DESERT SOUTHWEST REGION
10-YEAR PLAN PIVOT STRATEGY

Figure 1 Parker-Blythe Transmission Line

SPECIAL CUSTOMER SESSION WORKING MEETING: FEBRUARY 27TH, 2018
DESERT SOUTHWEST REGIONAL OFFICE
615 S. 43RD AVE
PHOENIX, AZ

Western Area Power Administration

POWERING THE ENERGY FRONTIER

Table of Contents

2. TABLE OF ACRONYMS 4
3. TABLE OF FIGURES 5
4. INTRODUCTION 6
5. SEED FUNDING UPDATE 7
5.1 FY18 Seed Funded Projects 7
5.2 Current Status of Continuing Resolution 7
5.3 Seed Funding Project Delays 7
6. 10-YEAR PLAN PIVOT 8
6.1 What Is The Pivot? 8
6.2 Why Do We Need to Pivot? 8
6.3 Customer Benefits 8
6.4 Objectives to Execute the Pivot 8
6.5 How Will the 10-Year Plan Program Look After The Pivot? 10
7. FY19 PROPOSED PROJECTS 11
7.1 Project Description 11
7.2 Project Justification 12
7.3 Maintenance Report - CartoPac 14
7.4 Proposed Alternatives Overview and Selection 15
7.5 Alternative Comparisons 18
7.6 Preferred Alternative 19
7.7 Project Phasing 20
8. FY20-21 PROPOSED PROJECT 22
8.1 Project Description 22
8.2 Project Justification 23
8.3 Maintenance Report - CartoPac 25
8.4 Proposed Alternatives Overview and Selection 26
8.5 Alternative Comparisons 32
8.6 Preferred Alternative 33
8.7 Project Phasing 34
9. APPENDICES 36
9.1 AOA Evaluation Methodology 36
9.2 WAPA's Ranking Process – Maintenance, Design, and Construction Council (MDCC) 38

1. MEETING AGENDA

Conference Call Bridge:

- To access the conference call bridge, please dial (888)-283-2963; when requested enter conference code number 60080 and then enter #. When requested provide your name.

Objective(s):

- To preview and solicit feedback from Parker-Davis Project (P-DP) and Intertie Customers on WAPA DSW's 10-Year Capital Plan. Have an open exchange on the proposed projects, emerging issues, and developments within the program.

AGENDA:

1. Welcome and Introduction
2. Why a "Special" meeting?
3. Seed Funding Updates
    a. Appropriated Seed Funding
        i. KOF-DEM T-line Rebuild
        ii. DME-GLA T-line Rebuild
4. 2018 10-Year Plan Pivot Strategy

5. **10 MINUTE BREAK**

6. FY19 Proposed Projects
    a. Fly-over video
    b. Bouse-Kofa Phase I/II
7. FY20-21Proposed Projects
    a. Fly-over video
    b. Parker-Blythe #2 161kV Phase I (of III phases)
8. Next Steps
    a. **March 29th, 2018** 10-Year Plan Customer Meeting
        i. Focus: Active Projects
    b. **June TBD, 20**18 10-Year Plan Customer Meeting
        i. Focus: Draft 10-Year Plan Discussion
    c. **September TBD**, 2018 10-Year Plan Customer Meeting
        i. Focus: Final 10-Year Plan Presentation
    d. **December TBD, 2018** 10-Year Plan Customer Meeting
        i. Focus: Prepayment (PCN) Vote

2. TABLE OF ACRONYMS

ACSR……ALUMINUM CONDUCTOR STEEL REINFORCED
ACSS……ALUMINUM CONDUCTOR STEEL SUPPORTED
APS……ARIZONA PUBLIC SERVICE
BES……BULK ELECTRIC SYSTEM
BOR……BUREAU OF RECLAMATION
CAP……CENTRAL ARIZONA PROJECT
CPC……CAPITAL PLANNING COMMITTEE
CTC……CUSTOMER TECHNICAL COMMITTEE
CX……CATEGORICAL EXCLUSION
CIP……CRITICAL INFRASTRUCTURE PROTECTION
DOE……DEPARTMENT OF ENERGY
DSW……DESERT SOUTHWEST REGION
EA……ENVIRONMENTAL ASSESSMENT
E&OC……ENGINEERING & OPERATING COMMITTEE
GFE……GOVERNMENT FURNISHED EQUIPMENT
IDC……INTEREST DURING CONSTRUCTION
IDIQ……INDEFINITE DELIVERY/INDEFINITE QUANTITY
JPA……JOINT PLANNING AGREEMENT
KCMIL……THOUSANDS CIRCULAR MILS
MDCC……MAINTENANCE DESIGN CONSTRUCTION COMMITTEE
NEPA……NATIONAL ENVIRONMENTAL POLICY ACT
NERC……NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
NESC……NATIONAL ELECTRICAL SAFETY CODE
NHPA……NATIONAL HISTORIC PRESERVATION ACT
NRHP……NATIONAL REGISTER OF HISTORIC PLACES
OGW……OVERHEAD GROUND WIRE
O&M……OPERATIONS AND MAINTENANCE
OPGW……OPTICAL OVERHEAD GROUND WIRE
OGW…… OVERHEAD GROUND WIRE
PAD……PARKER SUBSTATION
PCB……POLYCHLORINATED BIPHENYL
PCN……PREPAYMENT FUNDS
P-DP……PARKER-DAVIS PROJECT
USDA……UNITED STATES DEPARTMENT OF AGRICULTURE
RFP……REQUEST FOR PROPOSAL
ROM……ROUGH ORDER OF MAGNITUDE COST ESTIMATE
ROW……RIGHT-OF-WAY
SCE……SOUTHERN CALIFORNIA EDISON
SF6……SULFUR HEXAFLUORIDE
TEP……TUCSON ELECTRIC POWER
TYP……TEN YEAR PLAN
UES……UNISOURCE ENERGY SERVICES
WAPA……WESTERN AREA POWER ADMINISTRATION
WCF……WESTERN CONSTRUCTION FUNDS

3. TABLE OF FIGURES

Figure 1 Parker-Blythe Transmission Line 1
Figure 2- Estimates are in 1,000s 9
Figure 3 Final TYP Meeting Schedule 10
Figure 4 BSE-KOF Maintenance Report 14
Figure 5 Breakdown of AOA Rating and Costs for BSE-KOF 18
Figure 7 Bouse-Kofa Phasing Breakdown 20
Figure 8 Breakdown of AOA Ratings and Costs for Pad-Bly 32
Figure 10 Maintenance and Inspection Cost Comparison between Alternatives 32
Figure 11 Pad-Bly Phasing Breakdown 34

4. INTRODUCTION

Western Area Power Administration (WAPA) markets and delivers reliable, cost-based hydroelectric power and related services within a 15-State region of the central and western parts of the United States. WAPA is one of four power marketing administrations within the U.S. Department of Energy whose role is to market and transmit electricity from multi-use water projects. WAPA's transmission system carries electricity from 57 power plants. These power plants are operated by agencies such as the Bureau of Reclamation, U.S. Army Corps of Engineers, the International Boundary and Water Commission, as well as a number of private entities. These plants combined have an installed capacity of 10,395 Megawatts.

WAPA is divided into four primary regions. Upper Great Plains (UGP) located in Billings, Montana; Rocky Mountain Region (RMR) located in Loveland, Colorado; Sierra Nevada Region (SNR) located in Folsom, California; and Desert Southwest Region (DSW) located in Phoenix, Arizona. In addition to the four operating regions, a Management Center is located in Salt Lake City, Utah. All the regions are supported by a central Headquarters (HQ) office located in Lakewood, Colorado. WAPA's HQ serves many diverse customers, ranging from Congress to Native American power customers, special interest groups and WAPA's regional offices. HQ is responsible for designing WAPA's electrical projects and handles most of the support services such as legal, and human resources.

The Desert Southwest Region (DSW) sells power in Arizona, Nevada, southern California, and portions of the Southwest. The recipients of this power include wholesale customers such as towns, rural electric cooperatives, public utility and irrigation districts, Federal, state and military agencies, Native American tribes, investor-owned utilities, power marketers and U.S. Bureau of Reclamation customers. DSW is committed to maintaining and operating a reliable transmission system. The 10-Year Capital Program (TYP) provides both a capital investment plan, as well as a funding plan, that will maintain reliable power delivery to WAPA's customers.

The purpose of the Capital Program presentation for WAPA's Desert Southwest Region (DSW) is to clearly describe challenges, goals, objectives, strategies, and accomplishments, as well as provide a mechanism for customer collaboration.

The Capital Program is revised annually in response to:

- Approved funding allocations for the budget year
- Optimized project priorities
- Emerging issues within the transmission system
- Mandates or regulatory requirements
- New contractual requirements

5. SEED FUNDING UPDATE

5.1 FY18 Seed Funded Projects

In August of 2017 DSW presented proposed projects for fiscal 2018 which included Kofa-Dome Tap 161kV and Dome Tap-Gila 161kV rebuilds. These transmission line Projects were selected for Seed Funding using appropriations (WCF). Seed Funding would provide approximately $500,000 to begin the design phase with the objective of reaching >50% design package and a revalidated project budget for customer review in the fall of 2018.

FY2018 SEED FUNDING PLAN				
PROJECT	**CONCEPTUAL PROJECT COST**	**APPROPRIATED SEED FUNDS FY2018**	**PREPAYMENT SEED FUNDS FY2018**	**PREPAYMENT FUNDS REQUEST FY2019**
Kofa-Dome Tap Rebuild	$5,360,022	~$500,000	$0	TBD Fall 2018
Dome Tap-Gila Rebuild	$7,401,431	~$500,000	$0	TBD Fall 2018
Coolidge Valley Farms	$4,815,696	$0	~$800,000	TBD Fall 2018
TOTAL	**$12,761,453**	**~$1,000,000**	**$800,000**	**TBD Fall 2018**

5.2 Current Status of Continuing Resolution

As of February 9th, 2018 Congress has extended the Continuing Resolution (CR) through March 23rd, 2018. The current CR status limits WAPA's available appropriated funds for new capital improvement projects. Once the full budget passes Congress, appropriations will be made available to Seed Fund the proposed projects for fiscal year 2018.

5.3 Seed Funding Project Delays

The primary output of the Seed Funding phase is a partial project design package (>50% complete) and revalidation of the rough order magnitude project estimate from the AOA study phase. The project design package consists of the construction specifications, drawings, and associated procurement documents. The revalidated project cost estimate is derived from progressive elaboration of the project scope from the AOA study to the >50% design milestone.

WAPA estimates that approximately six months is required to develop the >50% of the design package and revalidated project cost estimate. With the current CR schedule it is anticipated that WAPA will not have appropriated Seed Funding available to begin this phase of work until a full budget passes congress. The result is a potential delay in the development of the partial design package. If appropriations are not approved at the end of the current CR on March 23rd, 2018, then the proposed projects for fiscal year 2018 will not be ready for customer review in the core customer meetings tentatively scheduled for June and September of this year. As a result these projects may not be sufficiently developed for full prepayment funding consideration.

6. 10-YEAR PLAN PIVOT

6.1 What Is The Pivot?

A onetime shift in the 10-Year Plan process that requires simultaneous approval of upcoming capital improvement projects. This simultaneous approval encompasses new project starts for Fiscal Years 2019, 2020 and 2021. The plan to pivot will conclude in December 2018 at the Prepayment Voting Meeting. Upon Completion of this Pivot, the Ten Year Plan will be in alignment with the Government's Budget Formulation Process.

6.2 Why Do We Need to Pivot?

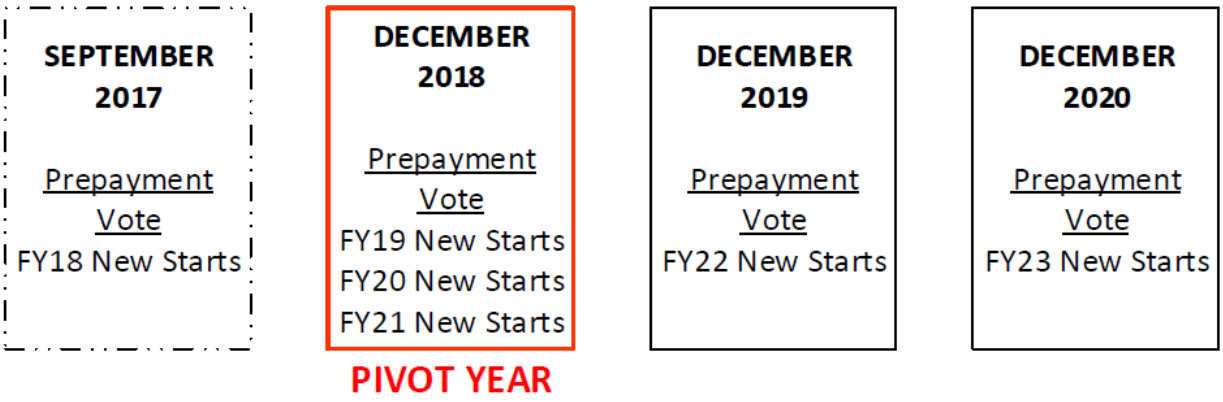
Federal Government Budget Formulation process begins two fiscal years prior to the execution fiscal year. Having the Prepayment funding vote occur on projects during the current Fiscal Year creates inconsistencies and issues with the execution of DSW's active budget. Modifications to resource allocation are made last minute, in order to compensate for any budgetary deviations. By aligning the customer Prepayment Vote with the Budget Formulation process, DSW can maintain consistency and predictability in its Budget Formulation and Execution. Aligning capital planning with budget formulation is imperative to the success of DSW

6.3 Customer Benefits

The "Ten Year Plan Pivot" is a pathway that has been identified by WAPA to allow a shift in the 10-Year Plan to better align with the Budget Formulation Process. As a result of this transition, the Customers will gain direct input into AOA study planning and results. Previously the AOAs were being performed concurrent with Budget Formulation, so opportunities for customer input/engagement were limited. To achieve WAPA's objective in providing customers with capital planning information early and often, the plan to pivot is the pathway to that goal.

6.4 Objectives to Execute the Pivot

- All new projects for fiscal year 2019, 2020, and 2021 must be reviewed by the customer group
  - The body of work for these three years includes two large scale transmission line rebuild projects
- The preferred alternative (scope) for each new start must be vetted and agreed upon by customers
- WAPA must move forward on the preferred alternatives for FY19, FY20, and FY21 to maintain the current budget through FY20.
- Receive customer's approval on prepayment funding for all three fiscal years.



DECEMBER 2018 PROJECTED PREPAYMENT VOTE (PIVOT YEAR)											
Start	**Project**	**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**PCN Total**	**Project Total**
FY18	Coolidge-Valley Farms 115kV Rebuild	$ 800	$ 2,673	$ 1,138	$ 205					$ 4,816	$ 4,816
FY18	Kofa-Dome Tap 161kV Rebuild	$ 500	$ 4,630	$ 500						$ 5,130	$ 5,630
FY18	Dome-Gila 161kV Rebuild	$ 500	$ 5,951	$ 950						$ 6,901	$ 7,401
FY19	Bouse-Kofa 161kV Rebuild Ph:I		$ 465	$ 6,376	$ 7,620	$ 778	$ 311			$ 15,085	$ 15,550
FY19	Bouse-Kofa 161kV Rebuild Ph:II		$ 465	$ 6,376	$ 7,620	$ 778	$ 311			$ 15,085	$ 15,550
FY20	Parker-Blythe 161kV Rebuild Ph: I			$ 500	$ 12,779	$ 6,385	$ 236	$ 100		$ 19,500	$ 20,000
Fy21	Parker-Blythe 161kV Rebuild Ph: II				$ 500	$ 12,779	$ 6,385	$ 236	$ 100	$ 19,500	$ 20,000
			$ 14,184	**$ 15,840**	**$ 28,724**	**$ 20,720**	**$ 7,243**	**$ 336**	**$ 100**	**$ 86,017**	**$ 88,947**

DECEMBER 2019 PROJECTED PREPAYMENT VOTE											
Start	**Project**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**PCN Total**	**Project Total**
FY22	Parker-Blythe 161kV Rebuild Ph: III	$ 500	$ 12,779	$ 6,385	$ 236	$ 100				$ 19,500	$ 20,000
FY22	TBD										
		$ 500	**$ 12,779**	**$ 6,385**	**$ 236**	**$ 100**	**$ -**	**$ -**	**$ -**	**$ 19,500**	

DECEMBER 2020 PROJECTED PREPAYMENT VOTE											
Start	**Project**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**	**PCN Total**	**Project Total**
FY23	Blythe-Headgate Rock 161kV Rebuild	$ 717	$ 9,799	$ 11,711	$ 1,195	$ 478				$ 23,183	$ 23,900
FY23	TBD										
		$ 717	**$ 9,799**	**$ 11,711**	**$ 1,195**	**$ 478**	**$ -**	**$ -**	**$ -**	**$ 23,183**	

Figure 2- Estimates are in 1,000s

6.5 How Will the 10-Year Plan Program Look After The Pivot?

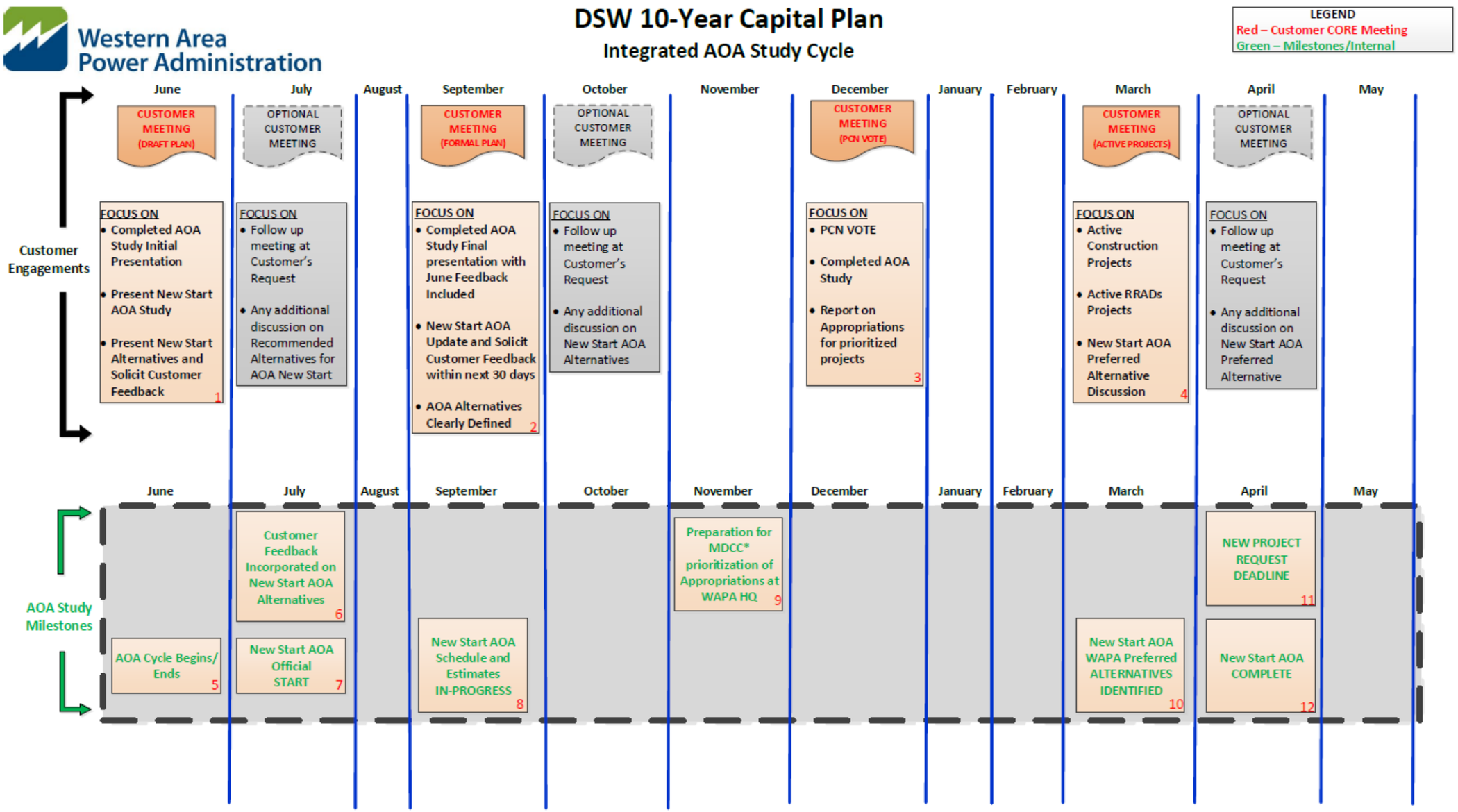


Figure 3 Final TYP Meeting Schedule

7. FY19 PROPOSED PROJECTS

7.1 Project Description

Bouse (BSE) to Kofa (KOF) is a single circuit, 84.3 mile, 161-kV transmission line segment of the overall Parker-Gila 161-kV Transmission Line originally built in 1943.

The BSE-KOF line is located in western Arizona running south from Bouse substation to Kofa substation. Bouse substation is located just north of the Junction of AZ Highways 72 and 95 in La Paz county. Kofa substation is located approximately 16 miles northeast of the city of Yuma in Yuma County. The terrain along the line is mostly low desert with multiple wash crossings and low rises. Toward the south end of the transmission line the terrain becomes more mountainous across the Castle Dome Mountains near Dome Tap.

The line was originally 78.9 miles long, constructed with three 300 kcmil hollow core copper conductors (Anaconda R178R2). Most of the wood H-Frame structures have been replaced with light duty steel H-Frame structures, and only 82 wood structures remain. In 2006 a portion of the line was rerouted around the town of Quartzsite. The reroute replaced 3.3 miles of the existing line through Quartzsite with 8.4 miles of three 954 kcmil ACSR conductors supported on single circuit steel monopoles.

7.2 Project Justification

This AOA identifies various gaps/deficiencies associated with this line and five possible alternatives to addressing this issue.

Experienced and/or Observed Issues:

- NERC/NESC violations have been identified and need to be corrected
- Noted deterioration and unsafe structures are significant
- Access road(s) and right-of-way availability and conditions are sub-par
- Install fiber optic ground wire to meet current and future protection, control, communication and security requirements

NERC/NESC Violations:

NERC requires all transmission line owners/operators to perform a Facility Rating Analysis of all transmission lines over 100-kV in order to determine the as-built condition and de-rate the line to that condition, or to mitigate the condition to achieve the design rating.

There are 106 cases of phase-to-ground clearances and one phase-to-OGW of a crossing line clearance not meeting the minimum clearance required by the National Electrical Safety Code (NESC) and NERC.

Transmission Line Conditions:

There are 17 structures identified by maintenances forces as needing replacement with more expected when detailed ground inspection is completed.

Access Roads and ROW:
According to maintenance field inspection reports, there are numerous cases of access roads and right-of-way paths requiring improvement to facilitate construction and maintenance activities. In some cases access roads need to be created. A lack of prompt access for appropriate resources presents reliability, safety, and cost risks.

Communications Requirements:
Installing Optical Overhead Ground Wire (OPGW) provides an alternate and physically independent path for protection, control and communication. Currently microwave provides the only communication path and the addition of an OPGW will allow for the future communication bandwidth needs to be met. Those needs include security which is currently in the process of installing live feed video cameras and IT networks at substations; the addition of these systems will tax and soon bypass the current communications bandwidth provided by microwave.

7.3 Maintenance Report - CartoPac

Western Area Power Administration
Geographic Information System

February 20, 2018 BSE-KOF 161kV G5200 Maintenance Report

Maintenance Performed in 2018

	Anchor	Brace	Crossarm	Foundation	Guy	Insulator	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	TOTALS
Adjusted/Modified												0
Repaired			1			1					8	10
Replaced							1				1	2
TOTALS	0	0	1	0	0	1	1	0	0	0	9	12

Note: Totals include RADDS projects and maintenance items.

2018 Inspection Progress

	Structures
Inspected	588
Uninspected	81
Total	669
	88%

Outstanding Maintenance in 2018

Row Labels	C	D	E	Grand Total
Anchor				0
Brace	38	2		40
Crossarm	21	6		27
Guy	6			6
Insulator	26			26
Phase/Conductor				0
Pole	36	5		41
Pole Hardware	7			7
Signs	2			2
Static Wire	4	4		8
Vibration Damper				0
Grand Total	140	17	0	157

Maintenance Priority Codes

A	Good or like new. No action required.
B	Minor defect. Monitor degradation.
C	Moderate defect. Rehabilitation or replacement recommended as scheduled maintenance.
D	Serious defect. Repair, reinforce, or replace as soon as possible.
E	Risk to public safety or system reliability.

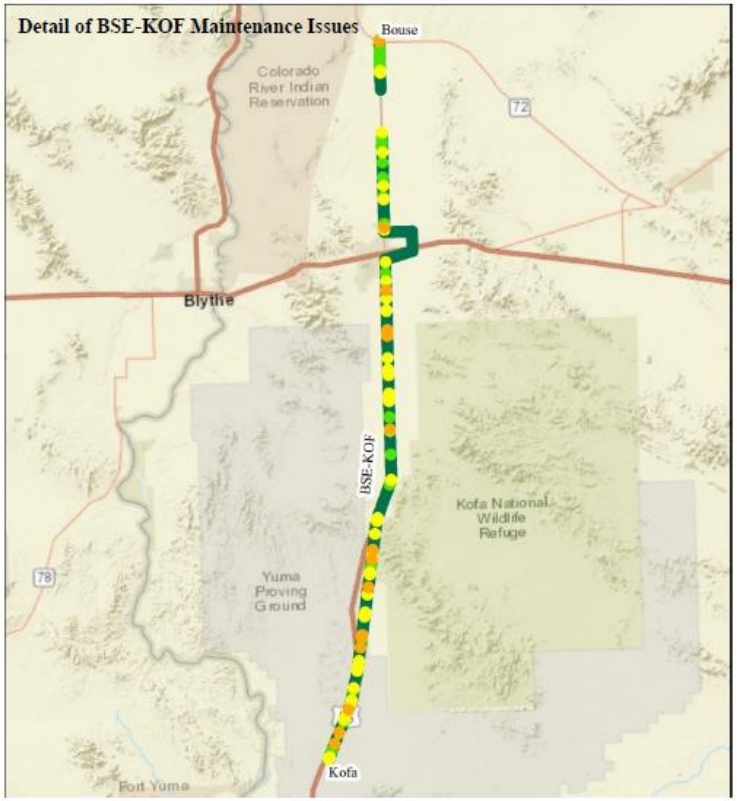


Figure 4 BSE-KOF Maintenance Report

7.4 Proposed Alternatives Overview and Selection

There were a total of five alternatives that were explored to provide a diverse range of viable, economically feasible design options. The feasibility/value of these Alternatives was explored in regards to Compliance, Reliability and Economy. A detailed breakdown of each Alternative can be found below

.

- Alternative 1- Status Quo (Maintenance only)
- Alternative 2- Reconductor and Replace failing wood poles in-kind
- Alternative 3- Reconductor and Replace all wood poles with Light Duty Steel H-Frame Structures
- Alternative 4- Rebuild to 230-kV Standards operated at 161kV using Light Duty Steel H-Frame Structures
- Alternative 5- Inset Structures as needed to mitigate NERC/NESC violations

Below you will find a more detailed breakdown of each Alternative from the AOA study.

Alternative #1- Status Quo (Maintenance Only)

Under the no action alternative, the BSE-KOF T-line continues in its present condition with 107 NERC/NESC violations. WAPA maintenance forces would continue to replace failed wood poles with new wood poles upon failure pending resource availability.

The status quo alternative would have no upfront construction costs, but to change out the remaining wood structures on an emergency maintenance basis could cost $5,948,000. This estimate is based on an actual pole replacements at a cost of $34,176.93. This scenario would leave 82 wood structures in the line. A detailed ground inspection which is still in progress for the current maintenance year has identified 17 structures that have poles that have been rejected or are recommended to be replaced. More structures are expected to be recommended for replacement when the detailed ground inspection of this line is completed.

Pros:

- There would be no design and construction costs.
- No additional ROW would be needed.
- There would be no scheduled outages.

Cons:

- WAPA could be assessed penalties if the NERC/NESC violations are not corrected.
- There will not be a redundant communications path established via overhead fiber.
- There will be increased maintenance costs as wood poles continue to deteriorate.
- Limited maintenance resources would not be able to tend to other parts of the system degrading response and rehabilitation capabilities.
- The line would be de-rated.

Risks

- The status quo alternative is not viable since it does not meet functional needs of this project.
- Increased risk of more frequent, severe, and costly unscheduled outages due to failed wooden structures. Increased safety hazards due to shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.

Alternative #2- Reconductor BSE-KOF

WAPA will replace 75.6 miles of three 300 kcmil Anaconda hollow core copper conductors with three 336.4 kcmil Oriole ACSS conductors, replacing one steel OGW with OPGW, and replacing 17 wood structures deemed as requiring replacement with light duty steel H-frame structures and others as needed to correct clearance issues not corrected by the stringing new ACSS conductor. Access roads will be improved as needed.

Pros:

- NERC/NESC violations would be corrected.
- Increase in line capacity.
- Cost of construction contract could be reduced by approximately $1,735,000 due to scrap value of removed copper conductor.

Cons:

- Eighty two wood structures remain which will require maintenance and annual inspection.
- Amended or new ROW may be have to be acquired from BLM.

Risks

- Outage coordination. Outage problems can be avoided by close coordination with customers and all affected entities.
- Future conversion to 230-kV would require a complete rebuild of the T-Line.
- Potential claims by landowners for damage to property.

Alternative #3- Rebuild with Light Duty Steel H-Frame Structures

WAPA will replace 75.6 miles of three 300 kcmil Anaconda hollow core copper conductors with three 336.4 kcmil Oriole ACSS conductors, replace one steel OGW with OPGW, and install light duty steel H-frame structures to replace the 82 wood structures left in the line segment. Install new light duty steel H-frame steel structures as needed to correct clearance issues not corrected by stringing new ACSS conductor. Access roads will be improved as needed to facilitate construction.

Pros:

- NERC/NESC violations would be corrected.
- A redundant communications path with the needed additional bandwidth will be provided.
- Maintenance costs would be reduced by replacing all wood structures in the T-Line and would change the requirement for inspecting the line every year to inspecting it once every three years.
- Cost of construction contract could be reduced by approximately $1,735,000 due to scrap value of removed copper conductor.

Cons:

- 161kV transmission line load capability limits load growth.
- Construction costs.
- Future conversion to 230-kV would require a complete rebuild of the T-Line.

Risks

- Outage coordination. Outage problems can be avoided by close coordination with customers and all affected entities.
- Potential claims by landowners for damage to property.

Alternative #4- Rebuild to 230-kV Standards

WAPA will remove 75.6 miles of three 300 kcmil hollow core copper conductor, two steel OGWs, 584 light duty steel H-Frame structures, and 82 wood H-Frame wood structures. WAPA will then rebuild the line segment by Installing 75.6 miles of three 954 kcmil ACSR conductor, OPGW, polymer insulators, and hardware designed for 230kV on single circuit steel monopoles but being operated at 161kV. Access roads will be improved as needed.

Pros:

- NERC/NESC violations would be corrected.
- The T-line would be built to 230-kV standards and ready for future conversion to 230-kV.
- Cost of maintenance of wood poles and annual inspection of the T-line would be avoided.
- A redundant communications path with the needed additional bandwidth will be provided.
- Cost of construction contract could be reduced by approximately $1,735,000 due to scrap value of removed copper conductor.

Cons:

- Highest material and construction costs.
- This alternative would be the highest cost alternative.
- Potential claims by landowners for damage to property.
- ROW would need its width to be expanded for entire length of the T-line.

Risks

- Outage coordination. Outage problems can be avoided by close coordination with customers and all affected entities.
- WAPA DSW crews are not equipped to erect and install Heavy duty steel mono-pole structures.

Alternative #5- Inset Structures

Description of Alternative 5 – WAPA will inset 107 light duty steel H-frame structures between existing transmission line structures as necessary to correct clearance issues. Access roads will be improved as necessary for construction.

Pros:

- NERC/NESC violations will be corrected.
- Current contractual obligations are met.

Cons:

- Still have 82 wood structures that require replacement.
- This alternative will only fix NERC/NESC violations.
- This Alternative will not provide a redundant communications path or the needed additional bandwidth.

Risks

- Increased risk of unscheduled outage due to failed wooden structures.
- Increased safety hazards due to shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.

Preferred Alternative:

Of these Alternatives, WAPA has concluded that Alternative 3 is preferred. Although Alternative 4 achieved a higher AOA Rating, the cost required to achieve that rating is far greater than Alternative 4. This fact is illustrated in Figure 5 "Breakdown of AOA Rating and Costs for BSE-KOF".

7.5 Alternative Comparisons

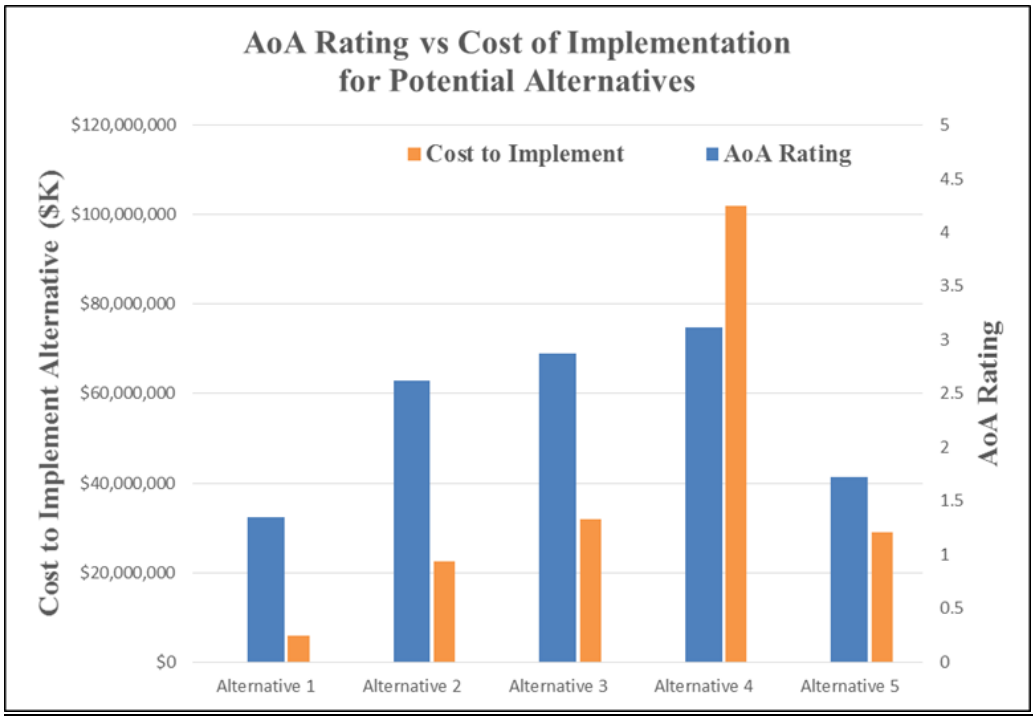


Figure 5 Breakdown of AOA Rating and Costs for BSE-KOF

7.6 Preferred Alternative

Project Predesign Estimate for Preferred Alternative (Alternative 3 Conceptual)

Preferred Alternative #3 Conceptual Estimate	
Rebuild With Light Duty Steel H-Frame Structures	
	TOTAL
Administrative (Inc. Project Management)	$986,000
EVMS*	$2,418,000
Design	$201,000
Construction Contract	$11,412,000
Government Furnished Equipment (GFE)**	$10,823,000
Commissioning	$134,000
Environmental	$620,000
Subtotal	$26,594,000
Contingency (20%)	$5,319,000
Phase I & II Total Project Budget	**$31,913,000**

*Earned Value Management System (EVMS) is a project management system required by the Department of Energy to manage cost and schedule on projects having a Total Project Cost (TPC) over $20 million.**OPGW is 2.9% of Total Project Cost. For a more detailed description of EVMS Please See Appendix Z – "*WAPA General Study and Design Standards*".

7.7 Project Phasing

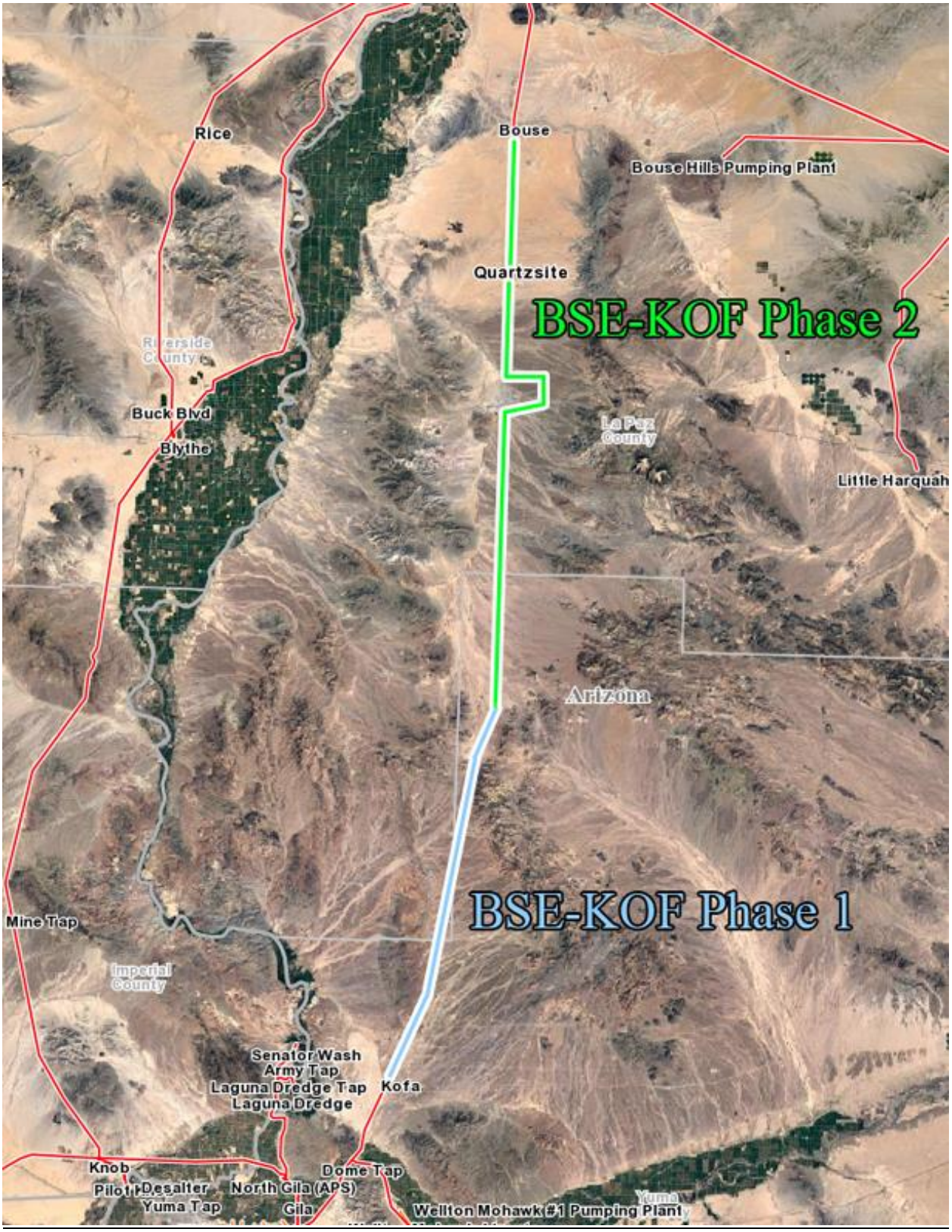


Figure 6 Bouse-Kofa Phasing Breakdown

Phase I

Design and construct 31.25 miles of 161-kV transmission line from structure 70-2 to Kofa Substation. Design includes replacing 43 wood structures, and selecting a new conductor that can be installed on existing and new light duty steel H-Frame structures to eliminate NERC/NESC violations to the extent possible. It is anticipated some existing light duty steel H-Frame structures will be replaced with taller structures. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure.

Phase II

Design and construct 44.25 miles of 161-kV transmission line from Bouse Substation to structure 70-2. Design includes replacing 40 wood structures, and selecting a new conductor that can be installed on existing and new light duty steel H-Frame structures to eliminate NERC/NESC violations to the extent possible. It is anticipated some existing light duty steel H-Frame structures will be replaced with taller structures. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure.

Advantages:

- Each phase can be scheduled around summer outage restrictions.
- Project can be completed faster with more manageable outages considering more work can be performed between outage restrictions.
- The terrain on the southern end of the line is much more mountainous and difficult than the north. Phasing allows a multiple contractor crews to focus on terrain specific locations concurrently.
- Environmental clearance for both phases can be obtained simultaneously.
- All GFE for both phases can be ordered at the same time with deliveries scheduled as needed by each phase.

Disadvantages:

- Two sets of specifications and drawings will be needed, a separate set for each phase.
- A separate construction contract would be needed for each phase.

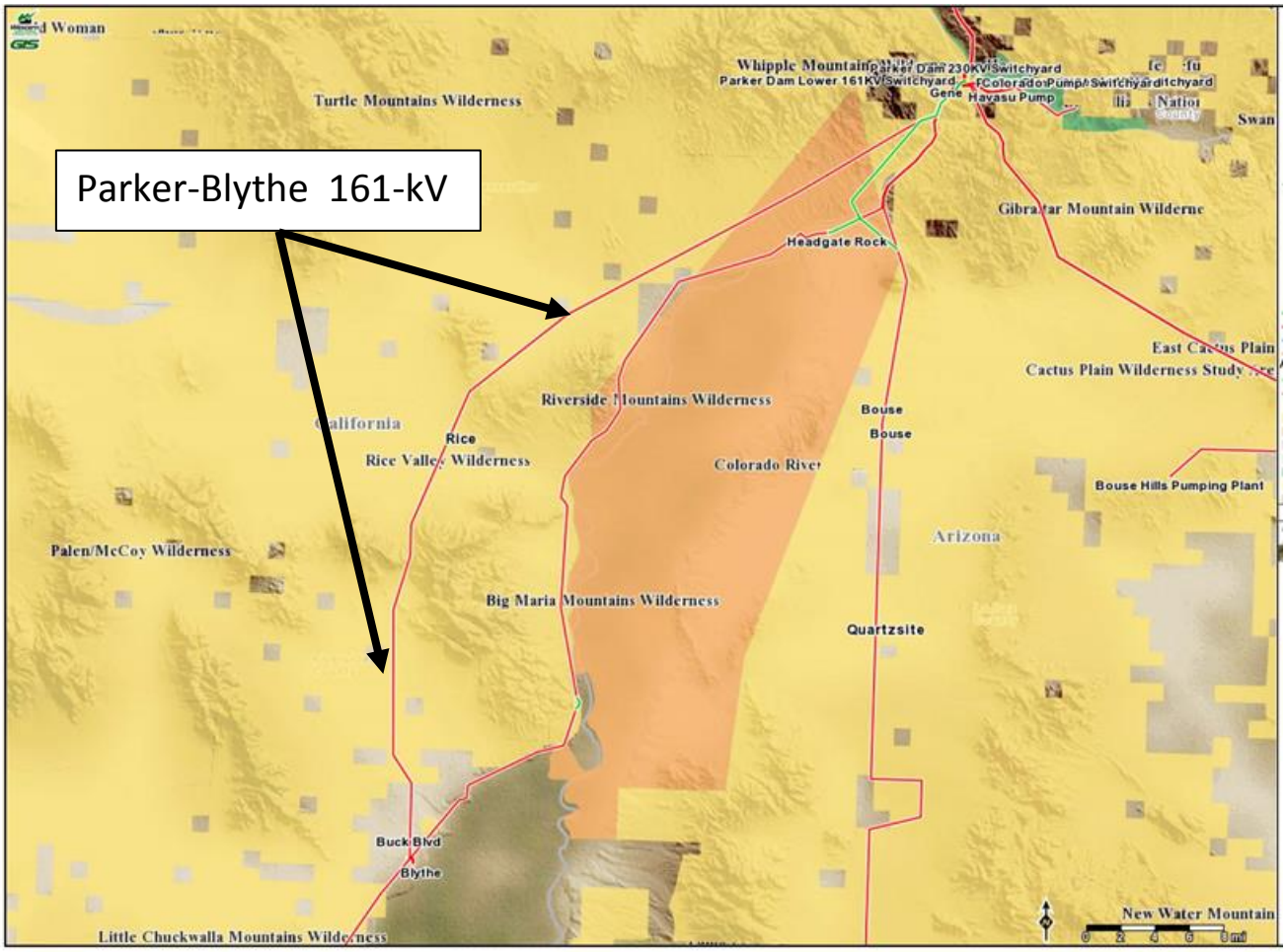
Project Assumptions & Constraints

- No new ROW would be needed except for temporary construction permits.
- No line outages are allowed between May 1 and Oct 1 in any given year.
- Cost estimate is conceptual and must be revised before establishing a construction project budget.
- Salvage value of retired copper wire was estimated at $1.55 per pound (market value at time of AOA).
- The project may be done in phases.
- Others have expressed interest in sharing fibers and costs of OPGW. Evaluations have been done in accordance with Federal laws and regulations.
- Detailed engineering of this project has not been started; all estimates and scheduling are based on discussions and proper charging estimates between Civil Design & Engineering (CD&E) and WAPA and do not guarantee that actual schedules and final cost will not vary from those projected.

8. FY20-21 PROPOSED PROJECT

8.1 Project Description

The Blythe(BLY) to Parker (PAD) 161-kV Transmission Line was built in 1969 and runs along the Colorado River in eastern California. The transmission line is 63.9 miles long utilizing 954 kcmil ACSR conductor and two steel overhead ground wires supported on wooden H-frame structures with 3-pole wooden structures at angle points and dead-ends. The transmission line is part of the Parker-Davis Project.



8.2 Project Justification

The PAD-BLY 161-kV Transmission Line is 49 years old and supported on wood H-Frame structures that have exhibited deterioration and are in need of rehabilitation. Eighty percent of the wood poles in the PAD-BLY line have been identified as needing replacing.

Rehabilitation of the PAD-BLY 161-kV Transmission line is needed to insure the safe, secure, reliable and affordable energy and transmission services to our customers. Rehabilitation would include:

- Replace all unsafe and deteriorated structures including those that were found to have test results with fiber strength that fell below 65% of their design strength.
- Install dead-ends at intervals of less than 10 miles to prevent cascading failures.
- Correct all NERC/NESC violations that have been identified.
- Repair access roads as needed to construct this project.
- Install fiber optic ground wire to meet current and future protection, control, communication and security requirement.
- NERC/NESC violations have been identified and need to be corrected.
- Noted deterioration and unsafe structures are significant.
- Access road(s) and Right-Of-Way availability and conditions are sub-par .
- Additional communication requirements have been identified.

NERC/NESC Violations:

There are five cases of phase-to-ground clearances not meeting the minimum clearance required by the NESC and NERC that need to be corrected.

Line Condition:

The PAD-BLY transmission line is 49 years old and has eighty percent of its supporting structures needing replacing as identified by detailed ground inspection and Polux® wood fiber strength testing.

Access Roads and ROW:
GIS data and inspection field reports shows that much of the ROW access road is so sandy, eroded or steep that construction vehicles and equipment will need to be towed in by dozer. A detailed ground inspection of the PAD-BLY transmission line conducted by DSW maintenance group identified 20% of the structures (103 out of 523) as needing a dozer tow for access to structures.

Communication Requirements:
The PAD-BLY transmission line does not have OPGW installed. OPGW has the added benefit of drastically increasing total bandwidth for data transfer over Power Line Carrier or Point to Point Microwave Systems. Security is currently in the process of installing live feed video cameras and IT networks at substations. The addition of these systems will tax or bypass the current communications bandwidth provided by the existing communication networks in place.

8.3 Maintenance Report - CartoPac

Western Area Power Administration
Geographic Information System

February 20, 2018 PAD-BLY-2 161kV G5200 Maintenance Report

Maintenance Performed in 2018

	Anchor	Brace	Crossarm	Foundation	Guy	Insulator	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	TOTALS
Adjusted/Modified												0
Repaired												0
Replaced												0
TOTALS	0	0	0	0	0	0	0	0	0	0	0	0

Note: Totals include RADDS projects and maintenance items.

2018 Inspection Progress

	Structures
Inspected	4
Uninspected	522
Total	526

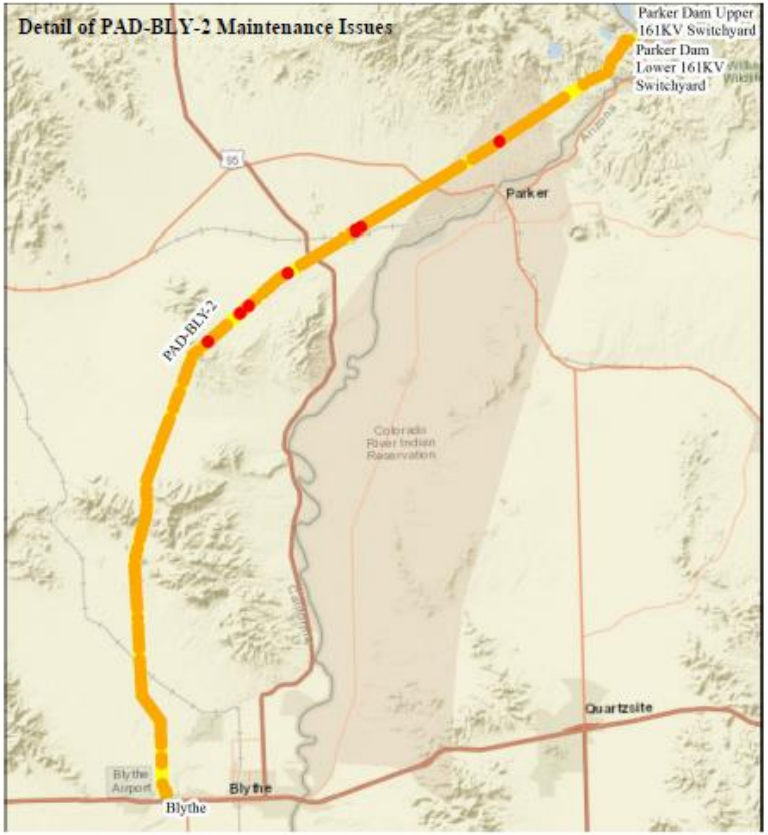
01%

Outstanding Maintenance in 2018

Row Labels	C	D	E	Grand Total
Anchor	19			19
Brace	141	4		145
Crossarm	71	2		73
Guy	30			30
Insulator	34	1		35
Phase/Conductor	1			1
Pole	554	311	7	872
Pole Hardware	11	2		13
Signs	13			13
Static Wire	3	2		5
Vibration Damper	4			4
Grand Total	881	322	7	1210

Maintenance Priority Codes

A	Good or like new. No action required.
B	Minor defect. Monitor degradation.
C	Moderate defect. Rehabilitation or replacement recommended as scheduled maintenance.
D	Serious defect. Repair, reinforce, or replace as soon as possible.
E	Risk to public safety or system reliability.



8.4 Proposed Alternatives Overview and Selection

There were a total of five alternatives that were explored to provide a diverse range of viable, economically feasible design options. The feasibility/value of these Alternatives was explored in regards to Compliance, Reliability and Economy. A detailed breakdown of each Alternative can be found below.

- Alternative 1- Status Quo (Maintenance Only)
- Alternative 2- Replace wood poles in kind and add steel structure dead-ends every <10 miles
- Alternative 3- Rebuild with light duty steel H-Frame structures using 161-kV specifications and standards
- Alternative 3a- Rebuild with light duty steel H-Frame structures using 230-kV specifications and standards
- Alternative 4- Rebuild with steel monopoles using 161-kV specifications and standards
- Alternative 5- Rebuild with steel monopoles using 230-kV specifications and standards (operated at 161kV)

Alternative #1- Status Quo (Maintenance Only)

The Parker-Blythe 161-kV Transmission Line would remain in its present condition continuing to deteriorate. The POLUX® test found only 20% of the line's supporting wood poles don't require replacement. WAPA's maintenance forces would replace individual wood poles as they fail or are deemed unfit to climb.

Alternative 1 Status Quo Maintenance Only	
New Construction Costs	$0
50 Year Inspection Costs	$3,367,576
50 Year Maintenance Costs	$41,981,003
50 Year Life Cycle Costs	**$45,348,579**

Pros:

- There would be no up-front design and construction costs.
- No additional ROW would be needed.
- There would be no scheduled outages.

Cons:

- Maintenance costs would be expected to increase as the wood support structures continue to deteriorate and be replaced as they fail.
- This alternative does not provide a redundant communications path via overhead fiber.
- WAPA could be assessed penalties if the NERC violations are not corrected.
- Unplanned outages and lost revenue may occur due to structure failure.

Risks

- The system will be at increased risk if structures fail causing circuit outages along with revenue losses.
- Significant structure failure could result in potential public health and safety risk and costly repairs in difficult terrain. This risk can be mitigated by prioritizing pole change outs in accordance with POLUX® test and ground inspection results and recommendations.
- Because of a large number of POLUX® "rejected" poles and a long distance between dead-ends, there is a risk of a cascading failure of the transmission line during a severe storm. This risk can be mitigated by installing an occasional dead-end (every 5 to 10 miles) in the transmission line when replacing rejected structures/poles.
- It is recommended that maintenance monitors and records the status of the equipment if this option is accepted. This data can then be used to better analyze the status quo maintenance solution.

Alternative #2- Upgrade – Add Steel Structure Dead-ends Every <10 Miles

After receiving environmental clearances and new or amended ROW from BLM construction can begin. All failing wood H-Frame structures would be replaced with new wood structures with steel cross-arms. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. Existing 954 ACSR conductor, insulators and hardware would be used, but one OGW would be replaced with OPGW. New structures will be installed using 161-kV clearances and standards.

Alternative 2 Rebuild With Wood H-Frames & Steel Deadends	
New Construction Costs	$35,965,991
50 Year Inspection Costs	$3,367,576
50 Year Maintenance Costs	$42,837,534
50 Year Life Cycle Costs	**$82,171,101**

Pros:

- The BLY-PAD transmission line would be restored to good condition.
- System protection, control, communication, and security would be enhanced with the addition of OPGW.
- Installation of steel cross-arms would reduce the amount of future maintenance time spent on replacing broken or deteriorated wood cross arms.
- No additional ROW would be needed.
- All NERC/NESC violations would be corrected.

Cons:

- The new wood poles would still be susceptible to insects, fungi, wood rot and other environmental factors that caused degradation of the structures that are being replaced.
- Maintenance costs for the life of the refurbished line would continue at a higher rate than that for steel.
- The line would still require yearly inspection.
- Future upgrade of the line to 230-kV would require a complete rebuild.

Risks

- The use of steel cross-arms on wood H-Frame structures is not a standard design for WAPA and may require extra design time for engineering evaluation.

Alternative #3- Rebuild With Light Duty Steel H-Frame Structures Using 161-kV Specifications and Standards

After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood H-Frame structures would be replaced with new light duty steel H-Frame structures. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators and hardware would be used, one new OGW and one new OPGW would be installed. All structures will be installed using 161-kV clearances and standards.

Alternative 3 Rebuild With Light Duty Steel 161-kV H-Frames	
New Construction Costs	$57,132,038
50 Year Inspection Costs	$2,172,890
50 Year Maintenance Costs	$0
50 Year Life Cycle Costs	**$59,304,928**

Pros:

- The BLY-PAD transmission line would restored to good condition.
- All NERC/NESC violations would be corrected.
- System protection, control, communication, and security would be enhanced with the addition of OPGW.
- No additional ROW would be needed.
- Future maintenance costs will be reduced.
- Inspection interval will go from annually to once every three years.

Cons:

- Future upgrade of the line to 230-kV would require a complete rebuild.
- Future load growth is limited by 161-kV transmission line capacity.

Risks

- The risk of unplanned outages is decreased by replacing the existing wood structures with light duty steel H-Frame structures.
- Safety hazards will be decreased by replacing wood structures with steel structures.

Alternative #3a- Rebuild With Light Duty Steel H-Frame Structures Using 230-kV Specifications and Standards

After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood H-Frame structures would be replaced with new light duty steel H-Frame structures. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators and hardware would be used, one new OGW and one new OPGW would be installed. All structures will be installed using 230-kV clearances and standards. The line would be operated at 161-kV until future conversion to 230-kV.

Alternative 3a Rebuild With Light Duty Steel 230-kV H-Frames	
New Construction Costs	$60,179,718
50 Year Inspection Costs	$2,172,890
50 Year Maintenance Costs	$0
50 Year Life Cycle Costs	**$62,352,608**

Pros:

- The BLY-PAD transmission line would restored to good condition.
- All NERC/NESC violations would be corrected.
- System protection, control, communication, and security would be enhanced with the addition of OPGW.
- No additional ROW would be needed.
- Future maintenance costs will be reduced.
- Inspection interval will go from annually to once every three years.
- Future upgrade of the line to 230-kV would not require additional transmission line work.
- New higher capacity conductor will allow future load growth.

Cons:

- Approximately 5% higher material and installation costs for 230-kV construction than for 161-kV construction.

Risks

- The risk of unplanned outages is decreased by replacing the existing wood structures with light duty steel H-Frame structures.
- Safety hazards will be decreased by replacing wood structures with steel structures.

Alternative #4- Rebuild With Steel Monopoles Using 161-kV Specifications and Standards

After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood support structures would be replaced with new steel monopoles. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators, hardware, and OPGW would be used. The new design and construction would use 161-kV clearances and standards.

Alternative 4 Rebuild With 161-kV Steel Monopoles	
New Construction Costs	$68,970,606
50 Year Inspection Costs	$2,172,890
50 Year Maintenance Costs	$0
50 Year Life Cycle Costs	**$71,143,496**

Pros:

- The BLY-PAD transmission line would restored to good condition.
- All NERC/NESC violations would be corrected.
- System protection, control, communication, and security would be enhanced with the addition of OPGW.
- No additional ROW would be needed.
- Future maintenance costs will be reduced.
- Inspection interval will go from annually to once every three years.
- Steel monopoles will have climbing provisions so that maintenance does not require a bucket truck.

Cons:

- Future upgrade of the line to 230-kV would require a complete rebuild.
- Higher construction costs than the preferred alternative.

Risks

- The risk of unplanned outages is decreased by replacing the existing wood structures with light duty steel H-Frame structures.
- Safety hazards will be decreased by replacing wood structures with steel structures.

Alternative #5- Rebuild With Steel Monopoles Using 230-kV Specifications and Standards (Operated at 161-kV)

After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood structures would be replaced with new steel monopoles. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators, hardware, and OPGW would be used. The new design and construction would use 230-kV clearances and standards.

Alternative 5 Rebuild With 230-kV Steel Monopoles	
New Construction Costs	$72,594,498
50 Year Inspection Costs	$2,172,890
50 Year Maintenance Costs	$0
50 Year Life Cycle Costs	**$74,767,388**

Pros:

- The BLY-PAD transmission line would restored to good condition.
- All NERC/NESC violations would be corrected.
- System protection, control, communication, and security would be enhanced with the addition of OPGW.
- No additional ROW would be needed.
- Future maintenance costs will be reduced.
- Inspection interval will go from annually to once every three years.
- The BLY-PAD would be ready for future upgrade to 230-kV.
- Steel monopoles will have climbing provisions so that maintenance does not require a bucket truck.

Cons:

- Alternative 5 has the highest construction cost of all the alternatives analyzed in this AOA.

Risks

- The risk of unplanned outages is decreased by replacing the existing wood structures with light duty steel H-Frame structures.
- Safety hazards will be decreased by replacing wood structures with steel structures.

8.5 Alternative Comparisons

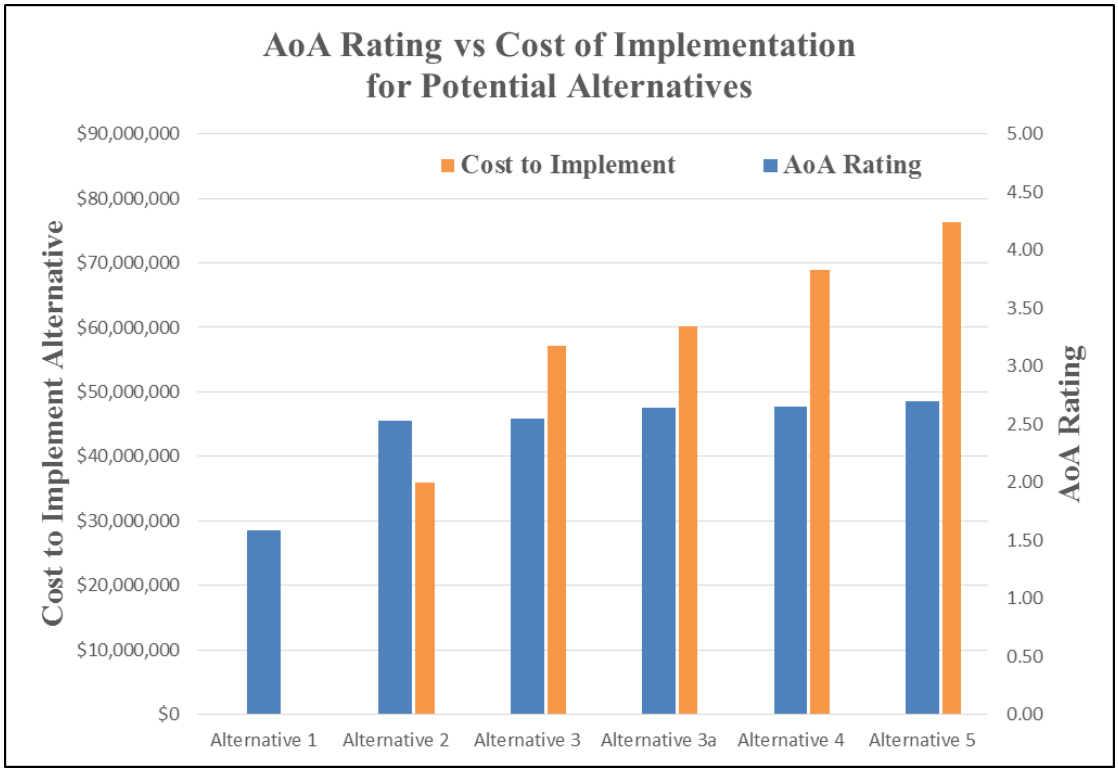


Figure 7 Breakdown of AOA Ratings and Costs for Pad-Bly

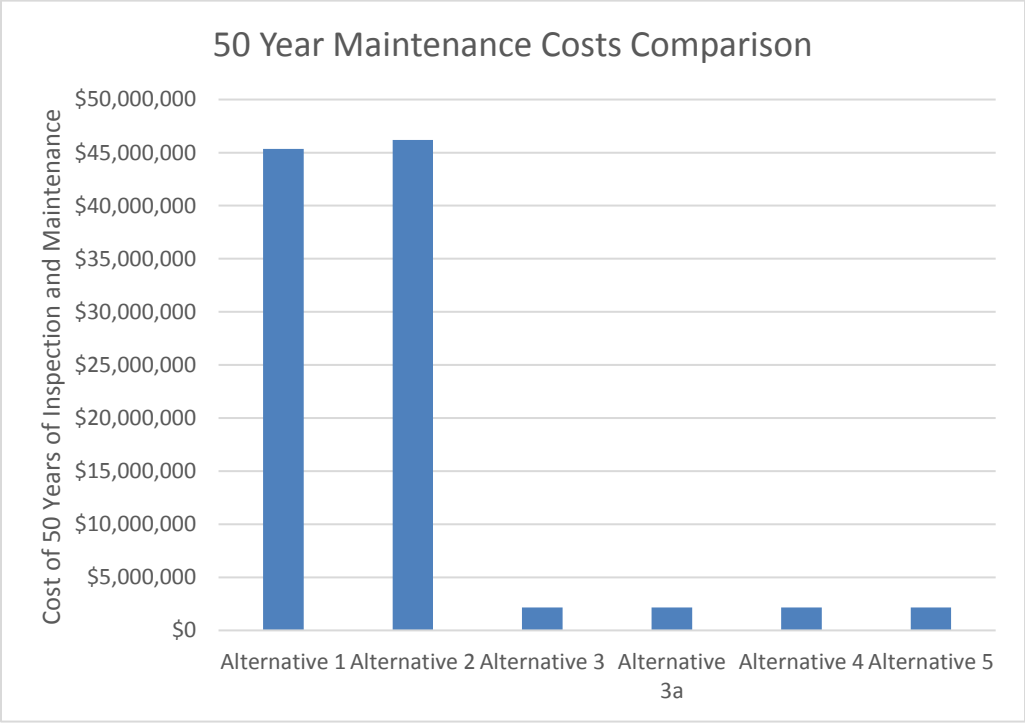


Figure 8 Maintenance and Inspection Cost Comparison between Alternatives

8.6 Preferred Alternative

Although Alternative 4 achieved a higher AOA Rating, the cost required to achieve that rating is far greater than Alternative 3a, as can be seen in the graph above.

Project Predesign Estimate for Preferred Alternative (Conceptual)

Preferred Alternative #3a Conceptual Estimate	
Rebuild With Light Duty 230kV H-Frames	
	TOTAL
Administrative (Inc. Project Management)	$994,535
EVMS*	$1,522,000
Design	$414,975
Construction Contract	$30,462,201
Government Furnished Equipment (GFE)**	$15,661,286
Commissioning	$382,532
Environmental	$596,000
Land and Land Rights	116,236
Subtotal	$50,149,765
Contingency (20%)	$10,029,953
Phase I, II, II Total Project Budget	**$60,179,718**

Alternative 3a Rebuild With Light Duty Steel 230-kV H-Frames	
New Construction Costs	$60,179,718
50 Year Inspection Costs	$2,172,890
50 Year Maintenance Costs	$0
50 Year Life Cycle Costs	**$62,352,608**

*Earned Value Management System (EVMS) is a project management system required by the Department of Energy to manage cost and schedule on projects having a Total Project Cost (TPC) over $20 million.
**OPGW is 2.9% of Total Project Cost.

8.7 Project Phasing

Alternative 3a: Blythe-Parker 161-kV Rebuild, Phase I, Phase II, and Phase III

Figure 9 Pad-Bly Phasing Breakdown

Phase I
Design and construct 21 miles of 161-kV transmission line from Parker Substation to structure 20-8. Design includes replacing 160 wood structures with new light duty steel H-Frame structures, and installing new conductor, one new OGW, one new OPGW, new hardware, and insulators. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure. The line will be designed to 230-kVstandards and specifications but will be operated at 161-kV.

Phase II
Design and construct 21.75 miles of 161-kV transmission line from structure 20-8 to structure 41-7. Design includes replacing 181 wood structures with new light duty steel H-Frame structures, and installing new conductor, one new OGW, one new OPGW, new hardware and insulators.
Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure. The line will be designed to 230-kVstandards and specifications but will be operated at 161-kV.

Phase III
Design and construct 21.25 miles of 161-kV transmission line from structure41-7 to Blythe substation. Design includes replacing 182 wood structures with new light duty steel H-Frame structures, and installing new conductor, one new OGW, one new OPGW, new hardware and insulators. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure. The line will be designed to 230-kVstandards and specifications but will be operated at 161-kV.

Advantages:
- No need to have contractor demobilize and remobilize between phases.
- Each phase can be scheduled around summer outage restrictions.
- Environmental clearance for all three phases can be obtained simultaneously.
- All GFE for all three phases can be ordered at the same time with deliveries scheduled as needed by each phase.

Disadvantages:
- Three sets of specifications and drawings will be needed, a separate set for each phase.
- A separate construction contract would be needed for each phase.

<u>Project Assumptions and Constraints</u>
- No line outages are allowed between May 1 and September 30 in any given year.
- Cost estimate is conceptual and must be revised before establishing a construction project budget.
- Schedules are based on conceptual Scope of Work and must be revised as design progresses.
- No new ROW is needed except for temporary construction easements.
- Existing ROW and access roads are overgrown and eroded.
- ROW crosses Federal Land, CRIT land and Desert Tortoise habitat.

9. APPENDICES

9.1 AOA Evaluation Methodology

During the Alternative Selection process of the Analysis of Alternatives (AOA), a ratings system consisting of three categories is used. Those categories are Compliance, Reliability, and Economics. WAPA has established a standard weighting for each category as follows: 40% Compliance, 35% Reliability and 25% Economics. This standard rating is the cornerstone in providing safe, secure, reliable and affordable transmission services. However, each of these three criteria can be weighted independently during the development of the Mission Need and the Alternatives when appropriate.

The methods utilized for WAPA's AOA Selection Process were created based on criteria derived from the Department of Energy (DOE)[1] and the Government Accountability Office (GAO)[2]. The DOE and GAO have provided guidance and best practices on the execution of an AOA study. DSW is following all relevant suggestions and incorporating guidance into the 10-Year Planning Program with a focus to meeting best practices outlined on behalf of the Federal Government for the benefit of its customers and stakeholders.

[1] *"DOE 413.3B - Program and Project Management for the Acquisition of Capital Assets"*

[2] *"GAO-15-37 - DOE and NNSA Project Management - Analysis of Alternatives Could Be Improved by Incorporating Best Practices"*

1. General Principals

1.1. The customer(s)/stakeholder(s) define the mission need and functional requirements without a predetermined solution.

1.2. The customer(s)/stakeholder(s) provide the team conducting the AOA with enough time to complete the AOA process to ensure a robust and complete analysis.

1.3. The team includes members with diverse areas of expertise including, at a minimum, subject matter expertise, project management, cost estimating, and risk management.

1.4. The team creates a plan, including proposed methodologies, for identifying, analyzing, and selecting alternatives, before beginning the AOA process.

1.5. The team documents all steps taken to identify, analyze and select alternatives in a single document.

1.6. The team documents and justifies all assumptions and constraints used in the analysis.

1.7. The team conducts the analysis without a predetermined solution.

2. Identifying Alternatives

The team:

2.1. Identifies study alternatives that are sufficient, diverse, viable, and economically feasible; representing a suitable range of design alternatives.

2.2. Describes alternatives in sufficient detail to allow for robust analysis.

2.3. Includes one alternative representing the status quo to provide a basis of comparison among alternatives.

2.4. Screens the list of alternatives before proceeding, eliminates those that are not viable, and documents the reasons for eliminating any alternatives.

3. Analyzing Alternatives

The team:

3.1. Develops a life-cycle cost estimate for each alternative, including all costs from inception of the project through design, development, deployment, operation, maintenance, and retirement.

3.2. Presents the life-cycle cost estimate for each alternative as a range or with a confidence interval, and not solely as a point estimate.

3.3. Expresses the life-cycle cost estimate in present value terms

3.4. Uses a standard process to quantify the benefits/effectiveness of each alternative and documents this process.
3.5. Quantifies the benefits/effectiveness resulting from each alternative over that alternative's full life cycle, if possible.
3.6. Explains how each measure of benefit/effectiveness supports the mission need.
3.7. Identifies and documents the significant risks and mitigation strategies for each alternative.
3.8. Tests and documents the sensitivity of both the cost and benefit/effectiveness estimates for each alternative to risks and changes in key assumptions.

4. Selecting a Preferred Alternative
4.1. The team or the decision maker defines selection criteria based on the mission need.
4.2. The team or the decision maker weights the selection criteria to reflect the relative importance of each criterion.
4.3. An entity independent of the AOA process reviews the extent to which all best practices have been followed (for certain projects, additional independent reviews may be necessary at earlier stages of the process such as for reviewing the study plan or for reviewing the identification of viable alternatives).

9.2 WAPA's Ranking Process – Maintenance, Design, and Construction Council (MDCC)

Criteria for Evaluating Capital Projects and Ranking Them for Comparison

Project Ranking:
Each Project will be ranked based on **Compliance**, **Reliability**, and **Economics** to determine the overall order these projects should be implemented. Each of these categories is comprised of specific criteria that will be evaluated and assigned a ranking based on importance/impact to the proposed project.
The **Compliance** category includes the following criteria:

- Meets Environmental regulatory requirements (not including projects that are solely to enhance the environment, IE. Basic Substation cleanup).
- Meets North American Electric Reliability Corporation (NERC) reliability standards.
- The equipment or facility currently is or in the near future will constrain the transmission system
- Meets Health and Safety requirements.
- Each criterion has equal weight within the category.

The **Reliability** category includes the following criteria:

- Condition of the equipment or facility
- Availability of replacement parts or repair services
- Impact to the power system if the project is not completed
- Number of outages that have occurred and the frequency of outages
- Facility loading and encroachment on maximum ratings
- Risk score(s) from the AM Risk Register Spreadsheet of various equipment that may be included in a project.

Each criterion has equal weight within the category.

The **Economic (WAPA and its customers)** category includes the following criteria:

- The economic impacts of not completing the project is determined to be significant to the regional transmission system.
- There is a contractual need for the project such as a power marketing agreement stating the need.
- An obligation for a path that meets a contractual requirement.
- Loss of revenue to WAPA, including additional revenue that would become available as a direct result of the project.
- Customer(s) incur increased costs if they need to purchase alternate path or power.

Each criterion has equal weight within the category.

The ranking levels are as follows:

0 - Minor: There is negligible impact in regards to the issue and why the project is needed
1 - Moderate: There is limited impact in regards to the issue and why the project is needed
2 - Major: There is significant impact in regards to the issue and why the project is needed
3 - Severe: There is high impact in regards to the issue and why the project is needed
4 - Catastrophic: Failure to complete the project will result in extended outages, severe system degradation and/or significant economic repercussions.

After each of the proposed projects is rated for each of the categories, the following weighting factor is applied:

- Compliance will have a weighting factor of 0.40 because of the need of the project and possible impact to life or limb, heavy fines could be imposed, and the requirement by law or regulation.
- Reliability will have a weighting factor of 0.35 because of its impact to the system and WAPA's credibility and reputation if there is a failure or outage.
- Economical will also have a weighting of 0.25 due to the monetary impact and direct impact to our customers if the project is not completed.

Other Considerations:

- If a capital project has had a prior year start, meaning that the project had a construction award or a major equipment purchase in the prior fiscal year, it will be given a priority in funding consideration in order to avoid increased costs resulting from equipment delivery issues, contract modifications, interest during construction (IDC), and personnel scheduling. If there is a funding conflict, a further comparison of risk will be performed.
- If the project has joint participation (i.e. Partial funding from customer trust project and partial WAPA funding) it will be given priority in funding consideration similar to prior year start projects.
- A NERC compliance violation, or other system emergency need, which may require a new project start, might be more costly than increased costs from delays to an on-going capital project, and may be given priority. In other words, cost impacts from delaying any prior starts will be weighed against the impact of not complying with NERC Standards or not correcting the system need.
- Interconnection requests that are not funded by the requestor will be included in this process for ranking.
- Upon completion of the ranking consensus, each region will review their qualifying projects to verify and confirm that they can execute the appropriated funds by fiscal year end.