA shows the transmission line running southwest from the Palo Verde Hub and following the Union Pacific Railroad line west of the Signal Mountains toward Yuma.

Project Status: The EA will be complete in summer 2006, with a Finding of No Significant Impact and a Record of Decision expected in fall 2006. A Certificate of Environmental Compatibility will be then be submitted to the State of Arizona, with approval expected by spring 2007.

16. White Tanks Master Land Use Plan

Lead Agency: ASLD
Author: URS Corporation

Purpose of Study: This study will illustrate a conceptual land use plan for state land holdings west of White Tank Mountain Regional Park. This plan is being prepared to help guide future development and auction of these lands.

Study Area: Adjacent state land parcels west of White Tank Mountain Regional Park.

Implications for the Hassayampa Study Area: The recommended land use plan will eventually be incorporated into the Town of Buckeye General Plan. Understanding the vision for these lands will help in assessing locations and determining classifications for future roadways in this area. The preliminary draft calls for mostly low-density residential development, with areas of commercial and employment along the extensions of Peoria Avenue, Cactus Road and Waddell Road, west of the White Tank Mountains. Turner Road would also be extended north, weaving through the state lands as a major north-south arterial roadway.

Project Status: Draft White Tanks Master Land Use Plan published in May 2006.

17. West Side Study Area Conceptual Plan, White Tanks

Lead Agency: ASLD
Author: ASLD

Purpose of Study: This study will illustrate a conceptual land use plan for state land holdings north and east of White Tank Mountain Regional Park. This plan is being prepared to help guide future development and auction of these lands.

Study Area: State land parcels adjacent to the north and east sides of White Tank Mountain Regional Park.

Implications for the Hassayampa Study Area: The recommended land use plan will eventually be incorporated into general plans for Maricopa County and the City of Surprise. Understanding the vision for these lands will help in assessing locations and determining classifications for future roadways in this area. The preliminary draft shows areas of high commercial development along Sun Valley Parkway/Bell Road, as well as commercial and high-density residential development along Northern Avenue, near the eastern edge of White Tank Mountain Regional Park.

Project Status: Preliminary Conceptual Plan draft published in May 2006.

18. Phoenix South Planning Area Resource Management Plan (RMP) and Environmental Impact Statement (EIS)

Lead Agency: Department of the Interior
Author: BLM, Phoenix Field Office

Purpose of Study: The overarching vision of the BLM in creating a RMP for the Phoenix South Planning Area is to retain an open and functioning desert ecosystem while still fulfilling multiple-use needs.

Study Area: The Phoenix South Planning Area covers approximately 8.8 million acres in Maricopa, Pinal and Pima counties. It comprises all of the land south of I-10 in the Hassayampa study area.

Implications for the Hassayampa Study Area: The management plan will include criteria identified for special status species, grazing management, fire management, mineral and energy resources, land, realty and recreation. Issues raised during the scoping process also address preservation of visual resources, transportation and access needs, utility corridor development, and socioeconomic impacts of land use. All of these factors will be used to determine the amount and capacity of public use on BLM land.

Project Status: A Draft EIS was expected to be released to the public in late fall 2006.

19. Buckeye Sun Valley Parkway Area Drainage Master Plan (ADMP)

Lead Agency: FCDMC
Author: FCDMC

Purpose of Study: This ADMP will identify known and potential flooding and erosion hazards in the Buckeye/Sun Valley area. It will estimate flood potential for watersheds, map watercourses, identify existing and potential drainage problems, and develop preliminary solutions and standards for sound floodplain and stormwater management.

Study Area: The watershed for the study area is generally bounded by Gates Road to the north, the White Tanks Mountains and the Dean Road alignment to the east, the Gila River to the south, and the Hassayampa River to the west, covering approximately 280 square miles.

Implications for the Hassayampa Study Area: This study will identify areas of flooding and drainage concerns, especially relative to new development in the study area. FCDMC will offer both structural and nonstructural alternative solutions to reduce flooding hazards.

Project Status: This project began in June 2003 and the data collection phase is complete.

20. Loop 303 Corridor/White Tanks ADMP

Lead Agency: FCDMC
Author: URS, Logan Simpson Design

Purpose of Study: This ADMP will identify existing drainage issues and provide alternative stormwater management plans in a north/south regional drainage corridor. These plans will be coordinated with the development of SR-303L.

Study Area: The study will analyze of approximately 220 square miles of watershed from the McMicken Dam south to the Gila River, and from the White Tank Mountains east to the Agua Fria River.

Implications for the Hassayampa Study Area: The study will identify drainage problems, update the existing hydrology, and develop cost-effective solutions for a storm water collection and disposal system. It will also identify potential outfall alternatives.

Project Status: An alternative was selected in October 2003 using a series of channels and basins to convey flows to the Gila and Agua Fria Rivers by maximizing the use of existing flood control facilities. The project area adjacent to SR-303L will be modified to reflect the upgrade of SR-303L from a parkway to a freeway.

21. Lower Hassayampa Watercourse Master Plan

Lead Agency: FCDMC
Author: J.E. Fuller Hydrology and Morphology

Purpose of Study: This watercourse master plan will identify and develop a plan and technical guidance for managing flood hazards, lateral migration of the watercourse, and cumulative impacts of existing and future development.

Study Area: The study area generally includes the floodplain and erosion hazard areas of the lower Hassayampa River, extending from the confluence with the Gila River on the south to the CAP Canal on the north--including the confluence of Jackrabbit Wash with the Hassayampa River.

Implications for the Hassayampa Study Area: This project will determine future land uses and the width of the lower portion of the Hassayampa River. Recommendations may include bridge crossings, channelization, and relationships to adjacent residential or commercial development.

Project Status: Phase 1, Existing Studies Inventory, is complete. Phase 2, the development of the master plan, will begin in January 2007.

22. Wittman ADMP

Lead Agency: FCDMC
Author: Entellus

Purpose of Study: The purpose of the Wittmann ADMP is to identify potential solutions to mitigate existing flooding problems and anticipate future ones associated with impending development. The goal of this study is to keep ahead of development and identify mostly non-structural flood control solutions for the area.

Study Area: The study area is composed of approximately 308 square miles in unincorporated Maricopa County, Peoria, Surprise and Buckeye, beginning at approximately Peoria Avenue on the south, extending north into Yavapai County, and generally following Douglas Ranch Road and McMicken Dam as the western and eastern boundaries.

Implications for the Hassayampa Study Area: This study will assess issues associated with McMicken Dam and the CAP Canal, anticipate future potential drainage problems, and generate "Rules of Development" with policies, standards, and guidelines to help guide development in this area.

Project Status: A consultant was selected in March 2006 and data collection is underway. This project is expected to take approximately 2.5 years to complete.

23. Maricopa County Eye to the Future – McMicken Dam Scenic Corridor Guidelines

Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This study is intended to provide policies that will guide development along a scenic corridor, by maintaining the vision of the Maricopa County Regional Trail System and the natural environment of washes, vegetation, and wildlife.

Study Area: The scenic corridor extends southwest for 9.5 miles from Grand Avenue to Peoria Avenue along McMicken Dam. The project area encompasses land within one-fourth mile of the property owned by FCDMC.

Implications for the Hassayampa Study Area: Maricopa County policies favor leaving existing conditions intact. The guidelines favor preservation of sensitive natural habitats, the use of open space as a development buffer, and imparting a southwestern character to development. Building height, signage, lighting and fencing are to be limited.

Project Status: A draft version of the report was published in March 2006.

24. Buckeye General Plan Update

Lead Agency: Town of Buckeye
Author: Partners for Strategic Action

Purpose of Study: This study is an update of the Town of Buckeye's General Plan, completed in 2001. The General Plan and the Town's Development Code will be completely rewritten to reflect recent and projected growth trends in the area, including the many entitled master-planned communities that are expected to make Buckeye one of Arizona's largest cities.

Study Area: Buckeye MPA.

Implications for the Hassayampa Study Area: This study will establish a transportation plan and update the current zoning plan within this MPA, which lies almost completely within the Hassayampa study area.

Project Status: This project began in March 2006, with expected completion in the spring of 2007.

2.3.3 Future Studies

25. Luke Wash ADMP

Lead Agency: FCDMC
Author: To be determined

Purpose: The purpose of this study is to identify flooding hazards and develop alternatives for mitigating them. The study will incorporate development plans for the area and jurisdictional drainage policies to develop a preferred solution.

Study Area: The study will include an analysis of approximately 115 square miles, with the northern limit just north of the CAP Canal, the southern boundary at the Gila River, the eastern limit along the Hassayampa River and Jackrabbit Wash, and the western boundary west of 163rd Avenue.

Expected Date of Initiation: January 2007

26. Upper Daggs/Star Wash Floodplain Delineation Study

Lead Agency: FCDMC
Author: To be determined

Purpose of Study: This study will upgrade approximately 75 linear miles of existing floodplains and tributaries of Daggs and Star washes to provide the county with improved floodplain mapping and analysis.

Study Area: The Upper Daggs/Star Wash study area is located immediately west of the Hassayampa River and north of the Patton Road alignment.

Expected Date of Initiation: Summer 2006

2.4 References Cited

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10-W14

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Attorneys for Plaintiff

IN THE SUPERIOR COURT OF THE STATE OF ARIZONA

IN AND FOR THE COUNTY OF MARICOPA

ARIZONA PUBLIC SERVICE COMPANY, an Arizona public service corporation, Plaintiff, vs. 10,000 WEST, L.L.C., an Arizona limited liability company; BUCKEYE COMMUNICATIONS, LLC, an Arizona limited liability company; BANK OF SCOTLAND, a foreign banking institution; FIRST AMERICAN TITLE INSURANCE COMPANY, a California corporation; MARICOPA COUNTY; JOHN DOES I-X, JANE DOES I-X; ABC PARTNERSHIPS I-X; and XYZ CORPORATIONS OR OTHER ENTITIES I-X; and UNKNOWN HEIRS, DEVISEES, and TRUST BENEFICIARIES OF THE ABOVE-NAMED DEFENDANTS, IF DECEASED, Defendants.	NO. CV2007-019257 **PLAINTIFF'S MOTION FOR SUMMARY JUDGMENT RE: RIGHT TO TAKE** (Assigned to the Honorable Robert Oberbillig) (Oral Argument Requested)

In this condemnation case, APS seeks to acquire an easement over a portion of Defendant's property for construction of two electric transmission lines. Although it has never properly disclosed the legal or factual basis for its position, Defendant appears to challenge APS' right to condemn the easement. A condemning authority's decision to condemn private property will not be disturbed absent fraudulent, or arbitrary and capricious

conduct. *See Citizens Utilities Water Co. v. Superior Court*, 108 Ariz. 296, 299, 497 P.2d 55, 58 (1972). Because the legal standard is so high, right to take challenges are extremely rare and almost never succeed. APS is the State's largest electric utility and has an undisputed obligation to ensure that it can transmit and distribute electricity in a reliable and efficient manner. The transmission line projects for which the easement is needed are designed solely to meet that obligation.

During the eight months that this case has been pending, Defendant has failed to produce any evidence supporting the contention that APS has acted fraudulently or arbitrarily in connection with the subject easement. Indeed, one of the transmission lines at issue was approved by the Arizona Corporation Commission's Line Siting Committee, and adjudicated by the Corporation Commission to be a necessary public use. **Defendant 10,000 West was a party to that administrative proceeding and consented to the location of the line over its property**. There is no legal or factual basis to Defendant's right to take challenge in this case, and APS is entitled to judgment as a matter of law that it has the right to condemn the subject easement.

Factual Background

APS seeks to condemn a 300-foot wide easement through a portion of Defendant's property. [Plaintiff's Statement of Facts ("PSOF"), at ¶ 1.] The easement will accommodate two transmission lines – a 230/69 kV line (the "West Valley Project") and a 500/230 kV line (the "TS5 to TS9 Project). [*Id.*] Both lines will pass through the TS5 or "Sun Valley" substation located immediately west of a portion of Defendant's property. [*Id.*]

Defendant is affiliated with the Lyle Anderson group of companies, which has built and planned residential developments in Arizona and several other states. The property at issue in this case is located on the northern edge of Buckeye, and is part of a 7,000-plus land holding that Defendant has assembled for future development as Festival Ranch. [*Id.* at ¶ 2.]

The easement APS seeks to acquire in this case is approximately 300 feet wide, and encompasses approximately 40 acres over three separate parcels. [*Id.* at ¶ 1.]

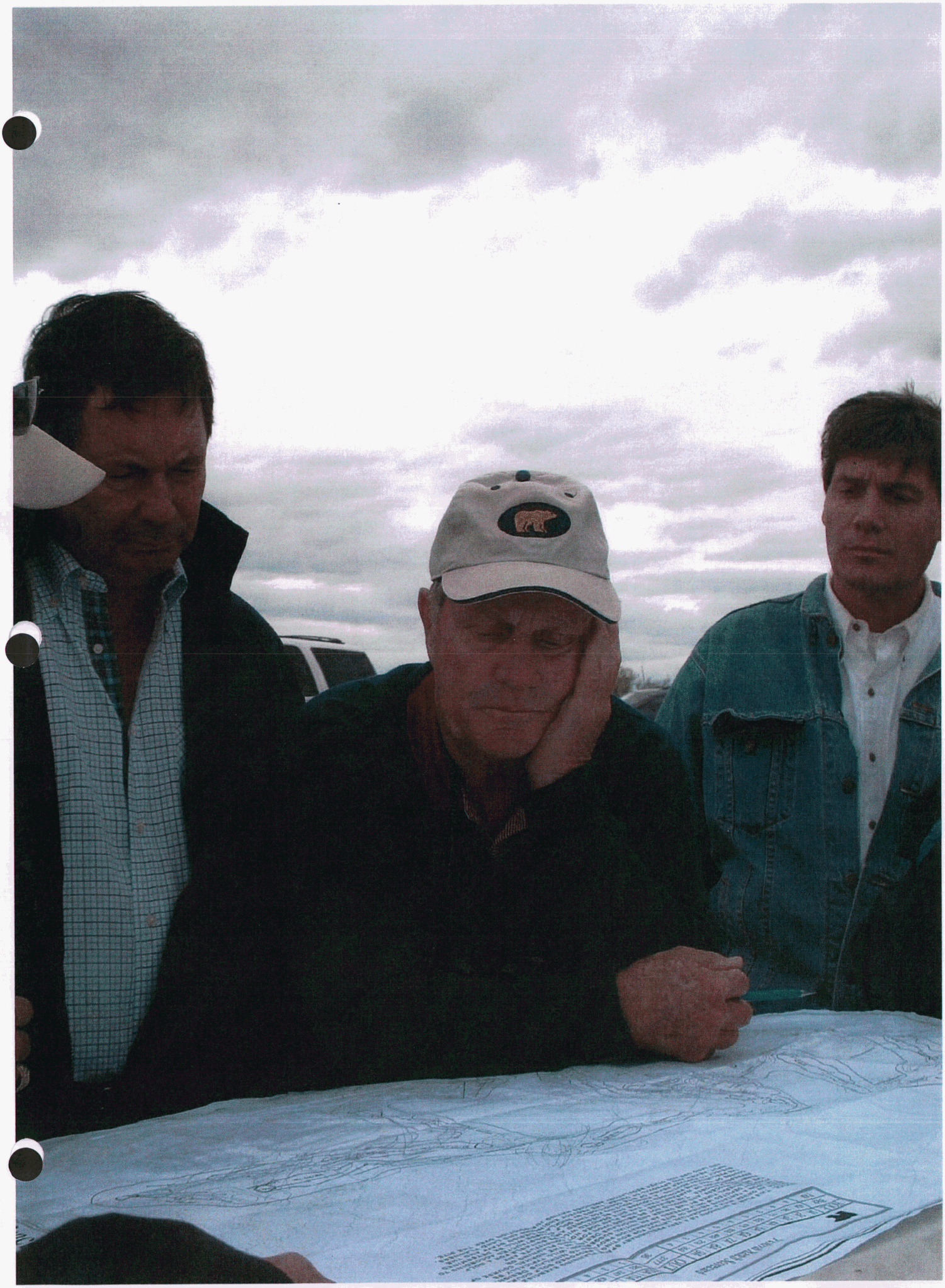
Following several months of public outreach, APS filed an application for a Certificate of Environmental Compatibility with the Arizona Corporation Commission. [*Id.* at ¶ 3.] The Corporation Commission approved the location of the Sun Valley substation and West Valley North Project transmission line following an extensive siting process conducted in 2005. [*Id.*] Defendant intervened in the Corporation Commission's siting proceeding, and was represented by counsel. [*Id.* at ¶ 4.] APS' application for the West Valley North Project line sought approval for a right-of-way easement of up to 150 feet in width. [*Id.* at ¶ 5.] The Corporation Commission issued a final order on May 5, 2005. [*Id.* at ¶ 6.] That Order approved APS' application, set the location of the Sun Valley substation, and identified a corridor for the West Valley Project 230/69 kV transmission line. [*Id.*] Neither 10,000 West, nor any of the other parties that intervened in that case requested a rehearing or appealed the Corporation Commission's Final Order under Ariz. Rev. Stat. §§ 40-253 & 254.

The remaining portion of the 300-foot right-of-way will accommodate a 500/230 kV transmission line known as the TS5 to TS9 Project. [*Id.* at ¶ 7.] That line, which will connect the Sun Valley Substation with another substation near Lake Pleasant in Peoria, is part of APS' plan to improve reliability and transfer capacity in the system. [*Id.* at ¶ 8.] APS has conducted several months of public outreach in connection with the TS5 to TS9 Project and recently filed an application for a Certificate of Environmental Compatibility with the Corporation Commission. [*Id.* at ¶ 12.] Hearings relating to APS' application are under way. Defendant has also intervened in that administrative matter. [*Id.*]

I. THE WEST VALLEY NORTH AND TS5 TO TS9 PROJECTS AT ISSUE IN THIS CASE ARE APPROPRIATE PUBLIC USES FOR WHICH DEFENDANT'S PROPERTY IS NECESSARY

A. The Corporation Commission's Certificate of Environmental Compatibility Conclusively Establishes APS' Right to Acquire the Easement.

10-W15



10-W16

TransWest Express and Gateway South

Co-developed by four leading entities:

Arizona Public Service
PacifiCorp
National Grid
Wyoming Infrastructure Authority

Regional Stakeholder Meeting
November 7, 2007
Cheyenne, Wyoming

APS

PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

nationalgrid

WYOMING INFRASTRUCTURE AUTHORITY

Standards of Conduct Non-Disclosure Statement

The following procedures have been implemented to provide Standards of Conduct Safeguards:

- Ten day advance notice of public meeting
- All eligible customers invited
- Telephone participation provided
- Handouts posted on OASIS prior to meeting
- Meeting notes will be taken and posted
- One eligible customer must be in attendance
- Meetings no more than twice per month

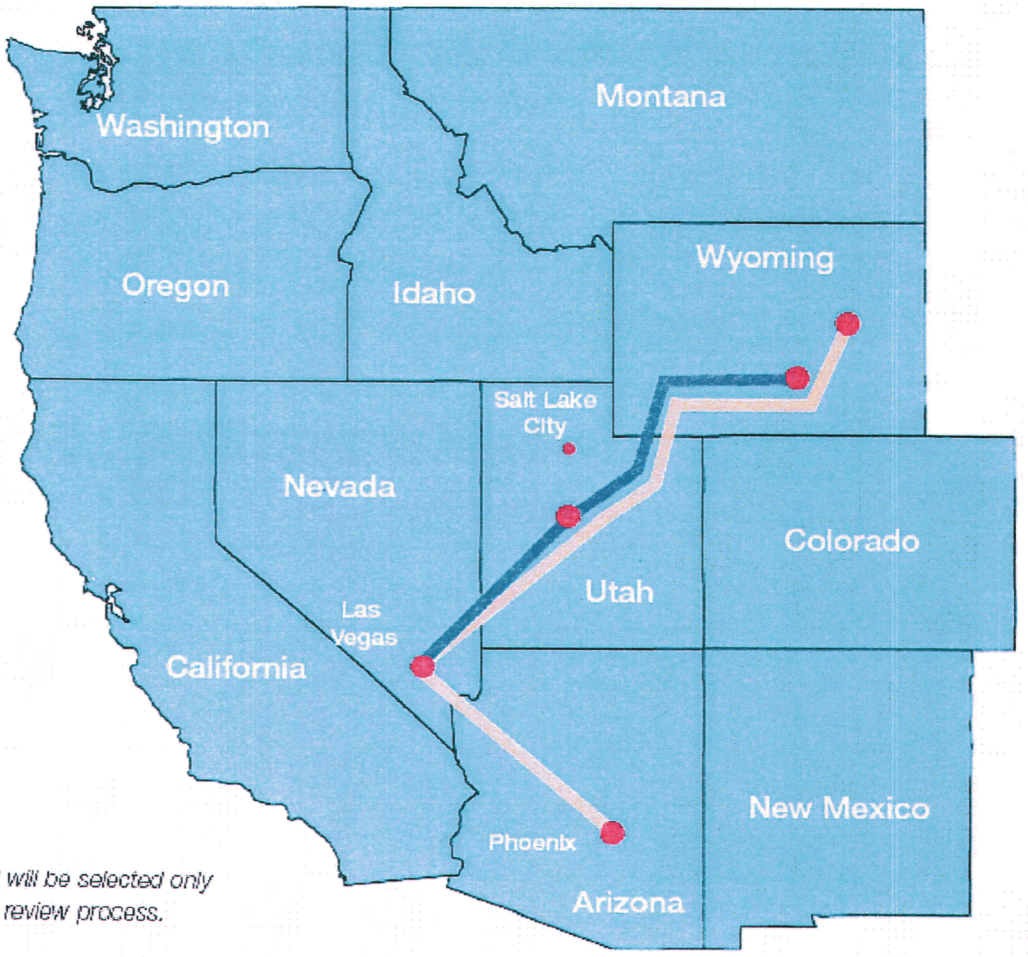
Our agenda for today…

1. **Welcome** – Loyd Drain
2. **Co-Development Partnership** – David Smith
   a. Overview of Partners
   b. Business Arrangements
   c. Benefits of Collaborating
3. **Overview of Projects**
   a. TransWest Express – Peter Krzykos
   b. Gateway South – Craig Quist
   c. Potential Co-Development Solutions – David Smith
   d. Transmission Study Loads and Resources
   e. Complementary Projects

   Lunch Break
4. **Stakeholder Forum**

Welcome and Introductions

APS, PacifiCorp, National Grid, and the WIA in accordance with the WECC Regional Planning Review Process, the NTTG and SWAT planning processes, and FERC Order 890, request stakeholder feedback on the TransWest Express and Gateway South projects



Projects

Gateway South

TransWest Express

Routes shown are for illustration only and will be selected only following a comprehensive environmental review process.

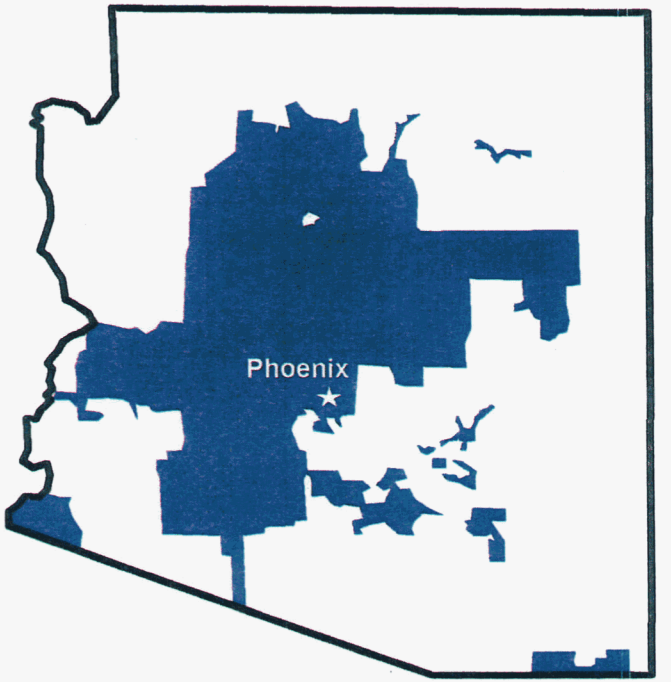
About Arizona Public Service

Regions Served

- 11 of 15 counties within Arizona
- Fastest growing state at 3.5%
- 3 times the U.S. average

APS

- Largest electric utility in Arizona
- Growth 4 times the U.S. average
- More than 1 million customers
- 6,600+ employees
- $1B 10-year Transmission Plan



About PacifiCorp

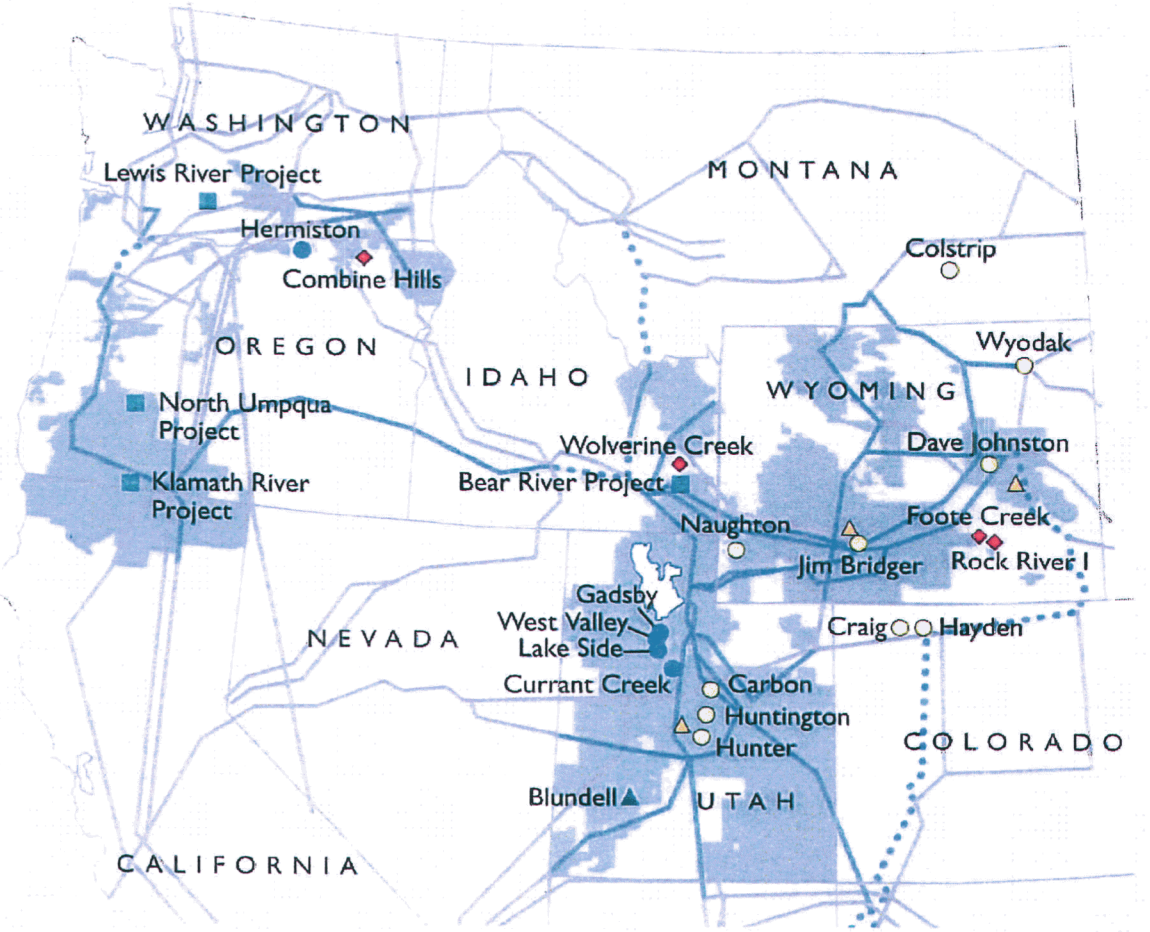
PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

Regions Served

- Oregon, Washington and California (Pacific Power)
- Utah, Wyoming and Idaho (Rocky Mountain Power)

PacifiCorp

- 15,000 miles transmission
- 1.7 million customers
- 6,600+ employees
- 9,062 MW of generation



About National Grid

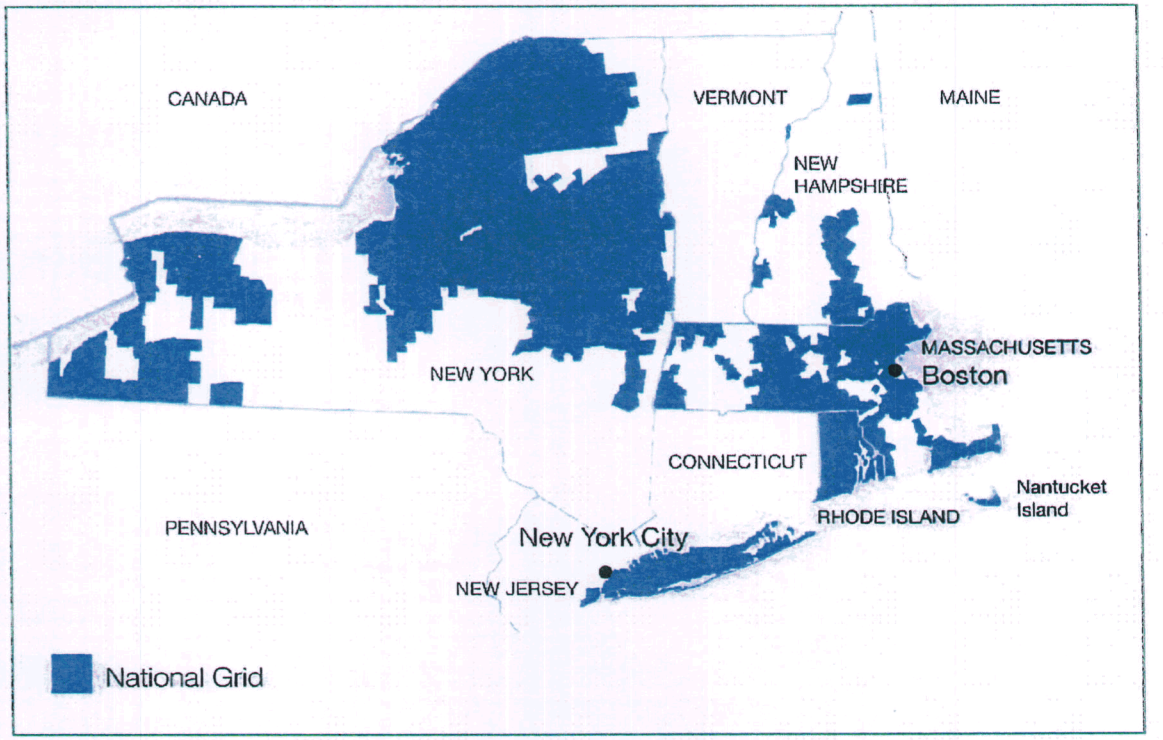
nationalgrid

Regions Served

- Northeast US
- All of UK

National Grid

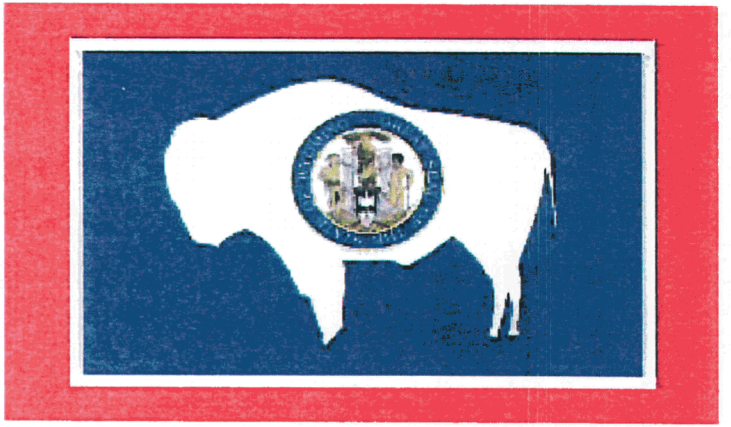
- Transmission Operator and System Operator in U.K.
- > 4 million electric customers in US
- > 20,000 employees
- > 2,000 electric transmission staff
- Capital investment of ~$4.5B per year



About Wyoming

Wyoming

- Largest energy exporting state in US
  - Largest producer of coal
  - Largest producer of uranium
  - Second largest producer of natural gas
- Estimated 3.4GW of > Class 6 wind and over 14GW of developable wind
- Governor Freudenthal chair of the Western Governors Association



Wyoming Infrastructure Authority

- Formed in 2004
- Mission to diversify and expand the state's economy through improvements in electric transmission infrastructure
- Authority to issue bonds to finance transmission facilities

Co-Development Agreement

Purpose

- Governance arrangements with a common steering committee
- National Grid as lead developer, responsible for deploying the project team
- Allows initial development steps to be taken while more complex technical and regulatory issues considered

Agreement

- Executed August 2007
- $3m budget; costs shared by parties
- Longer term business agreements targeted for 2008 if parties agree this makes sense

What is Co-Development?

Activities undertaken jointly

- Common project team implementation strategy and deployment
- Coordinated review of requests from 3rd party users
- More efficient regional planning and rating review processes
- Coordinate permitting
- Stakeholder and public outreach

Each project to maintain a degree of independence

Activities undertaken separately

- ROW filings - purpose and need case, approvals
- WECC Rating Process
- Regulatory filings, approvals
- Financing
- Construction (separate commissioning dates)

Meeting Regional Needs

- **Consistent with WGA, RMATS, and CDEAC recommendations for transmission expansion**

- **Improve overall electric reliability for the West**
  - Reinforces east side of Western Interconnection
  - Adds import capability into the Desert Southwest
  - Wasatch Front reinforced from North and South
  - AC and DC combination

- **Provides increased access for 3rd party transmission users**

- **Improves regional resource diversity, reliability and economics**
  - Access to renewables (primarily wind)
  - Enhance wholesale market vitality

Benefits of Co-Development

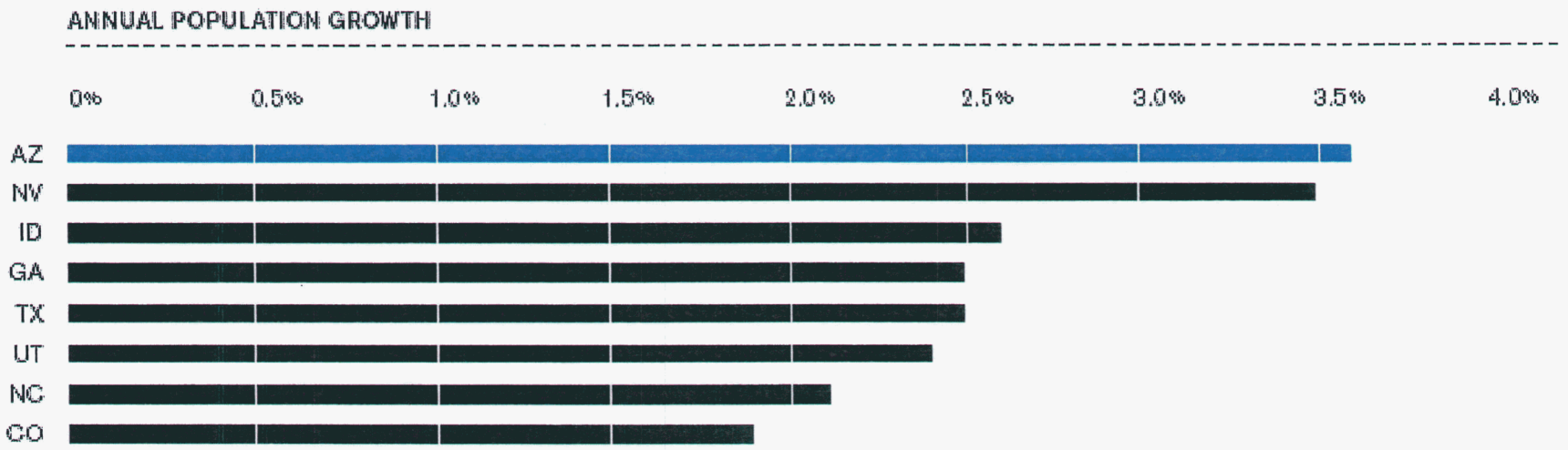
- Meet regional needs
- Better use of transmission corridors
- Opportunities to coordinate permitting
- Economies of scale and cost savings in the development and construction activities

TransWest Express
Need for the Project

APS Customers and Demand Continue to Grow

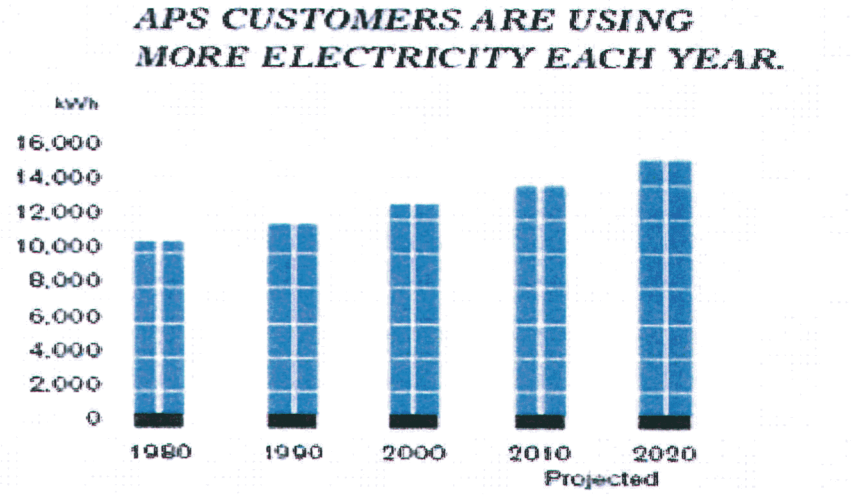
ARIZONA IS THE FASTEST GROWING STATE IN THE COUNTRY.

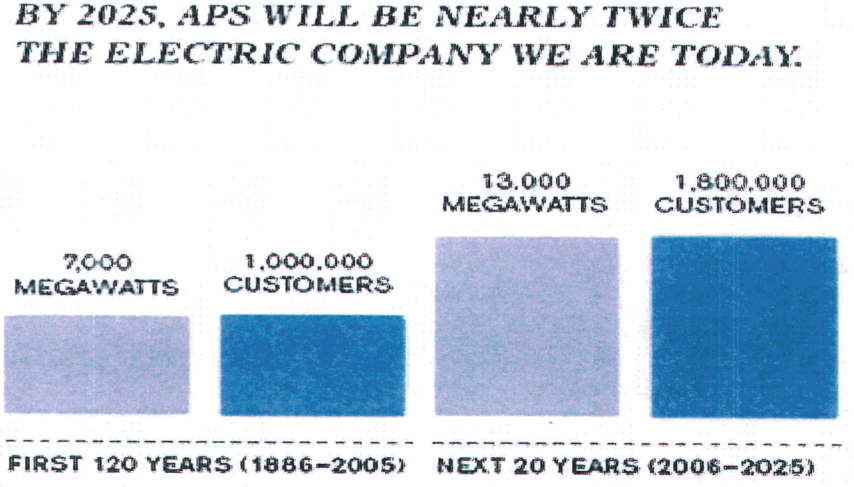
Source: Population Division, U.S. Census Bureau



TransWest Express – Need for the Project

- APS' summer resource capacity requirement expected to increase 8000MW by 2025
- APS' annual energy sales expected to increase by 70% by 2025
- Other Arizona utilities are growing at comparable rates
- Arizona RPS requires 15% of retail energy sales from renewable resources by 2025
- TransWest Express is viewed as a viable alternative to local resource development





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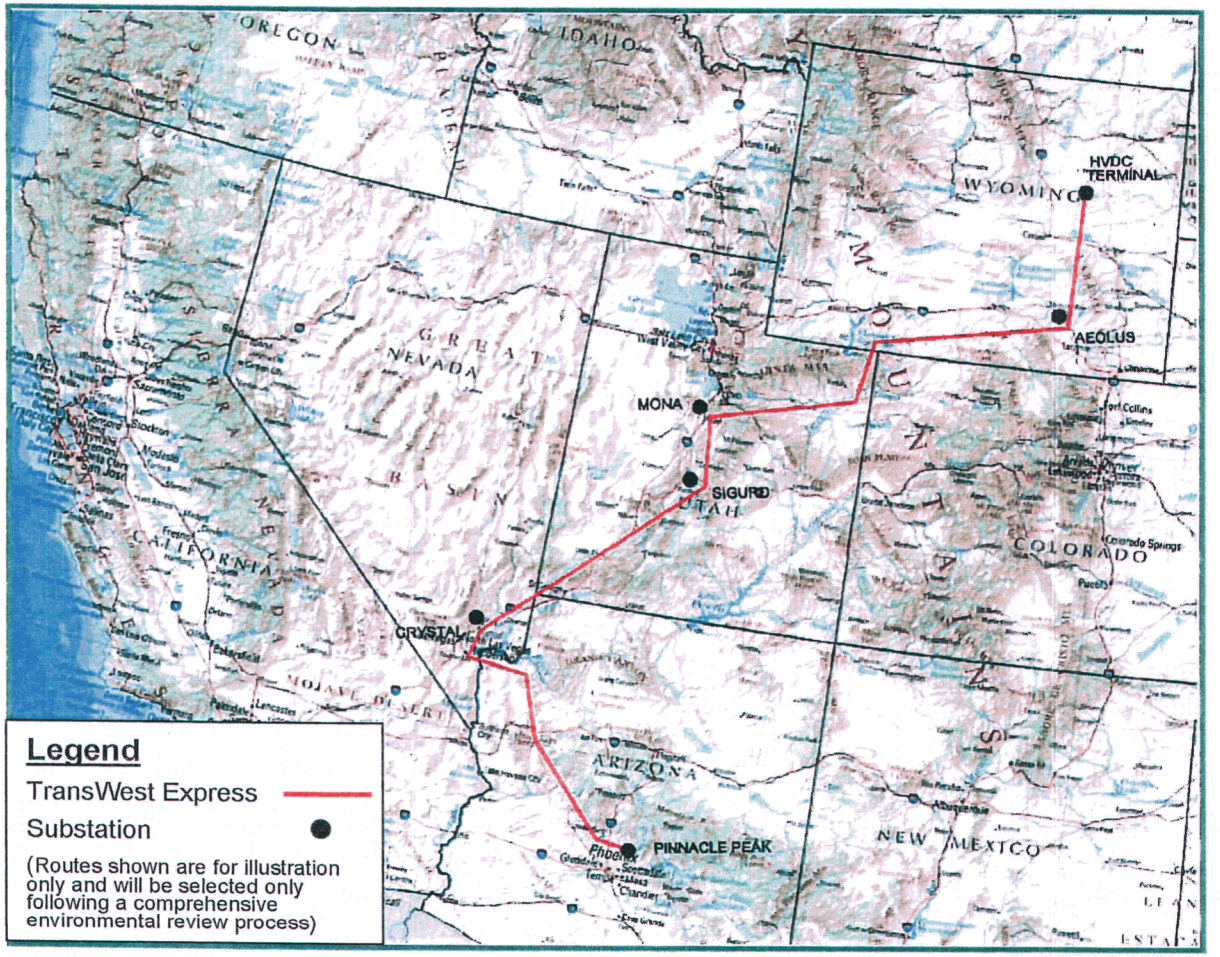
TransWest Express Stakeholder Input

- **Open stakeholder process**
  - November 2005 kick-off meeting - Phoenix
  - March 2006 project update meeting – Salt Lake City
  - June 2006 project update meeting - Jackson
- **Periodic project updates**
  - Sub-regional Planning Groups
  - SSG-WI
  - WECC
- **Completed Feasibility Study in December 2006**
  - Analyzed - 5 route options, 500 & 765 kV AC, 500 kV DC
  - Economic analysis supports DC or AC/DC hybrid alternatives
  - Cost $2.3B – $3.2B

TransWest Express Reference Case

- 3,000 MW
- 500kV bi-pole HVDC
- 2015 in-service date
- Route to preserve option of Las Vegas area terminal



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TransWest Express
Parties Expressing Interest

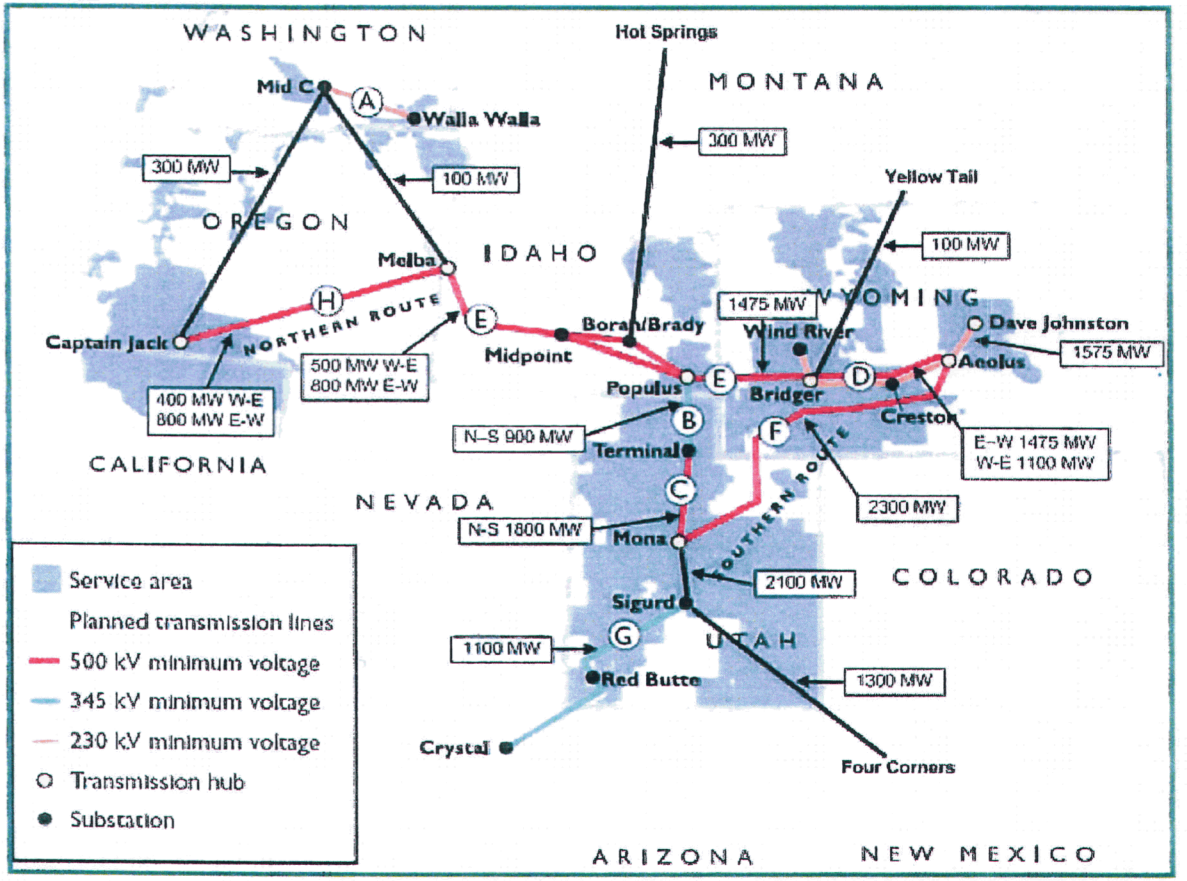
- Salt River Project, Tucson Electric Power and Southern California Edison expressed interest in participation
- National Grid, as Development Manager, and WIA joined Project Team
- PacifiCorp expressed interest in exploring co-development of TWE and Gateway South
- All parties remain interested in participation and support the work being conducted under the Co-Development Agreement

Gateway South
Need for the Project

- Wasatch Front annual peak load to increase 2500MW by 2022
- Southern Utah annual peak load to increase by 500MW by 2022*
- PacifiCorp IRP targets 8.5% renewables by 2016
- Over 5000MW in point to point Transmission Service Requests

*including Transmission Network Service customers

Third Party Point to Point Requests on PacifiCorp System



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Gateway South
Stakeholder Input

- **PacifiCorp Integrated Resource Plan**
  - Eight public meetings between December 2005 and April 2007 held in Salt Lake City, Cheyenne, and Portland

- **Northern Tier Transmission Group**
  - Three stakeholder meetings since May 2007 and ongoing to develop NTTG Sub-Regional Transmission Plan

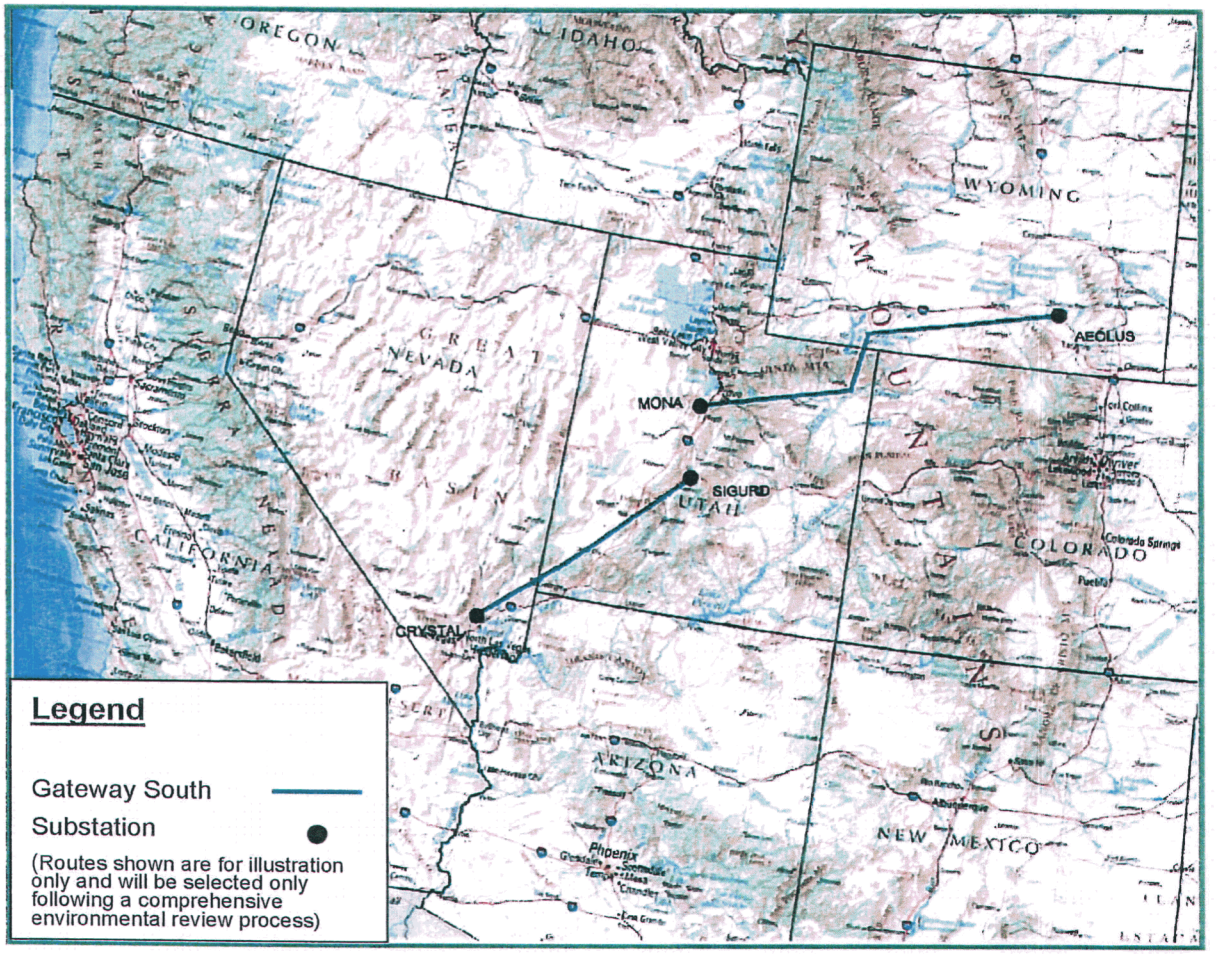
Gateway South Reference Case

Wyoming - Utah

- 3,000 MW
- 2 - 500kV AC
- 2014 in-service date

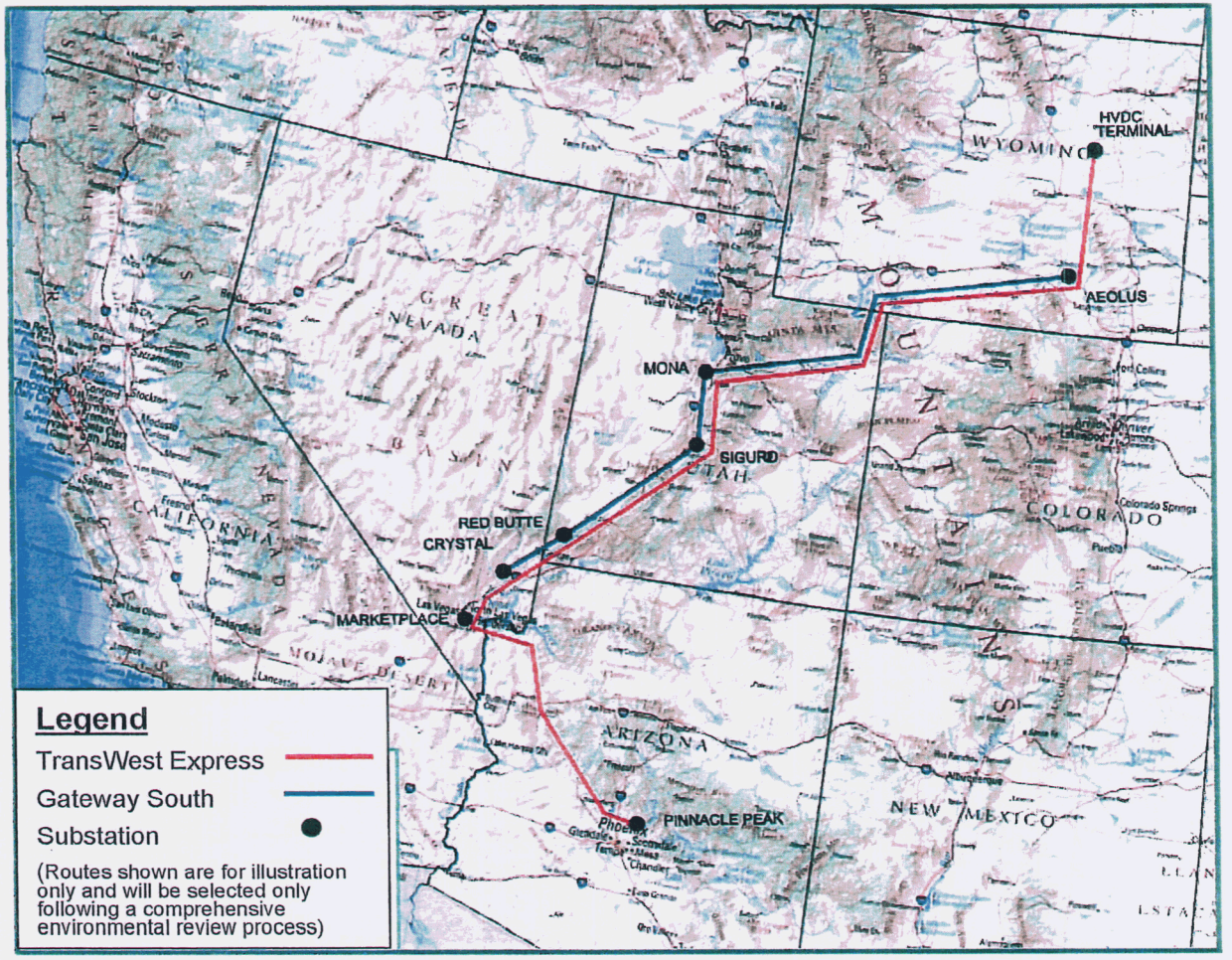
Utah - Nevada

- 800 - 1500 MW
- 345 kV or 500 kV AC
- 2014 in-service Date



TransWest Express and Gateway South Potential Design Solutions

- Size of combined projects dependent on regional and customer needs
- Capacity options are under review from 4,500 to 7,500 MW export from WY
- DC circuit options include 3rd terminal or termination in southern Nevada



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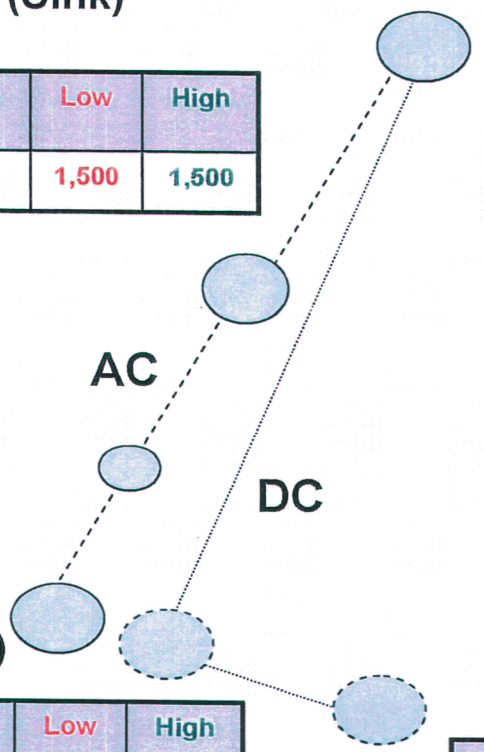
Gateway South and TransWest Express Projects - Needs Assumptions (MW)

Central Utah (Sink)

Gateway South	TransWest Express	Reference	Low	High
1,500 – 3,000	0	1,500	1,500	1,500

Wyoming (Source)

Gateway South	TransWest Express	Reference	Low	High
3,000	3,000	6,000	4,500	7,500



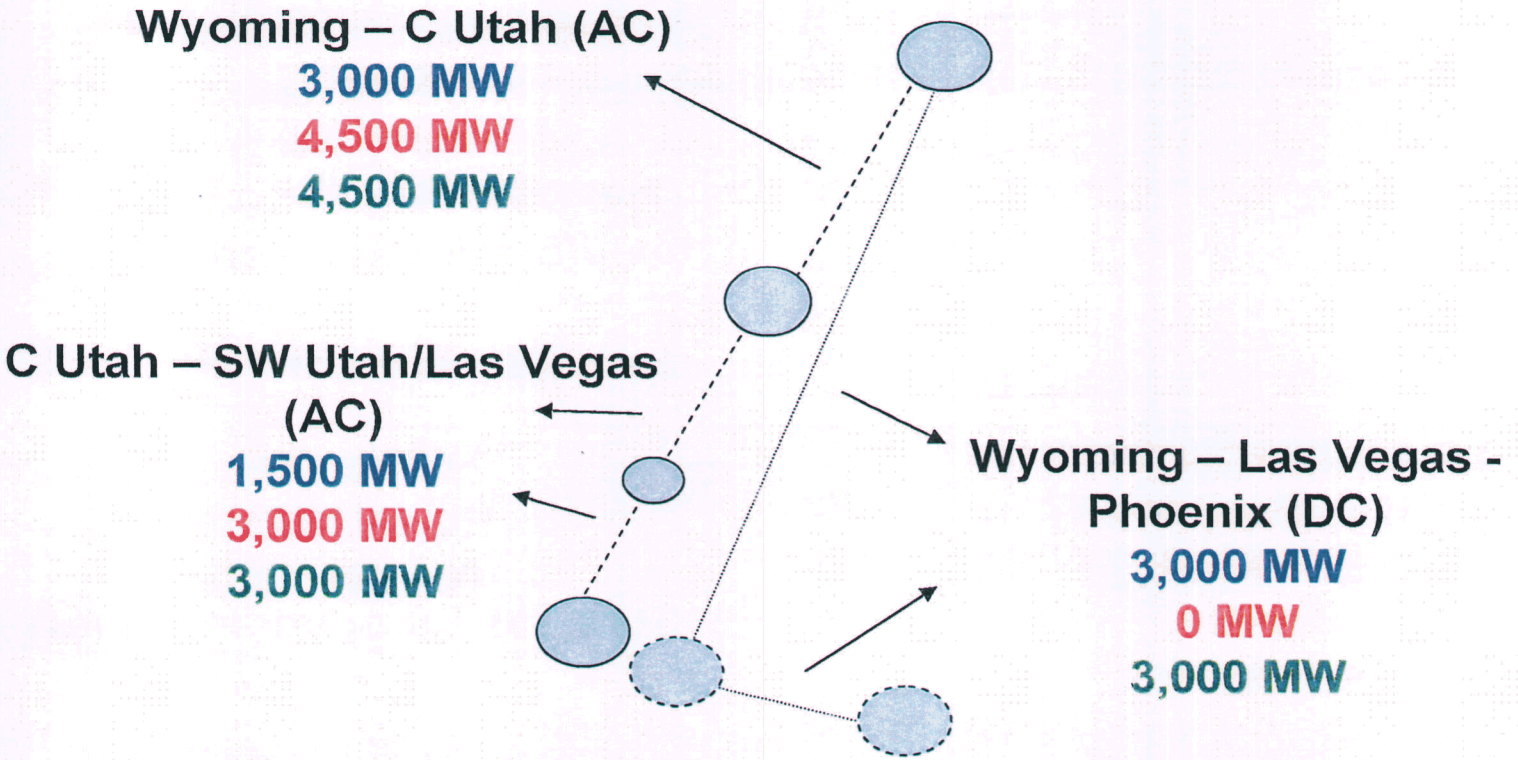
SW Utah/Las Vegas (Sink)

Gateway South	TransWest Express	Reference	Low	High
0 – 1,500	0	1,500	3,000	3,000
Las Vegas Terminal	Options	1,500-4500	3,000	6,000

Phoenix (Sink)

Gateway South	TransWest Express	Reference	Low	High
0	3,000	3,000	0	3,000
Las Vegas Terminal	Options	0-3000	0	0-3000

Potential Design Solutions



Key

Reference Case | Lower Case | Upper Case

Gateway and TransWest Express Transmission Study Loads & Resources

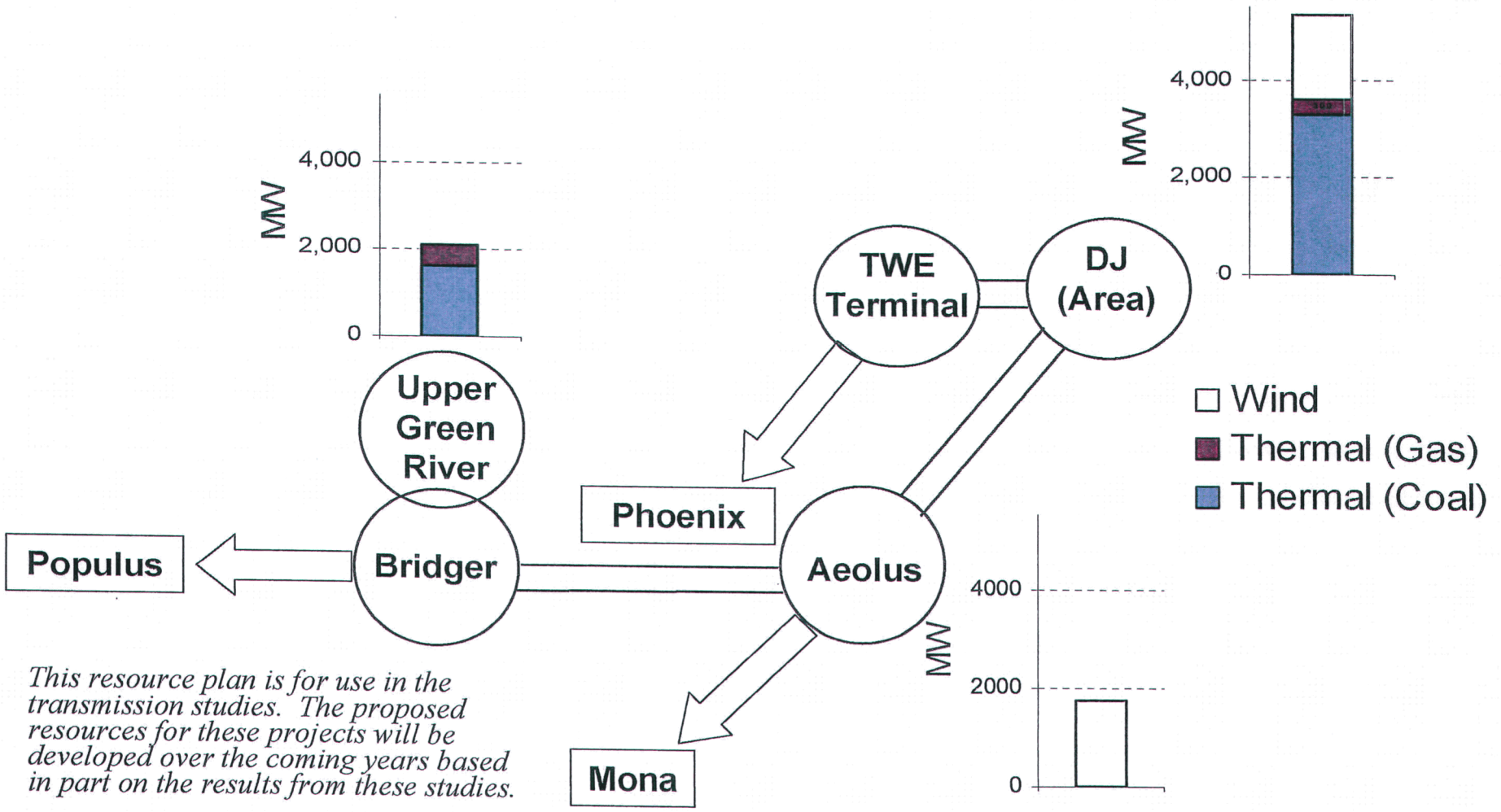
- **Transmission Study Loads**
  - WECC 2015 High Summer Case
  - Reduce Las Vegas and western Arizona generation to stress paths
- **Transmission Study Resources**
  - These are not the proposed resources for the projects
  - Developed (partially) from Integrated Resource Plans
  - Includes renewable resources above existing RPS levels
  - Wind resource level sufficient to test impacts of non-synchronous generation
- **Actual Resource Development for Projects**
  - Will be responsive to energy policies currently under review by utilities, regulators and other stakeholders
  - Specific economic and technology evaluations and siting/permitting processes also need to run their course

Gateway and TransWest Express Transmission Study Wyoming Resource Plan

Project	Resource Type	Jim Bridger	Upper Green River	Aeolus	Dave Johnston	Total
Gateway	Coal	1,600			1,800	3,400
	Wind			1,100	1,100	2,200
	Natural Gas		500			500
	Total	1,600	500	1,100	2,900	6,100
TransWest Express	Coal				1,500	1,500
	Wind			650	650	1,300
	Natural Gas				300	300
	Total			650	2,450	3,100
Wyoming Total	Coal	1,600			3,300	4,900
	Wind			1,750	1,750	3,500
	Natural Gas		500		300	800
	Total	1,600	500	1,750	5, 050	9,200

This resource plan is for use in the transmission studies. The proposed resources for these projects will be developed over the coming years based in part on the results from these studies.

Gateway and TransWest Express Transmission Study Resource Bubble Diagram



This resource plan is for use in the transmission studies. The proposed resources for these projects will be developed over the coming years based in part on the results from these studies.

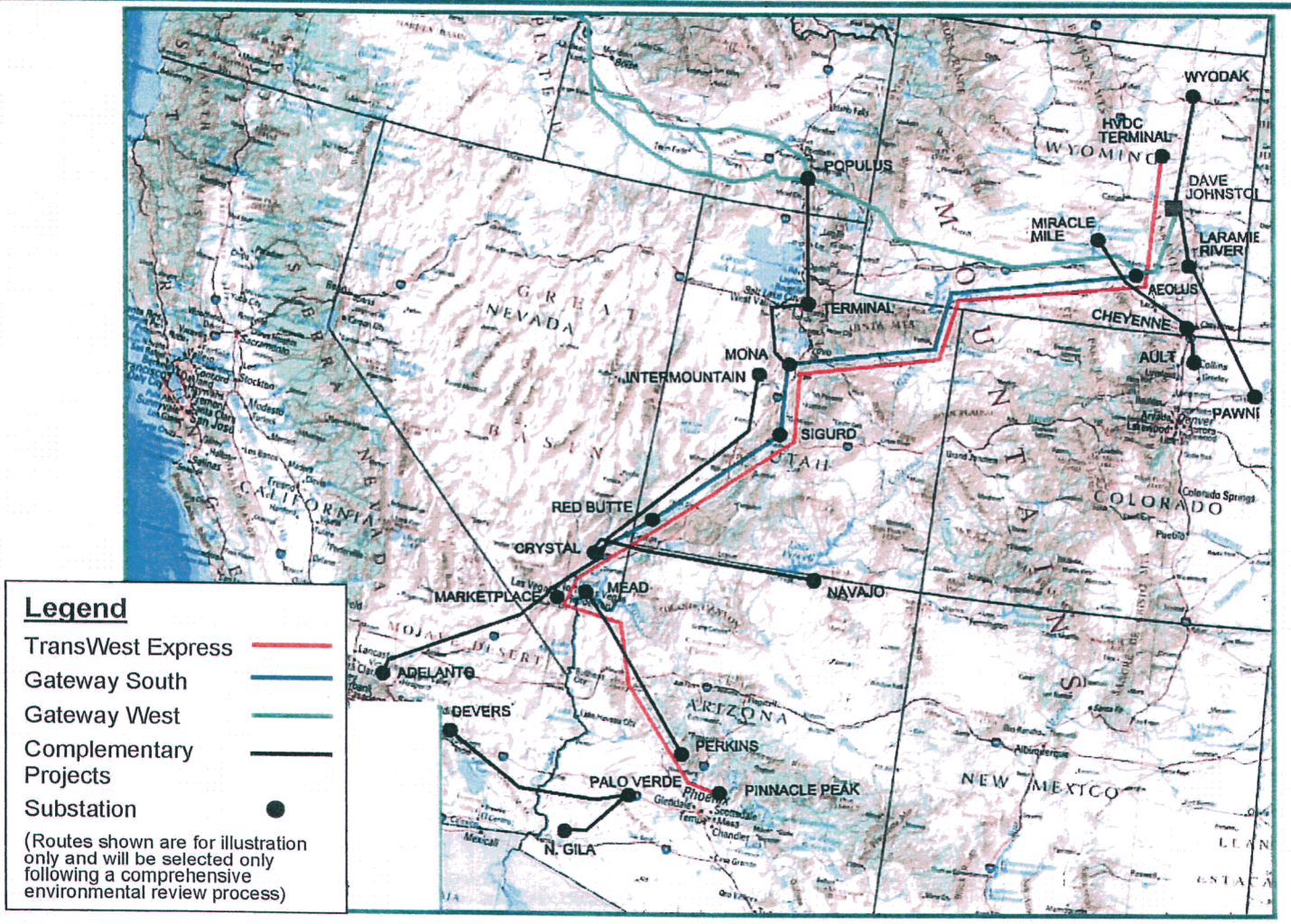
TransWest Express and Gateway South Complementary Projects

- Palo Verde - Devers #2 - 500kV line
- EOR 9300 Project
- Palo Verde - North Gila #2 - 500kV line

- Gateway West – 2-500kV line
- Mona – Terminal – 2-500kV line
- Populus – Terminal – 2-345kV line
- Path 27 (IPP HVDC Inter-tie) Upgrade

- Miracle Mile – Ault – 230 kV line
- Donkey Creek – Dave Johnston – 230 kV line
- Wyoming – Colorado Inter-tie – 345 kV line

TransWest Express and Gateway South Complementary Projects



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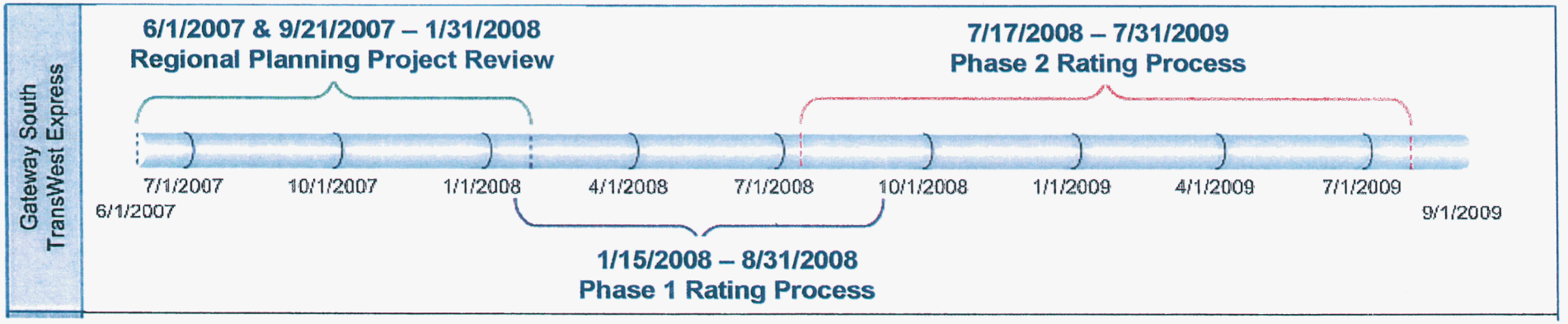
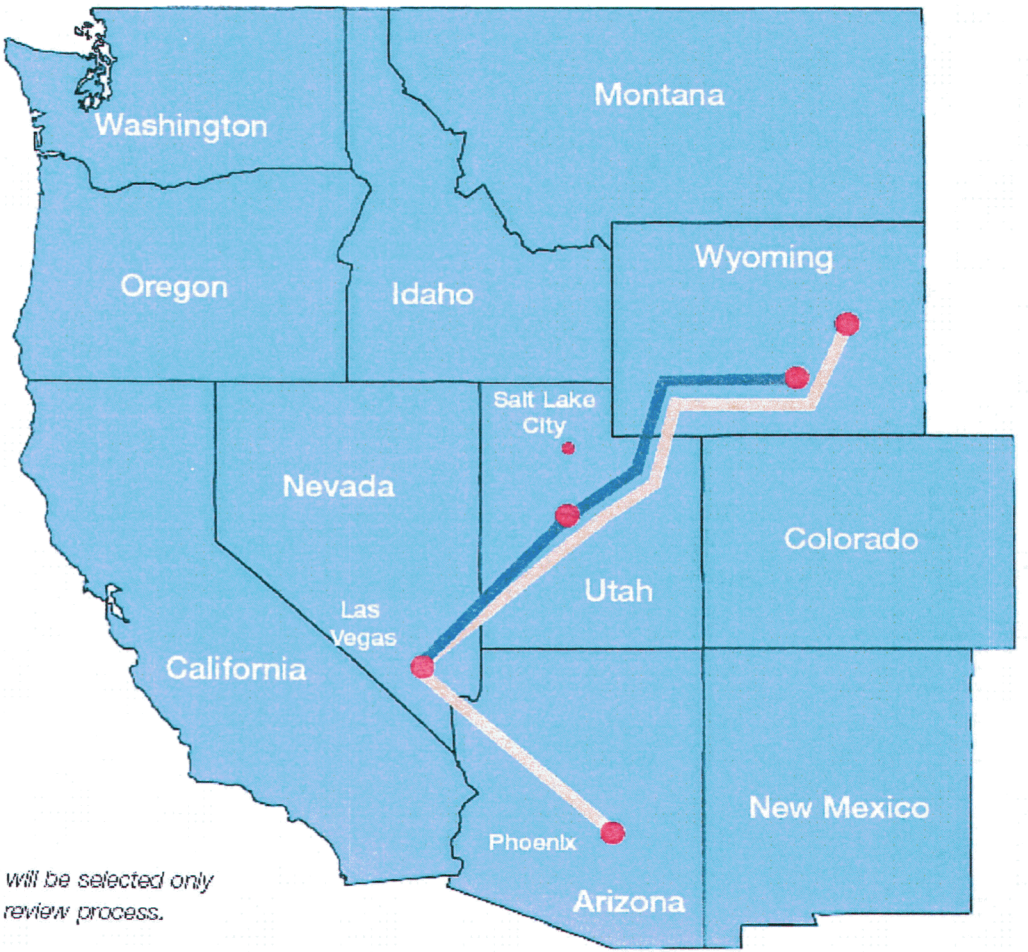
WECC Review Timeline for Projects

- **Regional Planning Project Review Stakeholder Meetings**
  - Salt Lake City – October 17, 2007
  - Cheyenne - November 7, 2007
  - Phoenix - December 5, 2007



Stakeholder Forum



Projects

Gateway South

TransWest Express

Routes shown are for illustration only and will be selected only following a comprehensive environmental review process.

APS • National Grid • PacifiCorp • Wyoming Infrastructure Authority

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10-W17

Interstate 10 – Hassayampa Valley Roadway Framework Study

Chapter 2

Future Land Use, Development and Environmental Conditions

September 2007

Prepared for

MARICOPA ASSOCIATION of GOVERNMENTS

Prepared by

DMJM HARRIS AECOM

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2.1 Introduction

This report presents an inventory and analysis of land use issues and related findings of studies that are pertinent to the development of the Interstate 10-Hassayampa Valley Roadway Framework Study (the "Hassayampa Study"). Previous and current planning studies were gathered from the municipalities and agencies coordinating the studies.

The project area extends from approximately SR-74 on the north to the Gila River on the south and from 459th Avenue on the west to SR-303L on the east, covering an area of roughly 1,430 square miles (Figures 2-1 and 2-2).

Figure 2-3 depicts the boundaries of all the jurisdictions and their municipal planning areas (MPA) within the study area, as well as generalized land ownership. An MPA is defined as the geographic area in which the jurisdictional planning process must be carried out. It includes, but is not necessarily limited to, the incorporated territory of the city or town. Four municipalities have planning authority over their incorporated areas: the Town of Buckeye, City of Surprise, City of Goodyear, and City of Glendale, with Maricopa County having planning and zoning authority over the unincorporated areas. Within these unincorporated areas, the county has planning authority over privately owned land as well as land owned by the Arizona State Land Department (ASLD). Approximately one-third of the study area is not under any local planning jurisdiction, but under control of the federal Bureau of Land Management (BLM).

Much of the BLM land is located west of the Buckeye MPA. BLM-designated lands are under an extra layer of federal protection, meaning that any transportation infrastructure planned for this area will have to go through an added level of review. Much of the eastern half of the study area is in the planning areas of Buckeye, Surprise, Goodyear, and Glendale. Transportation infrastructure planned for an MPA should be compatible with the city's or town's land use and transportation plans.

2.2 Study Area Land Use Issues

This section presents an inventory of land use issues and implications that are pertinent to the development of this Study. The inventory resulted in a series of detailed maps that have been included in this chapter, along with descriptive text, under the following categories:

- Population and Employment
- Revised Buildout Study Area Socioeconomic Forecasts and East Valley Comparison
- Environmental Context
- Existing Land Use
- Future Land Use
- Public Land Management
- Master-Planned Communities

2.2.1 Population and Employment

Population and employment statistics from the 2003 MAG publication, "Interim Projections of Population, Housing, and Employment by Municipal Planning Area and Regional Analysis Zone" show the study area to have 30,076 dwelling units and 34,411 jobs in the year 2000. Current MAG projections show these numbers increasing to 394,000 dwelling units and 388,000 jobs in the year 2030.

Figure 2-1 Study Area

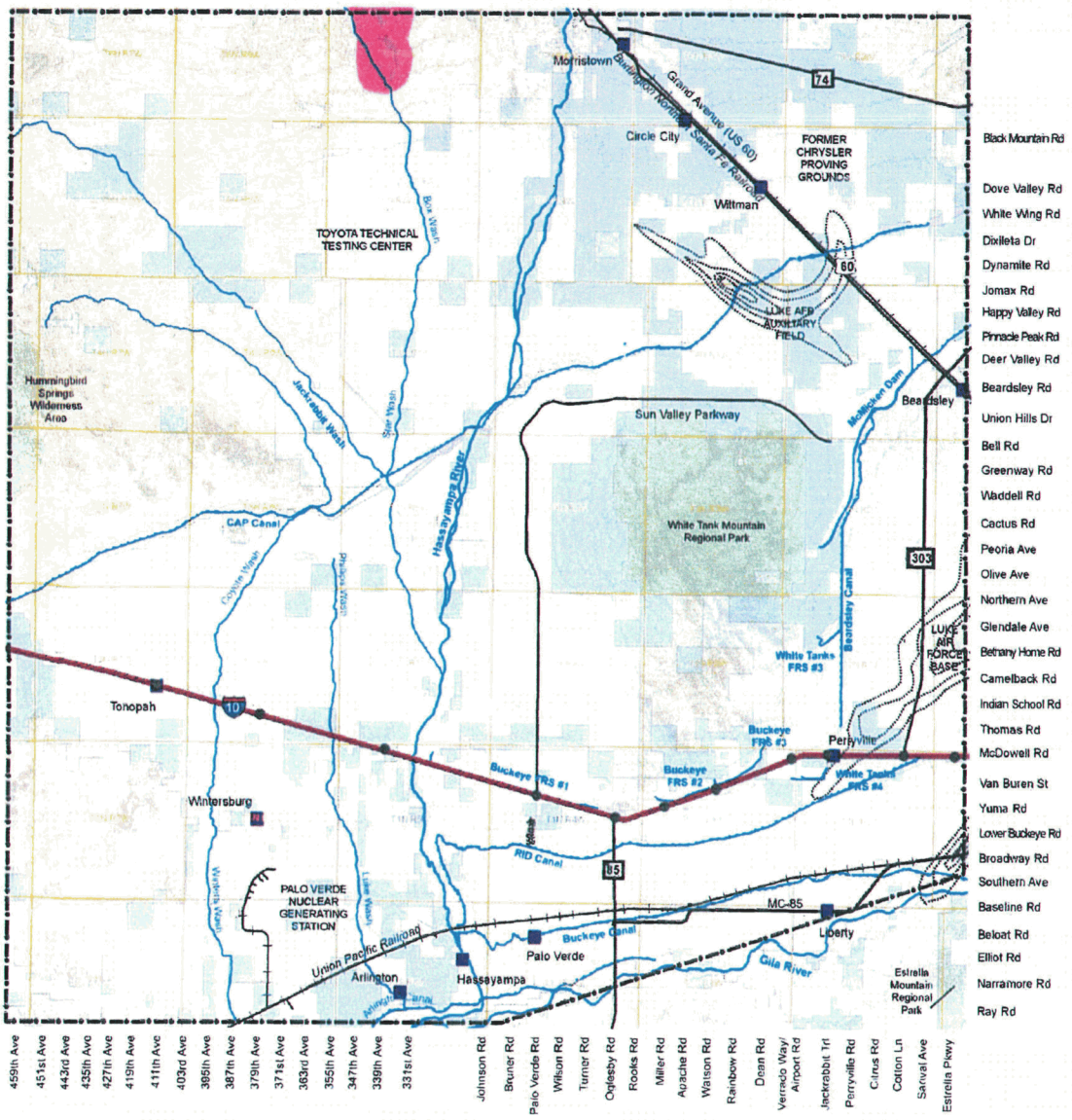
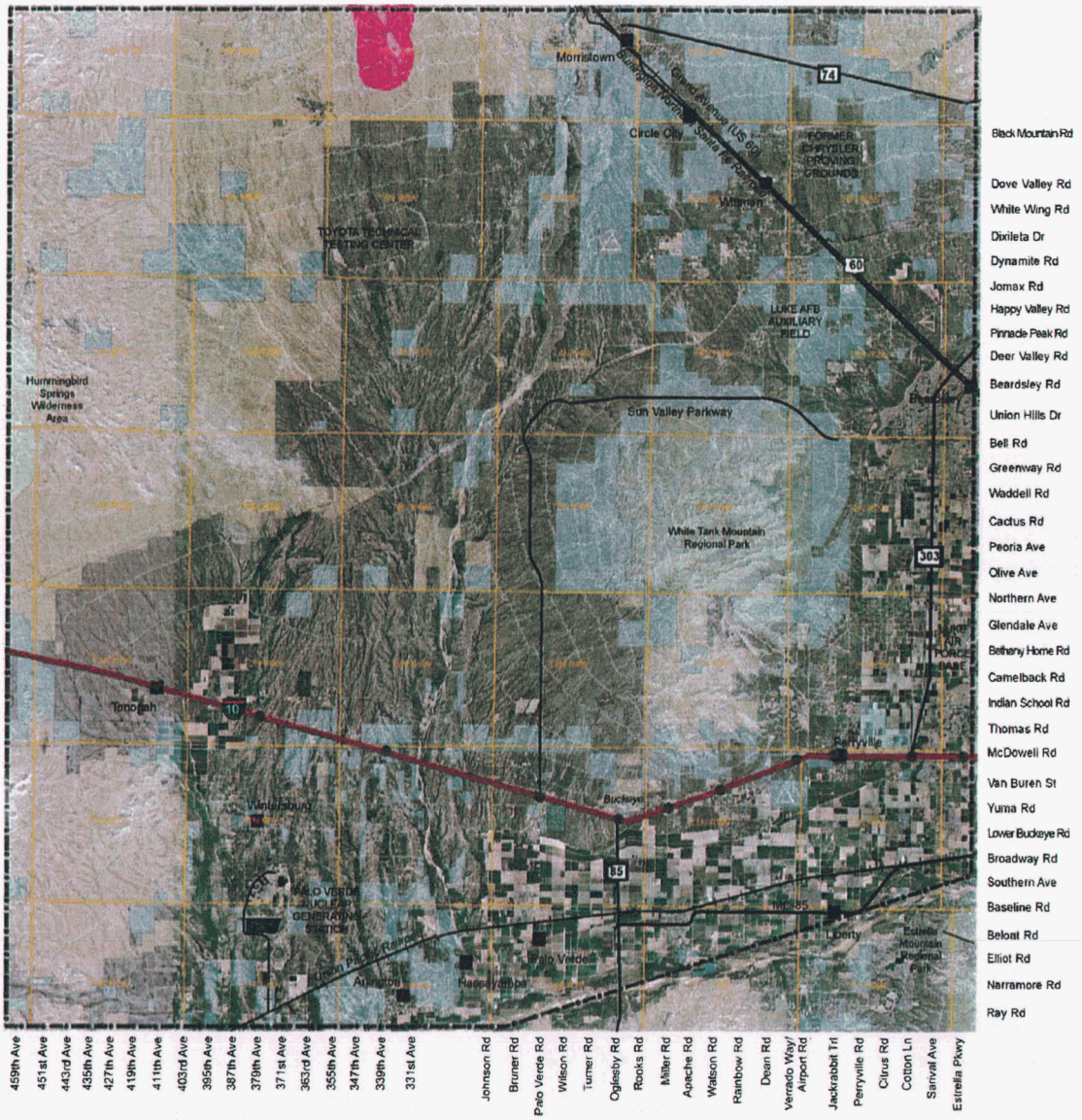


Figure 2-2 Study Area with Aerial Base



STUDY AREA WITH AERIAL BASE

Legend

- Railroads
- Roads
- Highways
- Freeways
- Township/Range
- Towns
- Existing Traffic Interchanges
- Topography (100' contours)
- BLM Raptor Protection Area
- Study Area Boundary

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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2-2

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Interstate 10/Hassayampa Valley Roadway Framework Study

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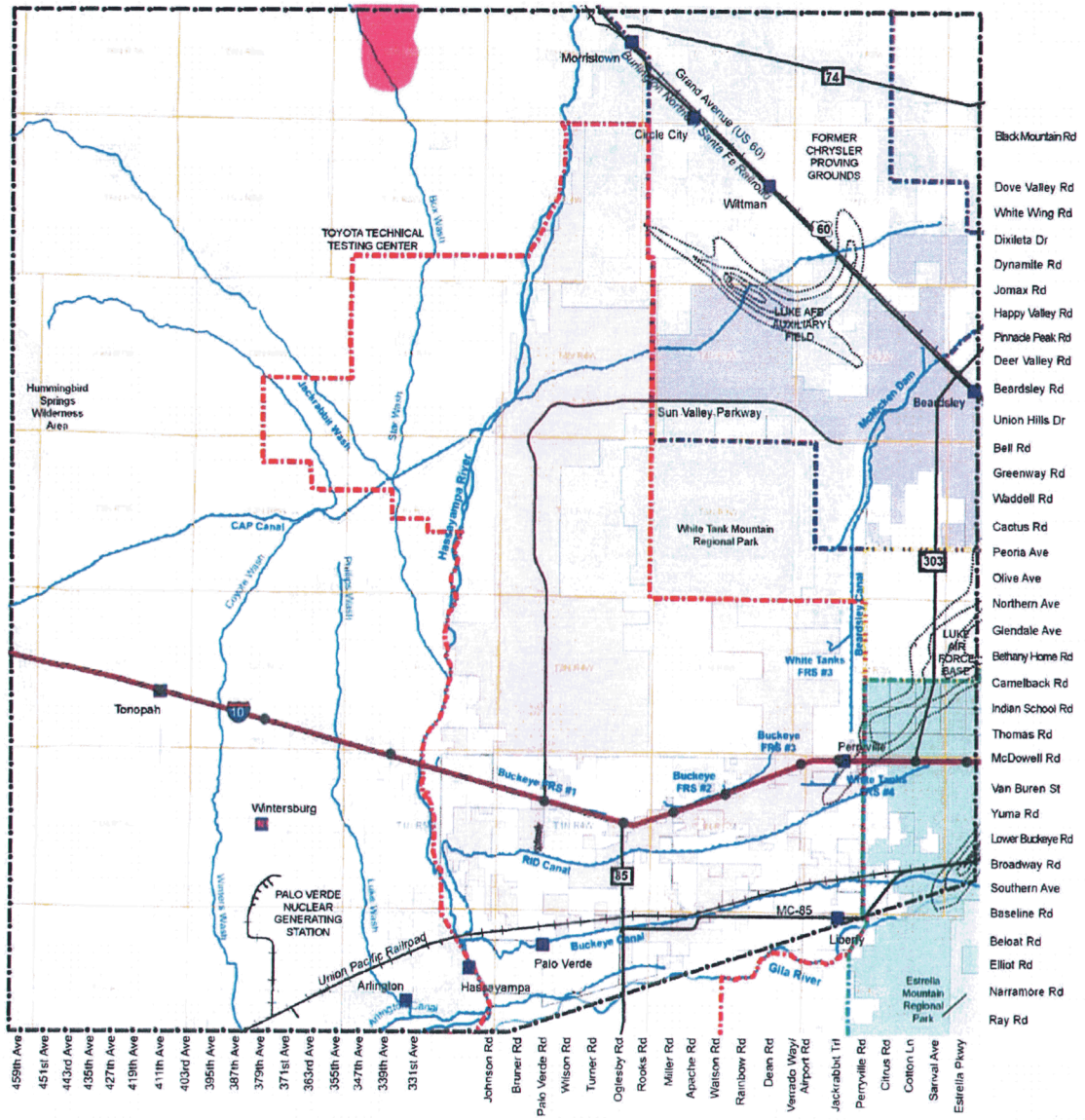
AUGUST 30, 2006

Figure 2-3 Jurisdictions and Planning Areas



JURISDICTIONS AND PLANNING AREAS

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Township/Range
- Towns
- Existing Traffic Interchanges
- Noise Contours
- BLM Raptor Protection Area
- Study Area Boundary

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Jurisdictions
- Buckeye
- Goodyear
- Surprise

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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AUGUST 30, 2006

Figures 2-4 through 2-7 illustrate the year 2030 projections. Population densities will be highest within the city and town MPA boundaries, especially adjacent to high-capacity transportation corridors like I-10, US-60, SR-303L, SR-74, SR-85, and the Sun Valley Parkway. Densities are projected to remain low near the Luke Air Force Base Auxiliary Field, the White Tank Mountains, and west of the Town of Buckeye, where much of the land belongs to the BLM and is not available for residential development.

Year 2030 employment will be generally much more concentrated than housing, with employers located along transportation corridors such as I-10, US-60, SR-303L, and SR-85, as well as near the Luke Air Force Base Auxiliary Field and in scattered employment pockets in the Buckeye MPA. These pockets in the Buckeye area can be attributed to the high–density, mixed-use town center developments proposed in many master planned communities, such as Sun Valley South, Douglas Ranch, and (in unincorporated Maricopa County) Belmont. Again, densities will remain low in the BLM land west of the Buckeye MPA.

2.2.2 Revised Buildout Study Area Socioeconomic Forecasts and East Valley Comparison

As part of its update of the Regional Transportation Plan, MAG is preparing revised population and employment forecasts for the entire region. The first step in preparing these projections is to establish Buildout population and employment estimates. To support this study, MAG "fast–tracked" development of Buildout socioeconomic estimates for jurisdictions within the study area. The study is using Buildout population and employment forecasts to identify the transportation infrastructure needed to satisfy the region's long-range travel demand.

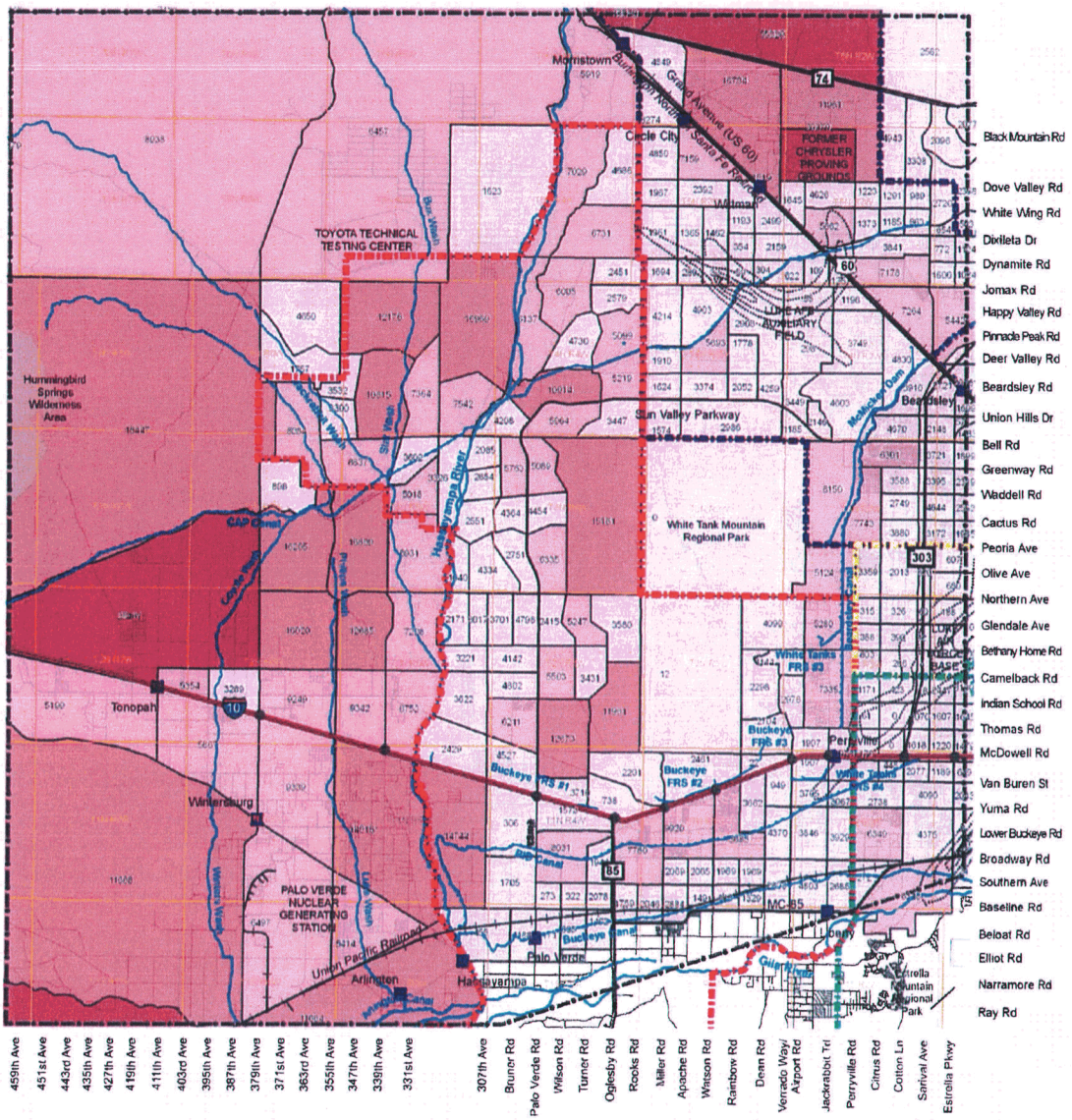
The Buildout analysis is based primarily on the current general and comprehensive plans of MAG member agencies: the Town of Buckeye, City of Surprise, City of Goodyear, City of Glendale, City of Peoria, and Maricopa County. These general plan estimates have been enhanced by information on current land use and development. State trust lands cover much of the study area. The ASLD works with the above jurisdictions to develop and agree on conceptual development plans that are reflected in each general plan.

MAG's analysis projects a Buildout population of 2.778 million people, with 1.047 million jobs (one job for every 2.65 residents) in the study area. To confirm that this Buildout dataset adequately accounts for expected future development, the study team performed a reasonableness check that compared the MAG Buildout land use projections for the study area with MAG year 2030 population projections for portions of the East Valley. The study team believes that the MAG year 2030 forecast for the East Valley area represents full Buildout of this portion of the MAG region. These projections for the East Valley can therefore be directly compared with the long-range Buildout forecast that MAG recently developed for the Hassayampa study area.

The purpose of this socioeconomic data comparison is to confirm that the recently developed general plan Buildout dataset will generate reasonable long-range travel demand forecasts for the study area. This land use comparison provides a point of reference between the Hassayampa study area and a portion of the MAG region under Buildout conditions, as represented by the MAG 2030 projections for the East Valley.

Within the Phoenix metropolitan area, the East Valley communities of Chandler, Gilbert, Guadalupe, Mesa, Queen Creek and Tempe are mature or maturing cities that are already approaching Buildout or expect to reach it in the near- to mid-term. At Buildout, the Hassayampa study area land use intensity is expected to be similar to what is seen now (2006) in these East Valley cities and towns.

Figure 2-4 Build Out Total Population



BUILD OUT TOTAL POPULATION (SAZ*)

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- xxx Total Dwelling Units
- Existing Traffic Interchanges
- Study Area Boundary

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Total Population (dwelling units)
- 0 - 5,000
- 5,001 - 10,000
- 10,001 - 20,000
- 20,001 - 60,000
- 60,001 - 110,000

Notes to Figure X:
*SAZ = Socioeconomic Analysis Zone

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SEPTEMBER 29, 2006

Figure 2-5 Build Out Population Density

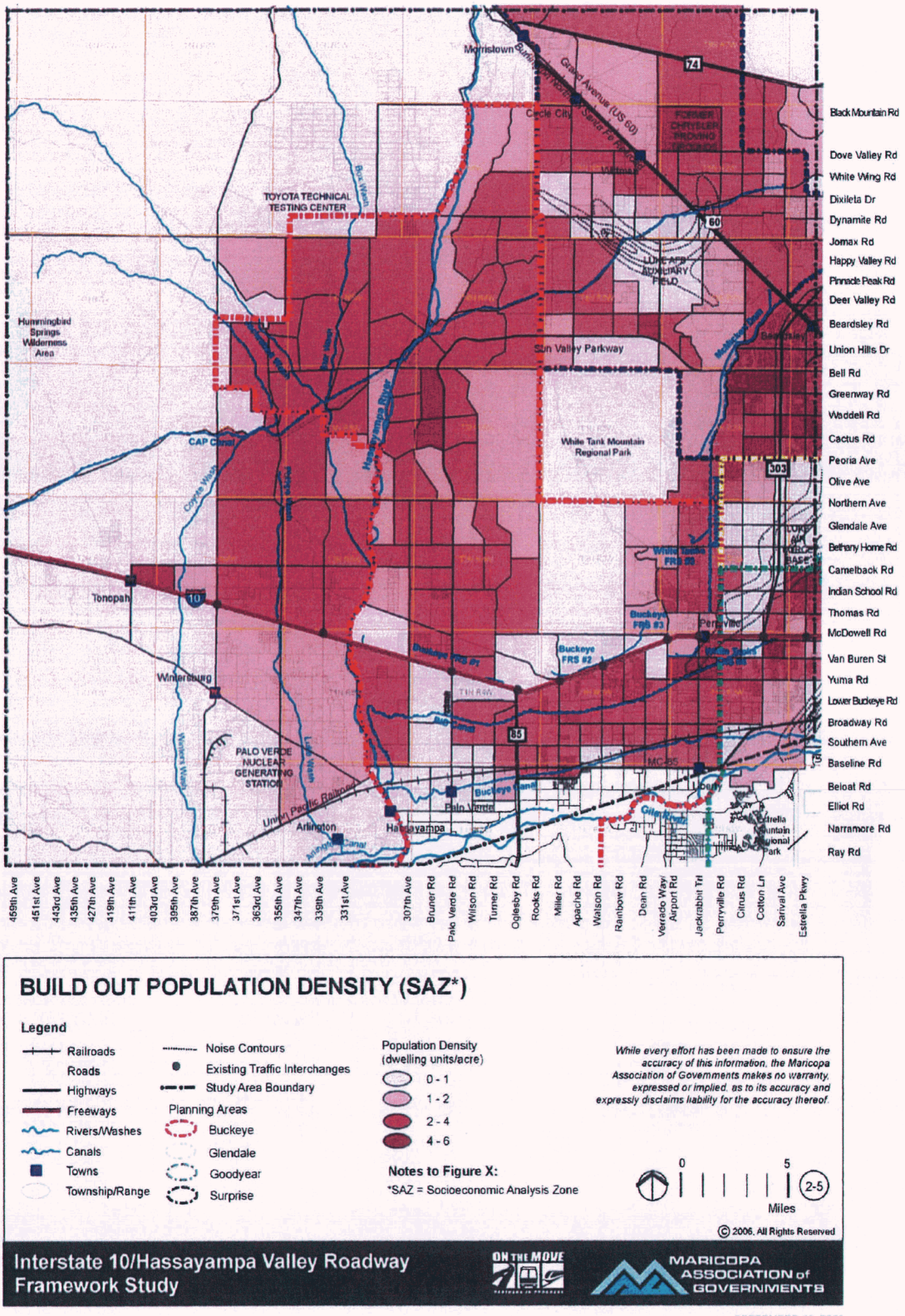
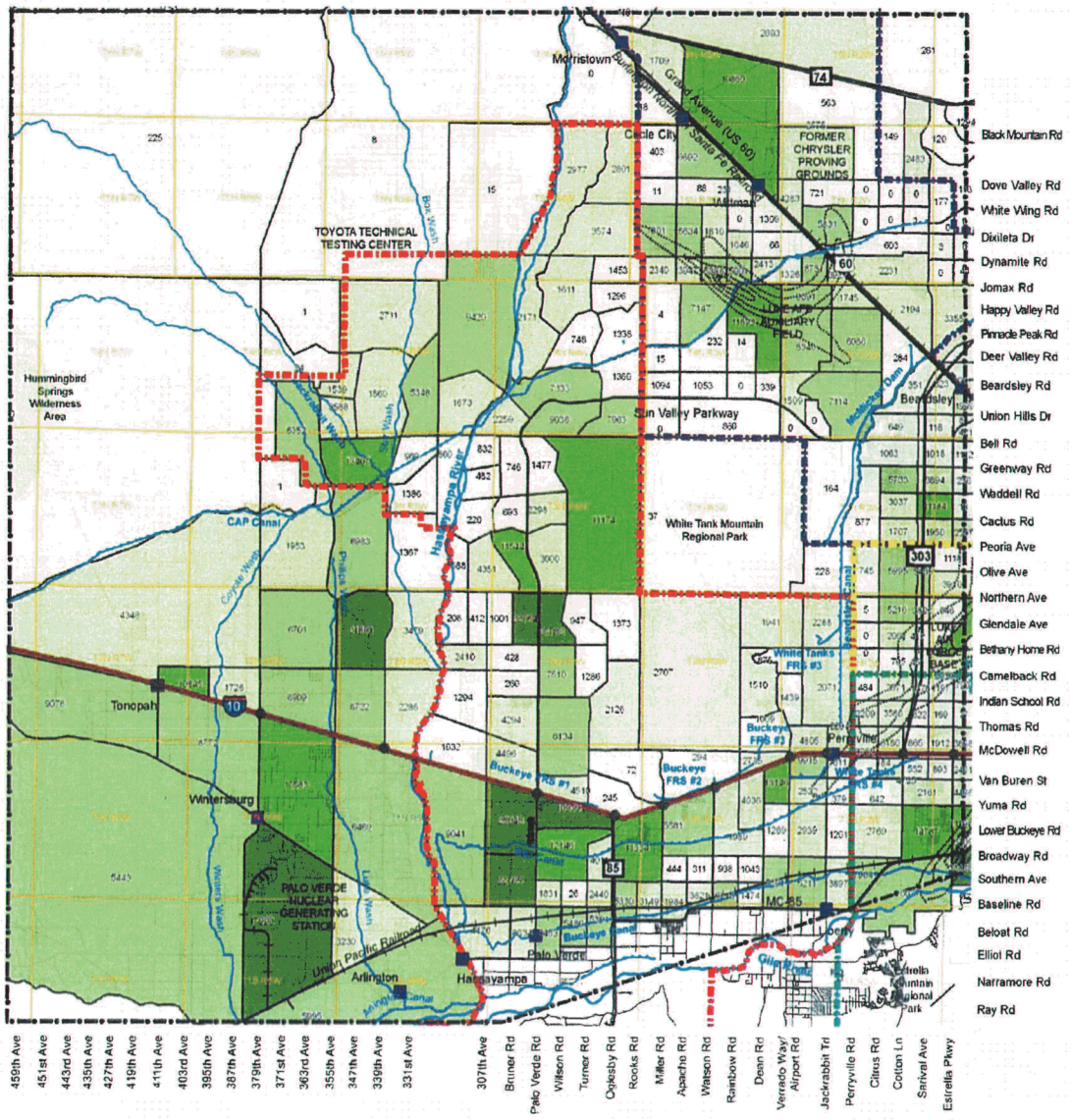


Figure 2-6 Build Out Total Employment



BUILD OUT TOTAL EMPLOYMENT (SAZ*)

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- XXX Total Jobs
- Existing Traffic Interchanges
- Study Area Boundary
- Planning Areas
  - Buckeye
  - Glendale
  - Goodyear
  - Surprise

Total Employment (jobs)

- 0 - 1,500
- 1,501 - 5,000
- 5,001 - 10,000
- 10,001 - 15,000
- 15,001 - 30,000

Notes to Figure X:

*SAZ = Socioeconomic Analysis Zone

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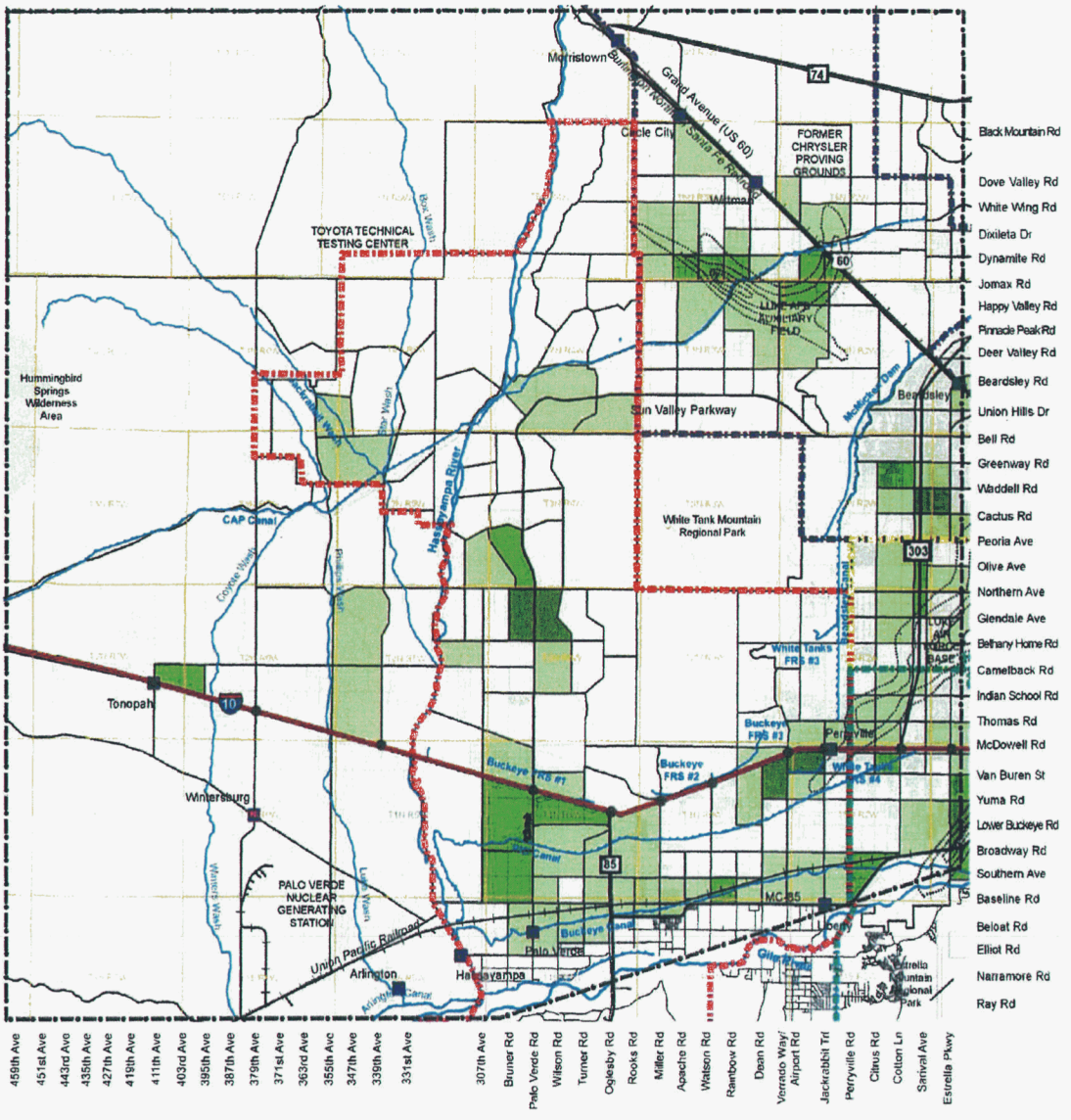
SEPTEMBER 29, 2006

Figure 2-7 Build Out Employment Density



BUILD OUT EMPLOYMENT DENSITY (SAZ*)

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- Existing Traffic Interchanges
- Study Area Boundary

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Employment Density (jobs/acre)
- 0 - 2
- 2 - 6
- 6 - 12
- 12 - 20

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Notes to Figure X:

*SAZ = Socioeconomic Analysis Zone

0 5 Miles

2-7

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The Hassayampa study area is a mosaic of public and private land ownership. State Trust Lands held by the ASLD may eventually transfer to private interests, through either sale or lease, for residential and commercial development. On the other hand, federal lands, such as those managed by the BLM, are unlikely to transfer. Figure 2-8 shows a map of study area land ownership patterns in the Hassayampa study area. Figure 2-9 shows a similar map of land ownership patterns in the East Valley comparison area. Table 2.1 provides a breakdown of land ownership by acreage, both within the study area and in the East Valley.

Table 2.1 Existing Land Ownership Summary

Land Category	I-10/Hassayampa Valley Study Area		East Valley	
	Acres	Pct Total	Acres	Pct Total
Bureau of Land Management	263,631	29%	1,343	1%
Bureau of Reclamation	918	0%	1,480	1%
County	46	0%	1,454	1%
Local and State Parks	29,200	3%	4,163	2%
Military	1,977	0%	2	0%
Private Lands	460,375	50%	235,523	95%
State Trust Lands	163,201	18%	3,950	2%
State Wildlife Area	42	0%	40	0%
U.S. Fish & Wildlife Service	-	0%	6	0%
Total	**919,390**	**100%**	**247,961**	**102%***

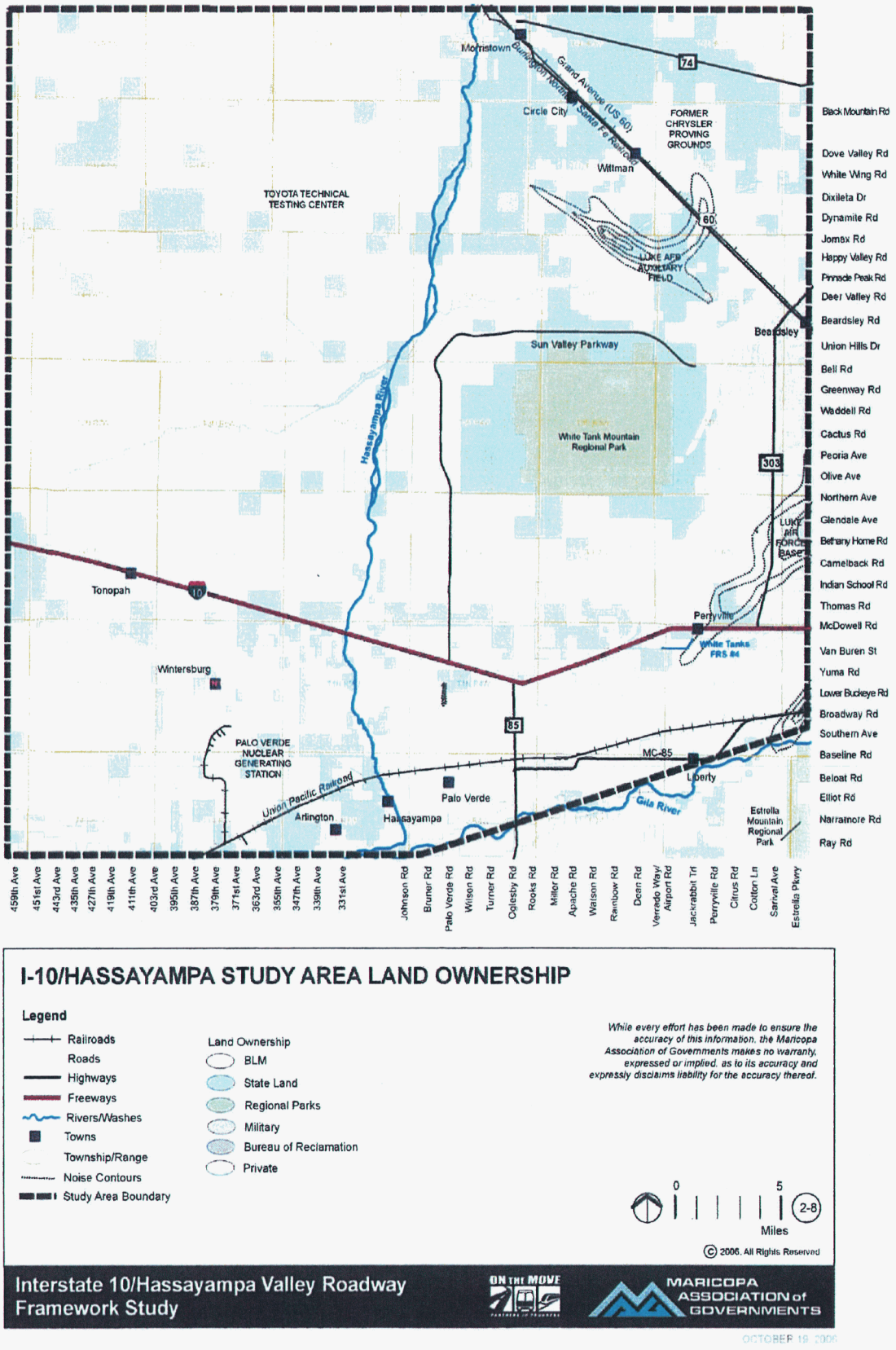
*Percents do not add precisely to 100 due to rounding.

Source: Arizona State Land Department, Arizona Land Resource Information System (ALRIS), 1988.

Significant differences exist between the distribution of land ownership in the East Valley and in the Hassayampa Valley. The vast majority of land in the East Valley is privately owned, but half the land in the Hassayampa Valley is publicly held, primarily by BLM and ASLD. However, land ownership in the East Valley may have been distributed differently several decades ago when the area was mostly undeveloped.

The study team prepared a comparison of land use intensity at Buildout between the study area and the East Valley. Table 2.2 includes both private and state lands (most of which are likely to develop someday) in the universe of total developable land. The average general plan Buildout density of dwelling units (DU) for the Hassayampa study area is 1.75 per (net) acre. This is 24 percent lower than the 2.31 dwelling units per acre in the MAG year 2030 East Valley data. The Hassayampa Valley Buildout employment density, in jobs per net acre, is well under half of that projected for 2030 Buildout conditions in the East Valley.

Figure 2-8 I-10/Hassayampa Study Area Land Ownership



I-10/HASSAYAMPA STUDY AREA LAND OWNERSHIP

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Towns
- Township/Range
- Noise Contours
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation
- Private

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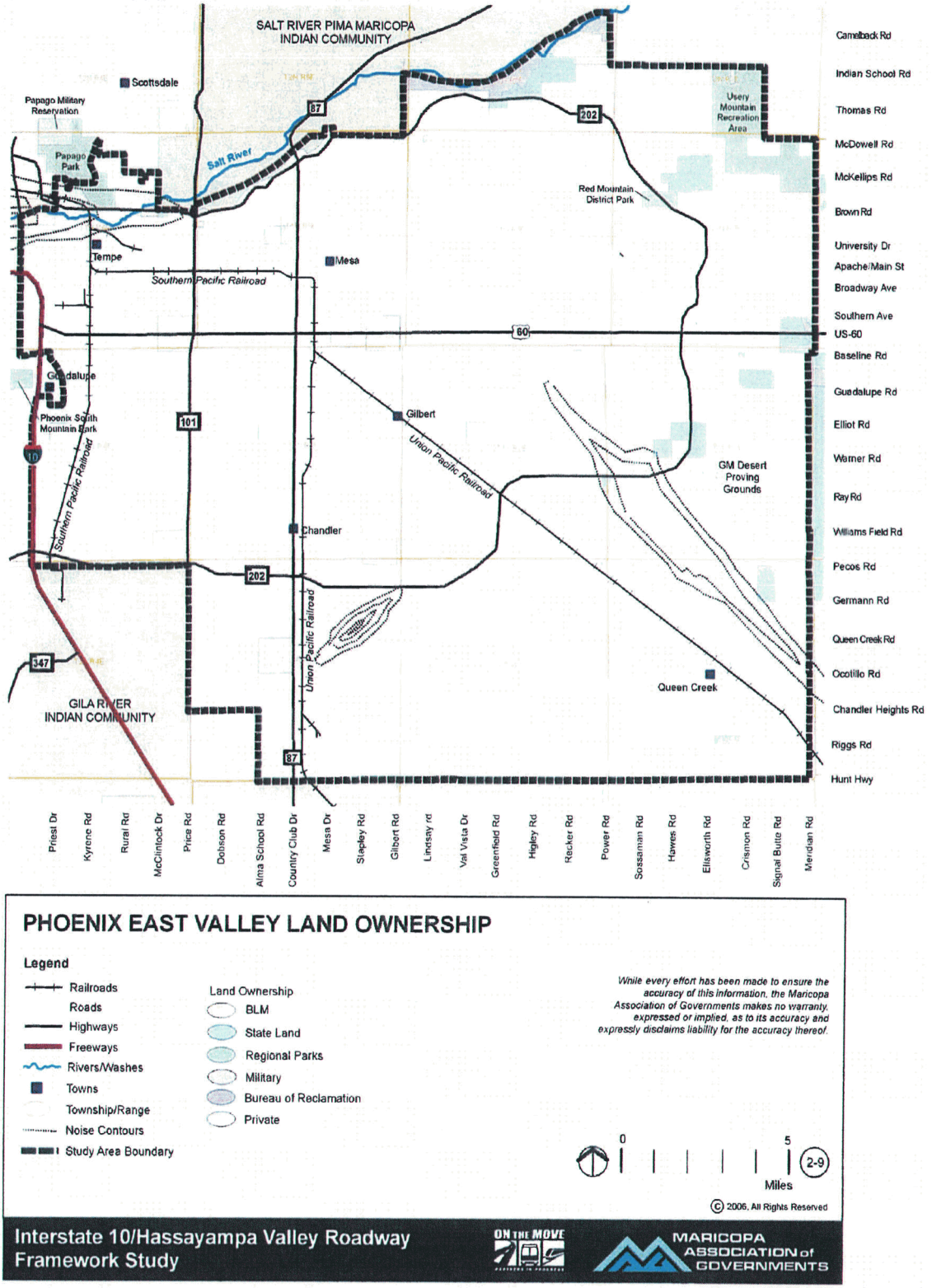
Figure 2-9 Phoenix East Valley Land Ownership



PHOENIX EAST VALLEY LAND OWNERSHIP

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Towns
- Township/Range
- Noise Contours
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation
- Private

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Table 2.2 I-10/Hassayampa Socioeconomic Data Comparison Land Use Summary with Private and State Land Holdings

Analysis Area	Gross Acres	Net Acres	POP	DU	DU/Net Acre	EMP	EMP/DU
I-10/Hassayampa Study Area (Buildout)	919,000	624,000	2,778,000	1,094,000	1.75	1,047,000	0.96
East Valley (2030)	248,000	239,000	1,512,000	552,000	2.31	899,000	1.63

Notes:
Gross acres represents the total land area of each analysis area. Net acres in both the study area and the East Valley are based on the sum of private and state lands from the ALRIS database.

Sources: MAG Buildout population and employment estimate for the I-10/Hassayampa Valley Study Area, September 2006; MAG 2030 population and employment estimates, July 2003 for the East Valley area.

According to the table, the East Valley Buildout population density (per net developable acre) is 42 percent higher than the Buildout density projected for the Hassayampa study area. The general plan Buildout scenario in the Hassayampa Valley region represents the initial vision for future urbanization, however, and could change in future decades as urban densification continues. To put this in context, the East Valley has had decade upon decade of general plan revisions and updates, rezonings, redevelopment, and infill development, which have shaped and will continue to shape land use.

Another key item is the projected jobs per dwelling unit. As shown in Table 2.2, the latest Buildout projections show employment per dwelling unit in the study area to be only 59 percent of that projected for the East Valley in 2030. However, a socioeconomic sensitivity analysis could be conducted to determine how a more favorable jobs/housing balance (i.e., a higher ratio) would affect the number of trips leaving the region, and ultimately the number of lanes needed on key regional, high-capacity facilities. The results of the jobs/housing balance sensitivity analysis could also affect anticipated infrastructure investment levels.

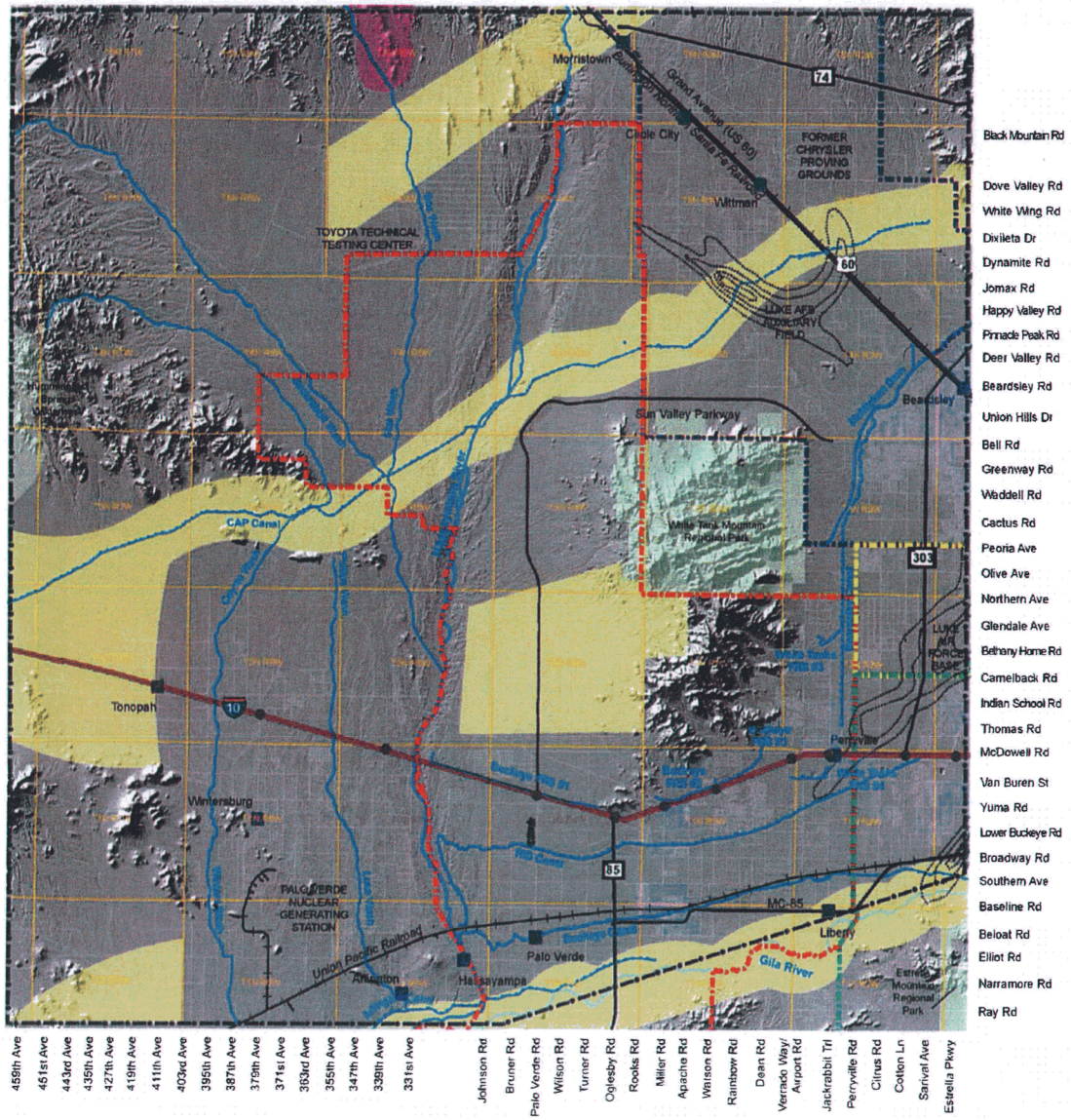
The MAG Buildout projections for the Hassayampa area reflect the low population and employment densities of initial suburban development. These densities are considerably lower than those projected for the East Valley in 2030. The East Valley projects reflect historic development trends and include the effects of full urbanization. In contrast, the initial set of MAG Buildout projections for the Hassayampa Valley reflect a mixture of rural and early-stage suburban development. Thus, as the Hassayampa Valley matures, and as general plans are revised and updated in future decades, population estimates are expected to be raised to reflect continuing and denser urbanization.

While this analysis indicates that the Hassayampa Valley at Buildout will be less densely developed and have fewer jobs per household than the East Valley, at least initially, the potential impact to regional transportation infrastructure needs could be offset by an improved subregional employment balance (i.e., more jobs per household in the study area). An improved jobs/housing balance would result in an increased level of trip capture within the Hassayampa Valley, thereby potentially reducing the needed lane miles of new regional highways.

2.2.3 Environmental Context

The study area includes such significant environmental features as topography, cultural resources, natural resources, drainage, and public utilities. These features are illustrated in Figures 2-10 through 2-15.

Figure 2-10 Environmental Context



ENVIRONMENTAL CONTEXT

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Potential Wildlife Linkage Zone
- Urban Areas
- Hillshade
- Noise Contours
- Study Area Boundary

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

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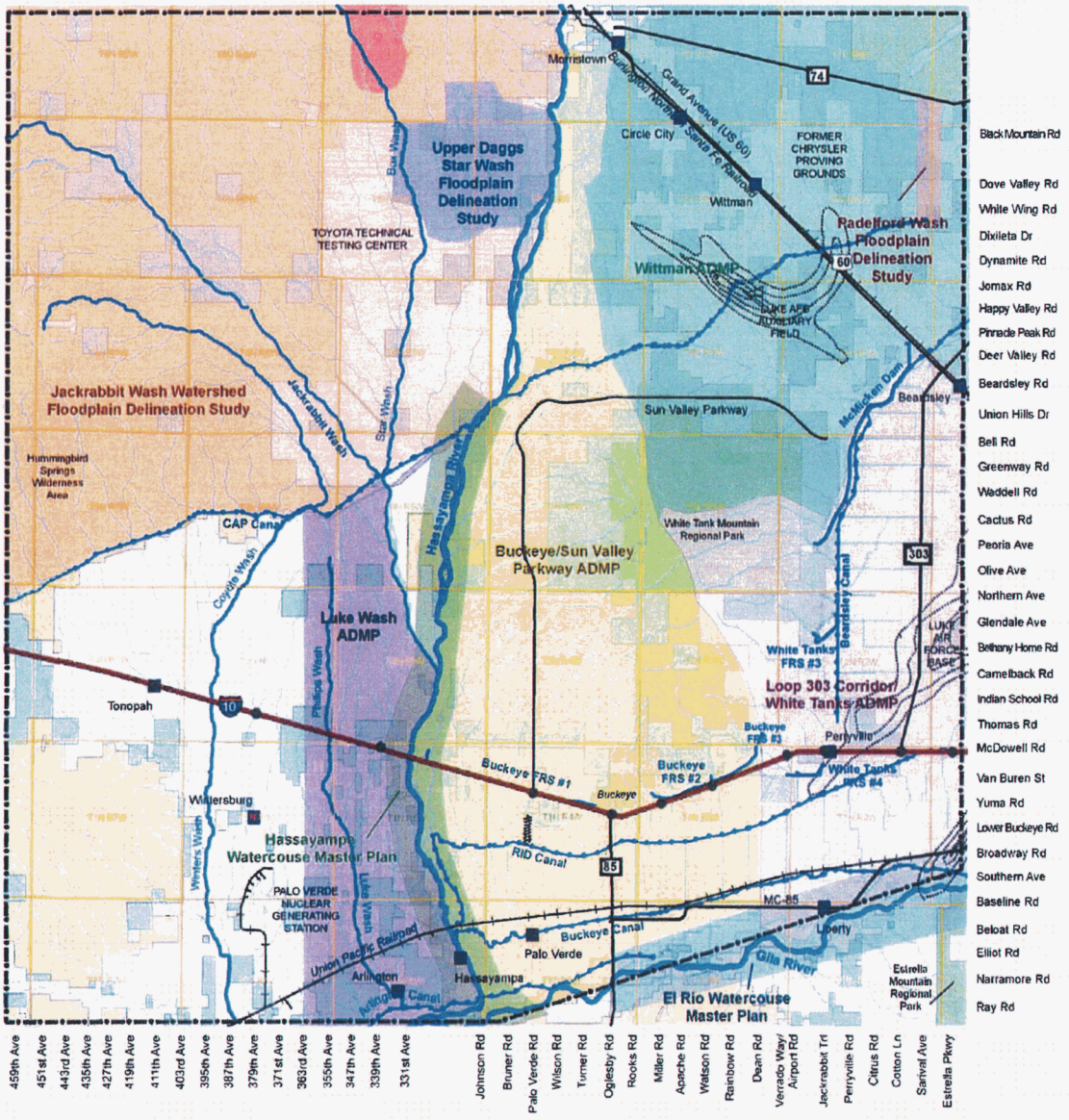
Figure 2-11 Drainage Features



DRAINAGE FEATURES

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Drainage Ways
- Towns
- Township/Range
- Existing Traffic Interchanges
- Noise Contours
- BLM Raptor Protection Area
- Flood Control District of Maricopa County Drainage Studies
- Study Area Boundary

Land Ownership

- BLM
- Study Area
- Regional Parks
- Military
- Bureau of Reclamation

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0 5 2-11 Miles

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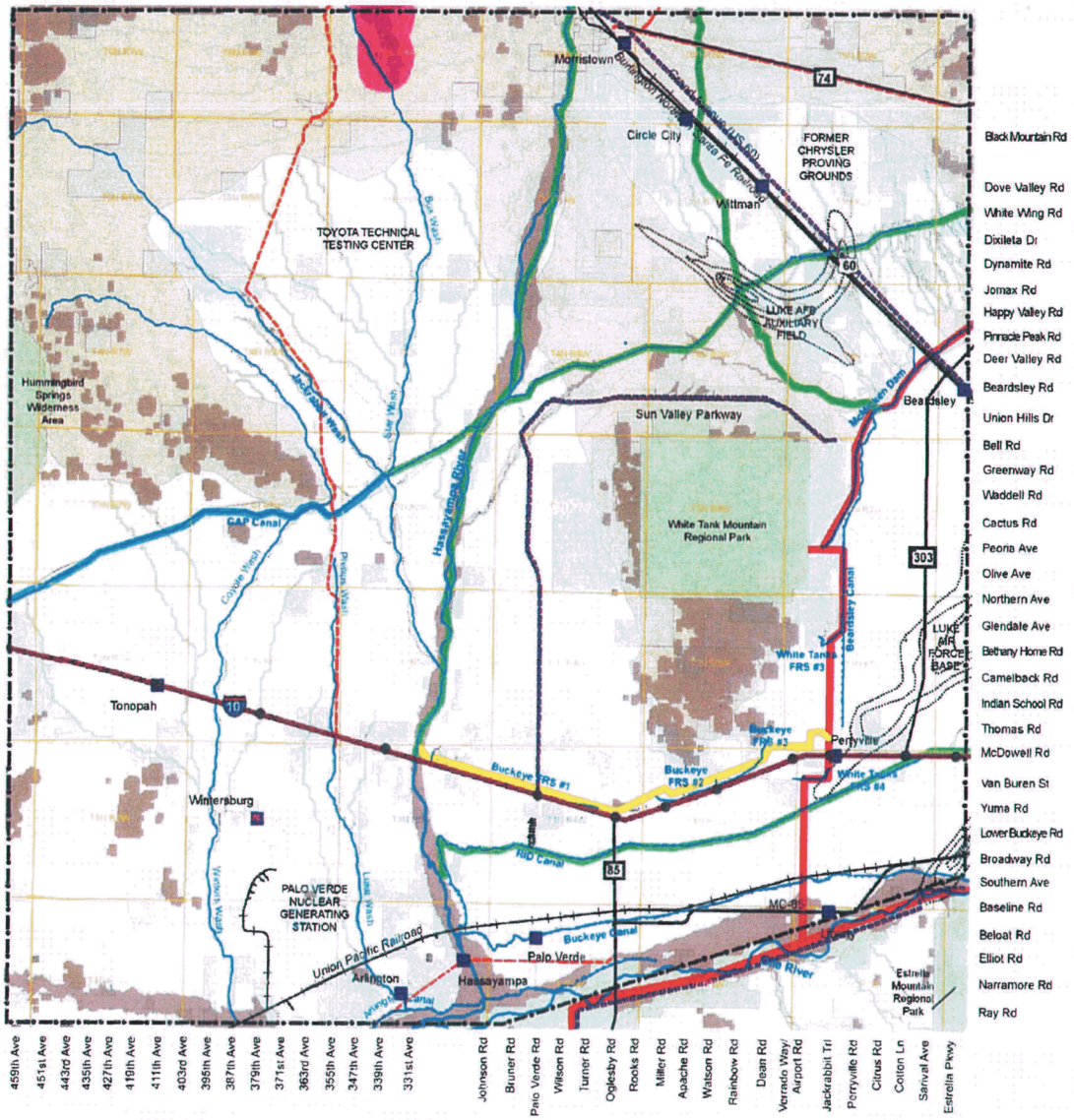
Figure 2-12 Recreational Opportunities



RECREATIONAL OPPORTUNITIES

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Topography (100' contours)
- Study Area Boundary

MAG Desert Spaces Plan
- Conservation Areas
- Retention Areas
- Secured Open Space
- Scenic Travelways
- Bikeways

Maricopa County Trails Plan
- Priority 1 Segments
- Priority 2 Segments
- Priority 3 Segments
- Priority 4 Segments

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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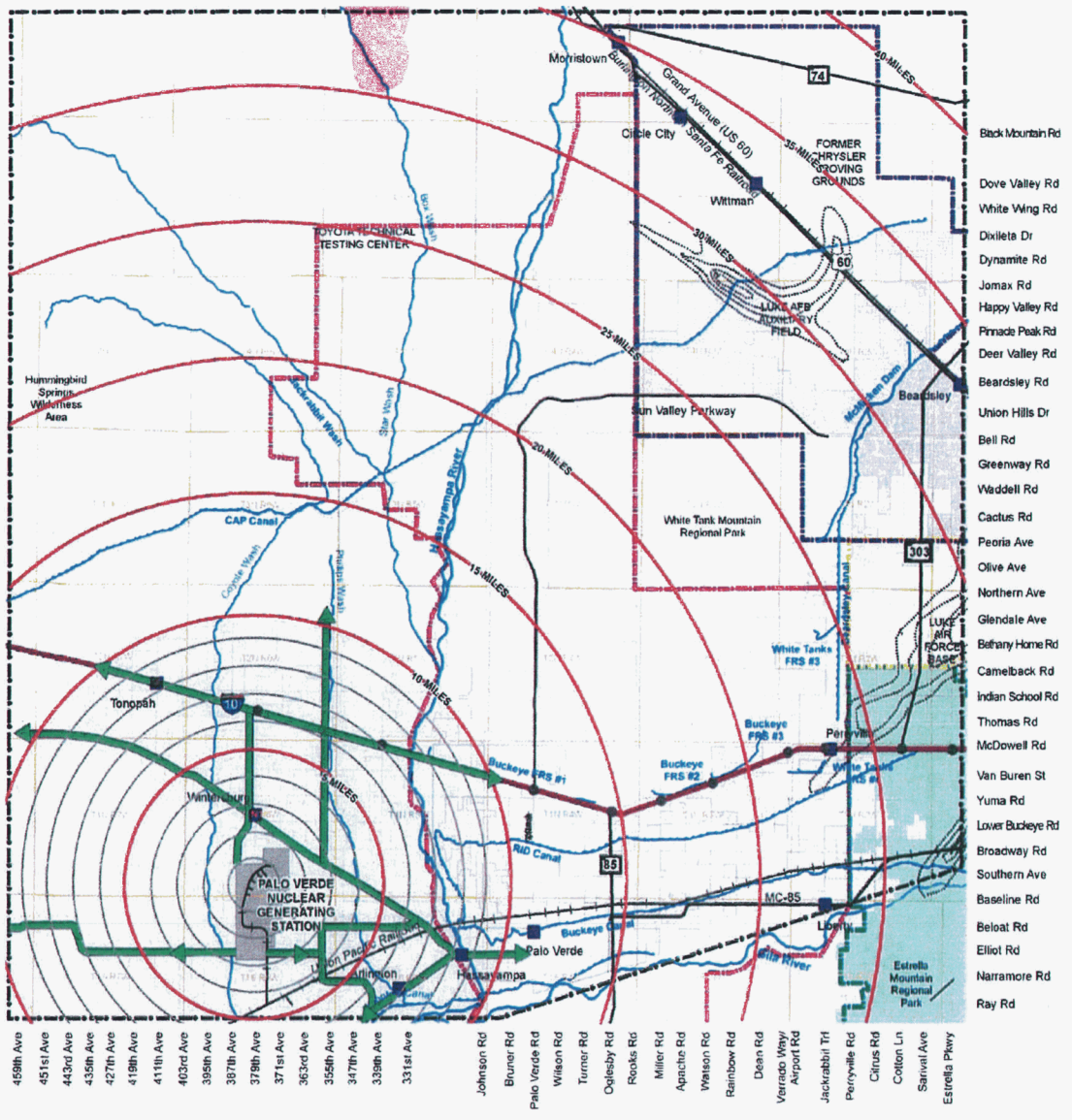
Figure 2-13 Palo Verde Nuclear Generating Station Emergency Planning



PALO VERDE NUCLEAR GENERATING STATION - EMERGENCY PLANNING

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Noise Contours
- Existing Traffic Interchanges

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

Jurisdictions
- Buckeye
- Goodyear
- Surprise

- 10-mile radius Emergency Planning Zone
- 50-mile radius Ingestion Pathway Zone
- Evacuation Routes
- Study Area Boundary

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Figure 2-14 Air Quality Nonattainment Area Boundaries

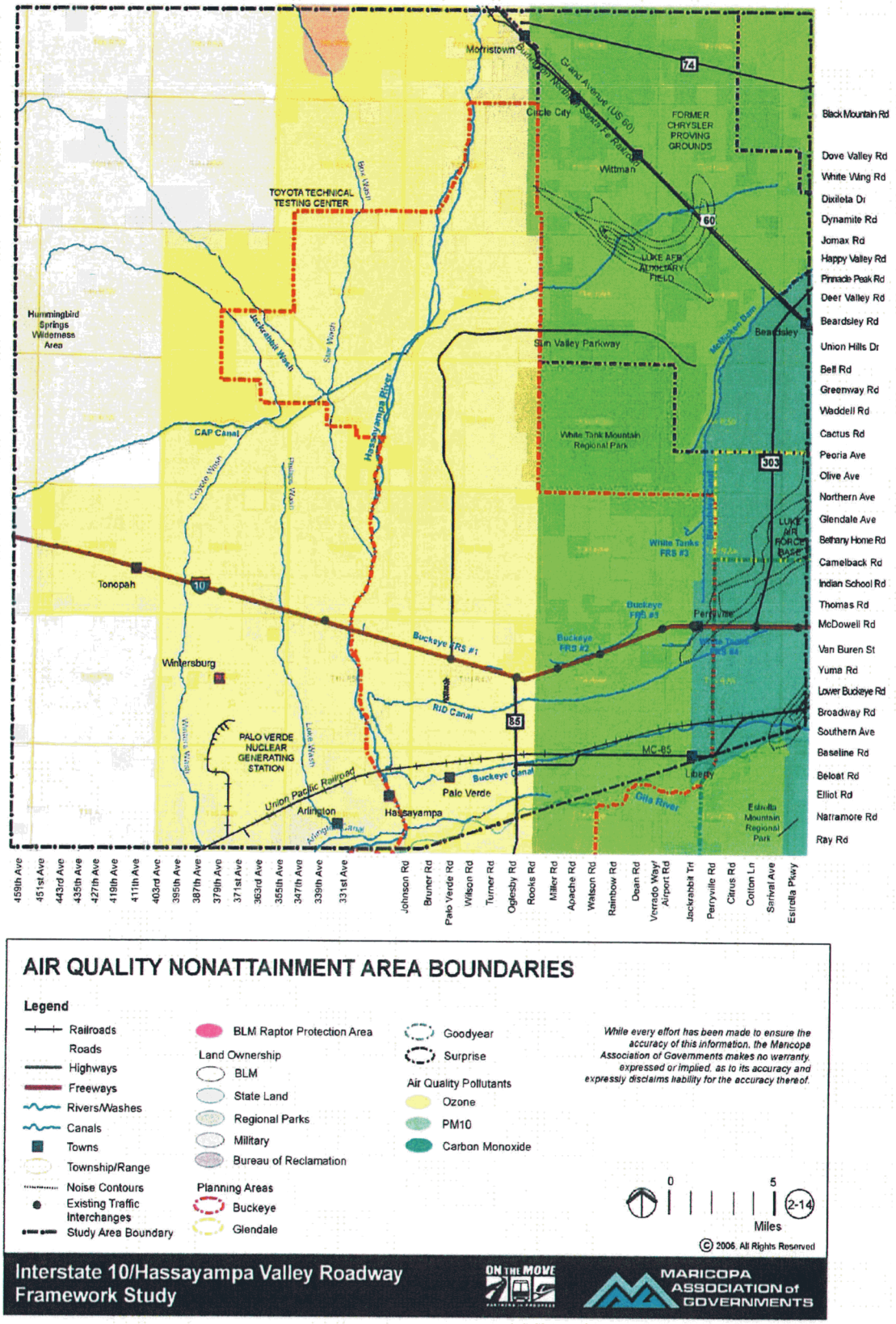
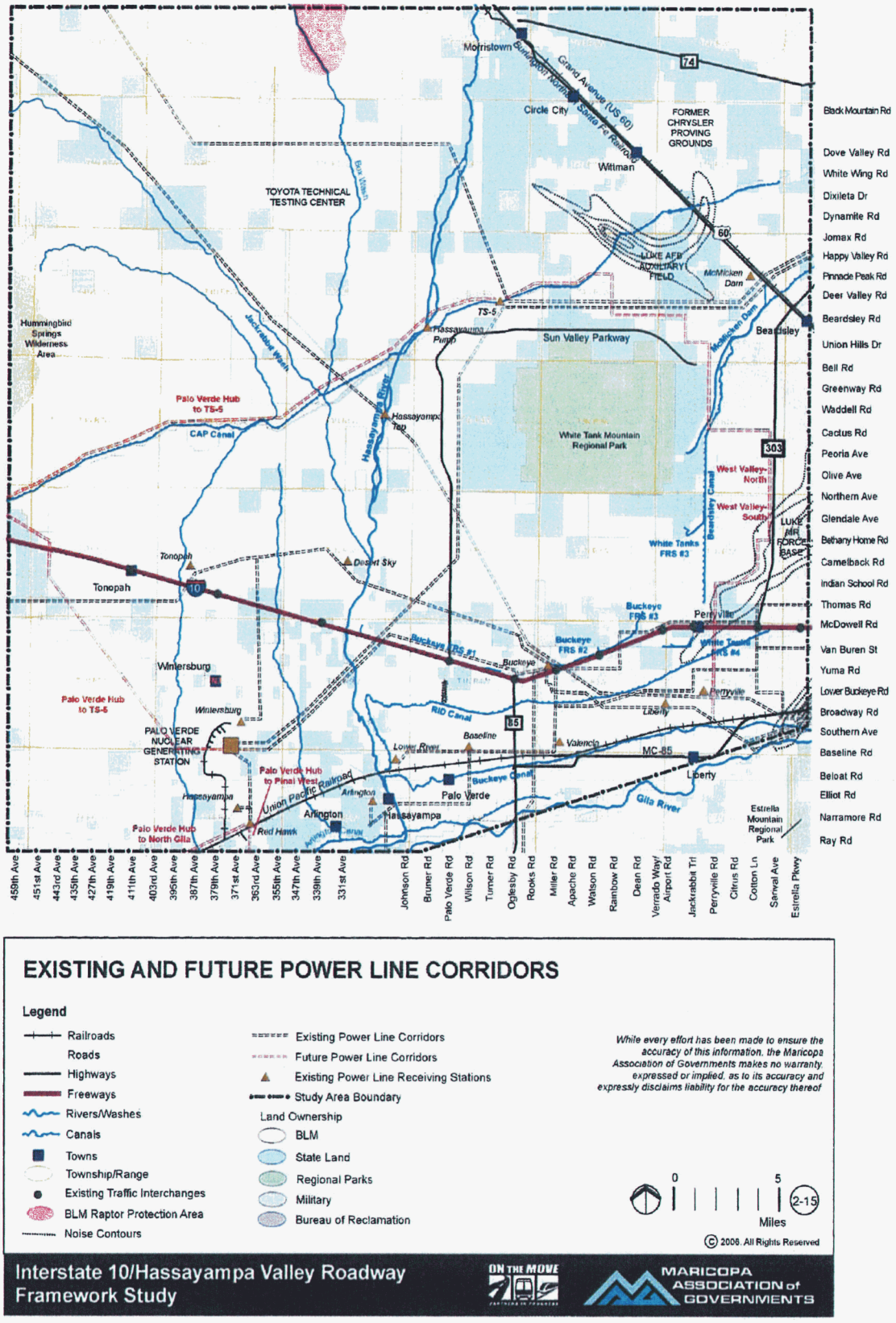


Figure 2-15 Existing and Future Power Line Corridors



The environmental features outlined below are based on readily available information that has not been field-verified. This information was obtained from various sources such as public agencies, municipalities, and web pages and databases based on Geographic Information Systems (GIS). On-site "ground truthing" and field investigation are recommended at the Corridor Improvement Study and Design Concept Report levels, to verify these environmental considerations.

Natural Resources

Figure 2-10 illustrates the existing environmental conditions of the study area. To begin with, this map shows the jurisdictions and urbanized areas. As described above, the study area is composed of (portions of) the Town of Buckeye, City of Surprise, City of Goodyear, City of Glendale, and unincorporated Maricopa County. Urbanized area is defined by the U.S. Census Bureau as the collective combination of urban areas and urban clusters, referring to a geographic area consisting of a central core and adjacent territory that contains at least 50,000 people, generally with an overall population density of at least 1,000 per square mile. Urban clusters, generally found at the edge of the urbanized area, are based on census block and block group density, do not coincide with official municipal boundaries, and need not be adjacent to the urban area boundary. The Phoenix urbanized area currently extends west across SR-303L and north of Bell Road as far as McMicken Dam. Downtown Buckeye is an urban cluster that spans MC-85 between Rooks and Watson roads.

Several topographic features stand out on the landscape. White Tank Mountain Regional Park, the largest unit of the Maricopa County park system, is located entirely within the study area. The highest peak in the White Tank Mountains is more than 4,000 feet tall. Hills and mountains associated with this landform, and ranging from 1,400 to 2,800 feet in height, extend south of the park for approximately five miles.

Part of Hummingbird Springs Wilderness Area is located within the study area. This wilderness extends from approximately Happy Valley Road to Waddell Road, and east to approximately 451st Avenue. The entire wilderness area encompasses 31,200 acres, but only a small eastern portion is located within the study area boundaries. This wilderness is marked by the 3,148 foot Sugarloaf Mountain, located outside the study area. The landscape surrounding the Hummingbird Springs Wilderness Area to the north, east, and northeast is characterized by peaks and hills ranging from 1,800 feet to 2,600 feet tall.

The land within the project area is generally higher in elevation in northern reaches and lower in the southern reaches. The White Tank Mountains are located within the southeastern quadrant of the project area. Several more mountains, peaks and hills are scattered throughout the landscape. There is an expansive range grouped in the northwestern corner of the study area, a smaller one in the southwestern corner, and an even smaller rise in the northeastern corner. Surface bodies of water (natural and man-made) include the Hassayampa River, Gila River, Arlington Canal, Beardsley Canal, Buckeye Canal, Roosevelt Irrigation District (RID) Canal, and Central Arizona Project (CAP) Canal, along with several washes.

Major Watercourses and Drainage

Major Watercourses

The Gila River lies adjacent to the southeast corner of the study area. Its channel flows generally from east to west along the south study area boundary for approximately twelve miles. Approximately two miles west of its confluence with the Hassayampa River, the Gila turns south to roughly parallel Old U.S. Highway 80 and SR-85.

The Hassayampa River, a tributary of the Gila, flows from north to south across the central portion of the project area. The river crosses the northern study area boundary at an elevation of 1,800 to 2,000 feet. It crosses the southern boundary at a lower elevation--approximately 800 to 1,000 feet. Several washes west of the northern reaches of the Hassayampa River flow from these highlands to Jackrabbit Wash, which flows into the river.

The CAP Canal flows from east to west within the study area, crossing the eastern boundary of the study area in its northern reaches, near White Wing Road. Within the project study area, the CAP canal is also referred to as the Hayden-Rhodes Aqueduct. This canal is managed and operated by the Central Arizona Water Conservation District. Its elevation in the study area is approximately 1,400 feet. The CAP canal extends

southwest from its intersection with the eastern study area boundary to the western boundary, crossing the western boundary approximately two miles north of I-10.

The Arlington Canal also flows from east to west, traversing the southern boundary of the study area. This canal parallels the Gila River for most of its length within the study area. Its elevation in the study area ranges from 800 to 880 feet. This canal crosses several roadways, including Johnson Road, Bruner Road, and SR-85.

The Beardsley Canal flows from north to south, traversing the east side of the White Tank Mountains. Its elevation in the study area ranges from 1,100 to 1,340 feet. The canal crosses many roadways, including Indian School Road, Olive Avenue, Sun Valley Parkway/Bell Road, and US-60. It begins near Lake Pleasant south of the New Waddell Dam, and crosses the Agua Fria River as it heads generally south and west to cross US-60 northwest of SR-303L. It then parallels Trilby Wash Basin for several miles before turning due south midway between the Perryville Road and Jackrabbit Trail alignments, terminating near Indian School Road. The Maricopa Water District owns this facility.

The Buckeye Canal flows from east to west through the southern portion of the study area. Its elevation ranges from 860 to 890 feet. This canal parallels the Gila River, Maricopa County Route 85 (MC-85) and the Union Pacific Railroad throughout the study area. It crosses many roadways, including Cotton Lane extension (dirt road), Jackrabbit Trail, Perryville Road, Estrella Parkway and Bullard Avenue.

The RID Canal flows from east to west, traversing Buckeye and Goodyear. This canal runs parallel to I-10 between that highway and MC-85 through most of the study area. Its elevation ranges from 950 feet near the Hassayampa River to 1,010 feet near I-10. This canal crosses many roadways, including Miller Road, Rainbow Road, Jackrabbit Trail, Cotton Lane and Estrella Parkway.

Trilby Wash traverses the study area generally from northwest to southeast, crossing US-60 near Circle City and continuing south and east to enter the Trilby Wash Detention Basin in Surprise. This wash is located north of Sun Valley Parkway and west of the Citrus Road alignment.

Drainage Features

Figure 2-11 shows current drainage structures, and completed and current drainage studies performed through the Flood Control District of Maricopa County (FCDMC). The Gila River and its tributary, the Hassayampa River, are the two major waterways in the study area. Jackrabbit Wash runs through the northwest portion of the study area, flowing into the Hassayampa River north of I-10. There are five canals (Arlington, Beardsley, Buckeye, CAP and RID), five flood retardant structures, and one major dam. All of these structures support the larger drainage system.

FCDMC is analyzing almost the entire project area. Three types of studies are or have been conducted: area drainage master plans (ADMP), watercourse master plans, and floodplain delineation studies. An ADMP generally estimates flood potential for a watershed, maps watercourses, identifies existing and potential drainage problems, and develops preliminary solutions and standards for floodplain and stormwater management. Watercourse master plans identify and develop a plan and technical guidance for managing flood hazards, lateral migration of the watercourse, and the cumulative impacts of existing and future development. Floodplain delineation studies demarcate floodplains within the project area.

Because the described waterways constitute obstacles to construction of transportation infrastructure, the results of the above studies will help determine the most cost-effective and accessible transportation alignments throughout the study area. These studies are also being used by the development community; therefore, planned developments along significant drainage corridors should have incorporated any findings or resulting construction issues into their master plans.

Land Subsidence and Earth Fissures

Land subsidence has been identified in several south-central Arizona locations. This phenomenon occurs when water is removed from underground reservoirs and the weight of the overlying material compresses, causing the land to settle. Once compressed, alluvial deposits take up less space than before and the ground surface sinks. The amount of subsidence varies by location. Land subsidence also creates another potential problem: earth fissures. These are cracks in the ground surface that occur because of uneven or differentiated

land subsidence. Depending on circumstances, fissures can form gullies as much as 50 feet wide and 10 to 15 feet deep. Once fissures start to form, they tend to increase in number and length, spreading at uneven speeds and directions for several miles.

The effects of land subsidence and earth fissures can be significant, because they may cause significant damage to infrastructure, increase flooding potential, worsen groundwater pollution, and accelerate soil erosion.

The land between SR-303L and the White Tank Mountains have been identified as having land subsidence and earth fissure problems. Land subsidence and the accompanying earth fissures will probably occur in this area as long as groundwater overdraft continues, although since earth fissures can occur in previously unnoticed areas, when or where new fissures will occur is unpredictable. With the exception of the White Tank Mountains, most the study area is known to have some degree of groundwater depletion, with the greatest depletion occurring on both sides (north and south) of I-10 in the Tonopah area.

Cultural Resources

The study area is located along the Hassayampa River Valley, on the north side of the Gila River drainage west of Phoenix. The environment includes river valley bottoms, desert and uplands, and river terraces above the Gila and Hassayampa Rivers.

This area was likely intensively occupied by the Hohokam between ca. AD 350 and AD 1500. The site of Las Colinas, a late prehistoric "large urban center," is east of the study area. Trade routes west along the Gila River passed along the southern edge of the study area. Likely site types include villages, year-round settlements with populations of more than 100, ball courts, central plazas, and platform mounds; hamlets and smaller year-round settlements; farmsteads (seasonal occupations of small social groups tied closely to larger settlements); and field houses (short-term agricultural sites consisting of a single structure). Hohokam settlement was organized in part into irrigation communities in major drainages, so there would have been irrigation facilities, including canals, and other water control features.

Historic-period sites are likely numerous as well, including farms, irrigation canals and dams, industrial sites such as mines, and transportation-related sites (e.g., the existing railroads). Conservatively, the number of registered sites in the area is likely be in the hundreds, with many more unregistered sites in areas that have been less intensively surveyed.

The locations of cultural sites are protected to prevent vandalism of these resources. Information on these locations is available to qualified specialists through the Arizona State Museum.

Recreational Opportunities

A review of the Maricopa County Trails Plan and the MAG Desert Open Spaces Plan found several trail and land conservation types. Maricopa County defines segments by construction priority for the ultimate Buildout of the interconnected county trail system. MAG identifies scenic trailways and bikeways, and the MAG Open Spaces Plan locates conservation, retention, and secured open space areas. These elements can be found in Figure 2-12. The City of Surprise is currently (January 2007) updating its Alternate Modes Plan, which includes trails, bikeways and pedestrian facilities.

Threatened and Endangered Species

A review of the U.S. Fish and Wildlife Service (FWS) and Arizona Game and Fish Department (AGFD) threatened and endangered species lists for Maricopa County was conducted to determine those species that potentially occur within the project study area. The AGFD provided a Special Species Status letter on July 28, 2006, regarding listed species known to occur within the project study area. Table 2.3 provides a summary of this review.

The general habitat types available within the study area were compared to those species that are known to occur within Maricopa County. A ranking of HIGH, MODERATE, or LOW was assigned to each species based on potential habitat availability. A ranking of LOW means that the species is rare or unlikely to occur within the study area; MODERATE means that the species has a reasonable probability to occur within the

study area; and HIGH means that the species is likely to occur or occurrences have been reported and documented.

Species of Concern and Candidate species are not afforded protection under the Endangered Species Act and have no regulatory listing status. Generally, these categories are identified during listed species reviews, as these species have potential to become listed in the future.

The BLM and U.S. Forest Service (USFS) have identified Sensitive species known to occur on BLM or forest lands in Arizona. Coordination with the BLM and USFS is required to identify potential impacts to these species. The AGFD has identified certain species as Wildlife of Special Concern in Arizona; these species are known to be or may be in jeopardy or face known or perceived threats, including population decline. The Arizona Department of Agriculture Native Plant Law (1993) protects certain plant species from being collected or harvested. This listing includes Highly Safeguarded (HS) species, Harvest Restricted (HR) species, Salvage Restricted (SR) species, Export Restricted (ER) species, and Salvage Assessed (SA) species. The following restrictions apply to species in these categories:

- HS No collection permitted
- HR Permit required for removal of plant by-products
- SR Permit required for collection
- ER Out-of-state transport prohibited
- SA Permit required for live tree removal

Of the species listed in Table 2.3, 11 are federally endangered, 3 are federally threatened, 2 are federally listed candidate species, 27 are Species of Concern, 28 are Wildlife of Special Concern in Arizona, 37 are sensitive BLM or USFS species, and 19 are listed under Arizona's Native Plant Law. (Many belong to more than one category.) The Cactus Ferruginous Pygmy Owl (CFPO) and the Arizona Agave have been delisted by the FWS, but the CFPO listing status is currently being contested in the federal courts. The Bald Eagle was proposed for delisting in February 2006, but is still afforded protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Coordination with USFWS and AGFD will be required prior to any type of development (e.g., land use, transportation infrastructure).

Table 2.3 Species Known to Occur within Maricopa County and Potentially within the Project Study Area

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
BIRDS							
American Peregine Falcon	*Falco peregrinus anatum*	SC	WSC	S		Prefers areas near rocky cliffs and permanent water sources. Transient.	MODERATE
Bald Eagle	*Haliaeetus leucocephalus*	T (PDL)	WSC	S		Large trees or cliffs near water with abundant prey.	MODERATE
Belted Kingfisher	*Ceryle alcyon*		WSC			Transient and winter resident of lakes, ponds and rivers.	LOW TO MODERATE
Black-bellied Whistling-duck	*Dendrocygna autumnalis*		WSC			Prefers low edges of lakes, oxbow ponds, wetlands and slow flowing rivers and creeks. Cottonwood, willow and velvet mesquite are usually favored vegetated areas.	MODERATE
Cactus Ferruginous Pygmy-Owl	*Glaucidium brasilianum cactorum*	E (DL)*	WSC			Well-vegetated Sonoran desertscrub and adjacent to densely wooded dry washes. Saguaros and large thorny trees (ironwood, palo verde and velvet mesquite are preferred).	MODERATE
California Brown Pelican	*Pelecanus occidentalis californicus*	E				Coastal land and islands; species found around many Arizona lakes and rivers. Uncommon transient in Arizona.	LOW
Common Black-Hawk	*Buteogallus anthracinus*		WSC	S		Riparian obligates associated with perennial drainages with mature gallery forests of broadleaved deciduous trees.	MODERATE
Great Egret	*Ardea alba*		WSC			Lowland riparian areas with hydrophytic emergent vegetation and cottonwood, willow, mesquite and/or tamarisk areas.	MODERATE
Least Bittern	*Ixobrychus exilis*		WSC			Larger marshes with dense, tall growth of emergent vegetation interspersed with water.	MODERATE
Mexican Spotted Owl	*Strix Occidentalis lucida*	T (CH)	WSC	S		El. 4,100 – 9,000 ft. Nests in canyons and generally dense older forests of mixed conifer or ponderosa pine/gambel oak.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
BIRDS							
Mississippi Kite	*Ictinia mississippiensis*		WSC			Lowland riparian woodlands; cottonwoods	LOW TO MODERATE
Osprey	*Pandion haliaetus*		WSC			Open bodies of water containing fish. Wetlands and shorelines of ponds, lakes, reservoirs and rivers. Drainages containing ponderosa pine, fir, cottonwood, maple, box elder, alder and willow.	LOW TO MODERATE
Snowy Egret	*Egretta thula*		WSC			Shallow protected backwaters of lakes, rivers, canals or other wetlands with roosting in nearby trees and shrubs.	LOW TO MODERATE
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E (CH)	WSC	S		Cottonwood/willow and tamarisk vegetation communities along rivers and streams. Distribution in range restricted to riparian corridors.	HIGH
Western Burrowing Owl	*Athene cunicularia hypugaea*	SC			S	Variable in open, well-drained grasslands, steppes, deserts, prairies and agricultural lands. Sometimes in open areas such as vacant lots, golf courses and airports.	MODERATE
White Snowy Plover	*Charadrius alexandrinus nivosus*		WSC	S		Sparsely vegetated alkali flats and drying shores of shallow water impoundments. Generally migrants observed along open shorelines, mudflats, sandbars of reservoirs, ponds and/or rivers.	LOW
Yellow-billed Cuckoo	*Coccyzus americanus*	C	WSC	S		Large blocks or riparian woodlands (cottonwood, willow, or tamarisk galleries).	MODERATE
Yuma Clapper Rail	*Rallus longirostris yumanensis*	E	WSC			Freshwater and brackish marshes. Generally associated with dense emergent riparian vegetation. Requires wet substrate with dense herbaceous or woody vegetation for nesting/burrowing.	MODERATE

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
FISH							
Bonytail Chub	*Gila elegans*	E	WSC			Main stream portions of mid-sized to large rivers, usually over mud or rocks. Can utilize ponded or inundated terrestrial habitats.	LOW TO MODERATE
Desert Pupfish	*Cyprinodon macularius*	E (CH)	WSC			Shallow springs, small streams, and marshes. Tolerate saline and warm water.	LOW TO MODERATE
Desert Sucker	*Catostomus clarki*	SC			S	Gila River basin. Found in rapids and flowing pools of streams and rivers.	LOW TO MODERATE
Gila Chub	*Gila intermedia*	E (CH)				Pools, springs, cienegas, and streams.	LOW TO MODERATE
Gila Longfin Dace	*Agosia chrysogaster chrysogaster*	SC			S	Gila River basin. Intermittent hot low-desert streams to clear/cool brooks at higher elevations.	LOW TO MODERATE
Gila Topminnow	*Poeciliopsis occidentalis occidentalis*	E	WSC			Small streams, springs, and cienegas vegetated shallows.	LOW TO MODERATE
Little Colorado Sucker	*Catostomus sp. 3*	SC	WSC	S	S	Creeks, small to medium rivers and impoundments.	LOW TO MODERATE
Razorback Sucker	*Xyrauchen texanus*	E (CH)	WSC	S		Riverine and lacustrine areas, generally not in fast moving water and may use backwaters. Found in Horseshoe Reservoir.	LOW TO MODERATE
Roundtail Chub	*Gila robusta*	SC	WSC	S		Cool to warm water, mid-elevation streams and rivers. Known to occur in the mainstem and tributaries of the Verde and Salt Rivers, as well as, canals in metropolitan Phoenix.	LOW TO MODERATE
Sonoran Sucker	*Castostomus insignis*	SC			S	Gila River basin. Warm water rivers to trout streams.	LOW TO MODERATE
Speckled Dace	*Rhinichthys osculus*	SC		S		Gila river basin. Bottom dweller in rocky riffles, runs and pools of headwaters, creeks and small to medium rivers.	LOW TO MODERATE

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
AMPHIBIANS							
Great Plain Narrow-mouthed Toad	*Gastrophryne olivacea*		WSC			Mesquite semi-desert grassland to oak woodland in close proximity to streams, springs and rain pools.	LOW TO MODERATE
Lowland Burrowing Treefrog	*Pternohyla fodiens*		WSC			Xeric environments, burrowing in low open mesquite grasslands, usually associated with major washes and arroyos.	LOW TO MODERATE
Lowland Leopard Frog	*Rana yavapaiensis*		WSC	S		Aquatic systems in desert grasslands to pinyon juniper.	LOW TO MODERATE
REPTILES							
Red-back Whiptail	*Aspidoscelis burti xanthonota*	SC		S	S	Santank and Sauceda Mts. in Maricopa Co. Canyons and hills in juniper-oak woodlands, down to Sonoran upland desert habitats.	LOW
Desert Rosy Boa	*Charina trivirgata gracia*	SC		S	S	Rocky areas in desert ranges, especially in canyons with permanent or intermittent streams.	LOW TO MODERATE
Mexican Rosy Boa	*Charina trivirgata trivirgata*	SC			S	Maricopa Mts in Maricopa Co. Rocky mountains or hillsides in desert ranges – granite outcroppings.	LOW
Arizona Skink	*Eumeces gilberti arizonensis*	SC	WSC	S	S	Documented along riparian habitats along perennial reaches of the Hassayampa River and its tributaries below Wickenburg. Rocks, leaf littler near permanent or semi-permanent streams.	HIGH
Sonoran Desert Tortoise	*Gopherus agassizii*	SC	WSC			Primarily on rocky slopes and bajadas of Sonoran desertscrub. Category 3 habitat identified in study area.	HIGH
Arizona Chuckwalla	*Sauromalus ater*	SC			S	Near cliffs, boulders, or rocky slopes. Rocky desert, lava flows, hillsides and outcrops.	LOW TO MODERATE
Northern Mexican Garter Snake	*Thamnophis eques megalops*	SC	WSC	S		Known from the Agua Fria River and the Verde River. Densely vegetated habitats including cienegas, cienega streams, and stock tanks.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
INVERTEBRATES							
Maricopa Tiger Beetle	*Cicindela oregona maricopa*	SC		S	S	Sandy stream banks and gravels/clays along streambanks. May occur in seeps or reservoir banks.	LOW
MAMMALS							
California Leaf-nosed Bat	*Macrotus californicus*	SC	WSC	S		Desert below 4,000 ft. elevation. Caves and tunnels. Sonoran desert scrub.	MODERATE
Cave Myotis	*Myotis velifer*	SC		S		Desert scrub of creosote, brittlebush, palo verde and cacti. Roosts in caves, tunnels and mineshafts and under bridges.	MODERATE
Yuma Myotis	*Myotis yumanensis*	SC				Variety of upland and lowland habitats. Prefers cliffs and rocky walls near water. Can have nursery colonies in buildings, caves, mines and under bridges.	MODERATE
Lesser Long-nosed Bat	*Leptonyceteris curasoae yerbabuenae*	E	WSC	S		Desert scrub habitat with agave and columnar cacti. Day roosts in caves and abandoned tunnels.	MODERATE
Greater Western Bonneted Bat	*Eumops perotis californicus*	SC				Lower and upper Sonoran desertscrub near cliffs, preferring rugged rocky canyons with abundance crevices.	LOW TO MODERATE
Pale Townsend's Big-eared Bat	*Corynorhinus townsendii pallescens*	SC				Day roosts in caves and mines from desertscrub up to woodlands and conifer forests.	LOW TO MODERATE
Pocketed Free-tailed Bat	*Nyctinomops femorosaccus*			S		Arid lower elevations usually around high cliffs and rugges rock outcrops.	LOW TO MODERATE
Sonoran Pronghorn	*Antilocapra Americana sonoriensis*	E	WSC	S		Broad intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations.	LOW TO MODERATE
Western Red Bat	*Lasiurus blossevillii*		WSC			Riparian and other wooded areas. Generally roosts in trees.	LOW TO MODERATE
Western Yellow Bat	*Lasiurus xanthinus*		WSC			May be associated with Washingtonian fan palm, other palms or sycamores, hackberries and cottonwoods.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
PLANTS							
Acuna Cactus	*Echinomastus erectocentrus* var. *acunensis*	C	HS			Well-drained knolls and gravel ridges between major washes; granite soils in Sonoran desert scrub association.	LOW
Arizona Agave	*Agave arizonica*	E (DL)	HS			El. 3,000-6,000 ft. Transition zone between oak-juniper woodland & mountain mahogany-oak scrub.	LOW
Arizona Cliffrose	*Purshia subintegra*	E	HS			White soils of tertiary limestone lakebed deposits.	LOW
Arizona Rosewood	*Vauquelinia californica* ssp. *sonorensis*				S	Desertscrub and desert grassland, in woodland or forest at base of cliffs, along canyon bottoms and on moderate to steep slopes.	LOW
Bigelow Onion	*Allium bigelovii*		SR			Gentle slopes from 2,000 – 5,000 ft elevation. Open, dry rocky soil in grassland and open chaparral, and desert scrub.	LOW
California Barrel Cactus	*Ferocactus cylindraceus* var. *cylindraceus*		SR			Gravelly or rocky hillsides, canyon walls, alluvial fans, and wash margins. Known to occur in the White Mountains, Maricopa Co.	LOW TO MODERATE
Emory's Barrel-cactus	*Ferocactus emoryi*		SR			(None Noted.)	LOW TO MODERATE
Flannel Bush	*Fremontodendron californicum*		SR		S	Known to occur within the Four Peaks-Mazatzal Mts. and Superstition Mts. in Maricopa Co. Dry, north slopes in canyons. Well-drained rocky hillsides and ridges.	LOW
Fish Creek Fleabane	*Erigeron piscaticus*	SC	SR	S	S	Total range in Maricopa County: Fish Creek Canyon, Superstition Mts. Moist, sandy canyon bottoms associated with perennial streams.	LOW
Fish Creek Rock Daisy	*Perityle saxicola*	SC		S		Found in Gila and Maricopa Cos. Near Tonto National Monument, Roosevelt Lake, above Horse Camp Creek (Sierra Ancha Mts.). Xeric habitat on very steep slopes.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
PLANTS							
Golden Barrel Cactus	*Ferocactus cylindraceus* var. *eastwoodiae*		SR			(None noted.)	LOW TO MODERATE
Hohokam Agave	*Agave murpheyi*	SC	HS	S	S	Verde River drainage, Bradshaw, McDowell, New River and Wickenburg Mts. Benches or alluvial terraces on gentle bajada slopes above major drainages in desert scrub.	LOW
Kofa Barberry	*Barberis harrisoniana*				S	Sand Tank Mts. Bottoms of deep, shady rocky canyons.	LOW
Organ Pipe Cactus	*Stenocereus thurberi*		SR		S	Sonoran desert; adjacent to thorn forests mostly on hills and bajadas.	LOW
Pima Indian Mallow	*Abutilon parishii*	SC	SR	S		Superstition Mts. Mesic situations in full sun with higher elevation Sonoran desert scrub.	LOW
Ripley Wild-buckwheat	*Eriogonum ripleyi*	SC	SR	S		Near Horseshoe Lake and Chalk Mountain, Maricopa Co. Tertiary lakebeds on well-drained powdery soils derived from limestone, sandstone or volcanic tuffs/ashes.	LOW
Straw-top Cholla	*Opuntia echinocarpa*		SR			Flats, slopes and washes.	MODERATE
Cactus Apple	*Opuntia engelmannii* var. *flavispina*		SR			May occur up to 2,500 ft. elevation in sandy bajadas.	MODERATE
Sweet Acacia	*Acacia farnesiana*			S		Rarely grows in the wild. El. 2,500 to 4,000.	LOW
Tonto Basin Agave	*Agave delamateri*	SC	HS	S		Mazatzal Mts near Sunflower. Usually found atop benches, at edges of slopes, on open hilly slopes in desert scrub, overlooking major drainages and perennial streams. 2,190 – 5,100 ft. Elevation.	LOW
Tourmey Agave	*Agave toumeyana* var. *bella*		SR			4,000 – 5,000 ft. elevation. Rocky slopes in chaparral.	LOW

Table 2.3 - Continued

Common Name	Scientific Name	Status				Habitat Considerations	Potential Occurrence in Project Study Area
		FWS	State	USFS	BLM		
PLANTS							
Tumamoc Globeberry	*Tumamoca macdougalii*		SR	S	S	Xeric situations, in the shade of a variety of nurse plants along gullies and sandy washes of hills and valleys in Sonoran desert scrub.	LOW TO MODERATE
Varied Fishhook Cactus	*Mammillaria viridiflora*		SR			Semidesert grasslands, interior chaparral, pinyon-juniper and oak woodlands, crevices, boulders, canyon sides and gravelly igneous substrates from 4,600-6,600 ft. elevation.	LOW
Zuni Fleabane	*Erigeron rhizomatus*	T				Found in Elevation 7,600–7,700 ft. pinyon-juniper woodlands	LOW

Notes: **E** = Endangered **T** = Threatened **PDL** = Proposed for Delisting **DL** = Delisted
C = Candidate Species **CH** = Designated Critical Habitat **SC** = Species of Concern

WSC = Wildlife of Special Concern **HS** = Highly Safeguarded **SR** = Salvage Restricted
ER = Export Restricted **SA** = Salvage Assessed
HR = Harvest Restricted **S** = Sensitive Plants

*The listing status is being contested in federal court. This species was delisted from the Endangered Species Act in April 2006.

Sources: USFWS. Species list for Maricopa County. Accessed from http://www.fws.gov/arizonaes/Threatened.htm#CountyList. July 25, 2006.
AZGFD. Species in the Arizona HDMS. April 2006. Accessed from http://www.azgfd.gov/w_c/edits/hdms_species_lists.shtml. July 25, 2006 and December 21, 2006.
AGFD. Special Status Species for Interstate 10/Hassayampa Valley Roadway Framework Study. July 28, 2006.

Potential Hazardous Materials Locations

Preliminary information regarding potential hazardous materials in the study area was collected through observation on aerial photographs only. No Initial Site Assessment (ISA) or Phase I Environmental Site Assessment was conducted for any sites within the study area. No properties were identified or evaluated for potential hazardous materials. It is recommended that an ISA, done to ASTM standards, is done for the site of any proposed developments within the Hassayampa Valley Framework Study area.

Four sites in the study area are potential sources of hazardous materials: three vehicle proving grounds and a nuclear power generating station. The vehicle proving grounds are located in the northern portion of the study area. Toyota, DaimlerChrysler and Volvo use them to test new automotive designs and concepts. In reaction to development, DaimlerChrysler has sold its 5,500-acre property to real estate developers. The site, in operation since 1958, will continue to operate as a proving ground until late 2007. The DaimlerChrysler proving ground contains mostly vacant, unimproved land, but also houses office buildings, labs, paved test tracks and other vehicle testing areas. The Volvo facility is located just east of the Luke Auxiliary Airfield, near the alignments of Pinnacle Peak Road and 211th Avenue.

The third proving ground within the study area is owned and operated by Toyota. This facility was established in 1993 and is located sixteen miles west of the DaimlerChrysler proving ground. It covers approximately

12,000 acres and contains a ten-mile paved circular track, ride and handling course, dirt course, straightaway course, brake testing area, steep grade area, and office buildings.

Located in the southwestern portion of the study area is the Palo Verde Nuclear Generating Station (PVNGS). The plant houses three nuclear reactors, all of which are on-line. This makes Palo Verde the second largest power plant in the U.S., while the capacity of reactor unit two makes it the largest nuclear reactor in the U.S. The net capacity of the plant is approximately 4,000 megawatts. The source of coolant water for the three reactors is treated wastewater effluent from neighboring municipalities. The wastewater is stored and treated on-site.

Figure 2-13 displays evacuation routes and planning zones in case of an emergency or nuclear event at the PVNGS. The 10-mile-radius Emergency Planning Zone is illustrated in gray, with the major evacuation routes for all who live or work in this zone. The 50-mile-radius Ingestion Pathway Zone is shown in 10-mile intervals, illustrating the area of potential health effects in case of an event.

Air Quality

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established air quality standards to protect public health and the environment. EPA has set national ambient air quality standards (NAAQS) for the six primary air pollutants. These criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM10 and PM2.5) and sulfur dioxide (SO_2). Gasoline-powered motor vehicles cause more than three-fourths of the Phoenix area's CO emissions. Arizona has adopted the federal NAAQS as the state Ambient Air Quality standards.

EPA designates an area as nonattainment if it has violated, or has contributed to violations of, the NAAQS over a three-year period. If an area is designated as nonattainment, the Clean Air Act requires the state, local and tribal governments to develop and produce a state implementation plan (SIP) to reduce emissions of the pollutants that exceed federal standards. A SIP is an enforceable plan developed at the state and local level that explains how the area will comply with air quality standards according to the Clean Air Act. The SIP is the cumulative record of all air pollution control strategies, state statutes, state and local rules, and local ordinances implemented under Title I of the Clean Air Act by governmental agencies within the state.

Figure 2-14 maps three air quality nonattainment and maintenance areas, as designated by EPA within the study area. Portions of the study area are classified as non-attainment for ozone and PM10, and as maintenance areas for CO, due to past violations of the NAAQS. This ozone non-attainment area must demonstrate attainment with the 8-hour ozone standard by 2009, and with the 24-hour and annual PM10 standards by December 31, 2006. If, for example, the PM10 standards are not met, a five-percent plan will be invoked, whereby the state would need to update the SIP to demonstrate a five percent annual reduction in PM10 concentrations. On January 5, 2005, EPA redesignated the Phoenix metropolitan area to attainment for CO and approved the attainment demonstration and maintenance plan that shows maintenance of the CO standard through 2015. The Phoenix metropolitan area has not had an exceedance of the CO standard since 1998.

As a result of new EPA regulations and guidelines set forth by the Federal Highway Administration (FHWA), future traffic studies will include an assessment of hazardous air pollutants, such as mobile source air toxics, that could adversely affect local communities. Project components, such as changes in traffic volumes, vehicle mix, location of the existing facility, or any other factor that would cause an increase in emissions impacts relative to the no-build alternative, will also be evaluated for the potential to create adverse mobile source air toxics.

Public Utilities

Figure 2-15 displays transmission line locations for both the Arizona Public Service (APS) and Salt River Project (SRP) utility companies. These lines range from 69kV to 500 kV. There are seventeen power line receiving stations located throughout the study area, with the largest being the PVNGS, located in the southeast portion of the area.

Five new power lines have been approved for this area. The West Valley North and West Valley South lines run around the northeast side of White Tank Mountain Regional Park, paralleling SR-303L south to

approximately the Buckeye Canal. The Palo Verde Hub to TS-5 line originates at the PVNGS, looping west and following the CAP Canal back east to the TS-5 receiving station. The Palo Verde to Gila Bend and Palo Verde-Pinal West transmission line corridors both originate at the Red Hawk receiving station, near the southern boundary of the study area, but soon leave the study area.

These power line transmission corridors will need to be considered when choosing future roadway alignments, as they are expensive to build and difficult to move. However, many existing and future power line corridors share right-of-way with major transportation and drainage routes.

2.2.4 Existing Land Use

Figure 2-16 illustrates existing land uses in the study area. The following subsections summarize key land uses and activity centers in the study area portions of Buckeye, Glendale, Goodyear, Surprise, and unincorporated Maricopa County.

Town of Buckeye

Almost the entire MPA of Buckeye lies within the study area. North of I-10, much of this land is undeveloped, except a large expanse of open space and some low-density residential development south of White Tank Mountain Regional Park. A large number of community master plans are approved in this area north of I-10, however. South of I-10, the Buckeye MPA is a combination of open space along the Hassayampa and Gila rivers, agricultural land between the RID Canal and the Gila River, undeveloped land just south of I-10, and scattered industrial uses. The open space category includes all active and passive open space, cemeteries, and golf courses. Small pockets of residential and commercial development exist at major arterial intersections, as well as in the downtown Buckeye area on both sides of MC-85 east of Miller Road.

City of Glendale

A small portion of the Glendale MPA is located within the study area from Perryville Road east, between Peoria Avenue and Camelback Road. This area is a combination of low-density residential development and open space. These uses generally support Luke Air Force Base, located just east of SR-303L.

City of Goodyear

All of the Hassayampa study area south of Camelback Road and east of Perryville Road is located in the northwestern quadrant of the Goodyear MPA. Goodyear has traditionally been an agricultural community and much of its land is still used for agricultural purposes, along with open space near the Gila River and pockets of low-density residential and commercial development dispersed near arterial intersections.

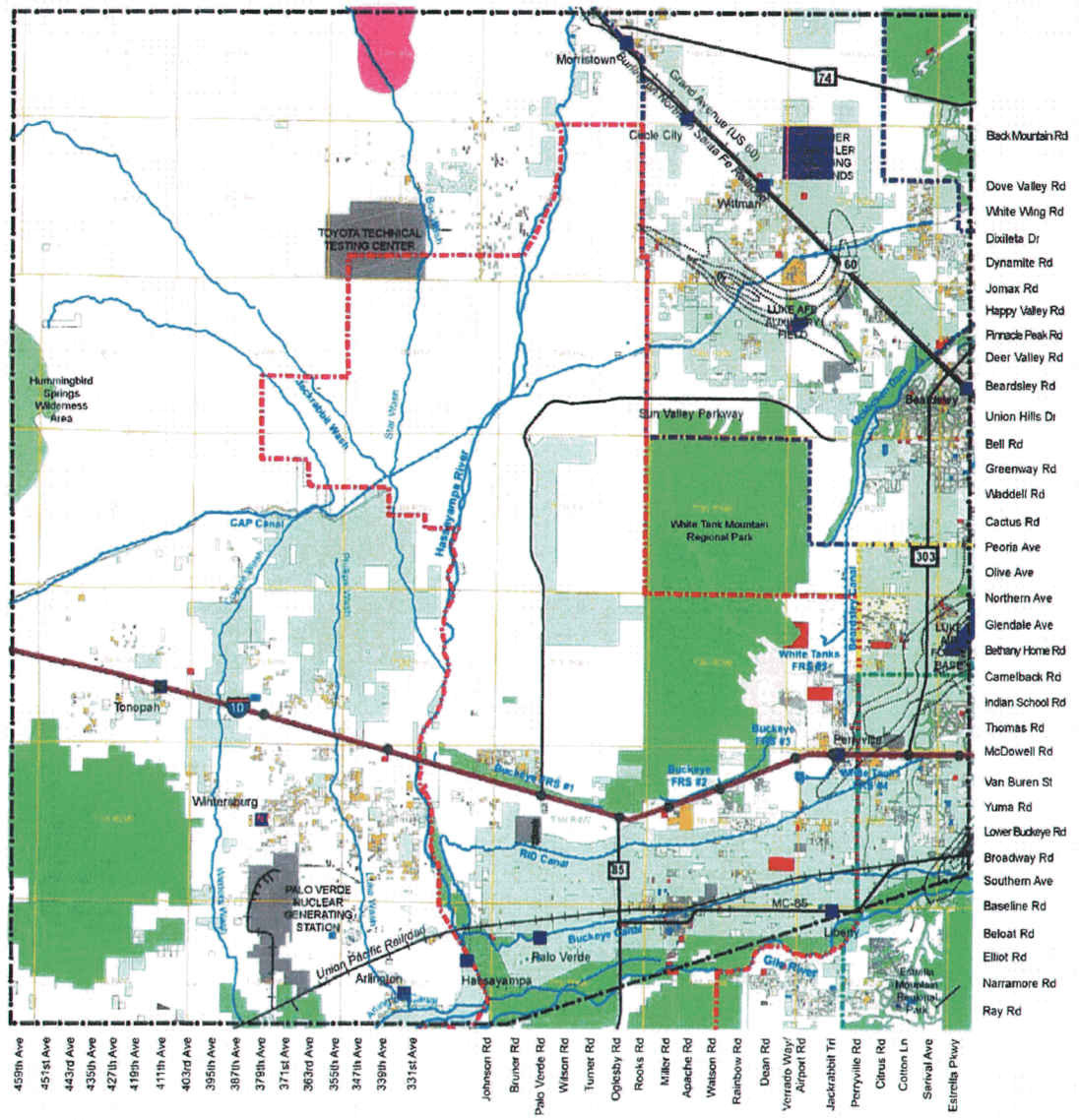
City of Surprise

The western portion of the Surprise MPA is included in the Hassayampa study area, including land east of 255th Avenue and north of Peoria Avenue. North of US-60, much of the land is either devoted to ranching or is undeveloped. A General Plan Amendment has recently been submitted for the former DaimlerChrysler Proving Grounds to convert this facility into a mixed-use center of residential and commercial development. The area south of US-60 spanning SR-303L is intensely developed with residential, commercial and open space. South of US-60, and north and west of the McMicken Dam, the area is a combination of open space, flood retention and undeveloped land, with small pockets of residential and commercial development. A Luke Air Force Base Auxiliary Field is located in this area, at approximately Happy Valley Road and 219th Avenue.

Maricopa County

Areas of unincorporated Maricopa County include White Tank Mountain Regional Park and all land west of the Buckeye MPA. Most of this land is currently undeveloped, with the exception of the Toyota Technical Testing Center and the PVNGS. Some scattered low-density residential development exists south of I-10 near unincorporated Wintersburg. White Tank Mountain Regional Park and Hummingbird Springs Wilderness Area are large tracts of protected open space.

Figure 2-16 Existing Land Use



EXISTING LAND USE

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Study Area Boundary

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Multi-Family Residential
- Commercial
- Office/Employment
- Public Facilities
- Industrial
- Open Space
- Agriculture

- Water
- Undeveloped

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

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Interstate 10/Hassayampa Valley Roadway Framework Study

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AUGUST 30 2006

2.2.5 Future Land Use

Figure 2-17 depicts planned future land use, based on the adopted general plan of each jurisdiction. Each city's general plan covers not just the area within its current limits, but its entire MPA, typically including land currently unincorporated but envisioned for annexation in the future. As Figure 2-17 shows, most of the land east of the Hassayampa River lies within the MPA of a city or town, whereas most of the land west of the river falls outside any MPA. Because this map represents anticipated Buildout conditions, the "undeveloped" category from Figure 2-16 no longer exists. In addition, much of the land shown as "agricultural" under existing conditions is designated as residential, commercial, office/employment, or mixed-use in Figure 2-17. Substantial territory will be preserved as open space, including land along the Hassayampa and Gila rivers south of I-10, White Tank Mountain Regional Park, state land south of the park, Hummingbird Springs Wilderness Area, and a large patch of open space south of Tonopah.

The following subsections summarize key land uses and activity centers in the study area portions of Buckeye, Glendale, Goodyear, Surprise, and unincorporated Maricopa County. All of these jurisdictions have updated (or are updating, in the case of Buckeye) their general plans to reflect the 1998 Growing Smarter and 2000 Growing Smarter Plus legislation, which strengthened general plan requirements by adding four new elements: Open Space, Growth Areas, Environmental Planning, and Cost of Development.

Town of Buckeye

The Town of Buckeye is currently updating the Buckeye General Plan and Development Code. The majority of the land north of I-10 will consist of planned developments (i.e., master-planned communities) which will have a combination of residential, commercial, mixed-use, open space, and office/employment land uses. Many planned developments will exist south of I-10, but greater emphasis will be placed on large employment centers and higher-density residential development, as opposed to self-contained master-planned communities. At the Buckeye General Plan Charrette Visioning Forum on May 13 through May 17, 2006, participants sketched out a vision of Buckeye consisting of several villages, linked through an interconnected system of open space and transit. These connections will occur in the town centers of the villages or master-planned communities. The Buckeye airport will expand as a major employment center, and the majority of existing open space near the confluence of the Hassayampa and Gila rivers will be preserved.

City of Glendale

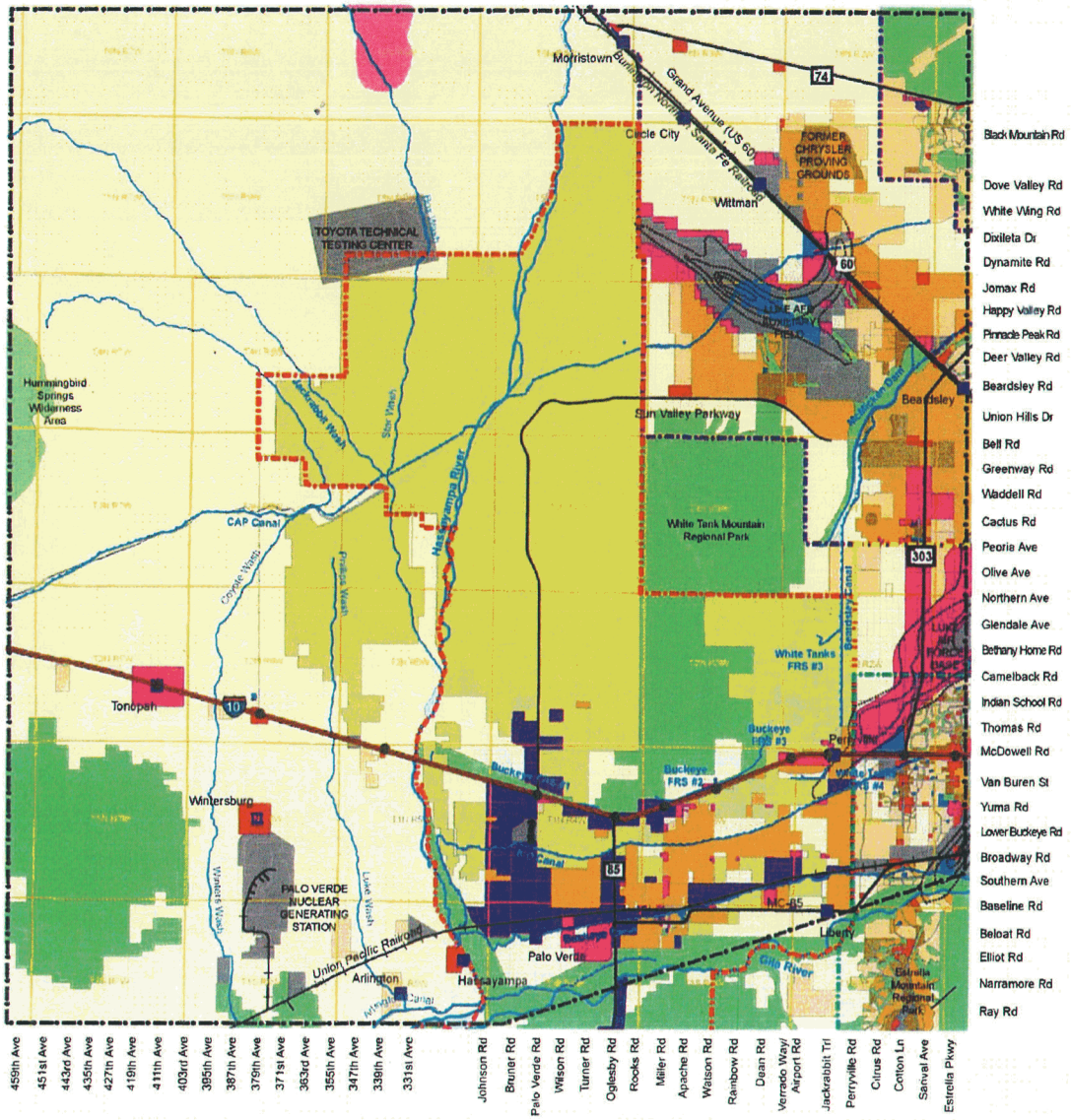
The Glendale General Plan identifies two growth areas pertinent to the project. The Luke Compatible Growth Area seeks to restrict residential and business development around Luke Air Force Base. The area is planned, strategically, to accommodate low concentrations of non-military activity. The SR-303L corridor, west of Luke Air Force Base, is expected to become a hub for commercial and employment activity.

City of Goodyear

The Goodyear MPA will continue developing with a mix of residential and commercial land uses. Land along the Union Pacific Railroad will tend to be industrial, while land along the Gila River will be preserved as open space.

The Goodyear General Plan identifies two growth areas within the project limits, the I-10 corridor and the Gila River corridor. The I-10 corridor spans a zone one mile wide on either side of I-10. This area is expected to include residential, employment, and support services. The corridor is projected to contain a Buildout population of nearly 34,000, with more than 11 dwelling units per acre and an employment base of approximately 28,500 jobs. The Gila River corridor spans an area approximately one-half mile wide on each side of the river. This area is projected to include residential, employment and open space land uses, developed in a manner environmentally compatible with the river. The corridor is projected to contain a Buildout population of over 12,400 and an employment base of approximately 2,500 jobs.

Figure 2-17 Future Land Use



FUTURE LAND USE

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Study Area Boundary

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Multi-Family Residential
- Planned Developments
- Mixed Use
- Commercial
- Office/Employment
- Public Facilities
- Industrial
- Open Space
- Agriculture
- Water

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

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Interstate 10/Hassayampa Valley Roadway Framework Study

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City of Surprise

The Surprise General Plan shows the following growth areas within the Hassayampa project limits:

- Grand Avenue (US-60) – SR-303L: This growth area is designated as an important commercial and employment center, maximizing economic development opportunities at the intersection of these two major transportation corridors. The SR-303L corridor will also be the focus of a future transit local route, providing a connection to and from the economic activity centers along Bell Road.
- Jomax Road – Grand Avenue: This area is almost at the geographic center of the Surprise MPA and is expected to have a high degree of mixed-use development, including a regional commercial and employment center and high-density residential development. Many people are expected to live, work and shop in this area.
- Grand Avenue – 211th Avenue: Planned as a major activity center, with intermodal freight (BNSF Railroad) facilities, commerce, employment and educational institutions.
- Jomax Road – 163rd Avenue: This area is optimal for high-technology firms or the development of a university-type research park. It is the only major employment-designated area in the MPA that does not have any noise or vibration constraints from aircraft or the BNSF railroad.
- Sun Valley Parkway – 211th Avenue: This area is expected to grow as a residential center with a mix of medium, medium-high and high-density residential development. This is an attractive area because of the substantial open space and viewsheds provided by the White Tank Mountains.
- 243rd Avenue – Sun Valley Parkway: Because of its proximity to White Tank Mountain Regional Park, this area is anticipated to become the site for high-end, low-density residential development for residents with higher incomes. Resort development will be targeted for this area, along with high-end retail and commercial activities.
- SR-303L Corridor: Some fairly intense development is expected along this corridor, including medium-density residential, commercial, employment, and mixed-use areas. As in many other portions of the study area, a complete arterial roadway system and other new infrastructure will have to be built to accommodate new residents and businesses. This area will also serve as the southern gateway to Surprise.

According to the future land use map in the Surprise General Plan, north of US-60 Surprise will consist primarily of residential development with small commercial and employment nodes along this highway. South of US-60, a large area of office/employment and mixed-use development will surround the Luke Air Force Base Auxiliary Field, bordered on the north by low-density residential development and on the south by medium- and high-density residential. Land along the McMicken Dam will be retained as open space. The portion of the city south of US-60 on both sides of SR-303L will continue to develop as a relatively dense residential and mixed-use area.

Maricopa County

The Maricopa County Comprehensive Plan indicates three General Plan Development Areas (GPDA), or growth areas. A GPDA is an unincorporated area that is likely to be annexed by a city or town in the future, and is therefore included in an adopted municipal general plan (and in the MPA for that municipality). These areas within the county include all land in the Buckeye MPA south of I-10, land spanning US-60 west of SR-303L in the Surprise MPA, and land spanning Sun Valley Parkway, also in the Surprise MPA. Urban growth area plans have been described for all of these areas in the preceding future land use descriptions for cities and towns.

Based on the Comprehensive Plan, unincorporated Maricopa County west of the Hassayampa River is expected to have mainly low-density residential development, with only small nodes of dense mixed-use development. The Toyota Technical Testing Center and the Palo Verde Nuclear Generating Station are expected to become areas of high employment. Tonopah (unincorporated) will become an area of mixed-use development, while Wintersburg will become a regional commercial center.

2.2.6 Public Land Management

Public lands in the study area are managed by both the ASLD and the BLM. The ASLD has authority over state lands until they are sold or leased, when planning authority is handed over to the appropriate city or county. BLM retains planning authority and control over its lands and rarely sells them to private entities, but will participate in land swaps in order to accumulate larger masses of land or release BLM-owned islands.

Three public land management studies are currently (January 2007) underway in the study area (Figure 2-18). The ASLD is studying land holdings west of the White Tank Mountains for future auction. This project is called the White Tanks Land Use Master Plan and will seek to help guide future development of these lands. The BLM is completing a Resource Management Plan and Environmental Impact Statement for a large portion of land in southwest Maricopa County, including all land south of I-10 in the study area. This study will guide the intensity of human interaction with the land in and around the Sonoran Desert National Monument.

The third study is a BLM project: the Phoenix South Planning Area Resource Management Plan (RMP) and Environmental Impact Statement (EIS). The management plan includes BLM lands bordering the Sonoran Desert National Monument, south of the Hassayampa study limits. The RMP will establish the amount of human interaction with the natural environment and the appropriate and allowable uses. Generally speaking, the overarching vision of the BLM is to retain an open and functioning desert ecosystem while still filling multiple-use needs.

2.2.7 Master Planned Communities

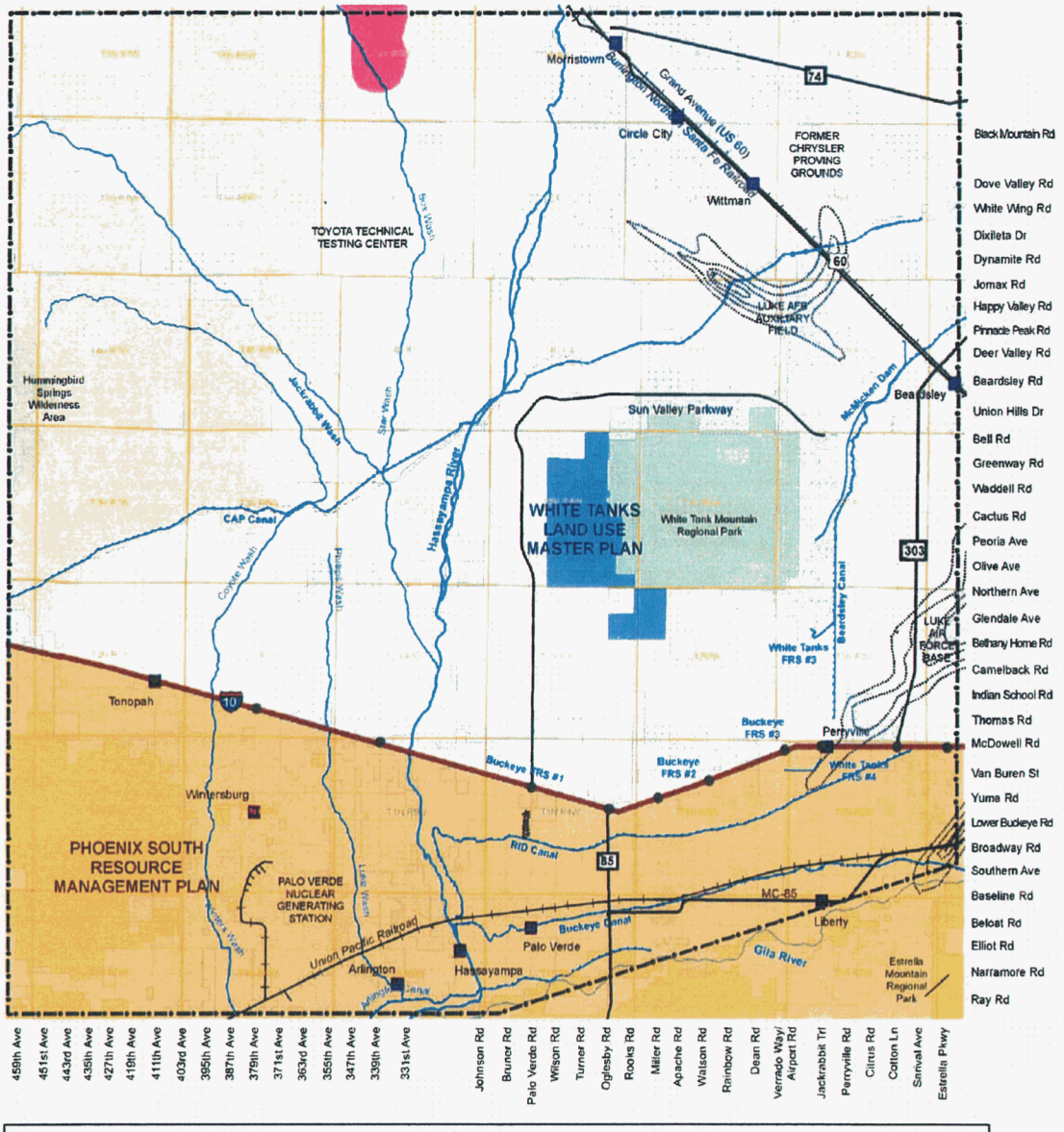
As of August 2006, at least 100 master-planned communities were planned within the study area. These communities are at various stages of development, with a general east-to-west growth pattern. The City of Surprise has an even balance of privately-owned lands and state land. Surprise's planning area has many small communities planned, but much of the private land is still open to new development proposals. North of I-10, the Town of Buckeye is almost entirely entitled with large master-planned communities. South of I-10, on the other hand, many smaller scattered communities are planned.

With the exception of Maricopa County's Belmont and Whispering Ranch master-planned communities, few developments are currently planned outside the municipal planning areas west of the White Tanks. Much of this land is owned by the BLM, which essentially precludes future large-scale development.

Planned Communities Development Overview and Implications

Figure 2-19 shows all of the planned residential developments known within the study area in August 2006. This map depicts approximately 100 planned developments, currently at various planning stages. More detailed information on each of these communities can be found in Table 2.4. Pertinent information was gathered from developers and local jurisdictions. The study team made every effort to obtain accurate and complete information up to August 15, 2006.

Figure 2-18 Public Land Management Studies



PUBLIC LAND MANAGEMENT STUDIES

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- BLM Raptor Protection Area
- Noise Contours
- Study Area Boundary

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation
- ASLD Managment Plan
- BLM Management Plan

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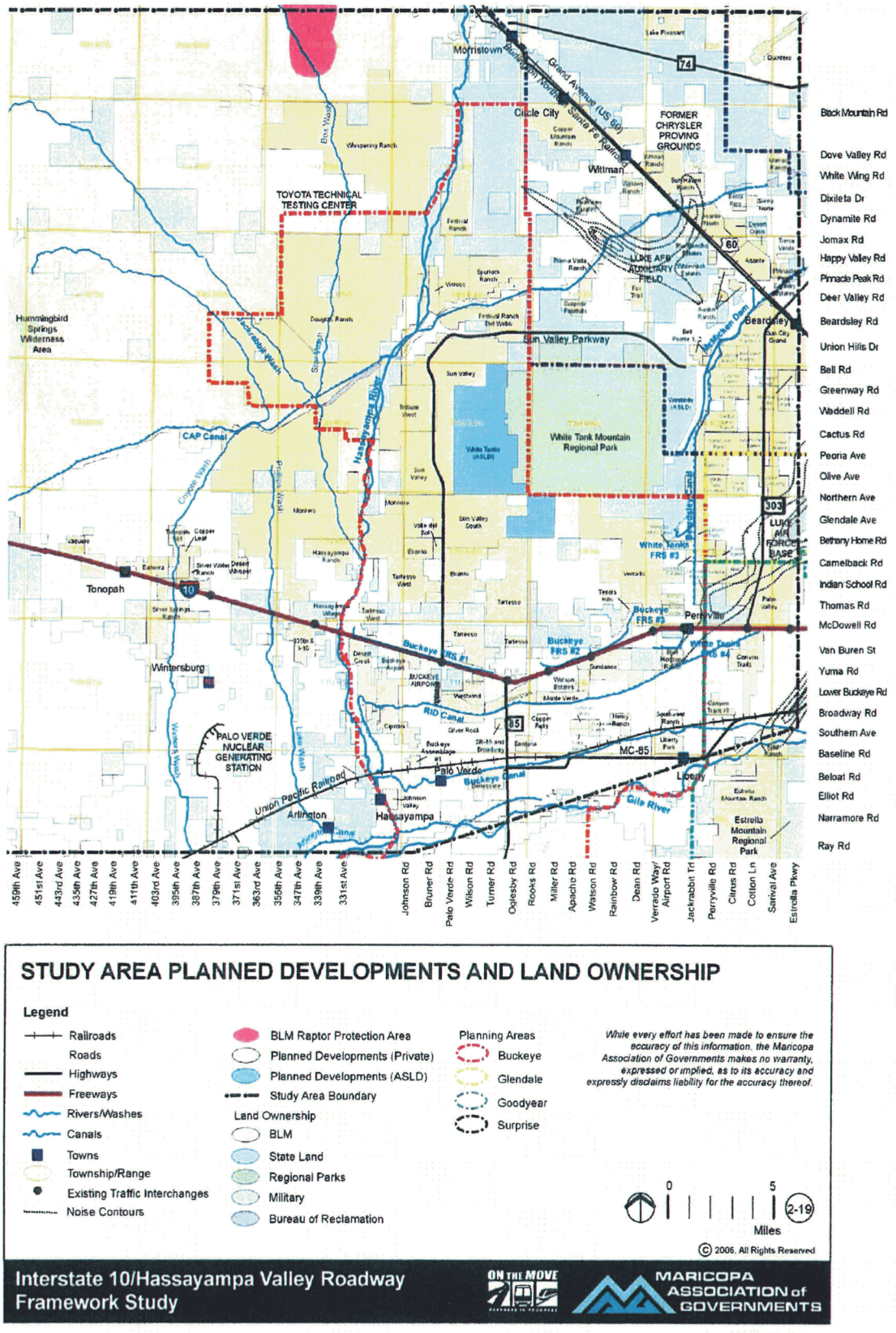
Figure 2-19 Study Area Planned Developments and Land Ownership



STUDY AREA PLANNED DEVELOPMENTS AND LAND OWNERSHIP

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Towns
- Township/Range
- Existing Traffic Interchanges
- Noise Contours
- BLM Raptor Protection Area
- Planned Developments (Private)
- Planned Developments (ASLD)
- Study Area Boundary

Land Ownership
- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

Planning Areas
- Buckeye
- Glendale
- Goodyear
- Surprise

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AUGUST 30, 2006

Table 2.4 Hassayampa Valley Master Planned Communities

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Buckeye MPA								
Benessere	Proposed	1,100	3,800	unknown	unknown	unknown	unknown	unknown
Blue Horizons	Approved	565	2,225	26	1	0	0	3.94
Cipriani	Proposed	2,362	6,453	187	5	0	1	2.73
Copper Falls	Approved	275	857	43	0	0	0	3.12
Desert Creek	Proposed	2,234	8,490	245	3	0	1	5.50
Douglas Ranch	Approved	35,250	84,034	2,472	27	0	6	2.39
Elianto	Approved	3,751	12,501	143	4	0	1	unknown
Festival Ranch	Approved	10,105	24,176	unknown	unknown	unknown	unknown	2.40
Henry Park	Proposed	430	1,655	unknown	unknown	unknown	unknown	3.85
Monte Verde	Proposed	860	2,991	38	0	0	1	3.30
Montierre	Approved	477	2,065	unknown	unknown	unknown	unknown	3.50
Sienna Hills (formerly Tesota Hills)	Approved	444	1,302	3	0	0	0	2.59
Silverock	Approved	1,241	5,397	83	3	0	0	4.35
Southwest Ranch	Approved	457	1,560	126	0	0	0	3.41
Spurlock Ranch	Approved	2,840	7,329	270	4	1	1	2.58
Sun Valley	Approved	16,266	41,370	413	26	0	4	3.26
Sun Valley Villages I, II	Proposed	5,770	17,536	669	11	0	2	3.28
Sun Valley South	Approved	11,200	29,200	1,265	4	0	0	2.93

Table 2.4 - Continued

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Sundance	Approved	2,016	6,862	222	3	0	0	3.40
Tartesso	Approved	13,000	50,000	57	4	0	1	3.56
Tartesso East, Amendment 2	Approved	5,780	23,270	110	4	0	1	4.03
Tartesso West, Amendment 1	Approved	5,124	19,667	189	10	0	1	3.84
Trillium	Approved	3,042	8,762	108	4	0	1	2.88
Valle del Sol	Proposed	320	1,129	40	0	0	0	4.0
Ventana Ranch (Buckeye Farms)	Approved	319	1,050	89	0	0	0	3.34
Verrado	Approved	8,800	14,080	600	1	1	1	1.60
Westpark	Approved	1,060	3,895	165	3	0	0	3.30
Westwind	Proposed	807	3,000	39	2	0	0	3.72
Maracay White Tanks 320	Proposed	318	1,020	0	0	0	0	3.20
Surprise MPA								
Austin Ranch	Future	850	2,240	18	1	0	0	2.64
Austin Ranch II	Proposed	175	674	25	0	0	0	3.84
Arizona Traditions	Under Construction	532	1,769	unknown	0	0	0	3.33
Asante	Future	1,508	6,703	101	2	0	0	4.40
Asante North	Proposed	2,106	6,000	232	3	0	0	4.26
Bell Pointe 1	Under Construction	106	405	unknown	0	0	0	3.82
Bell Pointe 2	Proposed	27	155	3	0	0	0	6.17

Table 2.4 - Continued

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Bell West Ranch	Under Construction	286	1,100	unknown	0	0	0	3.85
Buena Vista Ranch	Proposed	353	10,169	22	unknown	unknown	unknown	3.02
Copper Mountain Ranch	County	unknown	10,000	unknown	unknown	unknown	unknown	unknown
Desert Oasis	Under Construction	890	3,520	unknown	unknown	unknown	unknown	3.96
Fox Trail	Future	877	2,320	30	unknown	unknown	unknown	2.65
Grand Vista	Future	7,500	22,000	unknown	unknown	unknown	unknown	2.90
Lake Pleasant	County	5,000	9,800	unknown	unknown	unknown	unknown	1.96
Marisol Ranch	Approved	634	2,070	unknown	unknown	unknown	unknown	3.26
Peakview Estates	County	483	244	13	unknown	unknown	unknown	1.98
Prasada	Approved	3,355	4,495	1,225	3	0	0	4.51
Rio Rancho Estates	Future	194	863	34	unknown	unknown	unknown	4.44
Sarah Ann Ranch	Imminent	320	960	unknown	unknown	unknown	unknown	3.00
Sierra Montana	Under Construction	776	2,635	unknown	unknown	unknown	unknown	3.40
Sierra Norte	Proposed	160	374	unknown	unknown	unknown	unknown	unknown
Sun City Grand	Completed	3,723	9,510	114	0	0	0	2.55
Sunhaven Ranch	Approved	2,116	8,001	375	3	0	0	3.78
Surprise Farms	Under Construction	1,415	4,405	unknown	1	0	1	3.11
Surprise Foothills	Proposed	1,089	2,129	unknown	unknown	unknown	unknown	1.96
Surprise Ranch	Proposed	200	662	unknown	unknown	unknown	unknown	3.31
Sycamore Farms	Imminent	637	1,177	226	unknown	unknown	unknown	1.85

Table 2.4 - Continued

Name	Status	Total Acres	Total Dwelling Units	Commercial/ Employment Acres	Schools			Target Density* (du/acre)
					Elementary Schools	Middle Schools	High Schools	
Tierra Rico	Proposed	80	177	0	0	0	0	2.21
Walden Ranch	Proposed	520	1,761	29	unknown	unknown	unknown	3.39
Whonnock Estates	Proposed	40	154	unknown	unknown	unknown	unknown	3.85
Witman Ranch	County	577	1,570	unknown	1	0	0	2.72
Zanjero Trails	Proposed	831	3,525	18	1	0	0	4.42
Maricopa County MPA								
Balterra	Proposed	1,110	6,100	161	1	0	0	5.50
Belmont	Approved	20,800	72,800	2,059	16	4	2	3.50
Copper Leaf	Proposed	1,280	3,986	204	2	0	0	3.10
Desert Whisper	Proposed	961	3,505	43	1	0	0	3.88
Hassayampa Ranch	Approved	2,066	5,707	36	2	0	0	2.67
Hassayampa Village	Proposed	160	unknown	96	unknown	unknown	unknown	unknown
Silver Springs Ranch	Proposed	2,389	8,086	152	1	0	1	3.38
Silver Water Ranch	Proposed	529	2,077	37	0	0	0	3.50
Tonopah 561	Proposed	561	2,902	102	1	0	0	5.17
339th & I-10	Proposed	1,290	4,276	180	1	0	0	2.67
Goodyear MPA								
King Ranch	Approved	2,000	5,712	86	2	0	0	2.86

*Does not necessarily equal "Total Dwelling Units" divided by "Total Acres."
Source: Community Master Plans/Land Use Maps 2002-2006; table compilation complete as of August 15, 2006.

Developments east of the White Tank Mountains generally follow existing arterials and section lines, fitting into the larger grid network. Developments west of the White Tanks are typically larger and have created their own internal circulation patterns, not coinciding with any established roadway network or grid (which typically does not exist this far west). A key objective of this study is to develop an arterial roadway framework in this area to allow access between these communities, and between the Hassayampa Valley and other areas. However, the topography west of the White Tank Mountains, with its many washes and hills, will not easily conform to the traditional one-mile arterial grid network that has worked well throughout the Phoenix metropolitan area.

This study will also define access to I-10 and other high-capacity transit corridors. Currently, only Belmont and Douglas Ranch have a defined strategy in their master plans for routing a high-capacity transportation corridor through the community. The developers envision this route as the future CANAMEX Corridor, which will follow the 347th Avenue alignment through the center of the Belmont community, departing to the north over the CAP Canal. North of Belmont, Douglas Ranch has planned its town center and large-scale, mixed-use development along this route.

Major Master Planned Communities Summaries

Adjacent to and west of the White Tank Mountains, the planned developments are much larger than those farther south or east. A more in-depth review of six of the largest developments appears below and in Table 2.5, which uses information from Table 2.4 for a simple comparison of these developments.

Table 2.5 Major Master-Planned Communities Summary

Name	MPA	Total Acres	Total Dwelling Units	Target Density (du/acre)*
Belmont	Maricopa County	20,800	72,800	3.5
Douglas Ranch	Buckeye	35,250	84,034	2.39
Sun Valley	Buckeye	16,266	41,370	3.26
Sun Valley South	Buckeye	11,200	29,200	2.93
Tartesso	Buckeye	13,000	50,000	3.56
Verrado	Buckeye	8,800	14,080	1.6

*Gross area density; does not necessarily equal "Total Dwelling Units" divided by "Total Acres."

Source: Community Master Plans/Land Use Maps 2002-2005.

- Belmont: The master plan for Belmont was developed in 1991, with an expected Buildout timeframe of 40 to 50 years. It is composed of 25 residential villages developed for various market segments. Each village will have a distinct community node, generally focused around a school and a neighborhood park. A village center in the center of Belmont will contain extensive regional employment and service industries. Belmont will have a variety of housing types, with the neighborhoods least dependent on the employment center (i.e., retirement neighborhoods) to be developed first. Later residential development will include suburban-style single-family development, rental, and luxury housing. Belmont has planned for alignment of the proposed CANAMEX route through the village center.

- Douglas Ranch: The master plan for Douglas Ranch was developed in 2001. The development covers approximately 36 square miles with 27 planning areas, each developed around a school and neighborhood park. Many large wash corridors such as Jackrabbit Wash run through the development, leading to a land use plan with ample open space and looping roadways. The majority of the community will be composed of low-density residential development, with higher densities concentrated around the town center, located at the intersection of Douglas Parkway and Wickenburg Highway. This area, as well as the entire Wickenburg Highway corridor, is part of a CANAMEX land use corridor, which will contain much commercial and mixed-use development. The town center will also have a transit center to accommodate eventual bus and rail service.

- Sun Valley/Sun Valley South: The master plans for Sun Valley and Sun Valley South were developed in 2001. These communities span Sun Valley Parkway from approximately Bethany Home Road to Union Hills Drive. Villages will be grouped around school sites, with small areas of neighborhood commercial development. Larger commercial development will be located near arterial intersections, with a large urban center located in Sun Valley South near the intersection of Sun Valley Parkway and Glendale Avenue. Located at the edge of the White Tank Mountains, many open space corridors are planned, including several golf courses. Sun Valley will be composed of primarily medium-density residential development, with slightly lower densities in Sun Valley South.

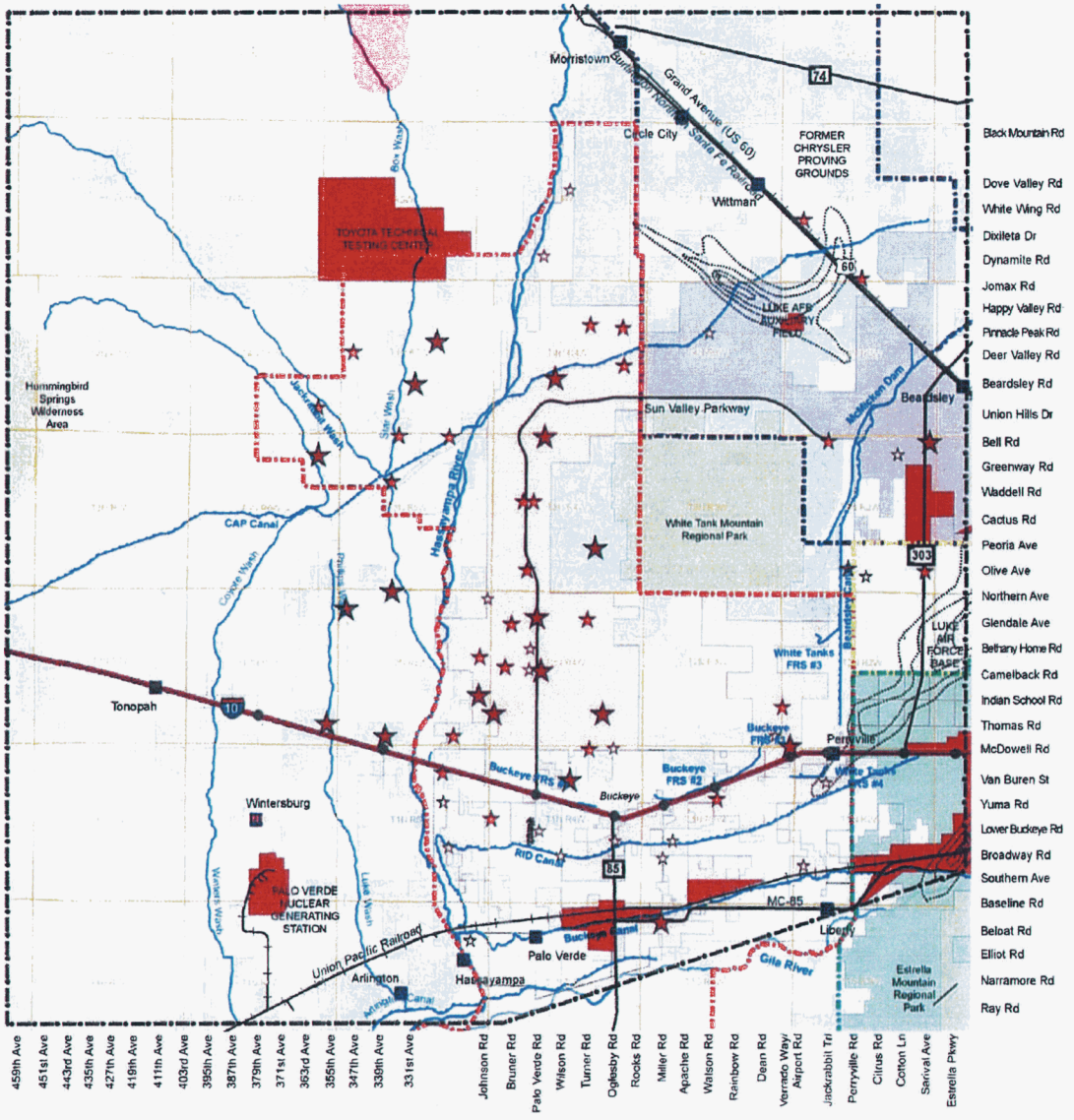
- Tartesso: The master plan for Tartesso was developed in 2002. Tartesso consists of several tracts of land on both sides of Sun Valley Parkway, south of both the Sun Valley and Sun Valley South communities. Development, which will cluster around neighborhood parks and schools, will consist primarily of medium- to high-density residential development, but with lower densities and more open space at the base of the White Tank Mountains. The Tartesso Town Center, to be located just north of I-10 at Sun Valley Parkway, will accommodate several shopping centers, two large employment complexes, a lifestyle center similar to Scottsdale's Kierland Commons, an auto mall, a movie theater, hospital, hotels, and higher-density residential development.

- Verrado: Located at the southern base of the White Tank Mountains, Verrado broke ground in 2002. The community is known for its "neo-traditional" style of architecture and urban development, a style that fosters interaction between neighbors and a quaint atmosphere, achieved through a dense town center, closely spaced houses, front porches and parks. The Verrado Main Street District is located at approximately the Camelback Road alignment and Verrado Way. This walkable area contains loft apartment living, shops, services, and restaurants. Another commercial node is located closer to I-10. Residential development is concentrated in the southern/central part of the development, as the northern portion is too steep because of the White Tank foothills. Much of this more mountainous area will be preserved as open space, with a resort, golf courses, and large estate residential development.

Major Employment Centers

Figure 2-20 maps significant employment centers in the study area. Except for some existing facilities (the Luke Air Force Base Auxiliary Air Field, the Toyota Technical Testing Center and PVNGS), major employment centers will be located along high-capacity transportation corridors such as I-10, SR-303L and MC-85. This pattern is likely to continue west as development spreads. The larger master-planned communities are also likely to have "town centers" serving as hubs of employment and other economic activity.

Figure 2-20 Major Economic Activity Centers



MAJOR ECONOMIC ACTIVITY CENTERS

Legend

- Railroads
- Roads
- Highways
- Freeways
- Rivers/Washes
- Canals
- Township/Range
- Towns
- Existing Traffic Interchanges
- Noise Contours
- Proposed Arterials
- BLM Raptor Protection Area
- Study Area Boundary
- Major Economic Activity Centers

Future Employment Centers (by community size)

- Over 10,000 acres
- 2,000 - 10,000 acres
- 0 - 2,000 acres

Jurisdictions

- Buckeye
- Goodyear
- Surprise

Planning Areas

- Buckeye
- Glendale
- Goodyear
- Surprise

Land Ownership

- BLM
- State Land
- Regional Parks
- Military
- Bureau of Reclamation

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Alignments for new freeway, highway, arterial, and light rail/ high capacity transit facilities will be determined following the completion of appropriate design and environmental studies.

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AUGUST 30, 2006

2.3 Related Studies and Reports

This section summarizes 26 studies considered pertinent to the Interstate 10-Hassayampa Valley Roadway Framework Study. They are grouped according to status: completed (within the last ten years), in progress, and future. Transportation studies are summarized in Chapter 4.

2.3.1 Completed Studies

1. West Valley South Power Line and Substation Project

Date Completed: December 2003
Lead Agency: APS
Author: URS Corporation

Purpose of Study: This study sought to respond to the increasing demand for electricity in the West Valley by expanding electrical services in Avondale, Buckeye, Glendale, Goodyear, Litchfield Park and Maricopa County. The goal of the project was to site substations and power lines in locations that minimize impacts to the natural and human environment.

Study Area: The area studied is bounded by approximately Thunderbird Road on the north, Baseline Road on the south, Oglesby Road on the west and 99th Avenue on the east.

Process: A comprehensive and detailed inventory of existing and future land uses, scenic resources, and other environmental factors was conducted. This environmental analysis was done in conjunction with an aggressive community involvement plan. Each alternative substation site and power line route was then evaluated by resource specialists to assess the potential impact of each alternative on land uses, scenic views, historic/archaeological sites and biological resources. After all potential substation sites and power line routes were assessed; they were ranked by level of impact.

Recommendations Relevant to the Study Area: The preferred system will allow APS to consolidate some 69kV and 230kV transmission lines on the same structures. The line will run north along Perryville Road from approximately Southern Avenue to Bethany Home Road, moving west to Tuthill Road and again north to Olive Avenue, where it will run east along Olive Avenue to the SR-303L alignment. The power line will then follow SR-303L south to Campbell Avenue, where it will loop west to meet up with the Perryville Road alignment. This option contains five new power line substations.

2. West Valley North Power Line and Substation Project

Date Completed: May 2005
Lead Agency: APS
Author: URS Corporation

Purpose of Study: This study was an extension of the West Valley South Power Line and Substation Project, also seeking to expand electrical services in the West Valley, while siting substations and power lines in locations that minimize impacts.

Study Area: The study area extended from approximately Jomax Road on the north to Northern Avenue on the south and from Sun Valley Parkway on the west to Reems Road/US-60 on the east.

Process: A comprehensive and detailed inventory of existing and future land uses, scenic resources and other environmental factors was conducted. This environmental analysis was done in conjunction with an aggressive community involvement plan. Each alternative substation site and power line route was then evaluated by resource specialists to assess its potential impact on land uses, scenic views, historic/archaeological sites and biological resources. After all potential substation sites and power line routes were assessed, they were ranked by level of impact.

Recommendations Relevant to the Study Area: The preferred system begins at Olive Avenue, paralleling SR-303L north to Cactus Road, and then proceeds west to one-half mile east of the Jackrabbit Trail

(195th Avenue) alignment. From there, the route continues north to approximately Beardsley Road, where it jogs west three-fourths of a mile, then north to Deer Valley Road, and west again to 243rd Avenue. Finally, it jogs north (following an existing fiber optic installation) to the CAP Canal, which it follows westerly to terminate at the proposed substation.

3. Palo Verde Hub to TS-5 500 kV Transmission Line Project

Date Completed: June 2005
Lead Agency: APS
Author: Environmental Planning Group

Purpose of Study: This study planned electrical transmission infrastructure to bring bulk power into the high growth area west of the White Tank Mountains. The project also will strengthen the entire APS transmission system by providing an additional high-voltage transmission source to the Phoenix metropolitan area, allowing importation of power from generating sources at or around the PVNGS.

Study Area: The study area has an irregularly shaped border that extends approximately four miles north of the CAP Canal, four miles south of the PVNGS, two miles west of Harquahala Valley Road, and two miles east of Sun Valley Parkway.

Process: In addition to general land use and environmental analysis, because this power line was proposed to be partially located on federal land, adherence to the National Environmental Policy Act was required, causing APS to work with the BLM to file right-of-way application and conduct an Environmental Assessment (EA). A public involvement program was conducted simultaneously with the EA.

Recommendations Relevant to the Study Area: The recommended transmission line will begin at the Palo Verde Hub at either the PVNGS or the Arlington Valley Energy Facility, and proceed northwest for approximately 20 miles to the north side of the CAP Canal. The line will then turn east and parallel the canal for approximately 23 miles, terminating at the new TS-5 Substation near the Hassayampa Pumping Plant along the canal.

4. Buckeye Conceptual Planning

Date Completed: June 2000
Lead Agency: Arizona State Land Department (ASLD)
Author: BRW, Inc.

Purpose of Study: This report outlined the needs for state lands within the Buckeye MPA for the year 2020, based on population and employment projections.

Study Area: The MPA of the Town of Buckeye.

Process: The study used several allocation models to predict the amount of employment, residential dwelling units and population in the year 2020. The mapping and socioeconomic analyses were also used to estimate future conditions in the study area.

Recommendations Relevant to Study Area: The Final Conceptual Plan outlines land use for approximately 19,900 acres of developable state lands in Buckeye. There are projected to be approximately 55,000 dwelling units accommodating a population of 128,000 in the year 2020. This future development includes 1,936 acres of commercial and employment uses and areas for potential affordable housing.

5. El Rio Watercourse Master Plan

Date Completed: March 2006
Lead Agency: FCDMC
Author: Stantec Consulting Inc.

Purpose of Study: The plan is intended to examine a range of flood control management plans that will foster maintenance and enhancement of the Gila River.

Study Area: The plan encompasses a segment of the Gila River from its confluence with the Agua Fria River westward to its crossing of SR-85.

Process: Development of the plan entailed identification of flood and erosion hazards, a definition of river characteristics, incorporation of stakeholder concerns, minimization of future spending of public funds, and consideration of environmental characteristics and multiple-use activities. Several plans were considered and evaluated based on public safety, social, economic, and environmental criteria.

Recommendations Relevant to Study Area: The final recommended alternative was a combination of soft-structural and non-structural elements with resource vegetation management. These elements were designed to prevent erosion and follow the 100-year floodway.

6. Padelford Wash Floodplain Delineation Study

Date Completed: 2002
Lead Agency: Flood Control District of Maricopa County (FCDMC)
Author: A-N West, Inc.

Purpose of Study: This study was conducted to create a new detailed floodplain analysis of Padelford Wash.

Study Area: The area of Padelford Wash lies between the CAP Canal on the south and SR-74 on the north, approximately along the 163rd Avenue roadway alignment.

Process: Development of the plan entailed identification and delineation of floodplain corridors within the assigned study area.

Recommendations Relevant to Study Area: This study provided a more detailed drainage analysis for this corridor to assist in development feasibility studies.

7. Offsite Emergency Response Plan for Palo Verde Nuclear Generating Station

Date Completed: Unknown
Lead Agency: Maricopa County
Author: Maricopa County Emergency Management Department

Purpose of Study: This plan was created to ensure a coordinated response to protect the public from the effects of radiation exposure in the event of an incident having offsite consequences.

Study Area: The response plan considers all land within a 50-mile radius of the PVNGS, which is located on 4,080 acres near Wintersburg.

Process: This plan outlines necessary responses and communications in case of a serious event. Two emergency planning zones (EPZ) surround PVNGS: the Plume Exposure Pathway EPZ and the Ingestion Exposure Pathway EPZ. The Plume Exposure Pathway EPZ covers a 10-mile radius around the PVNGS and includes evacuation routes for residents. The Ingestion Exposure Pathway EPZ has a 50-mile radius, denoting the area in which food or potable water could become contaminated as a result of a release of radioactive materials into the atmosphere.

Recommendations Relevant to Study Area: The Plume Exposure Pathway EPZ outlines evacuation routes from the PVNGS in case of a nuclear event. These evacuation routes follow existing arterial and high-capacity roadways within the Hassayampa study area, including I-10, Buckeye-Salome Road, 355th Avenue, Wintersburg Road, Elliot Road and Old US 80.

8. Maricopa County Eye to the Future – White Tank/Grand Avenue Area Plan

Date Completed: 2000
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This plan was compiled to provide one cohesive document in which regional growth and development conditions are addressed and analyzed. It is intended to prepare for growth over the next 15 to 20 years.

Study Area: Boundaries of the planning area encompass 760 square miles and include all or parts of the following communities: Avondale, Buckeye, El Mirage, Glendale, Goodyear, Litchfield Park, Peoria, Surprise, Youngtown, Sun City, Sun City West, Wittman, Circle City and Morristown (the last five are unincorporated). The boundaries extend from approximately SR-74 on the north to the Gila River on the south, and from the eastern limit of the Town of Buckeye on the west to Lake Pleasant Road on the east.

Process: This study is an updated consolidation of two previous sub-area studies: the White Tank/Agua Fria Policy and Development Guide and the Grand Avenue Area Plan, published in 1982 and 1992. They were combined into one document so that regional considerations could be identified, analyzed and addressed.

Recommendations Relevant to Study Area: Goals formulated at the conclusion of the study include integration of land use development with transportation systems and the natural environment; promotion of public health, safety and welfare; roadway improvements to accommodate future needs; and encouragement of the use of transit and alternative transportation modes.

9. Maricopa County Eye to the Future – Tonopah Arlington Area Plan

Date Completed: September 2000
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This study incorporates new and current issues in an update of the previous area plan, which was intended to guide decisions by the Planning and Zoning Commission, Board of Supervisors, policymakers and the private sector.

Study Area: The planning area for this study encompassed the communities of Tonopah and Arlington.

Process: Tonopah and Arlington were addressed as individual planning areas.

Recommendations Relevant to Study Area: Many of the policy recommendations in the area plan evolved from pre-existing plans within Maricopa County that were adapted to fit the Tonopah/Arlington area. The main transportation objective is the establishment of a countywide circulation system providing safe, convenient and efficient movement of goods and people. The plan recommends, among numerous policies, the development of alternative modes of transportation, maintenance of existing roadways, improved Interstate highway access, and provision of all-weather travel over washes.

10. Maricopa County Eye to the Future – State Route 85 Corridor Area Plan

Date Completed: November 2002
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: The plan was intended to prepare for and accommodate growth throughout the SR-85 corridor for the next ten to twenty years.

Study Area: The study area covers approximately 360 square miles and encompasses SR-85 from I-10 to I-8. The corridor also includes land up to five miles east and west of SR-85, stretching into the towns of Buckeye and Gila Bend.

Process: This corridor plan sets goals, objectives and policies in land use, transportation, environment, economics, growth areas, open space, water resources and cost that will be used to guide development along SR-85. The plan will be re-evaluated and updated periodically.

Recommendations Relevant to Study Area: Future land uses of the area within the Hassayampa study area (a six-mile segment of SR-85 from I-10 to the Gila River) will include two commercial centers to the west of SR-85 near the El Paso Natural Gas Line Road; and a mix of dedicated open space, rural residential, large lot residential, and industrial employment centers. Recommendations include upgrading the existing two-lane SR-85 to a four-lane highway, as well as concentrating urban development around the Town of Buckeye.

11. Maricopa County Eye to the Future – Rainbow Valley Area Plan

Date Completed: January 2003
Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This study is an update of a previous area study. It was initiated in response to rapid growth in Rainbow Valley, the evolution of new issues, the availability of new mapping data, and legislation that required new planning elements.

Study Area: Rainbow Valley is bounded by Rainbow Road on the west, Citrus Road on the east, Southern Avenue on the north, and El Paso Natural Gas Line Road on the south.

Process: This plan contains a series of goals, objectives, and policies used to define development standards, guide public investment, and guide public and private decision-making. Residents and stakeholders presented new planning objectives and the old study area was expanded to incorporate new development.

Recommendations Relevant to Study Area: Priorities in the plan, reflecting public input, center on preservation of open space and a rural lifestyle. Most of the planning area overlapping with the Hassayampa study area is intended to be used for low-density or large-lot residential development. The public also expressed concern with access across the Gila River and the environmental impacts of growth in general and all-terrain vehicles in particular.

12. Maricopa County Regional Trail System Plan

Date Completed: August 2004
Lead Agency: Maricopa County
Author: Maricopa County Trail Commission

Purpose of Study: This study created a regional planning framework for a 1,521-mile trail network for pedestrians, equestrians, bicyclists, and other non-motorized trail users, expanding upon existing and planned trail systems and seeking to provide connections between municipalities, trails, parks, and neighborhoods, as well as to provide open space corridors to protect natural and cultural resources.

Study Area: Maricopa County.

Process: The Maricopa County Trail Commission was formed in February 2000 to help form a regional trail system, using established trail routes and identifying future trail corridors throughout Maricopa County. The 1,521 miles of the Maricopa County Regional Trail System are organized into segments and priorities that will serve as a guide for implementing the trail plan.

Recommendation Relevant to Study Area: The Hassayampa study area contains portions of various proposed trail systems. The Priority 1 segments, including portions of the Beardsley Canal and Gila River floodplain, are part of the Sun Circle Trail or the Maricopa Trail. Priority 2 segments are important regional corridors that connect to the Maricopa Trail and may provide connections to regional park systems, such as trails along I-10 and Buckeye-Salome Road. Priority 3 segments are regional corridors that are not currently key components of the regional trail system, but may become important future trails. Examples are the RID Canal, the Hassayampa River and the CAP Canal. Most Priority 4 trails are conceptual corridors in outlying areas of Maricopa County, including several in the Hassayampa study area.

13. Estrella Mountain Ranch/Goodyear General Plan Amendment

Date Completed: March 2006
Lead Agency: Newland Communities
Author: DMJM Harris

Purpose of Study: This narrative describes the elements of, and justification for, a Major General Plan Amendment within the City of Goodyear to establish a transportation framework for the master-planned community of Estrella Mountain Ranch, including arterial roadway and transit options, as well as a plan for the extension of SR-303L south of I-10 and across the Gila River.

Study Area: Estrella Mountain Ranch Master-Planned Community in Goodyear.

Process: This document has been submitted to the City of Goodyear for City Council approval in December 2006.

Recommendations Relevant to Study Area: The proposed SR-303L alignment follows the east side of Waterman Wash, south to I-8 through a combination of privately owned and BLM land. This alignment is open to change, however, as the Hidden Valley Regional Transportation Study will begin in early 2007. This study will mirror the Hassayampa study, exploring potential roadway connections south of the Gila River from 459th Avenue to approximately I-10. Alignment possibilities may demonstrate alternative routes for SR-303L, such as creating a north-south connection to I-8 in Pinal County or an east-west connection to I-10 near Maricopa, either north or south of the Ak-Chin Indian Community.

14. Palo Verde to Pinal West Transmission Project

Date Completed: 2004
Lead Agency: SRP
Author: Greystone Environmental Consultants

Purpose of Study: This study is a result of the Central Arizona Transmission System Study to determine new power line transmission capacity for central Arizona. The objective is to analyze system reliability, capacity and increasing demand for energy delivery in Arizona, and to plan for any additional required transmission. The project began as one, but was subsequently divided in two, Palo Verde to Pinal West (PV-PW) and Pinal West to Southeast Valley/Browning (PW-SEV/BRG). The latter is outside the Hassayampa study area.

Study Area: The study area follows the El Paso Natural Gas Line Road alignment on the south, bordering the Sonoran Desert National Monument, and extends for approximately six miles north and east of this alignment, originating at the Hassayampa Substation and terminating at the Pinal West substation.

Process: An extensive siting process was conducted to determine the most appropriate location for the power line, involving a land use and environmental analysis as well as an extensive public outreach program.

Recommendations Relevant to the Study Area: Only a portion of the recommended alternative falls within the Hassayampa study area. The preferred 500 kV transmission line alignment runs south from the Red Hawk substation until it meets El Paso Natural Gas Line Road, and then follows this rural road to the Pinal West Substation.

2.3.2 Current Studies

15. Palo Verde Hub to North Gila 500 kV Transmission Line Project

Lead Agency: APS
Author: Environmental Planning Group

Purpose of Study: This project will site a new 500 kV transmission line that will provide the electrical transmission infrastructure to import additional generation resources from the power plants in and around the Palo Verde Hub (agglomeration of the PVNGS and Hassayampa, Red Hawk, Arlington, and Mesquite substations) into the Yuma area, which is experiencing high growth. The project will also improve the reliability of the APS electric system in the Yuma area by providing an additional high-voltage transmission source to that region

Study Area: The study area extends from the La Paz/Yuma County line on the north to the Barry M. Goldwater Air Force Range on the south, and from the Colorado River on the west to the Palo Verde Hub on the east.

Implications for the Hassayampa Study Area: The recommended alternative in the EA shows the transmission line running southwest from the Palo Verde Hub and following the Union Pacific Railroad line west of the Signal Mountains toward Yuma.

Project Status: The EA will be complete in summer 2006, with a Finding of No Significant Impact and a Record of Decision expected in fall 2006. A Certificate of Environmental Compatibility will be then be submitted to the State of Arizona, with approval expected by spring 2007.

16. White Tanks Master Land Use Plan

Lead Agency: ASLD
Author: URS Corporation

Purpose of Study: This study will illustrate a conceptual land use plan for state land holdings west of White Tank Mountain Regional Park. This plan is being prepared to help guide future development and auction of these lands.

Study Area: Adjacent state land parcels west of White Tank Mountain Regional Park.

Implications for the Hassayampa Study Area: The recommended land use plan will eventually be incorporated into the Town of Buckeye General Plan. Understanding the vision for these lands will help in assessing locations and determining classifications for future roadways in this area. The preliminary draft calls for mostly low-density residential development, with areas of commercial and employment along the extensions of Peoria Avenue, Cactus Road and Waddell Road, west of the White Tank Mountains. Turner Road would also be extended north, weaving through the state lands as a major north-south arterial roadway.

Project Status: Draft White Tanks Master Land Use Plan published in May 2006.

17. West Side Study Area Conceptual Plan, White Tanks

Lead Agency: ASLD
Author: ASLD

Purpose of Study: This study will illustrate a conceptual land use plan for state land holdings north and east of White Tank Mountain Regional Park. This plan is being prepared to help guide future development and auction of these lands.

Study Area: State land parcels adjacent to the north and east sides of White Tank Mountain Regional Park.

Implications for the Hassayampa Study Area: The recommended land use plan will eventually be incorporated into general plans for Maricopa County and the City of Surprise. Understanding the vision for these lands will help in assessing locations and determining classifications for future roadways in this area. The preliminary draft shows areas of high commercial development along Sun Valley Parkway/Bell Road, as well as commercial and high-density residential development along Northern Avenue, near the eastern edge of White Tank Mountain Regional Park.

Project Status: Preliminary Conceptual Plan draft published in May 2006.

18. Phoenix South Planning Area Resource Management Plan (RMP) and Environmental Impact Statement (EIS)

Lead Agency: Department of the Interior
Author: BLM, Phoenix Field Office

Purpose of Study: The overarching vision of the BLM in creating a RMP for the Phoenix South Planning Area is to retain an open and functioning desert ecosystem while still fulfilling multiple-use needs.

Study Area: The Phoenix South Planning Area covers approximately 8.8 million acres in Maricopa, Pinal and Pima counties. It comprises all of the land south of I-10 in the Hassayampa study area.

Implications for the Hassayampa Study Area: The management plan will include criteria identified for special status species, grazing management, fire management, mineral and energy resources, land, realty and recreation. Issues raised during the scoping process also address preservation of visual resources, transportation and access needs, utility corridor development, and socioeconomic impacts of land use. All of these factors will be used to determine the amount and capacity of public use on BLM land.

Project Status: A Draft EIS was expected to be released to the public in late fall 2006.

19. Buckeye Sun Valley Parkway Area Drainage Master Plan (ADMP)

Lead Agency: FCDMC
Author: FCDMC

Purpose of Study: This ADMP will identify known and potential flooding and erosion hazards in the Buckeye/Sun Valley area. It will estimate flood potential for watersheds, map watercourses, identify existing and potential drainage problems, and develop preliminary solutions and standards for sound floodplain and stormwater management.

Study Area: The watershed for the study area is generally bounded by Gates Road to the north, the White Tanks Mountains and the Dean Road alignment to the east, the Gila River to the south, and the Hassayampa River to the west, covering approximately 280 square miles.

Implications for the Hassayampa Study Area: This study will identify areas of flooding and drainage concerns, especially relative to new development in the study area. FCDMC will offer both structural and nonstructural alternative solutions to reduce flooding hazards.

Project Status: This project began in June 2003 and the data collection phase is complete.

20. Loop 303 Corridor/White Tanks ADMP

Lead Agency: FCDMC
Author: URS, Logan Simpson Design

Purpose of Study: This ADMP will identify existing drainage issues and provide alternative stormwater management plans in a north/south regional drainage corridor. These plans will be coordinated with the development of SR-303L.

Study Area: The study will analyze of approximately 220 square miles of watershed from the McMicken Dam south to the Gila River, and from the White Tank Mountains east to the Agua Fria River.

Implications for the Hassayampa Study Area: The study will identify drainage problems, update the existing hydrology, and develop cost-effective solutions for a storm water collection and disposal system. It will also identify potential outfall alternatives.

Project Status: An alternative was selected in October 2003 using a series of channels and basins to convey flows to the Gila and Agua Fria Rivers by maximizing the use of existing flood control facilities. The project area adjacent to SR-303L will be modified to reflect the upgrade of SR-303L from a parkway to a freeway.

21. Lower Hassayampa Watercourse Master Plan

Lead Agency: FCDMC
Author: J.E. Fuller Hydrology and Morphology

Purpose of Study: This watercourse master plan will identify and develop a plan and technical guidance for managing flood hazards, lateral migration of the watercourse, and cumulative impacts of existing and future development.

Study Area: The study area generally includes the floodplain and erosion hazard areas of the lower Hassayampa River, extending from the confluence with the Gila River on the south to the CAP Canal on the north--including the confluence of Jackrabbit Wash with the Hassayampa River.

Implications for the Hassayampa Study Area: This project will determine future land uses and the width of the lower portion of the Hassayampa River. Recommendations may include bridge crossings, channelization, and relationships to adjacent residential or commercial development.

Project Status: Phase 1, Existing Studies Inventory, is complete. Phase 2, the development of the master plan, will begin in January 2007.

22. Wittman ADMP

Lead Agency: FCDMC
Author: Entellus

Purpose of Study: The purpose of the Wittmann ADMP is to identify potential solutions to mitigate existing flooding problems and anticipate future ones associated with impending development. The goal of this study is to keep ahead of development and identify mostly non-structural flood control solutions for the area.

Study Area: The study area is composed of approximately 308 square miles in unincorporated Maricopa County, Peoria, Surprise and Buckeye, beginning at approximately Peoria Avenue on the south, extending north into Yavapai County, and generally following Douglas Ranch Road and McMicken Dam as the western and eastern boundaries.

Implications for the Hassayampa Study Area: This study will assess issues associated with McMicken Dam and the CAP Canal, anticipate future potential drainage problems, and generate "Rules of Development" with policies, standards, and guidelines to help guide development in this area.

Project Status: A consultant was selected in March 2006 and data collection is underway. This project is expected to take approximately 2.5 years to complete.

23. Maricopa County Eye to the Future – McMicken Dam Scenic Corridor Guidelines

Lead Agency: Maricopa County
Author: Maricopa County Planning and Development Department

Purpose of Study: This study is intended to provide policies that will guide development along a scenic corridor, by maintaining the vision of the Maricopa County Regional Trail System and the natural environment of washes, vegetation, and wildlife.

Study Area: The scenic corridor extends southwest for 9.5 miles from Grand Avenue to Peoria Avenue along McMicken Dam. The project area encompasses land within one-fourth mile of the property owned by FCDMC.

Implications for the Hassayampa Study Area: Maricopa County policies favor leaving existing conditions intact. The guidelines favor preservation of sensitive natural habitats, the use of open space as a development buffer, and imparting a southwestern character to development. Building height, signage, lighting and fencing are to be limited.

Project Status: A draft version of the report was published in March 2006.

24. Buckeye General Plan Update

Lead Agency: Town of Buckeye
Author: Partners for Strategic Action

Purpose of Study: This study is an update of the Town of Buckeye's General Plan, completed in 2001. The General Plan and the Town's Development Code will be completely rewritten to reflect recent and projected growth trends in the area, including the many entitled master-planned communities that are expected to make Buckeye one of Arizona's largest cities.

Study Area: Buckeye MPA.

Implications for the Hassayampa Study Area: This study will establish a transportation plan and update the current zoning plan within this MPA, which lies almost completely within the Hassayampa study area.

Project Status: This project began in March 2006, with expected completion in the spring of 2007.

2.3.3 Future Studies

25. Luke Wash ADMP

Lead Agency: FCDMC
Author: To be determined

Purpose: The purpose of this study is to identify flooding hazards and develop alternatives for mitigating them. The study will incorporate development plans for the area and jurisdictional drainage policies to develop a preferred solution.

Study Area: The study will include an analysis of approximately 115 square miles, with the northern limit just north of the CAP Canal, the southern boundary at the Gila River, the eastern limit along the Hassayampa River and Jackrabbit Wash, and the western boundary west of 163rd Avenue.

Expected Date of Initiation: January 2007

26. Upper Daggs/Star Wash Floodplain Delineation Study

Lead Agency: FCDMC
Author: To be determined

Purpose of Study: This study will upgrade approximately 75 linear miles of existing floodplains and tributaries of Daggs and Star washes to provide the county with improved floodplain mapping and analysis.

Study Area: The Upper Daggs/Star Wash study area is located immediately west of the Hassayampa River and north of the Patton Road alignment.

Expected Date of Initiation: Summer 2006

2.4 References Cited

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November 17, 2008

Shane Gosdis
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2415 East Camelback Road
Suite 700
Phoenix, Arizona 85016-4245

RE: 10,000 WEST'S THIRD SET OF INFORMAL DATA REQUESTS IN THE APS TS-5 TO TS-9 LINE SITING PROCEEDING
DOCKET NO. L-00000D-08-0330-00138

Dear Mr. Gosdis:

Enclosed is Arizona Public Service Company's response to 10,000 West's Third Set of Informal Data Requests in the above-captioned matter.

If you or your staff have any questions regarding the enclosed information, please contact Jeff Johnson at (602) 250-2661.

Sincerely,

Barbara Klemstine

Attachments

BK/dk

INTERVENOR 10,000 WESTS
THIRD SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY
DOCKET NO. L-00000D-08-0330-00138
NOVEMBER 6, 2008

10,000 West 3.1 Please provide a copy of the contract for the sale of the TransWest Express transmission project.

Response: APS objects to this request as untimely and irrelevant. Eleven days of hearing have taken place and the hearing is near complete. Moreover, the TransWest Express project is not relevant to this proceeding. Not withstanding these objections, APS is producing copies of the TransWest Express contracts, which are attached hereto at APS13193 and APS13195.

EXECUTION COPY

RIGHT OF FIRST OFFER AGREEMENT

This Right of First Offer Agreement (this "Agreement"), dated as of July 28, 2008 (the "Effective Date"), is between **The Anschutz Corporation**, a Kansas corporation ("TAC"), and **Arizona Public Service Company**, an Arizona corporation ("APS").

Recitals

A. TAC, APS, National Grid Transmission Services Corporation, a Massachusetts corporation ("National Grid"), Wyoming Infrastructure Authority, an instrumentality of the State of Wyoming ("WIA," and together with APS and National Grid, the "Existing Parties"), are parties to the TransWest Express Transition Agreement, dated as of the Effective Date (the "Transition Agreement"), pursuant to which (i) TAC agreed to assume the role of lead developer with respect to the Project (as such term is defined in the Transition Agreement; for clarity, the Project shall not include any generation assets or rights); (ii) the Existing Parties agreed to assign and transfer to TAC all of their rights and interests in the Project, and (iii) TAC agreed to cause the Existing Parties to be reimbursed certain costs incurred by the Existing Parties in developing the Project under certain circumstances (the "Reimbursement Obligation"), in each case, subject to TAC's right to terminate the Transition Agreement and its obligations thereunder and to cause a reversion of the Project to APS and WIA. Capitalized terms used herein and not otherwise defined herein have the respective meanings set forth in the Transition Agreement.

B. In connection with the transactions provided for by the Transition Agreement, TAC desires to grant to APS a right of first offer to acquire certain undivided, direct ownership interests in all, but not less than all, of the assets constituting the Project (the "Direct Interests").

Agreement

In consideration of Ten Dollars ($10.00) paid by APS to TAC, the execution by APS of the Transition Agreement and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. **Notice of Proposed Transfers.** Except as provided in Sections 3 and 4, neither TAC nor the legal entity formed by TAC in the future to hold and develop the Project (the "Project Entity") shall transfer any Direct Interests or any equity interests in the Project Entity ("Equity Interests" and collectively with the Direct Interests, the "Interests") to any individual, corporation, limited liability company, joint venture, partnership, trust, unincorporated organization or governmental entity or agency (any such transferee is herein called a "Person" and any such transfer is herein called a "Transfer"), unless TAC or the Project Entity, as the case may be, shall have first given notice to APS of its intent to transfer such Interests (the "Transfer Notice") at least 45 days in advance of the Transfer. The Transfer Notice shall set forth (i) the Interests that are proposed to be transferred and the intent of TAC or the Project Entity, as the case may be, to seek to Transfer such Interests, (ii) the terms and conditions of such Transfer which may be in the form of definitive documents or in the form of a term sheet describing at least the offering price and all material representations, warranties, covenants, indemnities, and contribution or funding commitments, (iii) in the case of a proposed Transfer of Direct Interests, all material operating agreements or co-owner agreements that will burden the Direct Interests being transferred or that will be assumed by the transferee, and (iv) in the case of a proposed Transfer of Equity Interests, all material governing documents of the Project Entity and any other material agreements to which the equity interests in the Project Entity being transferred will be subject or that will be assumed by the transferee.

In the case of a proposed Transfer of Equity Interests, the Transfer Notice shall also set forth the Direct Interests representing the same percentage interest in the Project assets as are indirectly represented by such Equity Interests, and the equivalent purchase price therefor, which price shall take into account all debt of the Project Entity or that burdens the Project assets.

The Transfer Notice shall be deemed an irrevocable offer to transfer the Direct Interests described therein (which in each case shall include whatever transmission access rights such Direct Interests may afford APS under applicable laws, tariffs and regulatory approvals), as applicable, covered by the Transfer Notice to APS in accordance with the terms of this Agreement. During such 45 day period, TAC shall make available for inspection by APS the books, records and information in TAC's possession relating to the Project and the Project Entity (if such Project Entity exists) subject to a customary confidentiality agreement.

2. Right of First Offer; Final Offer.

(a) Upon receipt of the Transfer Notice, APS shall have an irrevocable and exclusive option, but not the obligation, to purchase all or any portion of the Direct Interests covered by such Transfer Notice for the same consideration and on the same terms and conditions as are specified in the Transfer Notice; *provided, however,* APS shall not have the right to acquire more than 15% of the total Direct Interests through the exercise of its rights under this Agreement with respect to one or more Transfer Notices in the aggregate. It is understood that APS shall have no rights to acquire any Equity Interests.

Such option may be exercised by APS only if it provides notice of its election to exercise such option to TAC or the Project Entity, as applicable, on or before the 45th day after the receipt of the Transfer Notice by APS. APS and TAC or the Project Entity, as applicable, shall in good faith, as promptly as practicable, but in no event later than 30 days from the date of termination of the 45-day election period, prepare and enter into the documentation necessary to consummate such Transfer.

If APS elects to purchase either none, or less than all, of the offered Direct Interests specified in the Transfer Notice, then the right of first offer under this Section 2 shall terminate and be of no further force or effect solely as to the proposed Transfer of that portion of the Direct Interests offered to APS in the Transfer Notice that APS does not elect to purchase (the Direct Interests in a given Transfer Notice that APS declines to purchase are referred to herein as the "Rejected Interests"), and TAC or the Project Entity, as the case may be, shall be free to consummate the Transfer of such Rejected Interests, or the Equity Interests corresponding thereto, to a third party, for a price not less than the price specified in the Transfer Notice, and on such other terms and conditions as are not materially more favorable to the third party than those specified in the Transfer Notice, free and clear of any such right of first offer.

If TAC or the Project Entity, as applicable, desires to consummate such Transfer to a third party for a price less than the price specified in the Transfer Notice, or on other terms and conditions materially more favorable to the third party than those specified in the Transfer Notice, then TAC or the Project Entity, as applicable, shall again offer such Direct Interests to APS for such revised price (or revised equivalent price in the case of a proposed Transfer of Equity Interests) and on such changed terms and conditions pursuant to a revised Transfer Notice describing such changes, and APS shall have the right to accept such offer as to all or any portion of such Direct Interests only if it provides notice of its election to accept such offer within ten business days after receipt of such revised Transfer Notice. If APS elects to purchase either none, or less than all, of the offered Direct Interests in such revised Transfer Notice, TAC shall be free to Transfer the Rejected Interests to a third party free and clear of APS's right of first offer for a price not less than the price specified in the revised Transfer Notice, and on such other terms and conditions not materially more favorable to the third party than those specified in the revised Transfer Notice.

(b) If this Agreement has not terminated pursuant to Section 5(b), (c) or (e) prior to the business day immediately preceding the Expiration Date (as defined in Section 5), then TAC shall offer to sell the Shortfall Interests (as defined below), if any, to APS by delivering a Transfer Notice, which shall be subject to the same time periods outlined in Section 2(a) with respect to an initial offer of Direct Interests (i.e., the 45-day election period and 30-day closing period), to APS on or before such business day covering the Shortfall Interests for a price (on a per percentage of Direct Interests basis) equal to all costs and expenses incurred by TAC, its affiliates and the Project Entity (on a per percentage of Direct Interest basis) with respect to the Project from and after the Effective Date *plus* interest at the rate of 10% per annum, compounded annually, on such amounts from the date paid to the date of closing of the Shortfall Interests purchase. TAC shall determine such costs and expenses in good faith and shall make available to APS all information in its possession and to which it has access relating to such costs and expenses. Upon receipt of the Transfer Notice covering the Shortfall Interests, APS shall have an irrevocable and exclusive option, but not the obligation, to purchase all or any portion of the Shortfall Interests covered by such notice.

For purposes of this Agreement, "Shortfall Interests" shall mean the following (but not less than zero), as of the date of the Transfer Notice described in this subsection "(b)," (i) 15% of the total Direct Interests *less* (ii) the aggregate of all of the Direct Interests covered by each Transfer Notice with respect to which APS has elected to purchase all or any portion of the Direct Interests covered by such Transfer Notice (without regard to the date the Transfer Notice) (for purposes of illustration only, if a given Transfer Notice offers APS 10% of the Direct Interests and APS elects to purchase only 5% of such offered Direct Interests, the 10% figure would be used for purposes of calculating the reduction under this clause (ii)), *less* (iii) the aggregate of all of the Direct Interests covered by each Transfer Notice given after 18 months after the Effective Date with respect to which APS has not elected to purchase any portion of the Direct Interests covered by such Transfer Notice and which Direct Interests, or Equity Interests corresponding to the Direct Interests, have been Transferred to a third party for a price not less than the price specified in the applicable Transfer Notice and on such other terms and conditions not materially more favorable to the third party than those specified in the applicable Transfer Notice.

If APS elects to purchase some or all of the Shortfall Interests and closes such purchase, APS shall have the right for a period of 90 days after such closing to dispute TAC's determination of the costs and expenses included in determining the purchase price.

(c) The closing of any acquisition of Direct Interests by APS shall occur at the principal place of business of the Project Entity unless TAC and APS otherwise agree. At the closing, TAC or the Project Entity, as applicable, shall execute and deliver to APS an assignment of the Direct Interests. At the closing, APS's pre-agreement project investment of $1,348,000, *plus* interest at the rate of 10% per annum, compounded annually, from the Effective Date to the closing date (the "APS Investment"), shall be applied toward the purchase price for the purchased Direct Interests. If the entire APS Investment is not used in the initial purchase of Direct Interests, such APS Investment shall be applied toward subsequent purchases of Direct Interests until used in its entirety. TAC shall be deemed to have satisfied its obligations to APS under Section 5 of the Transition Agreement to the extent the APS Investment has been applied toward the purchase of Direct Interests.

3. **Exempt Transfers; Restriction**. This Agreement and APS's first offer rights shall not apply to (a) any Transfers (i) by TAC to the Project Entity or (ii) by TAC or the Project Entity to any Person that controls, is controlled by or is under common control with TAC, or (b) the Transfer of 100% of the Direct Interests in the Project or 100% of the Equity Interests in the Project Entity, *provided* that, with respect to any Transfers described in subsections (a) or (b), any such transferee must assume TAC's obligations under this Agreement. Other than assets sold or disposed of in the ordinary course of business that are not needed for the Project, TAC covenants that it will not transfer any direct ownership

interest in any of the Project assets other than in the form of a Transfer of all of such Project assets or of an undivided direct percentage interest in all of such assets (which in each case shall be subject to subsection (b) above and require the assumption by the transferee of TAC's obligations under this Agreement).

4. Pledge. This Agreement and APS's first offer rights shall not apply to (i) any pledge or other encumbrance of any Interests as security for borrowed money or in connection with financing the Project and any Transfer (whether voluntary or involuntary) in connection therewith or (ii) to any Transfer to or by any such pledgee or encumbrancer in connection with any foreclosure, Transfer in lieu of foreclosure or other realization upon such Interests; *provided, however*, that TAC (and any transferee assuming TAC's obligations under this Agreement) will not enter into any pledge or any other agreement encumbering the Direct Interests (each a "Security Agreement"), as contemplated in subsection (i) of this Section 4, which would impair APS's rights under this Agreement prior to the occurrence of an event of default by TAC (or its transferee) under the terms of such Security Agreement (for example, a negative covenant or definition of "event of default" in the Security Agreement that restricts or prevents TAC from performing its obligations to APS under this Agreement).

5. Termination. This Agreement and APS's first offer rights hereunder shall automatically terminate, and shall have no further force and effect upon the *earliest* to occur of the following (the "Expiration Date"):

(a) the fourth anniversary of the Effective Date;

(b) such time as APS has elected to purchase 15% of the Direct Interests pursuant to one or more Transfer Notices given after the Effective Date;

(c) such time as (i) the aggregate of all of the Direct Interests covered by each Transfer Notice with respect to which APS elects to purchase all or any portion of the Direct Interests covered by such Transfer Notice (without regard to the date the Transfer Notice(s) with respect thereto) (for purposes of illustration only, if a given Transfer Notice offers APS 10% of the Direct Interests and APS elects to purchase only 5% of such offered Direct Interests, the 10% figure would be used for purposes of calculating the applicable amount under this clause (i)), *plus* (ii) the aggregate of all of the Direct Interests covered by each Transfer Notice given after 18 months after the Effective Date with respect to which APS does not elect to purchase any portion of the Direct Interests covered by such Transfer Notice and which Direct Interests, or Equity Interests corresponding to the Direct Interests, have been Transferred to a third party for a price not less than the price specified in the applicable Transfer Notice and on such other terms and conditions not materially more favorable to the third party than those specified in the applicable Transfer Notice, equals or exceeds 15% of the total Direct Interests;

(d) such time as "Financial Closing" has occurred under the Transition Agreement; and

(e) the termination of the Transition Agreement, in the case of this Section 5(e), whether or not APS has exercised its option to acquire offered Direct Interests, if such Direct Interests have not been transferred to APS prior to the termination of the Transition Agreement.

The parties hereto agree that (i) APS may terminate this Agreement at any time upon written notice to TAC, and (ii) TAC may only terminate this Agreement before the Expiration Date if it concurrently terminates the Transition Agreement pursuant to the terms thereof.

Upon the termination of this Agreement for any reason, neither party shall have any further obligations hereunder, except that (i) the provisions in this Agreement for accepting and closing on any Direct

Interests, including the Shortfall Interests, if any, shall continue to apply according to their terms (which means, in part, that APS may (A) elect to purchase any Direct Interests offered in any Transfer Notice that is outstanding at the time of termination and (B) close on the purchase of any Direct Interests that APS has elected to purchase (but not yet purchased) prior to the time of termination), and (ii) the termination of this Agreement shall not release any party from any liability for any breach by such party of this Agreement prior to such termination.

The parties hereto agree that APS's obligations to TAC under the Transition Agreement (other than under Section 5 thereof) shall terminate upon the termination of this Agreement.

6. **Notices**. All notices, requests and demands to or upon a party to be effective shall be in writing (including by telecopy), and shall be deemed to have been duly given or made when delivered by hand or a nationally recognized overnight courier service upon actual receipt or, in the case of telecopy notice, when confirmation is received, addressed to the addresses set forth on the signature page hereto or to such other address as may be designated by a party in a written notice to the other party.

7. **Waiver and Amendment**. Any covenant, term or condition of this Agreement which may legally be waived, may be waived, or the time of performance hereof extended, at any time by the party hereto entitled to the benefit thereof. This Agreement may only be amended by an instrument in writing signed by all of the parties to this Agreement. Any such waiver, extension or amendment shall be evidenced by an instrument in writing executed on behalf of the appropriate party by a Person who has been authorized by such party to execute waivers, extensions or amendments on its behalf. No waiver by any party, whether express or implied, of its rights under any provision of this Agreement shall constitute a waiver of such party's rights under such provisions at any other time or a waiver of such party's rights under any other provision of this Agreement. No failure by any party to take any action against any breach of this Agreement or default by another party shall constitute a waiver of the former party's right to enforce any provision of this Agreement or to take action against such breach or default or any subsequent breach or default by such other party.

8. **Limitation of Liability.** NOTWITHSTANDING ANY OTHER PROVISION OF THIS AGREEMENT, NONE OF THE PARTIES SHALL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES, OR ANY LOST PROFITS, LOST SALES, LOST BUSINESS OPPORTUNITIES, OR BUSINESS INTERRUPTION, WHATSOEVER, WHETHER ANY CLAIM FOR SUCH DAMAGES OR ITEMS SHALL ARISE UNDER THIS AGREEMENT, FROM STATUTORY OR REGULATORY NONCOMPLIANCE, IN TORT (WHETHER NEGLIGENCE, STRICT LIABILITY OR OTHERWISE) OR OTHERWISE.

9. **Specific Performance**. Each of the parties hereby acknowledges and agrees that the other party would be damaged irreparably in the event that any of the provisions of this Agreement are not performed in accordance with their specific terms or otherwise are breached. Accordingly, each of the parties agrees, subject to Section 8, that the other party shall be entitled to an injunction or injunctions to prevent breaches of the provisions of this Agreement and to enforce specifically this Agreement and the terms and provisions hereof in any action instituted in any court of the United States or any state thereof having jurisdiction over the parties and the matter (subject to the provisions set forth in Section 15), in addition to any other remedy to which they may be entitled, at law or in equity.

10. **Assignment**. Except as provided in Section 3, this Agreement may not be assigned by any party without the written consent of the other party. Subject to the preceding sentence, this Agreement shall be binding upon and inure to the benefit of the parties and their respective successors and permitted assigns.

11. Entire Agreement, Etc. This Agreement and any other documents executed in connection herewith express the entire understanding of the parties with respect to the transactions contemplated hereby. Neither this Agreement nor any term hereof may be changed, waived, discharged or terminated, except as provided in Section 7.

12. Severability. In the event that any one or more of the provisions contained in this Agreement shall be declared invalid, void or unenforceable, the remainder of the provisions of this Agreement shall remain in full force and effect, and such invalid, void or unenforceable provision shall be interpreted as closely as possible to the manner in which it was written.

13. Further Assurances; Copy of Project Execution Strategy. The parties further agree to take such additional actions and execute such agreements and instruments as may be reasonably required to effect the intent of the agreements contemplated herein. TAC agrees to furnish to APS, on a confidential basis, a copy of the final Project Execution Strategy promptly following completion thereof (as such term is defined in the Transition Agreement).

14. Counterparts. This Agreement may be executed in one or more counterparts, each of which will be deemed to be an original copy of this Agreement and all of which, when taken together, will be deemed to constitute one and the same agreement. The exchange of copies of this Agreement and of facsimile signature pages by email or telecopier shall constitute effective execution and delivery of this Agreement as to the parties and may be used in lieu of the original Agreement for all purposes. Signatures of the parties transmitted by email or telecopier shall be deemed to be their original signatures for all purposes. In proving this Agreement it shall not be necessary to produce or account for more than one such counterpart signed by the party against whom enforcement is sought.

15. Governing Law, Jurisdiction and Venue. THIS AGREEMENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF COLORADO WITHOUT REFERENCE TO THE RULES THEREOF RELATING TO CONFLICTS OF LAW. THE PARTIES HEREBY IRREVOCABLY SUBMIT TO THE JURISDICTION OF THE STATE AND FEDERAL COURTS LOCATED IN THE CITY AND COUNTY OF DENVER, COLORADO AND AGREE AND CONSENT THAT SERVICE OF PROCESS MAY BE MADE UPON THEM IN ANY LEGAL PROCEEDING RELATING TO THIS AGREEMENT BY ANY MEANS ALLOWED UNDER STATE OR FEDERAL LAW. ANY LEGAL PROCEEDING ARISING OUT OF OR IN ANY WAY RELATED TO THIS AGREEMENT OR ANY OTHER RELATIONSHIP BETWEEN THE PARTIES SHALL BE BROUGHT AND LITIGATED EXCLUSIVELY IN ANY ONE OF THE STATE OR FEDERAL COURTS LOCATED IN THE CITY AND COUNTY OF DENVER COLORADO HAVING JURISDICTION UNLESS THE LENDER SHALL ELECT OTHERWISE. THE PARTIES HERETO HEREBY WAIVE AND AGREE NOT TO ASSERT, BY WAY OF MOTION, AS A DEFENSE OR OTHERWISE, THAT ANY SUCH PROCEEDING IS BROUGHT IN AN INCONVENIENT FORUM OR THAT THE VENUE THEREOF IS IMPROPER.

[Signatures Begin on Next Page]

The parties have executed this Agreement on the date indicated below. This Agreement shall be deemed effective when signed by all of the parties indicated below.

The Anschutz Corporation

By: William J. Miller
Name: WILLIAM J. MILLER
Title: VICE PRESIDENT
Address: 555 - 17TH ST. SUITE 2400
DENVER, CO. 80202

Arizona Public Service Company

By: _____
Name: _____
Title: _____
Address: _____
_____

The parties have executed this Agreement on the date indicated below. This Agreement shall be deemed effective when signed by all of the parties indicated below.

The Anschutz Corporation

By:_____
Name: _____
Title: _____
Address:_____
_____

Arizona Public Service Company

By: [signature]
Name: Steven M. Wheeler
Title: Exec. V.P. Customer Service and Regulation
Address: 400 North Fifth Street MS 9040
Phoenix, Arizona 85004

EXECUTION COPY

TRANSWEST EXPRESS TRANSITION AGREEMENT

TRANSWEST EXPRESS TRANSITION AGREEMENT, dated as of July 28, 2008 (this *"Agreement"*), among **ARIZONA PUBLIC SERVICE COMPANY**, an Arizona corporation (*"APS"*), **NATIONAL GRID TRANSMISSION SERVICES CORPORATION**, a Massachusetts corporation (*"National Grid"*), **WYOMING INFRASTRUCTURE AUTHORITY**, an instrumentality of the State of Wyoming (*"WIA"*, and, together with APS and National Grid, the *"Existing Parties"*), and **THE ANSCHUTZ CORPORATION**, a Kansas corporation (the *"New Lead Developer"* and, together with the Existing Parties, the *"Parties"*).

WHEREAS, APS was the initial developer of the TransWest Express Project (the *"Project"*); and

WHEREAS, the Existing Parties, together with PacifiCorp, an Oregon corporation (*"PacifiCorp"*), later entered into an Interim Agreement, dated as of August 3, 2007 (the *"Interim Agreement"*), to progress the Project, in cooperation with PacifiCorp's Gateway South Project (the *"Gateway South Project"*), with National Grid as the lead developer, which agreement has expired by its own terms; and

WHEREAS, the Existing Parties recognize that the needs of the Project have now fundamentally changed, such that a new lead developer is required to take the Project forward; and

WHEREAS, the New Lead Developer is ready, willing and able, subject to ongoing management reviews and additional due diligence, to take over the role of lead developer;

NOW, THEREFORE, in consideration of the promises contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

§1. ***Definitions***. The terms listed in *Appendix A* hereto, when used in this Agreement, including its preamble, recitals and appendices, shall have the meanings set forth in *Appendix A*.

§2. ***Execution Strategy Completion Date***. The New Lead Developer shall, on or prior to September 30, 2008 (the *"Execution Strategy Completion Date"*), complete all additional due diligence deemed by it to be necessary and develop a new execution strategy for the Project that shall identify a proposed way forward for the Project. Such execution strategy shall address key challenges, partner strategy, regulatory strategy, implementation strategy, budget, etc. (the *"Project Execution Strategy"*).

§3. ***Assignment of Project Assets***.

(a) Each of the Existing Parties hereby assigns and transfers to the New Lead Developer any and all rights and interests such Existing Party may have in and to the Project name of "TransWest Express." The New Lead Developer acknowledges that such name has not been registered as a tradename or trademark.

(b) Each of the Existing Parties will facilitate the New Lead Developer's entering into ongoing agreements with the current Project advisers, as listed in *Appendix B* (the *"Project Advisers"*), for the sole purpose of continuing with the advancement of the Project, for a maximum period of three months from the date of this Agreement. The New Lead Developer is free to continue or discontinue the engagement of any of the Project Advisers, in its sole discretion. To the extent it has the authority to do so, each Existing Party hereby authorizes and directs the Project Advisors to share their work product and any documents prepared by them after the date of the Interim Agreement with respect to the Project with the New Lead Developer. Each of the Existing Parties may, following the date of this Agreement, continue to maintain a relationship with any of the Project Advisers for purposes other than the development of the Project.

(c) Each of the Existing Parties hereby assigns, transfers and will promptly deliver to New Lead Developer following the execution of this Agreement all of such Existing Party's rights and interests in and to the Project, including, without limitation, its interests, if any, in and ownership of (i) the documentation and information listed in *Appendix C* (including in electronic form to the extent such information exists in such form), and (ii) all other documents, models, analyses, studies, evaluations, know how, intellectual property rights, designs and other materials prepared or assembled in connection with the Project to the extent such other materials are jointly owned by the parties to the Interim Agreement, in each case, to the extent that the Existing Party has possession or control over such information and has the legal right to assign and deliver the same to New Lead Developer, (collectively, the *"Project Information"*). New Lead Developer shall own and have the right to use, pledge and transfer the Project Information.

(d) Each of the Existing Parties will facilitate introductions between the New Lead Developer and key stakeholders, provide any required briefings as they relate to the Project and generally provide any support requested by the New Lead Developer, for a maximum period of three months following the execution of this Agreement to the extent that such actions do not conflict with any other priorities or duties that an Existing Party may assign its own personnel. Any such support provided by National Grid shall be free of charge.

(e) National Grid hereby assigns to the New Lead Developer the Right of Way application for the Project that it filed with the BLM (to the extent National Grid is legally able to transfer such application) and shall cooperate to cause the New Lead Developer (or its designee) to be substituted as the applicant for such right-of-way or to assist the New Lead Developer in resubmitting such application in the name of the New Lead Developer (or its designee) as requested by the New Lead Developer. APS and WIA will take all such action as is reasonably necessary to support the foregoing.

(f) National Grid hereby assigns to the New Lead Developer the WECC rating process and the sponsorship of the Project within the respective NTTG and WestConnect Transmission Plans. APS and the WIA will take all such action as is reasonably necessary to support such assignment.

(g) The Existing Parties make no representations or warranties regarding the Project assets, including the Project name, and all Project assets, including the Project name, will be transferred to the New Lead Developer on an "as is, where is, with all faults" basis, and without any recourse against the Existing Parties.

§4. ***New Lead Developer Representations and Covenants.*** The New Lead Developer represents and covenants to and with the Existing Parties as follows:

(a) It has the financial capacity to undertake the lead developer's role.

(b) In assembling any additional equity participants for the Project, it will endeavor to secure participants with adequate financial capacity to advance the Project.

(c) It is open to a number of possible regulatory strategies, and understands that FERC may not support the prior allocation of transmission capacity to the New Lead Developer's owned or affiliated generation (the so-called anchor tenant approach) and that it may be obliged to offer all capacity to the market in a transparent open season process.

(d) It understands that PacifiCorp's Gateway South Project is proposed to be located in portions of the same right-of-way corridor as the Project and that it will be necessary to accommodate such co-location of such projects.

(e) It recognizes that a specialized, multi-disciplined project team will be required in order to effectively lead development of the Project, and is committed to acquiring such a team, either by reaching agreement with a partner, through direct recruitment or through outsourcing.

(f) It understands that in order to progress with the development of the Project, it will be necessary to:

(i) Continue to build the support of potential Project stakeholders;

(ii) Proceed with the WECC rating process and the right of way application with the BLM;

(iii) Provide briefings to APS and the WIA; and

(iv) Represent the Project in various regional forums.

(g) Subject to its termination rights under §11, the New Lead Developer shall use its commercially reasonable efforts to implement the Project Execution Strategy through to full implementation and commercial operation as expeditiously as is reasonably practicable. Nothing in this §4(f) shall undermine the New Lead Developer's termination rights or its right to continue with due diligence into the Project, to undertake periodic management reviews, and to lead the Project in what it considers to be its best judgment.

§5. ***Pre-Agreement Project Costs***. The New Lead Developer recognizes that the Existing Parties have incurred costs in developing the Project prior to the date of this Agreement. As and when the Project reaches Financial Closing and the commencement of Phase 3, the New Lead Developer will cause the Existing Parties to be reimbursed the following sums:

	Pre IA Costs	IA Costs	Post IA Costs	Total
APS	$478,000	$870,000	$0	$1,348,000
NG	$150,000	$870,000	$200,000	$1,220,000
WIA	$150,000	$290,000	$0	$440,000
	$778,000	$2,030,000	$200,000	$2,808,000

The New Lead Developer will similarly bind any successor organization and/or equity participant to its pro rata share of this obligation, such that it survives any subsequent restructuring of the Project. In the event of a termination of this Agreement and reversion of the Project to APS and the WIA as provided in §11, APS and the WIA agree that they, together with their successors and assigns, will be bound by the provisions of this §5 and further agree that the New Lead Developer's documented reasonable costs incurred in developing the Project between the date of this Agreement and any termination of this Agreement shall be reimbursed to the New Lead Developer as and when the Project reaches Financial Closing and the commencement of Phase 3, on the same terms as the pre-Agreement project costs of the Existing Parties are reimbursed as provided in this §5. Without limiting the generality of §6 below, as of the effective date of any reversion of the Project to APS and WIA pursuant to §11 below, the New Lead Developer shall be released of all liability under this §5.

§6. ***Other Costs***. Except as expressly provided in this Agreement, by its execution of this Agreement no Party is assuming and shall not have any obligation or liability with respect to the Project, including without limitation, any contractual or monetary obligation to any person for any costs relating to the Project, or any obligation to proceed with the development or construction of the Project, and any such obligations or liabilities shall arise, if at all, only pursuant to such separate written agreements as may be executed by such Party (which, in the case of the New Lead Developer, will include arrangements with the Bureau of Land Management to pay certain costs incurred by it after the date hereof in processing the right-of-way application for the Project).

§7 ***Future Direct Interest Participation and Governance Arrangements***. From and after the date of this Agreement, the New Lead Developer shall have the unfettered right to structure the future Project equity and governance of the Project and Project financing, as it determines in its sole discretion. The New Lead Developer and APS are entering into a separate Right of First Offer Agreement. For the avoidance of doubt, except for APS's rights under such Right of First Offer Agreement: (i) the New Lead Developer shall have no obligation to offer National Grid, APS, WIA or any other person any rights to acquire future Project equity interests; and (ii) the New Lead Developer is free to negotiate with the WIA or any other person

regarding an ongoing equity participation, but is under no obligation to include the WIA or any other person in any future equity structure.

§8. ***Ongoing Advisory and Supporting Roles for APS and WIA.*** APS and the WIA agree to provide advice and support to the New Lead Developer on Project direction and decisions when solicited by the New Lead Developer. APS will provide such support to the New Lead Developer with the WECC rating process and representation of the Project within various WECC forums, and the WIA will provide support to the New Lead Developer in co-coordinating the Wyoming based wind generation developers and in promoting the deployment of Wyoming based renewable generation in regional policy forums, in each case when solicited by the New Lead Developer.

§9. ***Publicity and Outreach.*** The Parties will issue a press release contemporaneously with the execution of this Agreement, announcing the fact that The Anschutz Corporation has assumed the new lead developer role. Thereafter, until the Execution Strategy Completion Date, the New Lead Developer commits to coordinating an ongoing communications strategy for the Project with APS and WIA. The New Lead Developer will conduct its ongoing development of the Project, including its ongoing communications and outreach program, such that it will not prejudice the good standing, name and reputation of any of the Existing Parties. No Party will make any representations that it is acting as an agent of any other Party and no Party will have any authority to bind any other Party. The name of a Party shall not be used in any advertisement, press release or other publication without such Party's prior written consent.

§10. ***Exclusivity.*** The Existing Parties commit that, prior to any termination of this Agreement pursuant to §11, this Agreement shall constitute an exclusive transition of the Project to the New Lead Developer and the New Lead Developer shall have the exclusive right to develop the Project. For so long as the New Lead Developer is diligently pursuing the development, construction or operation of the Project, each of APS and National Grid agree that it will not develop or participate in any other transmission project unless such project has a different scope and purpose from the Project. This §10 shall not apply to and shall not restrict APS's or National Grid's participation in the Gateway South Project. Nothing in this §10 shall prevent APS from complying with its duties under applicable law, including its duty to provide cost-effective service to its customers.

§11. ***Termination.*** The New Lead Developer shall have the right to terminate this Agreement at any time upon notice to the other Parties. If this Agreement is terminated, then the rights to the Project name of TransWest Express shall revert to APS, all rights and responsibilities relating to and assets included in the Project that have been transferred or assigned to the New Lead Developer under this Agreement or subsequently acquired by the New Lead Developer from the date of this Agreement until the date of such termination shall revert to APS and the WIA; provided, however, that any agreements, commitments, obligations or liabilities created by the New Lead Developer shall not revert to APS or WIA without the prior written permission of APS and WIA. The New Lead Developer shall execute and deliver to APS and the WIA all such instruments and agreements as are reasonably necessary or appropriate to assign all such rights and responsibilities. Following such transfer of such rights and responsibilities, all rights and obligations of the Parties hereunder shall terminate and no Party shall have any liability or obligation to any other Party under this Agreement or otherwise with

respect to the Project; except as set forth in §5. Notwithstanding anything contained in this Agreement to the contrary, termination of this Agreement shall not release any Party from any liability for any breach by such Party of the terms and provisions of this Agreement prior to such termination.

§12. ***Notices.*** All notices, requests and demands to or upon the respective Parties to be effective shall be in writing (including by telecopy), and shall be deemed to have been duly given or made when delivered by hand or a nationally recognized overnight courier service upon actual receipt or, in the case of telecopy notice, when confirmation is received, addressed to the addresses set forth on *Appendix D* hereto or to such other address as may be designated by any Party in a written notice to the other Parties.

§13. ***Waiver and Amendment.*** Any representation, warranty, covenant, term or condition of this Agreement which may legally be waived, may be waived, or the time of performance hereof extended, at any time by the Party hereto entitled to the benefit thereof, and any term, condition or covenant hereof may be amended by the Parties at any time. Any such waiver, extension or amendment shall be evidenced by an instrument in writing executed on behalf of the appropriate Party by a person who has been authorized by such Party to execute waivers, extensions or amendments on its behalf. No waiver by any Party, whether express or implied, of its rights under any provision of this Agreement shall constitute a waiver of such Party's rights under such provisions at any other time or a waiver of such Party's rights under any other provision of this Agreement. No failure by any Party to take any action against any breach of this Agreement or default by another Party shall constitute a waiver of the former Party's right to enforce any provision of this Agreement or to take action against such breach or default or any subsequent breach or default by such other Party.

§14. ***Limitation of Liability and Disclaimer.*** NOTWITHSTANDING ANY OTHER PROVISION OF THIS AGREEMENT, NONE OF THE PARTIES SHALL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES, OR ANY LOST PROFITS, LOST SALES, LOST BUSINESS OPPORTUNITIES, OR BUSINESS INTERRUPTION, WHATSOEVER, WHETHER ANY CLAIM FOR SUCH DAMAGES OR ITEMS SHALL ARISE UNDER THIS AGREEMENT, FROM STATUTORY OR REGULATORY NONCOMPLIANCE, IN TORT (WHETHER NEGLIGENCE, STRICT LIABILITY OR OTHERWISE) OR OTHERWISE.

§15. ***Assignment.*** This rights and obligations of the Existing Parties under this Agreement may not be assigned by such Existing Party without the written consent of each of the other Parties, such consent not to be unreasonably withheld. Subject to the preceding sentence, this Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors and permitted assigns.

§16. ***Entire Agreement, Etc.*** This Agreement and any other documents executed in connection herewith express the entire understanding of the Parties with respect to the transactions contemplated hereby. Neither this Agreement nor any term hereof may be changed, waived, discharged or terminated, except as provided in §13.

§17. ***Severability***. In the event that any one or more of the provisions contained in this Agreement shall be declared invalid, void or unenforceable, the remainder of the provisions of this Agreement shall remain in full force and effect, and such invalid, void or unenforceable provision shall be interpreted as closely as possible to the manner in which it was written.

§18. ***Further Assurances.*** The Parties further agree to take such additional actions and execute such agreements and instruments as may be reasonably required to effect the intent of the agreements contemplated herein.

§19. ***No Third Party Beneficiaries.*** This Agreement is for the sole benefit of the Parties, and no other person or entity is intended to be a beneficiary of this Agreement or shall have any rights hereunder.

§20. ***Counterparts***. This Agreement may be executed in one or more counterparts, each of which will be deemed to be an original copy of this Agreement and all of which, when taken together, will be deemed to constitute one and the same agreement. The exchange of copies of this Agreement and of facsimile signature pages by email or other telecopier shall constitute effective execution and delivery of this Agreement as to the Parties and may be used in lieu of the original Agreement for all purposes. Signatures of the Parties transmitted by email or telecopier shall be deemed to be their original signatures for all purposes. In proving this Agreement it shall not be necessary to produce or account for more than one such counterpart signed by the Party against whom enforcement is sought.

§21. ***Governing Law.*** **THIS AGREEMENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF WYOMING.**

IN WITNESS WHEREOF, the undersigned have duly executed this Agreement as a sealed instrument as of the date first set forth above.

ARIZONA PUBLIC SERVICE COMPANY

By:_____
Name:_____
Title: _____

NATIONAL GRID TRANSMISSION SERVICES CORPORATION

By: [signature]
Name: Stephen Burrage
Title: Senior V.P. Business Development

WYOMING INFRASTRUCTURE AUTHORITY

By:_____
Name:_____
Title: _____

THE ANSCHUTZ CORPORATION

By:_____
Name:_____
Title: _____

IN WITNESS WHEREOF, the undersigned have duly executed this Agreement as a sealed instrument as of the date first set forth above.

ARIZONA PUBLIC SERVICE COMPANY

By: Steven M. Wheeler
Name: Steven M. Wheeler
Title: Exec. V.P. Customer Service and Regulation

NATIONAL GRID TRANSMISSION SERVICES CORPORATION

By: _____
Name: _____
Title: _____

WYOMING INFRASTRUCTURE AUTHORITY

By: _____
Name: _____
Title: _____

THE ANSCHUTZ CORPORATION

By: _____
Name: _____
Title: _____

IN WITNESS WHEREOF, the undersigned have duly executed this Agreement as a sealed instrument as of the date first set forth above.

ARIZONA PUBLIC SERVICE COMPANY

By:_____
Name:_____
Title: _____

NATIONAL GRID TRANSMISSION SERVICES CORPORATION

By:_____
Name:_____
Title: _____

WYOMING INFRASTRUCTURE AUTHORITY

By: [signature]
Name: Steve Wondstra
Title: Executive Director

THE ANSCHUTZ CORPORATION

By:_____
Name:_____
Title: _____

IN WITNESS WHEREOF, the undersigned have duly executed this Agreement as a sealed instrument as of the date first set forth above.

ARIZONA PUBLIC SERVICE COMPANY

By:_____
Name:_____
Title: _____

NATIONAL GRID TRANSMISSION SERVICES CORPORATION

By:_____
Name:_____
Title: _____

WYOMING INFRASTRUCTURE AUTHORITY

By:_____
Name:_____
Title: _____

THE ANSCHUTZ CORPORATION

By: William J. Miller
Name: William J. Miller
Title: Vice President

LIST OF APPENDICES

Appendix A	Definitions
Appendix B	TWE Advisers and Consultants
Appendix C	TWE Project Data
Appendix D	Addresses for Notice

DEFINITIONS

"APS". See preamble.

"BLM". The Federal Bureau of Land Management.

"Execution Strategy Completion Date". As defined in §2.

"Existing Parties". See preamble.

"FERC". The Federal Energy Regulatory Commission.

"Financial Closing" means the date upon which the New Lead Developer and/or its successors and assigns shall have entered into all necessary contractual arrangements or commitments for the debt and equity funding of Phase 3, and the funding arrangements are available to be drawn upon for the Phase 3 activities including construction of the Project.

"Gateway South Project". See preamble.

"Good Utility Practice". Any of the practices, methods and acts engaged in or approved by a significant portion of the electric power industry in the WECC region during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time a decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in the WECC region.

"National Grid". See preamble.

"New Lead Developer". See preamble.

"PacifiCorp". See preamble.

"Phase 3" means those activities, and the period of time during which they are conducted, related to the funding of construction, construction and commissioning of the Project to be undertaken after the Financial Closing.

"Project". See preamble.

"Project Execution Strategy". As defined in §2.

"WECC". The Western Electricity Coordinating Council, or any successor to its responsibilities and functions.

"WIA". See preamble.

TWE Advisers and Consultants

1. Energy Strategies (Scott Gutting and others)
   - strategy, outreach, economic analysis, regulatory analysis

2. Jim Gibson Esq. (engaged through Energy Strategies)
   - Nevada political advice

3. Copper State Consulting (Stan Barnes) (engaged through Energy Strategies)
   - Arizona political advice

4. Black & Veatch (Don Mundy)
   - engineering and construction

5. Charles River Associates (Chuck Trabandt)
   - FERC regulatory advice

6. EPG Group (Garlyn Bergdale)
   - environmental & permitting, 3rd party EIS consultant (Note – EPG is currently bidding for the BLM 3rd party consultant role)

7. Folger Levin & Kahn (Michael Kahn)
   - California political and regulatory advice

8. Holland & Hart (xx)
   - regional legal support (permitting etc)

9. PA Consulting (Andrew Rae)
   - economic analysis

10. SWCA Environmental Consultants (Mark Raming)
    - owner's permit/environmental team (Note – Mark will likely undertake a similar role for PacifiCorp's Gateway South project)

TransWest Express Project Data

(Note: National Grid is undertaking due diligence as to whether any approvals and/or NDA assignments are required for items marked with a *).

Interim Agreement
* Interim Agreement
* Steering Committee - Notes and Actions
* Invoices
* Budget reports and approval

Marketing
Slide Decks
Outreach and Contact Lists/notes
Marketing Notes
Website materials
Communications Plan
Communications Materials – pamphlets, FAQs, Q&A

Economics
Project Economic Report
Independent Project Economic Report – PA Consulting
Frontier Pre-Feasibility Report
Inventory of Industry Reports & Reports

Permitting
TWE Right-of-Way Application, including Preliminary Plan of Development
TWE/GS Transmission Corridor Study
TWE/GS Transmission Corridor Study, supplemental evaluation criteria and draft report
TWE/GS GIS model of route
TWE/GS Surface Management USGS 1:100,000 Scale Topographic Quadrangle Maps
TWE/GS mileage of route by state and federal agency
TWE Draft Purpose & Need Document
TWE/GS Draft BLM Cost Recovery Agreements and MOU's between sponsor, 3rd party consultant and lead agency
TWE 3rd party Environmental Contractor RFP
* TWE 3rd party Environmental Contractor proposal – EPG
* TWE 3rd party Environmental Contractor proposal – ENSR

Engineering
Conceptual Technical Report
Engineering Work Papers
WECC Regional Planning Project Review Report
WECC Project Rating Process Study Plan
PSS/E project model and initial screening report
Wyoming Resource Study

Wyoming Transmission Roadmap
Owner's Engineer (Permitting Support) Scope of Work
* B&V Phase 1 Services proposal

Legal / Regulatory
Applicable State and local permits, condemnation policies, regulations etc. for transmission lines :
Eminent Domain/Condemnation law - Wyoming, Utah, Nevada, Colorado, Arizona
Land Use Regulations Affecting Transmission Projects - WY, UT, NV, CO, AZ
Regulatory Planning Papers:
TWE & GS Review (IA), TWE CAISO TAC and Independent models

Other
Project Estimate Model
Development Schedule and cost estimates

APPENDIX D

ADDRESSES FOR NOTICE

Arizona Public Service Company
400 North Fifth Street MS 2259
Phoenix, AZ 85004
Attention: Robert Smith
Facsimile: 602.250.1155

National Grid Transmission Services Corporation
257 E. 200 S., Suite 330
Salt Lake City, UT 84111
Attention: Stephen Burnage
Facsimile: 801.328.2139

Wyoming Infrastructure Authority
200 East 17th Street, Suite B
Cheyenne, WY 82001
Attn: Mr. Steve Waddington, Executive Director
Facsimile: 307.635.5336

The Anschutz Corporation
555 17th Street, Suite 2400
Denver, CO 80202
Attention: Mr. Bill Miller
Facsimile: 303-299-1518

10-W32

10,000 West LLC
8777 North Gainey Center Drive
Suite 205
Scottsdale, Arizona 85258

March 14, 2008

Arizona Public Service Company
Post Office Box 53933 Mail Station 4030
Phoenix, AZ 85072-3933
Attn: Mike DeWitt

Reference: Arizona Public Service Company Proposed TS-5 to TS-9 500 kV TML Project

Dear Mr. Dewitt:

Thank you again for the helpful meeting of February 12, 2008, and for the information which you have provided to us since.

As we left the meeting, we understood that you were also going to send us:

- the most recent system load studies, related system planning studies, and any other related documents that were used in preparing the 10-year plan for the 2008-2017 period; and
- a map showing APS's current facilities, and current planning for future facilities, in the area west of the area depicted in the "Conceptual Transmission Subtransmission System Northwest Valley Rev. 12/5/2007."

We would appreciate it if you would forward this information to us.

At the meeting, Jan asked that we (and others in attendance) advise APS of any changes in our thinking as to appropriate routings for the proposed 500kV line connecting TS-5 and TS-9. We are writing to provide such an update.

As you will recall, we have previously asked APS to expand its study area to allow meaningful consideration of alignment alternatives west of the Hassayampa River. We have also suggested consideration of an alignment which crosses the Sun Valley Parkway, in order to reach and then follow an existing power corridor located not far, and in a southwesterly direction, from TS-5. In response to these suggestions, we were told that alternatives west of the Hassayampa River were not attractive, in large part because they would entail crossing the Hassayampa River. We were also told that crossing the Sun Valley Parkway would be objectionable to others, so it was not an option worthy of consideration for this proposed project.

In reviewing the materials you provided on and since February 12, 2008, we see that APS's current 10-year plan includes constructing a 230kV line and a 69kV line from TS-5 across the Hassayampa River, in order to serve Douglass Ranch and adjoining areas. The 10-year plan also contemplates crossing the Sun Valley Parkway with a 230kV line and a 69kV line, running from TS-5 to the Buckeye Substation. Based on these factors, we are even more convinced that viable alternatives, consistent with APS's own plans for the near-term future, have been inappropriately excluded from consideration in the work done to date on the proposed TS-5 to TS-9 500kV line.

We have also learned that the Town of Buckeye is working to establish power corridors, which would accommodate lines connecting the Palo Verde generating station with TS-5 and TS-9. As you know, there are already a number of power corridors west of the White Tank Mountains, and we strongly endorse the desire of the Town of Buckeye to plan any additional power corridors in a constructive, thoughtful way, in order to minimize visual and other impacts while insuring that all stakeholders, including APS and landowners in Buckeye, are able to meet their needs and obligations. From what we have seen, it appears that the Town's preferred power corridor is not among the options that are being considered, which again seems inappropriate.

The plans we have been provided[1] show 12 lines entering or emerging from TS-5, and those plans do not include the two 500kV lines which are proposed to enter or emerge from TS-5. The 12 lines are shown as entering six separate power corridors, all within a mile or two of TS-5. And five of these depicted corridors, as we understand them, have no power lines in them today.

In other words, from what we have seen and understand today:

- APS anticipates that it will need to install at least 14 lines into or out of TS-5 within the next 10 years or so, and in doing so expects to create as many as five new power corridors in the immediate vicinity of TS-5;
- At least 3 of the 14 lines (not including the TS-5 to TS-9 500kV line) are expected to cross the Hassayampa River (in order to serve areas west of the Hassayampa River), and at least two other lines (again not including the TS-5 to TS-9 500kV line) are expected to cross the Sun Valley Parkway, but APS is taking the position that it cannot sensibly consider crossing the Hassayampa River or the Sun Valley Parkway with its proposed TS-5 to TS-9 500kV line;
- The TS-5 substation is intended to serve significant areas west of the Hassayampa River, yet those areas (and others likewise to be served) are not included in the study area for the proposed TS-5 to TS-9 500kV project; and
- The Town of Buckeye's preferred alignment is not among the alternatives being considered by APS.

At least 50% of the 14 proposed lines will have, or may have, very significant impacts on the lands owned by 10,000 West. Today 10,000 West is being told where two or three of

[1] We are referring here to the "Conceptual Transmission Subtransmission System Northwest Valley Rev. 12/5/2007."

these lines will be, or are proposed to be, located. It is virtually impossible to make sensible decisions about the proposed location of individual lines, or about mitigation measures related to individual lines, when you know that other lines will be proposed in the near future, and yet their proposed locations (and therefore their likely impacts) are not disclosed.

We continue to want to be a good neighbor, and we value our good relationship with APS. But our bottom line today is that we still think, with all due respect, (i) that APS has arbitrarily excluded consideration of viable alternative routings for its proposed TS-5 to TS-9 500kV project, and (ii) that we cannot sensibly respond to the proposed routing of individual lines, in the absence of a more detailed, meaningful plan for the web of lines that APS apparently anticipates will enter, or emerge from, TS-5. We ask again that APS take the time to reconsider its approach.

Sincerely,

Robert B. Rice
on behalf of
10,000 West LLC

cc:
David French
Jan Bennett
Mark Nadeau
Salem Al-Shatti
Shane Gosdis
Toby Block
Walt Bouchard

W.L. Bouchard
& Associates, Inc.

January 15, 2008

Arizona Public Service Company
Post Office Box 53933 Mail Station 4030
Phoenix, AZ 85072-3933
Attn: Mike DeWitt

Reference: Arizona Public Service Company Proposed TS-5 to TS-9 500 kV TML Project

Subject: Comments Regarding the Routing of 500/230 kV Transmission Line Facilities Impacting Festival Ranch Owned by 10,000 West, LLC

Dear Mike:

This letter is intended to supplement previous comments[1] submitted on behalf of 10,000 West, LLC, regarding Arizona Public Service Company's (APS) proposed TS-5 to TS-9 500/230 kV Transmission Line (TML) Project. As indicated in previous communications, 10,000 West, LLC is the owner of the planned 7,000 acre Festival Ranch development (Festival Ranch). As you know, the subject TML Project includes proposed route links that are located within or on the boundary of Festival Ranch.

Since first learning of the proposed TS-5 to TS-9 500/230 kV TML Project, 10,000 West, LLC has attended several public meetings, evaluated the potential impacts of APS's proposed route links, and submitted extensive comments to APS indicating that the potential impacts of many of the proposed route links associated which would result in significant impacts to Festival Ranch. Additionally, 10,000 West, LLC encouraged an expansion of APS's TS-5 to TS-9 500/230 kV TML Project Study Area to investigate lower impact alternatives, and completed a study of route alternatives to the west of the Hassayampa River ("Western Alternatives Study") which has been provided to APS.

10,000 West, LLC is in receipt of the letter which you sent to them on November 14, 2007, providing APS's response to the above referenced comments including the Western Alternatives Study. The company has also received APS's Project Newsletter #3 that was distributed in mid-November 2007. As you and I have discussed, 10,000 West, LLC is disappointed in APS's decisions not to eliminate proposed route links of concern to Festival Ranch, or to expand the Study Area to the west of the Hassayampa River, or to offer route options west of the Hassayampa River for the TS-5 to TS-9 500/230 kV TML Project.

APS's Project Newsletter # 3 presents the addition of the proposed 230 kV circuit to the TS-5 to TS-9 500/230 kV TML Project. There are concerns that the recently proposed 230 kV circuit was not included in APS's 10 Year Plan 2007-2016, nor had it been presented in any other venues readily available to 10,000 West, LLC. The explanation provided by APS acknowledges growth in the northwest portion of

[1] Reference letters submitted to Mike DeWitt, Project Manager, APS on behalf of 10,000 West, LLC dated August 30, 2007; November 2, 2007; and November 12, 2007.

11209 North 75th Street Scottsdale, AZ 85260
480-905-7163 Office 480-905-7164 Fax
www.wlbouchard.com

the TS-5 to TS-9 500/230 kV TML Project Study area. I respectfully submit that significant growth is also occurring on the west side of the Hassayampa River, and that growth has not been acknowledged by APS in planning route options for the TS-5 to TS-9 500/230 kV TML Project. 10,000 West, LLC believes that additional electric system planning is needed to the west of the Hassayampa River.

10,000 West, LLC believes that the reasons expressed by APS for not expanding route considerations to the west of the Hassayampa do not consider all of the facts at hand. For example, in regard to concerns expressed by APS associated with the river crossing at the TS-5 Substation, 10,000 West, LLC is aware of certificated high voltage power lines that, when built, will create a new corridor across the Hassayampa River. That line is the "Palo Verde Hub to TS-5" Project that will connect a new 500 kV TML to the TS-5 Substation with a new river crossing directly adjacent to the TS-5 substation (ref. State Line Siting Committee Case # 128).

Without a commitment on the part of APS to more positively collaborate with 10,000 West, LLC on these matters, further discussion of routing options west of the Hassayampa River becomes rather one sided. For that and other reasons indicated in previous comments to APS, it is the intention of 10,000 West, LLC to maintain the position that APS has not adequately considered all reasonable options for routing of the TS-5 to TS-9 500/230 kV TML Project.

The attached Exhibit #8a is an amended version of Exhibit #8 (previously submitted to APS by 10,000 West, LLC) that presents an aerial photograph as the base layer, with several overlaying map layers that help to illustrate the areas west of the Hassayampa River suggested for routing consideration. To the extent of the area of the base photograph, Exhibit #8a also indicates the location of APS's Study Area and the route link alternatives presented by APS in the TS-5 to TS-9 Project Newsletter #3. Exhibit #8a also illustrates the new route link opportunity which we think is worthy of serious consideration for routing of the proposed TS-5 to TS-9 500 kV TML west of the Hassayampa River.

Without conceding the expressed positions of 10,000 West, LLC regarding the west side of the Hassayampa River, 10,000 West, LLC continues to request that in the event that the proposed TS-5 to TS-9 500/230 kV TML is routed to the east of the Hassayampa River that the route link alternatives within or on the boundary of Festival Ranch east of the Hassayampa River be eliminated from further consideration. The subject route links are highlighted in red on the previously submitted Exhibit # 4 "TS5 to TS9 500kV TML – Route Links Requested for Removal from Consideration" (ref. 10,000 West, LLC comment letter of 11-02-07). All of these route links present visual, environmental, and construction impacts.

With specific regard to the proposed route links on the east edge of the Hassayampa River proceeding directly north from the TS-5 substation, those links will present significant visual impacts to planned residences within Festival Ranch and environmental impacts to riparian areas. 10,000 West, LLC has planned that high end homes will face the Hassayampa River to benefit from the natural views presented by the riparian habitat of the river. A desert river represents a diverse and unique natural habitat possessing plants, animals, and terrain of great interest. As such, Festival Ranch will feature that riverside habitat as a premium view opportunity for its residents.

In the view of 10,000 West, LLC, the construction of a 500/230 kV transmission line along the eastern edge of the Hassayampa River would present a significant impact to Festival Ranch. There is no other transmission line corridor or other linear siting feature present on the east edge of the Hassayampa River that would serve to mitigate visual impacts. A linear alignment along the east side of the Hassayampa River would also present additional construction costs and the need for construction of pole foundations

that are adequate to withstand anticipated river flows and episodic flooding along the east side of the river. The visual, environmental and construction cost impacts related to the proposed north-south linear route links on the east side of the Hassayampa River would apply equally to a north-south linear alignment on the west side of the river.

It is important to note that the route west of the river suggested by 10,000 West, LLC will involve two tangential east-west crossings through the flowage of the Hassayampa River to connect with a route alternative farther to the west of the river. Such an alignment can avoid significant impacts to the Hassayampa River if planned and constructed properly. For instance, co-location of the exit of the TS-5 to TS-9 500/230 kV TML Project from the TS-5 Substation adjacent to the corridor necessary for the certificated Palo Verde Hub to TS-5 Project would reduce river crossing impacts. 10,000 West, LLC has presented other mitigating factors in previous communications.

There are several other route links presented in APS's Newsletter #3 that cross diagonally or pass along the boundaries of Festival Ranch. These are of significant concern to 10,000 West, LLC. Those route links would result in significant impacts and are delineated in red in the previously mentioned Exhibit # 4. The concern is with land takings, environmental impacts, and visual impacts which are estimated by 10,000 West, LLC to be significant relative to the criteria required for consideration by the Line Siting Committee and the Arizona Corporation Commission.

The proposed route link exiting the TS-5 substation following the CAP canal on the north side also presents significant visual, design, and construction impacts to Festival Ranch. 10,000 West, LLC has encouraged a collaborative design process relative to the certificated West Valley North 230 kV TML planned north of the CAP. APS has not allowed that to occur. Without a resolution of the design of the West Valley North 230 kV TML and related right of way matters, 10,000 West, LLC strongly opposes the route link exiting TS-5 substation following the CAP canal on the north side for the TS-5 to TS-9 500/230 kV TML Project.

I appreciate the opportunity to provide these comments on behalf of 10,000 West, LLC. I am available to meet with you to explain or expand on these comments if you have any questions or need more detail. Thank you again for the courtesy and professionalism you have provided in the past.

I'm looking forward to continuing discussions on these matters.

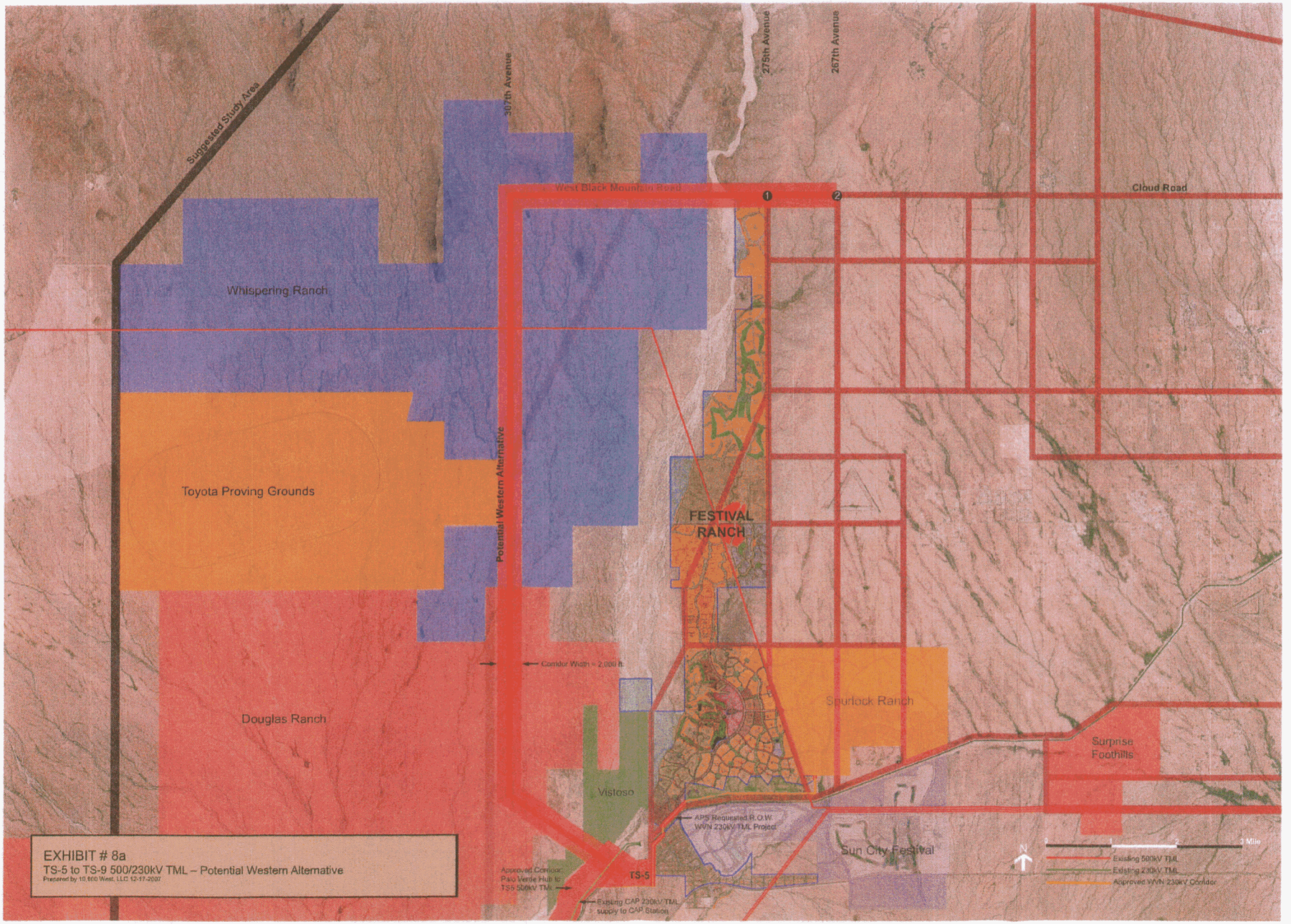
Sincerely,

Walter L. Bouchard, MPH, CIH
President

Attachment

Exhibit #8a Festival Ranch - Route Alternative West of the Hassayampa River

cc/ Salem Al-Shatti
Bob Rice
Toby Block
David French
Mark A. Nadeau, Esq., DLA Piper US LLP
Shane Gosdis, Esq., DLA Piper US LLP


Suggested Study Area
307th Avenue
275th Avenue
267th Avenue
West Black Mountain Road
Cloud Road
Whispering Ranch
Toyota Proving Grounds
Douglas Ranch
Potential Western Alternative
FESTIVAL RANCH
Corridor Width = 2,000 ft.
Spurlock Ranch
Surprise Foothills
Vistoso
APS Requested R.O.W. WVN 230kV T/L Project
Sun City Festival
Approved Corridor: Palo Verde Hub to TS-5 500kV T/L
TS-5
Existing CAP 230kV T/L supply to CAP Station
N
3 Mile
Existing 500kV T/L
Existing 230kV T/L
Approved WVN 230kV Corridor
EXHIBIT # 8a
TS-5 to TS-9 500/230kV TML – Potential Western Alternative
Prepared by 10,000 West, LLC 12-17-2007

Town of Buckeye

January 4, 2008

Mr. Mike DeWitt
Arizona Public Service
Mail Station 8508
P.O. Box 53999
Phoenix, Arizona 85072

Reference: 1) Letter from Jeanine Guy, Interim Town Manager, Town of Buckeye, to Mr. Mike DeWitt, Arizona Public Service, November 1, 2007
2) Letter from Mike DeWitt, Project Manager, Arizona Public Service, to Ms. Jeanine Guy, Town of Buckeye, November 14, 2007, Re: TS-5 to TS-9 Transmission Line Project
3) Letter from Michael Cronin, Director of Entitlements. El Dorado Holdings, to Mr. Mike DeWitt. Arizona Public Service, December 31, 2007

Dear Mr. DeWitt:

Thank you for providing the Town of Buckeye with additional information about the planned changes to the TS-5 to TS-9 Transmission Line Project. The Town supports the efforts of Arizona Public Service (APS) to increase the reliability of electricity supply and service to the Valley and is pleased to learn that APS is looking beyond the immediate 10 year planning horizon in order to respond effectively to the anticipated electrical growth expected in the region. The Town shares this desire to plan with foresight and effectiveness and it was for this reason that we proposed consideration of long range comprehensive utility infrastructure planning and the development of an energy infrastructure corridor.

In light of our commitment to a comprehensive planning solution, the Town asks that APS reconsider the TS-5 to TS-9 Transmission Line Project timeline, anticipating that additional information and an evaluation of APS's electric system growth and the engineering rationale for locating transmission facilities within the Town of Buckeye and its Metropolitan Planning Area (MPA) may provide solutions within the context of a regional and long term solution. I believe it is appropriate to restate that the TS-5 substation is proposed and is not an existing facility. If the proposed substation were relocated, many more opportunities for line siting would exist. APS should plan the location of new substations and applicable line siting simultaneously. Meaningful, simultaneous locating of substations and transmission lines could be accomplished through the use of long range comprehensive planning.

The addition of the proposed 230 kV circuit to the TS-5 to TS-9 Transmission Line Project would seem to demonstrate the need for an updated regional understanding of electric system needs. With growth in the Buckeye MPA occurring on both sides of the Hassayampa River, we believe that regional growth has not been sufficiently recognized by APS in its past electric system planning. It is important to consider how the electrical system needs of this region are related to

those of the entire Western Interconnection given that Arizona is currently a net exporter of energy to the western grid. It is already the case that transmission line corridors in the Town of Buckeye planning area are proliferating in a somewhat haphazard manner. For example, the Town is aware of a certificated APS 500 kV transmission line originating from the Palo Verde Hub (Arizona Corporation Commission Decision #68063) which when constructed will cross the Hassayampa River from the west into the TS-5 substation.

For these reasons the Town invites APS to build upon the foresight that has already lead to planning beyond the current 10 year horizon by conducting a comprehensive long-range planning process for a study area that includes existing and fully planned build-out of the Hassayampa River Valley as well as consideration of relevant interactions with the Western Interconnection. Such an effort should include consideration of an energy corridor. The Town is eager to work with APS, property owners, developers, relevant governmental agencies and other interested parties in this planning effort. We believe that long range comprehensive planning will enable APS to be effective in its efforts to increase the reliability and expand the supply of electricity while adequately mitigating for environmental, quality of life and economic impacts on our affected communities.

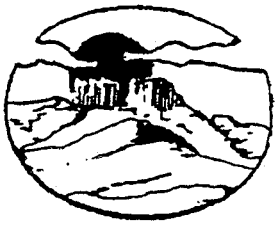
I would like to take this opportunity to express the Town's support for the request by El Dorado Holdings to have a meeting to review the APS 10 Year Plan to gain a better understanding of the need for future power line corridors and energy infrastructure within the Douglas Ranch area. The Town is very interested in participating in such a discussion and believes that the time is now to plan for the future.

Thank you for your continued willingness to consider input from the Town of Buckeye. We look forward to working with APS and other regional stakeholders to develop a comprehensive long range plan for the Hassayampa River Valley that will enable APS to meet the power needs of western Maricopa County as well as the Western Interconnection for the foreseeable future.

Sincerely,

Jeanine Guy
Interim Town Manager

Cc: Michael Cronin, El Dorado Holdings
David French, The Lyle Anderson Company



El Dorado
Holdings, Inc.

December 31, 2007

Arizona Public Service Company
Post Office Box 53933 Mail Station 4030
Phoenix, AZ 85072-3933
Attn: Mike DeWitt

Re: Comments Regarding APS' Proposed TS-5 to TS-9 500/230 kV Project – Request for meeting to review APS Ten-Year Plan for western Maricopa County

Dear Mr. DeWitt:

Douglas Ranch El Dorado LLC is the owner of Douglas Ranch, which is located to the west of Arizona Public Service Company's ("APS") proposed TS-5 to TS-9 500/230 kV Transmission Line Project ("TS-5 to TS-9 Project"). As you know, we have been following the public process currently underway and have had several discussions with you about the proposed route locations.

Douglas Ranch would like to ensure that APS' current electric system planning recognizes the planned growth in the area west of the Hassayampa River, which includes Douglas Ranch. When completed, Douglas Ranch will be home for up to 290,000 residents and will create approximately 150,000 new jobs. As a result, Douglas Ranch believes that it is critical to ensure that current plans for electric system growth in the region are adequate.

We are aware that certain stakeholders to the east of the Hassayampa River have suggested an expansion of the TS-5 to TS-9 Project Study Area and consideration of transmission line routes to the west of the Hassayampa River near Douglas Ranch. While no landowner would willingly invite the presence of a transmission line on its property, Douglas Ranch recognizes the importance of establishing a well-planned electrical system for the region. In fact, we are currently working with APS to provide easements through Douglas Ranch for the Harquahala Junction to TS-5 500 kV Transmission Line.

In light of our mutual interests, I believe it is important to schedule a meeting to review the APS 10 Year Plan to gain a better understanding of the proposed transmission lines needed or proposed in the Douglas Ranch area. The purpose of the meeting is to review the future power needs in this area and gain a better understanding of the need for future power line corridors. As we make decisions regarding transmission line corridors, we need to see how those decisions fit into the overall electrical system planned for this area and the planned land uses in Douglas

One Gateway Center
426 North 44th Street, Suite 100 • Phoenix, Arizona 85008 • (602) 955-2424 • FAX (602) 955-3543

Ranch. It may be helpful to include representatives from the Town of Buckeye at this meeting so they can be part of the discussion and provide input from the Town's perspective.

We appreciate your consideration and look forward to collaborating with APS on these important issues. Please give me a call so we can determine the appropriate people to attend and the best time to get together.

Sincerely,

Michael J. Cronin
Director of Entitlements
El Dorado Holdings, Inc.

cc: Jeanine Guy, Interim Town Manager
Ruth Garcia, Intergovernmental Affairs Director

W.L. Bouchard
& Associates, Inc.

November 12, 2007

Arizona Public Service Company
Post Office Box 53933 Mail Station 4030
Phoenix, AZ 85072-3933
Attn: Mike DeWitt

Reference: Arizona Public Service Company Proposed TS-5 to TS-9 500 kV TML Project

Subject: Comments Regarding Route Options West of the Hassayampa River

Dear Mike:

This letter has been prepared on behalf of 10,000 West, LLC, which is the owner of the planned 7,000 acre Festival Ranch development (Festival Ranch). As discussed in comments submitted to APS on August 30th and November 2nd; 10,000 West, LLC has concerns regarding the potential impacts of a number of the transmission line route alternatives for the proposed TS-5 to TS-9 500 kV TML Project currently under consideration by APS. This communication supplements those previous comments and provides more specific suggestions regarding route alternatives to the west of the Hassayampa River.

As a follow on to comments submitted on November 2, 2007; 10,000 West, LLC has engaged Gary Rich, Electrical Engineer to collaborate with me in completing a study of route alternatives west of the Hassayampa River (hereinafter the "Route Study"). Both Mr. Rich and I possess over 25 years of professional experience in completing such studies. Our charge was to first delineate an expanded Study Area to the west of the Hassayampa River and then to identify potential route link opportunities for APS's proposed TS-5 to TS-9 500 kV TML. It was necessary that the Route Study be completed quickly to comply with APS's schedule for stakeholder input. The results of the Route Study are reported herein. 10,000 West, LLC will continue to evaluate route alternatives and may provide additional input as APS continues the routing process.

The attached Exhibit #8 presents an aerial photograph as the base layer with several overlaying map layers that help to illustrate certain aspects of the Route Study. The Exhibit is designated as #8 to follow sequentially with previous numbered exhibits submitted to APS on this matter.

The base photograph used in Exhibit #8 was sized and selected to illustrate the expanded area west of the Hassayampa River which was considered in the Route Study. To the extent of the area of the base photograph, Exhibit #8 also indicates the location of APS's Study Area and the route link alternatives presented by APS in the TS-5 to TS-9 Project Newsletter #2.

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Exhibit #8 also illustrates a new route link opportunity which, based on our findings in the Route Study, we think is worthy of serious consideration for routing of the proposed TS-5 to TS-9 500 kV TML west of the Hassayampa River.

The Route Study included consideration of existing and future land uses, potential environmental impacts, visual impacts, distance as a relative function of construction and right of way acquisition cost, and several other factors. The route opportunity west of the Hassayampa River that we have selected as the most compatible connects the TS-5 substation with APS's proposed route links intersecting at 275th Avenue and West Black Mountain Road (aka Cloud Road). Hereinafter, the selected route will be referred to as the "Western Alternative".

The Western Alternative exits the TS-5 Substation in a northwesterly direction and immediately descends 100 feet to the Hassayampa River. Continuing across the Hassayampa River for approximately 1.5 miles the route ascends 100 feet to the Hassayampa Plain and continues across the plain for 0.75 miles to an intersection with the north/south alignment for 307th Avenue. The Western Alternative then turns north parallel with the alignment for 307th Avenue for approximately 9.0 miles to the intersection with West Black Mountain Road. Turning east the Western Alternative follows the alignment of West Black Mountain Road and Cloud Road ending at the intersection of 275th Avenue and Cloud Road which is a distance of approximately 4.25 miles. Included in this segment is a 0.5 mile crossing of the Hassayampa River which is approximately 75 feet lower than the terrain on either side.

From the intersection of 275th Avenue and West Black Mountain Road there are numerous alternative pathways to connect with the TS-9 substation. Most prominent among the many possible options to connect to TS-9 are route links that connect to AZ 74 which provides a potential west to east route to bring the TS-5 to TS-9 500 kV TML towards the TS-9 substation.

There are a number of designs and construction options for the crossings of the Hassayampa River associated with the Western Alternative. The structures could either be tubular steel poles or lattice steel towers. The design and construction of the foundations is a primary concern. Of course the foundations will need to consider soil conditions, water levels, rate of flow, and barricades to prevent scouring.

Lattice steel towers have several advantages for the river crossings. One is that the use of lattice steel towers will reduce the number of structures in the river crossings by one third. The reason for this is that in general tubular steel poles have average span lengths of 800 to 1200 feet while lattice steel towers have average spans of 1200 to 1500 feet. Another advantage is that lattice towers would better facilitate a required crossing of the existing WAPA 230kV transmission line located at the eastern edge of the Hassayampa River near TS-5. The horizontal configuration of lattice towers will permit a much lower structure.

Finally, most of the existing transmission lines crossings of the Hassayampa River are on lattice towers so there is a considerable amount of design, construction, and cost information available for lattice towers in the river.

The total length of the Western Alternative from the TS-5 Substation to the intersection of 275th Avenue and Cloud Road is approximately 15.5 miles. That distance includes about 9.0 miles of lateral distance north to south which would also be required in any alignment east of the Hassayampa River. Subject to completion of a detailed design, we estimate the east-west portions of the Western Alternative will be about 6.6 miles. Of that, we estimate that about 2.0 miles would likely require pole or tower structures capable of placement in areas subject to periodic river flowage.

The design and construction of the segments comprising the Western Alternative along 307th Avenue, West Black Mountain and Cloud Roads could be the same as those tubular steel poles already intended for use by APS for the route alternatives on the east side of the Hassayampa River. The Western Alternative may actually have a cost advantage in that the Western Alternative only requires turning structures to complete two heavy angle turns. These include one forty-five degree angle west of TS-5 turning north onto the 307th Avenue alignment and one ninety degree angle at the turn east from the alignment with 307th Avenue onto an alignment with West Black Mountain Road. Almost any combination of line segments east of the Hassayampa River would likely have a greater number of heavy angle structures to reach the same point as the suggested Western Alternative. Presuming that angle structures are more costly, the implication is that construction costs may be increased (as to turning structures) if the TS-5 to TS-9 500 kV TML project were to be built primarily on the east side of the Hassayampa River.

Also, 10,000 West, LLC believes that right-of-way costs to acquire route segments to the east of the Hassayampa River will generally be more costly to APS and more time consuming to acquire than would be necessary with the Western Alternative. The attached exhibit indicates a greater diversity and density of existing and planned land uses to the east of the Hassayampa River. The volume of recent requests from stakeholders east of the Hassayampa River for APS to consider route options to the west of the Hassayampa indicates the potential complexity and costs likely to be required in acquisition of rights-of-way on the east side of the Hassayampa River.

A preliminary assessment of the natural habitat associated with anticipated tangential river crossings for the Western Alternative indicates that environmental impacts may be limited. These areas are already significantly disturbed by trails, roads, and manmade activity. Additionally, the presence of several other tangential high voltage transmission line crossings in the area also suggests the potential environmental compatibility of the crossings needed for the Western Alternative.

Despite that manmade disturbance observed and the presence of other transmission lines, it is important to recognize that a comprehensive evaluation should be completed to properly design and construct the Western Alternative so as to preserve and protect riparian resources. 10,000 West, LLC is suggesting a corridor width of 1,000 feet on each side of the suggested route for the entire Western Alternative to allow for environmental and construction design considerations.

10,000 West, LLC is also mindful that the river crossings associated with the Western Alternative would require APS to acquire Section 404 Permit Approval(s) from the U.S Army Corps of Engineers. It is acknowledged that construction organizations generally prefer to limit "permit triggering" actions where reasonable to do so. On the other hand the Section 404 process should not limit timely construction of the TS-5 to TS-9 500 kV TML if the required studies and applications are filed diligently.

I appreciate the opportunity to provide these comments on behalf of 10,000 West, LLC. Please give consideration to the opportunity provided by the Western Alternative described herein. I am available to meet with you to explain or expand on these comments if you have any questions or need more detail. Thank you again for the courtesy and professionalism you have provided in our interactions. It is a pleasure working with you.

I'm looking forward to continuing discussions with you on these matters.

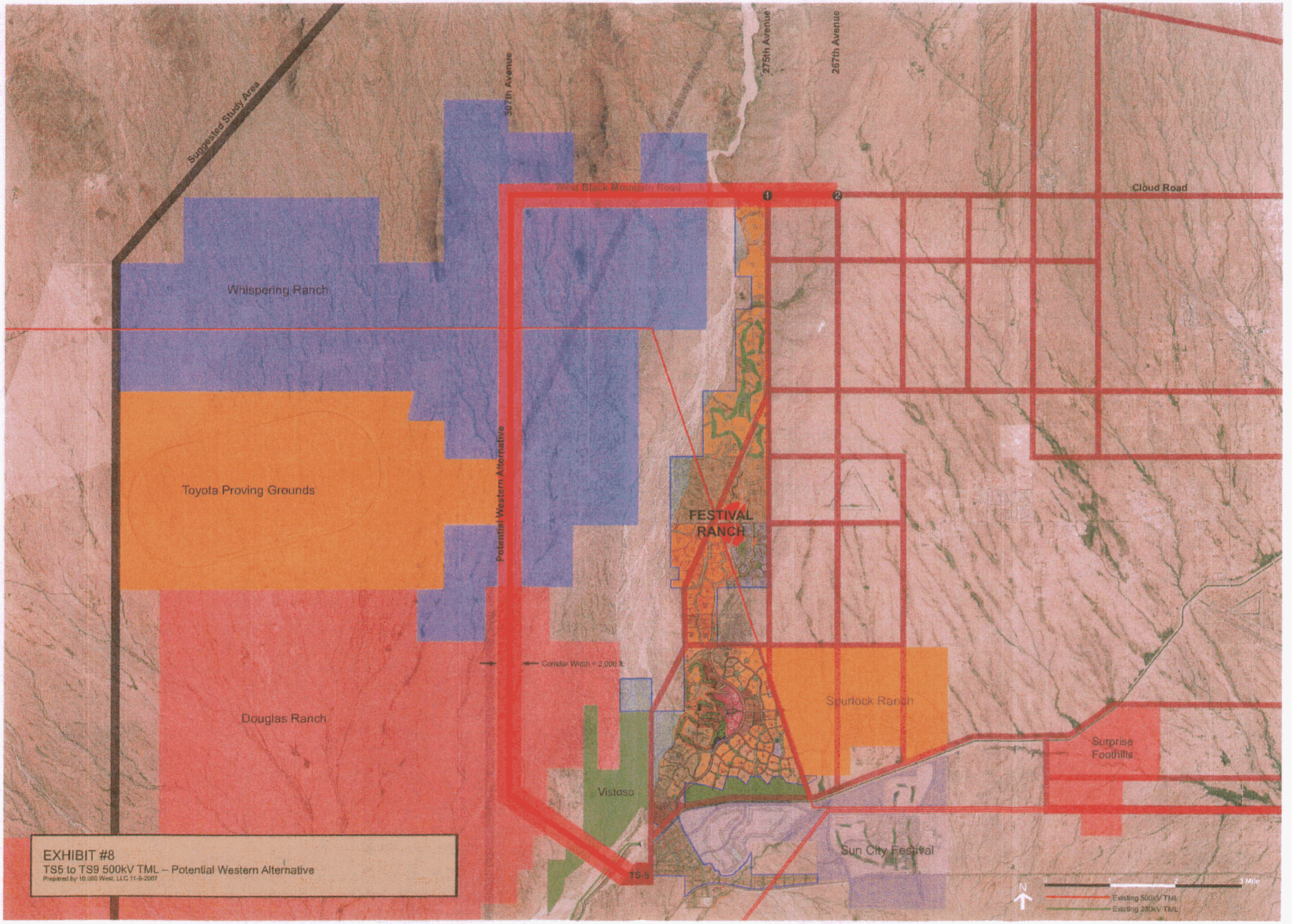
Sincerely,

Walter L. Bouchard, MPH, CIH
President

Attachment

Exhibit #8 Festival Ranch - Route Alternative West of the Hassayampa River

c/ Lyle Anderson
Bob Rice
Salem A. Al-Shatti
Toby Block
David French


Suggested Study Area
307th Avenue
275th Avenue
267th Avenue
West Black Mountain Road
Cloud Road
Whispering Ranch
Toyota Proving Grounds
Potential Western Alternative
FESTIVAL RANCH
Corridor Width = 2,000 ft
Douglas Ranch
Spurlock Ranch
Surprise Foothills
Vistoso
Sun City Festival
TS-5
EXHIBIT #8
TS5 to TS9 500kV TML – Potential Western Alternative
Prepared by 10,000 West, LLC 11-9-2007
N
3 Miles
Existing 500kV TML
Existing 230kV TML

W.L. Bouchard & Associates, Inc.

November 2, 2007

Arizona Public Service Company
Post Office Box 53933 Mail Station 4030
Phoenix, AZ 85072-3933
Attn: Mike DeWitt

Reference: Arizona Public Service Company Proposed TS-5 to TS-9 500 kV TML Project

Subject: Comments Regarding the Routing of 500 kV Transmission Line Facilities Impacting Festival Ranch Owned by 10,000 West, LLC

Dear Mike:

This letter has been prepared on behalf of 10,000 West, LLC which is the owner of the planned 7,000 acre Festival Ranch development (Festival Ranch). An executive summary of the comments contained in this letter is attached. The business entity known as 10,000 West, LLC, is a Lyle Anderson company. Lyle Anderson's companies have developed such notable projects as Desert Highlands, Desert Mountain and Superstition Mountain.

Over the past year you and your colleagues at Arizona Public Service Company (APS) have been interacting primarily with the management team of The Lyle Anderson Company, Inc. regarding existing and planned APS transmission line (TML) facilities impacting Festival Ranch. In this letter I will be referring to the owner of Festival Ranch as 10,000 West, LLC with due regard that 10,000 West, LLC is a Lyle Anderson company.

Festival Ranch is located on lands impacted by APS's future TS-5 500/230/69 kV substation and a significant number of the electric transmission line route links currently under consideration in APS's proposed TS-5 to TS-9 500 kV TML Project.

As discussed in my letter of August 30, 2007, 10,000 West, LLC has concerns regarding the potential negative impacts of a number of the transmission line route alternatives currently under consideration by APS. This communication supplements that initial letter and provides more specific comments regarding the various route alternatives presented in APS's Project Newsletter titled, TS-5 to TS-9 500 kV Transmission Project, Issue 2, dated September 2007.

As you know, I attended the TS-5 to TS-9 500 kV TML Project "Public Information Open House" on September 27, 2007 at the Vistancia Elementary School. Additionally, you and I met on October 5, 2007 in your office. We had a good opportunity to talk at each of those occurrences. Thank you again for the attention and courtesy you have provided.

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Mike, I am going to present comments on behalf of 10,000 West, LLC in the following order:

1. Brief Overview of Festival Ranch
2. Existing and Approved Transmission Facilities Impacting Festival Ranch
3. Matters related to ROW acquisition and future construction of the certificated double circuit WVN 230 kV TML
4. Request for expansion of the TS-5 to TS-9 500 kV TML Project Study Area and for consideration of route links west of the Hassayampa River
5. Discussion of current TS-5 to TS-9 500 kV transmission line route links which if constructed would present significant impacts to Festival Ranch
6. Request to add new transmission line route links for the TS-5 to TS-9 500 kV TML east of the Hassayampa River with the intent of reducing transmission line routing impacts
7. Request to APS to provide mitigation to reduce the impacts related to construction and operation of any transmission lines impacting Festival Ranch.

FESTIVAL RANCH

Entitlements

The land acquisition, planning, design, and entitlement process for Festival Ranch has been underway for over 10 years. During this period, planning has been completed to accommodate approximately 15,000 dwelling units and over 5 million square feet of entitled commercial uses. Most of the commercial uses are concentrated along the Sun Valley Parkway.

The owner of Festival Ranch has worked collaboratively with the Town of Buckeye, Maricopa County, and local stakeholders in the Festival Ranch planning process. The Festival Ranch Master Plan has been approved by the Town of Buckeye. A similar copy of that plan is attached as Exhibit 1 "Festival Ranch - Village Master Plan".

Following the high-end theme of Desert Highlands and Desert Mountain, Festival Ranch will carry on the tradition of a premier Master Planned Community that Lyle Anderson's companies have produced time and time again over the last 30 plus years. Festival Ranch will be a cohesive community with employment opportunities, commercial services, recreational opportunities, and well-defined neighborhoods.

The Town of Buckeye understands the need for a high-end community to complement its diverse new metropolis, and with The Lyle Anderson Company's reputation of high quality projects they demonstrated their support through approvals of the attached Master Plan which entitles Festival Ranch's 7,000 acres for the fully planned 15,000 units and over 5 million square feet of commercial uses.

Vision

Festival Ranch is unique in its shape and size, as well as its emphasis on quality of life. The vision is for amenities, services and facilities, including a Village and Town Center concept with employment for support uses. The design of Festival Ranch is literally the result of many years of

planning which, once implemented, will result in a master planned community that will truly be a special and unique place to live, work, and shop.

Festival Ranch will be a community of some 40,000 residents at build-out. Like other projects of Lyle Anderson companies, such as Desert Mountain and Superstition Mountain, Festival Ranch will be a unique development with a very real "sense of place" even before the first homeowners arrive. Whether it's the signature Jack Nicklaus course open for play on day one of Festival Ranch's opening or the joint partnerships created to help seed a true regional Town Center with real employment opportunities, the identity of Festival Ranch will be readily apparent at the first stages of its development which is tentatively planned to start construction at the beginning of 2009.

Transmission Line Impacts

While the Festival Ranch development team understands the electrical needs of the estimated 1.4 million new homeowners planned for the Buckeye region over the next 50-60 years, it is also becoming apparent that Festival Ranch is bearing the brunt of the infrastructure needed to fulfill this requirement.

With reference to the TS-5 to TS-9 500 kV TML routing project currently underway, the only two route alternatives out of the TS-5 substation offered by APS in Project Newsletter # 2 significantly impact Festival Ranch. There have been no options offered by APS for exiting the TS-5 substation without impacts to Festival Ranch. This situation is disappointing to the management of the Lyle Anderson Company given the attempts they have made over the past year to communicate their concerns to APS about transmission line impacts at Festival Ranch.

The proposed route links of concern that exit the TS-5 substation include:

- The transmission line route segments extending from the TS-5 substation to the east along the north side of the CAP canal, and
- The combination of transmission line route segments extending north from the TS-5 substation along the east side of the Hassayampa River to Dixileta Drive

Both options would significantly impact Festival Ranch. The route alternative which extends north along the eastern boundary of the Hassayampa River, directly impacts planned high end homes which are designed to benefit from the views of the riparian area. The second route link along the north side of the CAP canal directly impacts the planned entrance, a regional park, and planned housing within Festival Ranch.

Other proposed links described in APS's Project Newsletter #2 also have significant impacts on Festival Ranch. These matters will be addressed in more detail later in this letter.

EXISTING AND APPROVED TRANSMISSION FACILITIES IMPACTING FESTIVAL RANCH

After full consideration of the potential impacts of the proposed TS-5 to TS-9 500 kV TML options, 10,000 West, LLC believes that there are additional options for routing of the proposed line that have not been presented by APS. Considering that better routing options may exist as described in this letter, Festival Ranch should not be required to assume the burden of the route options proposed by APS.

As a matter of perspective in considering the impact of the proposed TS-5 to TS-9 500 kV TML, 10,000 West, LLC also considered the existing WAPA 500 kV and future WVN 230 kV electric transmission facilities that already directly impact Festival Ranch. Festival Ranch has assumed a large share of the burden of such facilities in the region. Electric Transmission Facilities impacting Festival Ranch are illustrated on the attached as Exhibit 2 "Impacts - Existing and Future Electric Transmission Facilities".

These electric transmission facilities include:

- The existing Western Area Power Administration (WAPA) single circuit 500 kV TML corridor. This transmission line is constructed on lattice towers. The WAPA corridor first impacts Festival Ranch north of the CAP canal at about 267th Avenue, thereafter the WAPA corridor continues in a northwest direction across the Festival Ranch site and a small intersecting piece of State land for a distance of 5.3 miles to a point on the northwest portion of the Festival Ranch site (roughly in alignment with Dixileta Drive); the corridor occupies a total of 4.37 miles of Festival Ranch. The WAPA corridor continues from Festival Ranch's northwest boundary in a northwest direction across the Hassayampa River with continued visual impacts to planned homes within Festival Ranch.

- Future 69 kV sub-transmission facilities necessary to serve Festival Ranch
  10,000 West, LLC understands and accepts the burden of providing access to routes for sub-transmission lines to support its own community and regional transmission needs. However, the anticipated 69 kV system will be a significant planning and cost constraint for Festival Ranch. It is mentioned here only to help with the understanding that transmission and sub-transmission impacts to Festival Ranch are already significant.

- The certificated 500/230/69 kV transmission facilities included in CEC # 127 approved by the ACC in 2005. These facilities include:

  - The TS-5 500/230/69 kV substation which is authorized to be constructed to the west of Festival Ranch on up to 120 acres at Section 29 Township 4 N Range 4 W (roughly 291st Avenue and Beardsley Road);
  - The West Valley North (WVN) 230 kV TML which is authorized to be constructed as a 230 kV double circuit line on monopoles with a double circuit 69 kV under build within a 2500' corridor north of the fence line of the CAP until the mid-section of Section 20 Township 4 N Range 4 W (roughly 291st Avenue and the mid section between Deer Valley and Beardsley Road) at which point the line turns south across the CAP canal

within a 2000' corridor (1000' east of 291st Avenue and 1000' west of 291st Avenue) until the section line of Section 29.

THE WEST VALLEY NORTH 230 kV TRANSMISSION LINE PROJECT

There is an important nexus between the routing of the TS-5 to TS-9 500 kV TML Project and the West Valley North 230 kV transmission line Project which was certificated in 2005 by the Arizona Corporation Commission in Case #127 before the Line Siting Committee.
As a result of communication between 10,000 West, LLC and APS over the past year, 10,000 West, LLC understands that the proposed design location of the WVN 230 kV TML is approximately 1000' north of the CAP. If so, such an alignment would impose avoidable impacts on the Festival Ranch planned entrance, a significant portion of a regional park, and planned housing in the Festival Ranch community. 10,000 West, LLC had been under the impression that the WVN line would be located much closer to the CAP to minimize impacts in the area. Additionally, APS's request for a 300' ROW is much greater than expected. It is clear that the ROW request for additional space contemplates the possibility of additional transmission lines.

Even though it is recognized that only the ACC can authorize new construction of a 500 kV TML adjacent to the WVN corridor, the request for additional ROW by APS's Land Department raises concern to the management of 10,000 West, LLC. Projected takings in the area are already great. A parallel 500 kV alignment would only multiply an already significant impact.

Obviously, for the 10,000 West, LLC organization the design of the WVN 230 kV TML alignment and acquisition of related rights of way are inextricably linked to their interests regarding the TS-5 to TS-9 500 kV TML routing process. With due respect to the separateness of the processes underway for the construction of the WVN 230 kV TML versus the routing of the proposed TS-5 to TS-9 500 kV TML Project; it is necessary that APS understand that these transmission line activities are viewed by 10,000 West, LLC as a unified issue.

The management team of 10,000 West, LLC believes that APS has not provided adequate information to them regarding the placement and design of the WVN 230 kV TML within the authorized 2,500 foot corridor north of the CAP canal within Festival Ranch and the related acquisition of ROW. This is an important issue because in order for 10,000 West, LLC to evaluate impacts for the proposed TS-5 to TS-9 500 kV TML options 10,000 West, LLC needs to completely understand the proposed 230 kV alignment and any related mitigation options.

The following is an explanation of the information problem as explained to me by persons within 10,000 West, LLC. These matters predate my involvement with 10,000 West LLC. Although I was not involved, I am providing this information because it is a key factor in understanding the view of 10,000 West, LLC regarding the link between the location of the WVN 230 kV TML ROW, the design of the WVN 230 kV TML and the TS-5 to TS-9 500 kV TML routing process.

From time to time during the period of late 2006 and 2007 until approximately July 2007, representatives of 10,000 West, LLC were in discussion with various APS representatives including Dennis Pomroy, Senior Land Agent, regarding the detailed placement and design of the

WVN 230 kV transmission line and related ROW matters north of the CAP canal. On July 16th and 17th of 2007 e-mail exchanges occurred between David French of The Lyle Anderson Company and Mr. Pomroy. In those e-mails and related discussions, Mr. Pomroy made certain commitments to supply information. According to David French, among other things Mr. Pomroy promised to provide him with:

1. A copy of the proposed site plan and conceptual design for the TS-5 substation
2. Feedback from APS's attorneys regarding the possibility of considering re-routing options to the south of the certificated route for the WVN 230 kV project
3. A specific cost estimate for undergrounding a 2000', 3000', or 4000' increment of the WVN 230 kV TML near the Festival Ranch bridge crossing over the CAP
4. A confirmed "drop dead date" upon which 10,000 West, LLC would need to inform APS of a desire to pursue an underground option for the WVN 230kV TML in the area of Festival Ranch's bridge location across the CAP canal. That bridge is the entrance to Festival Ranch
5. A transmission line design drawing showing pole locations for the WVN 230 kV TML that 10,000 West, LLC could use to provide additional comment so as encourage APS to place the TML line as close as possible north of the CAP canal to avoid impacts to Festival Ranch

As of this date, with the exception of a response to item #2 received by me through communications with you (Mike DeWitt); David French informs me that he has not received any of the promised information from Mr. Pomroy.

Apparently, Mr. French was also assured by Mr. Pomroy that in the event that APS felt that it was necessary to stop discussions regarding ROW acquisition and move to condemnation proceedings that he would give Mr. French a call to so inform him. Instead, 10,000 West, LLC unexpectedly received a letter dated October 12, 2007 from the law firm of Morrill & Aronson, PLC indicating that APS has instructed the firm to file condemnation proceedings on behalf of APS regarding the "necessary easements". Apparently such proceedings were filed shortly thereafter.

The importance of the relationship between the WVN 230 kV TML siting and design issues and the TS-5 to TS-9 500 kV TML routing process was emphasized in the letter submitted on behalf of 10,000 West, LLC on August 30, 2007. 10,000 West, LLC fully understands that your responsibilities as Project Manager for the TS-5 to TS-9 500 kV TML Project do not include the WVN 230 kV TML matter. However, they believe that the requested information about the WVN 230 kV TML is important to them in order to fully participate in the public process associated with the TS-5 to TS-9 500 kV TML Project. Without it they cannot complete a meaningful evaluation of APS's proposed TS-5 to TS-9 500 kV TML route link that would parallel the WVN 230 kV TML. As such they would appreciate any effort that APS could provide to supply the promised information.

Additionally, APS's attempt to secure a 300' ROW appears to presuppose a location for the proposed TS-5 to TS-9 500 kV TML. The land in question is very valuable to Festival Ranch. It is 10,000 West, LLC's continued position that ROW beyond that needed for authorized

construction cannot be condemned in anticipation of transmission line routing decisions not yet made by the Arizona Corporation Commission.

THE TS-5 TO TS-9 500 KV TML PROJECT STUDY AREA AND ROUTE LINKS WEST OF THE HASSAYAMPA RIVER

The delineation of the Project Study Area for routing of the proposed TS-5 to TS-9 500 kV TML is of interest to 10,000 West, LLC because it directly impacts the route options available to connect the proposed TS-5 to TS-9 500 kV TML into the TS-5 substation. As you know all of the route options offered by APS for linking the TS-5 and TS-9 substations are located east of the Hassayampa River. The western boundary of the Project's currently defined Study Area is located roughly parallel to the western edge of the Hassayampa River with no route options offered west of the River.

Among the route options proposed in Newsletter #2, APS has proposed only two connecting routes into the TS-5 substation. Construction of either option into the TS-5 substation would have significant impacts to Festival Ranch. We therefore respectfully request that APS revise and expand the Study area to also consider routes west of the Hassayampa River. A map indicating the suggested area to be added is included in the attached Exhibit 3 "TS5 to TS9 500kV TML – Expanded Project Study Area". The map indicates four points labeled A, B, C, and D along the western boundary of the Study Area that should be moved directly west to delineate an expanded Study Area that encompasses routing opportunities west of the Hassayampa River.

We are mindful of the level of effort and schedule impacts involved in such an expansion of the Study Area of the TS-5 to TS-9 Project. However, we firmly believe that this broader evaluation is necessary given the significant impacts which we believe would result from construction of many of the proposed route options currently presented by APS. Further, we believe that such an expansion of the Study Area to the west of the Hassayampa River would better support APS's filing of a Certificate of Environmental Compatibility (CEC) before the Line Siting Committee.

In view of these matters, 10,000 West, LLC has initiated a modest technical study to investigate and suggest possible route options west of the Hassayampa. It is our intent to provide input to APS regarding route suggestions within the week of November 5th. It is our hope that APS will use that input in considering route link options presented in the next Project Newsletter.

Assuming an expanded study area, 10,000 West, LLC requests that APS delineate potential route options west of the Hassayampa River with particular consideration to existing and planned land uses, along with other required assessments of environmental, engineering, system electric and other evaluations proper to the selection of reasonable route alternatives. Only by assessing route alternatives west of the Hassayampa River can the stakeholders in the present Study Area, the Line Siting Committee, and the Arizona Corporation Commission be assured that adequate consideration has been given to routing the TS-5 to TS-9 500 kV TML.

For the reasons stated above, 10,000 West, LLC strongly urges APS to expand the TS-5 to TS-9 Study Area and to consider routes west of the Hassayampa River. It is understood that APS has recently decided to include publication of an additional Newsletter and to provide more time for