From: evan mudd <evan.mudd@gmail.com>
Sent: Tuesday, October 1, 2024 11:17 AM
To: Sullivan, Jim (COMM) <Jim.Sullivan@state.mn.us>
Subject: Re: Public Comment: Docket 22-415/22-416 Surface Color Treatment of Transmission Line Structures

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Adding to this comment, color treatment should also be considered for any monopole structures aligned with, or crossing Crow Wing County Road 218, as this is all in the same neighborhood.

Thanks,

From: evan mudd <evan.mudd@gmail.com>
Sent: Tuesday, October 1, 2024 11:07 AM
To: Sullivan, Jim (COMM) <jim.sullivan@state.mn.us>
Subject: Public Comment: Docket 22-415/22-416 Surface Color Treatment of Transmission Line Structures

Hi Jim,

I realize that the comment period for route selection has ended, but I would like to make this comment public, as it remains relevant regardless of the chosen route.

Monopole structures should be carefully considered for coating in visually sensitive areas. The attached document is a detailed study on coatings for monopole structures and data which measured how well the poles blended with a natural environment.

One of the proposed routes near Riverton runs directly alongside Crow Wing County Road 59, which leads to the Cuyuna State Recreation Area. The US Bureau of Land Management has conducted thorough research demonstrating that coatings in "shadow gray and shale green" are effective in helping transmission line projects become far less obtrusive, even inconspicuous if the colors are done right. Therefore, I suggest that the shale green color be used for the monopoles near the Cuyuna State Recreation Area in Riverton, MN. This choice would enhance public reception of the transmission line project by reducing the visual impact of the structures as people travel to the state trail system.

Evan Mudd
Ironton, MN

Surface Color Treatment of Transmission Line Structures

Brandon Colvin, MLA
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ABSTRACT

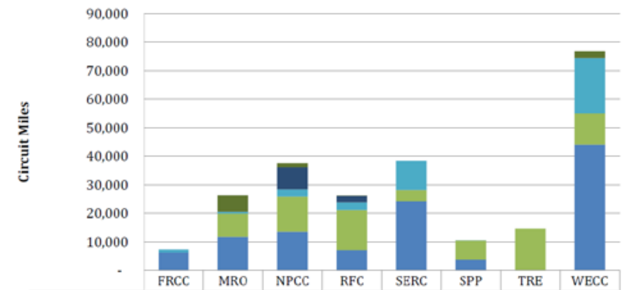
With the increasing need for reliable energy infrastructure in the United States, the once natural openness of the Wild West has now evolved to a web of infrastructure scattered across the landscape. BLM public lands managed under a multiple-use mission are no exception to this rapid expanse of development.

While projects built on BLM land go through in-depth environmental analysis, including making recommendations for proper design features and mitigation measures to reduce impacts to visual resources, it is often difficult for BLM staff to solidify the full implementation of these measures. This is sometimes a result of BLM staff not having the expertise or tools necessary to simulate design features and mitigation measures. Having a visual simulation to show the net gain these measures provide in reducing impacts to visual resources is an invaluable asset in project development.

This presentation captures the process that the BLM followed to warrant the color treatment of transmission structures on a recent 500kV transmission line through a highly scenic and publicly sensitive landscape. It will highlight the process of using 2D visual simulation techniques to conduct a color analysis of the natural landscape. It will also demonstrate how utilizing these techniques proved an invaluable source of information in aiding BLM decision makers in selecting the most appropriate surface color treatment for the structures of this project.

ENERGY TRANSMISSION OVERVIEW

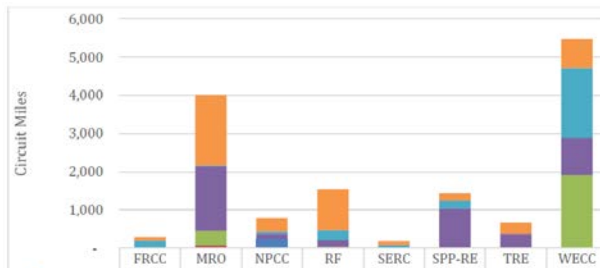
Since the first long-distance transmission line was constructed, which is believed to have been built in 1889 in Portland, Oregon, thousands of miles of transmission lines have been strung across the U.S. (Madrigal, 2010). These lines are supported by structures that vary from small roughly cut wood poles to large steel structures that are capable of withstanding the most intense abuse nature can throw at them.



	FRCC	MRO	NPCC	RFC	SERC	SPP	TRE	WECC
Total DC	-	5,773	1,452	66	-	-	-	2,252
600 kV - 799 kV	-	-	7,671	2,201	-	-	-	-
400-599 kV	1,201	600	2,570	2,776	10,132	94	-	19,477
300-399 kV	-	8,218	12,270	14,132	4,049	6,614	14,679	10,852
200-299 kV	6,200	11,705	13,597	7,018	24,267	3,834	-	44,171

Figure 1 - Existing transmission lines as of last day of 2015
(Department of Energy - Annual US Transmission Data Review 2016)

As the energy demand continues to increase in the United States, there remains a need to expand energy transmission infrastructure. This means not only more energy production, but also more energy transmission.



	FRCC	MRO	NPCC	RF	SERC	SPP-RE	TRE	WECC
100-199 kV	95	1,842	359	1,074	94	188	291	759
200-299 kV	193	29	62	263	81	209	-	1,834
300-399 kV	-	1,690	134	171	-	1,034	372	974
400-599 kV	-	380	-	19	-	-	-	1,913
600 kV+	-	69	-	14	-	-	-	-
Total DC	-	-	237	-	-	-	-	-

Figure 2 - Planned lines expected to be completed by 2020
(Department of Energy - Annual US Transmission Data Review 2016)

As of 2016, there were 237,871 total circuit miles of transmission lines ranging from 200kV to 799kV (including DC) across the U.S. In addition to that staggering figure, there are plans for another 14,380 circuit miles of transmission to be completed by 2020. Adding to these figures still, conceptual transmission projects could add even more circuit miles, increasing that number by an additional 2,017 for completion sometime between 2021 and 2025.

As is clearly evident in these figures, reliable and efficient energy transmission, predominantly through overhead transmission lines, is a vital part of our energy dependent society.

PROJECT BACKGROUND

The desert landscapes of Arizona are no exception to this rapid expansion of energy transmission. Multiple transmission lines are currently either under construction, or in the planning phases, many of which involve BLM lands. The Sun Valley to Morgan 500kV Transmission line (SV2M) is one such project.

Arizona Public Service Electric Company (APS), one of the main utility providers in Arizona, determined that they needed to construct a 500kV line to support the growing energy demand in the Phoenix-metro area. This project would provide a connection between the Sun Valley substation (north of the Town of Buckeye and west of the City of Surprise) and the Morgan substation (just south of Lake Pleasant). Hence, this project was titled the Sun Valley to Morgan 500kV Transmission Line.

As the study area and proposed alignment was submitted for the project, there was a significant amount of public opposition, mainly due to proximity of the project to residential communities. This opposition led to political pressure on APS to consider a new alignment that would push the proposed SV2M route farther away from the opposing communities.

The new proposed alignment of the project still connected the Sun Valley and the Morgan

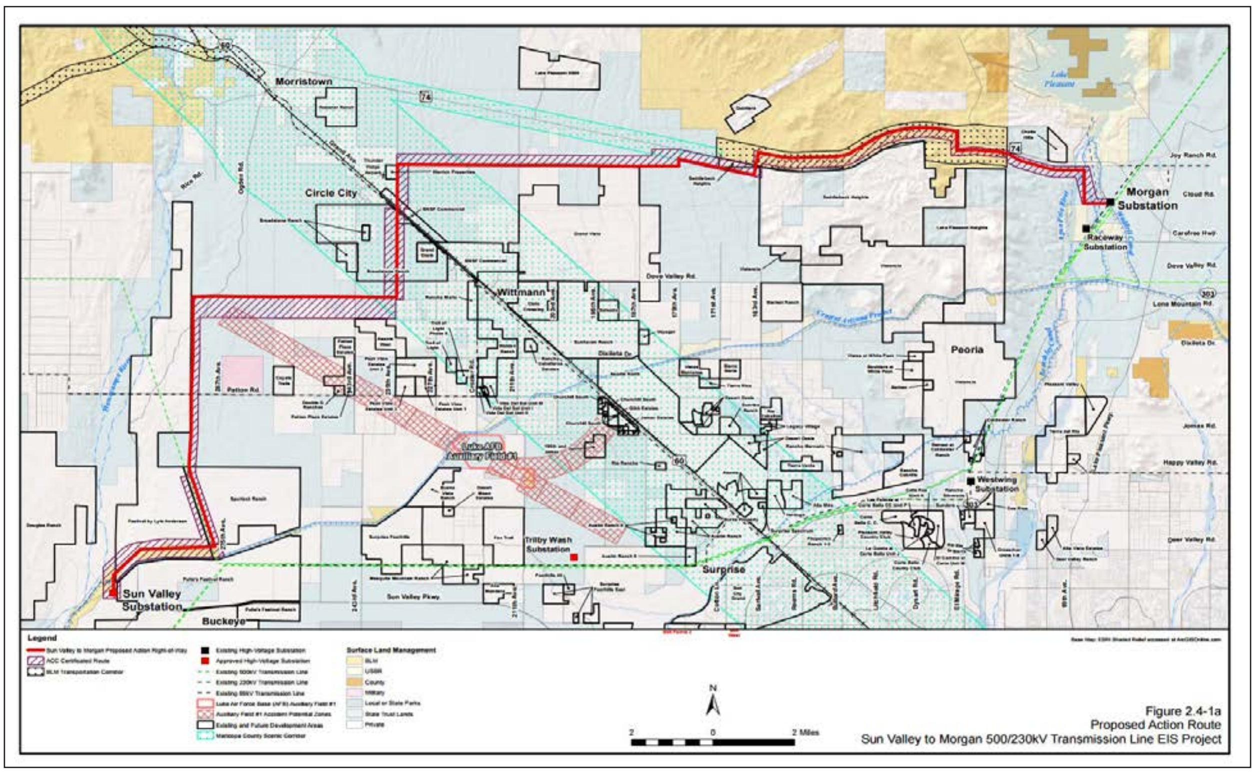


Figure 3 - Sun Valley to Morgan 500kV Transmission Line proposed action route (solid red line)
(Project Environmental Impact Statement)

substations, but the alignment was delineated on BLM managed public lands for approximately 7 of the 38 total miles of the project. Specifically, the newly modified alignment followed the general area of SR74 which connects I17 north of Phoenix to Wickenburg, AZ.

This change, while placating the groups that had opposed the SV2M original alignment, led to other challenges for APS. The BLM-managed land was not designated to allow for utility-scale energy transmission. The Bradshaw-Harquahala Resource Management Plan (RMP), the document establishing BLM planning and management objectives, did not include language that would allow such a project to be built along the proposed alignment. In fact, the RMP stated that utility-scale energy projects were required to use already designated energy corridors on BLM land.

This area was also designated in the RMP as a BLM visual resource management (VRM) class II landscape. VRM class II lands are established to retain the existing natural condition of the landscape, allowing for some minor modification that does not attract attention of the casual observer. Due to the high scenic quality of the proposed alignment, along with the high public sensitivity to change along the scenic SR74 highway, it would be unlikely that a 500kV transmission line would conform to this objective.

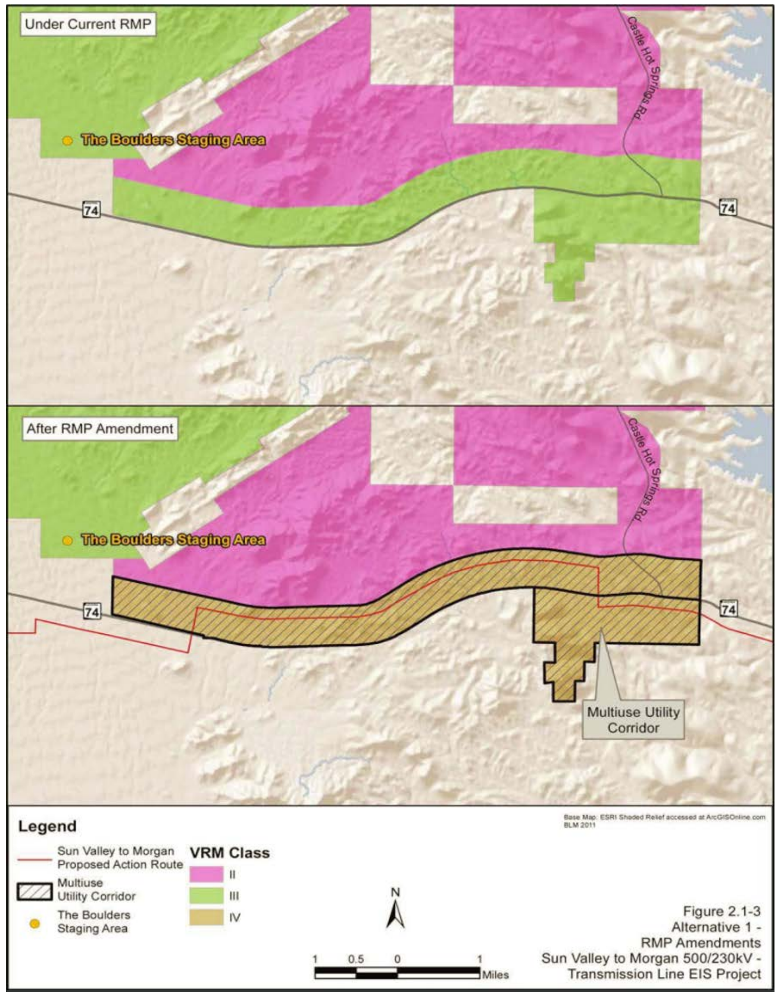


Figure 4 - Proposed RMP amendment
(Project Environmental Impact Statement)

Because of the conflict between the proposed action and the objectives in the RMP, a plan amendment, referred to as a Resource Management Plan Amendment (RMPA) would have to be processed. The decision by the field office was to proceed with the RMPA, and to proceed with an Environmental Impact Statement (EIS) for the proposed action.

ENVIRONMENTAL IMPACT STATEMENT ANALYSIS

In addition to conducting an analysis on what the impacts would be of amending the plan to allow the SV2M project to be constructed, the project would also go through analysis of the impacts to all environmental factors as would typically be done in a NEPA compliant environmental document.

A key part of the visual resource analysis in the EIS for the SV2M project was regarding color selection. An in-depth analysis of the existing landscape was conducted to determine the most

Figure 5 - Existing landscape of SV2M project area
(Image source: Brandon Colvin)

appropriate color for use on the transmission structures (consisting of 165-foot steel monopoles on BLM land). Because of the density of vegetation on BLM land where the project was being proposed, as well as the topographic relief common to this area, it was determined that the color that would reduce the visual contrast of the project elements was either shale green or shadow gray. Both of these colors are BLM standard colors that have been analyzed in various landscapes across public lands, and have proven to blend well, especially in vegetated desert conditions.

The EIS summarized this analysis in the following way:

> *"The color of the structures or lattice towers affects how well the structure blends in the environment. Photographs of boards treated with the BLM's standard environmental colors were taken from KOPs* [key observation points] *representing typical topography and vegetation within the Project Area. The photographs were then analyzed to identify which standard environmental color would minimize visual impacts. While no one color works best in all situations and lighting conditions, the shadow gray and shale green colors blended best under front lit conditions and had low levels of contrast in back lit situations."* (BLM, SV2M EIS)

Unfortunately, conflicting language was also included in the EIS relative to the color analysis. It stated:

> *"Surface treatment options for monopole structures are very limited and do not achieve much color variation. The colors available would be shades of gray ranging to almost black; no surface treatments available would resemble shale green."* (BLM, SV2M EIS)

This language left a large discrepancy to be worked out by the project team. On one hand, the analysis had concluded that shale green or shadow gray were the appropriate colors to reduce the contrast of the structures with the surrounding landscape. On the other hand, the EIS stated that achieving these color tones on monopole structures was not possible, and therefore would mean the monopoles would only be treated with a monochromatic shade of gray.

Also an unfortunate situation that we found ourselves in, was that the visual simulations produced as part of the EIS had only simulated a light galvanized steel finish. This made it very difficult to demonstrate the value of the shale green or shadow gray colors on the structures.

Despite these conflicts, ultimately the BLM maintained the authority to approve the color of the structures. This was captured with the following statement in the Record of Decision (ROD) which stated:

> *"The transmission structures will be finished with flat finish, similar in color to Shadow Gray from the BLM color chart; the finish will be approved by the BLM."* (BLM, SV2M ROD)

COLOR SELECTION MEETING

As an initial step to work through this situation, and to come to a conclusion on the surface color selection for the monopole structures, a meeting was held to discuss the color options for the steel monopoles. Valmont Industries, Inc. (Valmont), the monopole manufacturer on contract with APS to produce the steel monopoles, provided three samples of galvanized steel as options for use on this project. The three samples included a light galvanized finish, a medium galvanized finish, and a dark galvanized finish.

Figure 6 - Valmont galvanized steel samples compared to BLM standard color chart
(Image source: Brandon Colvin)

During the meeting, the following topics were discussed:

- EIS stated that current manufacturing techniques limited the ability for monopole manufacturers to achieve any variation from tones of gray for monopoles.
- Three samples were passed around to the group, and a comparison was conducted between these samples and the BLM standard colors shadow gray and shale green.
- Samples provided did not match the BLM shadow gray or shale green colors.
- Option to use a weathered steel type of material instead of a color treated or galvanized surface.

- Ultimately, the ROD stated that the BLM reserved the right to approve the final finish of the monopole structures.

Much discussion was had on these topics. APS and Valmont were hopeful to receive approval from the BLM of one of the samples provided. But differences in opinion continued. At the conclusion of the meeting, it was determined by the team that the best plan of action was to review samples produced by the manufacturer in the field to assess the performance of the proposed material finishes in matching the shadow gray and shale green colors.

RESEARCH ON COLOR TREATMENT OF TRANSMISSION STRUCTURES

During the initial meeting, one of the main points of disagreement was the statement claiming that variations in color were not possible for steel monopoles. This led to the need for additional research to validate or nullify this statement.

I made contact with multiple steel transmission structure manufacturers throughout the U.S., inquiring of their capability to color treat monopole structures. While none claimed this to be a common practice, they did confirm it was possible. In fact, some manufacturers even market their ability to color treat these types of structures on their websites.

Figure 7 - Color treated monopole (Boise, ID)
Image source: Brandon Colvin)

In addition to the market research I conducted, I also have captured multiple examples of color treated monopoles in various U.S. states. As a part of my responsibilities as a landscape architect, specifically being a part of the BLM visual resource management training cadre, I have the opportunity to travel across many of the western states. For years, I have taken photographs of energy projects, oil and gas facilities, reclamation projects, and many other project elements. Part of this is a result of simply having a love for landscapes. Another part is to document different project elements to help inform future decisions we make at the BLM.

After reviewing my repository of images, I found multiple examples of transmission projects that had color treated monopoles, such as Figure 7. I also made a conscious effort to document these types of projects on trips I made across various western states. This led to me documenting even more examples of color treated monopoles. One project in particular, was a transmission line built in the 1970s along I-70 in Colorado. This project had been color-treated during its initial construction, and though slightly faded, the structures still blend well with the surrounding landscape.

Having successfully identified transmission line projects across the western landscapes that were color treated, and strongly believing that color treating the monopoles for SV2M was not only possible, but necessary to properly reduce visual impacts, I set out to demonstrate the benefits that could be achieved by using color treated monopole structures.

PROJECT VISUAL SIMULATIONS

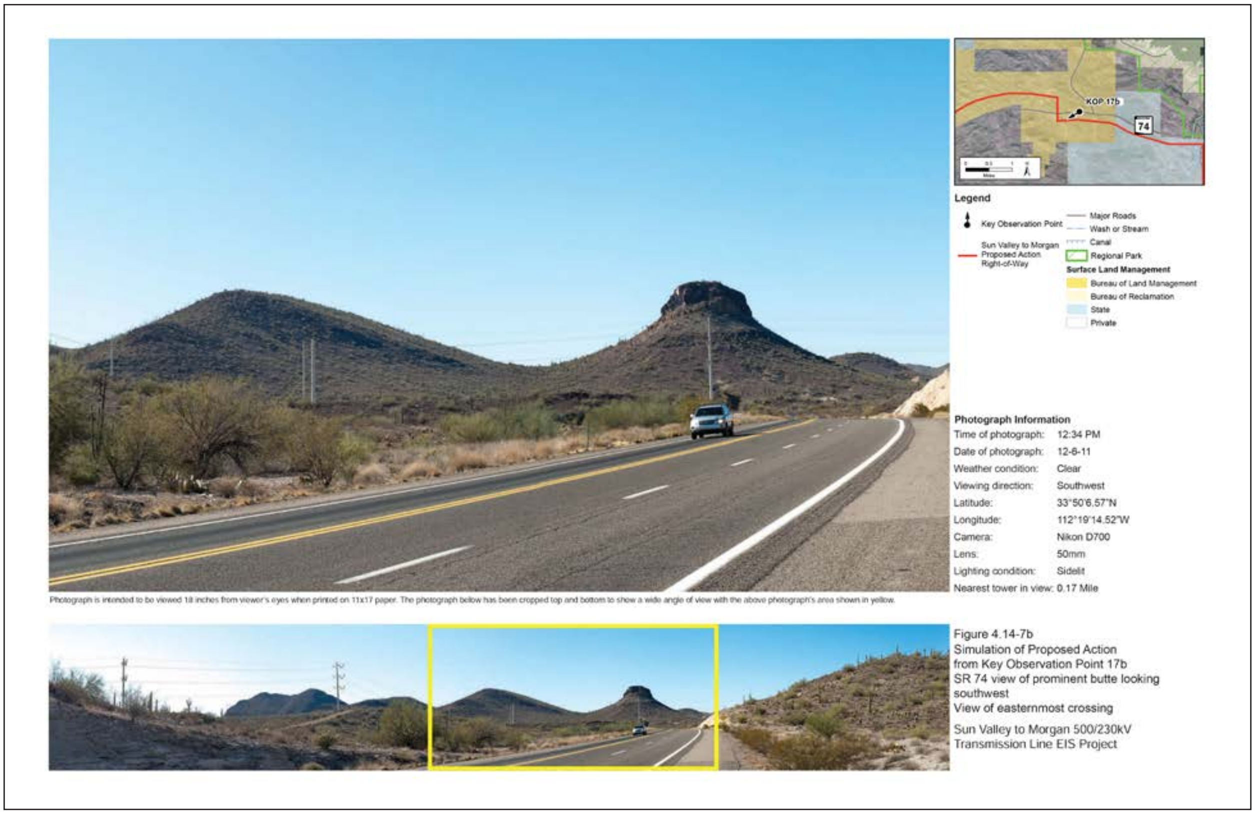


Figure 8 - Simulation of Sun Valley to Morgan 500kV Transmission Line (galvanized steel)
(Project Environmental Impact Statement)

For SV2M, the visual simulations, though only shown with a light galvanized material, proved once again that visual simulations can be the difference in making successful mitigation decisions for a project. The simulations provided a great opportunity to demonstrate the location of the project, what the structures and lines would look like, and ultimately demonstrate the contrast these project elements would have with the surrounding landscape. Unfortunately, because they did not portray the colors that had been identified as reducing the contrast and visual impacts as the analysis had concluded, they were only useful to a certain degree.

Having worked with Adobe Photoshop for many years during my education and professional work as a landscape architect, I was confident that through photo-editing techniques, I could demonstrate opportunities for reducing the impacts of the project through proper color selection using the original simulations from the EIS.

COLOR TREATMENT ON EXISTING VISUAL SIMULATIONS

As stated previously, after concluding at the initial meeting that the galvanized material samples did not appear to match the shadow gray or shale green colors, the team concluded that weathered steel could be an alternative that often performs well in desert conditions. Since a weathered steel sample would be provided, in addition to the galvanized steel material poles, I felt it was necessary to test that material in a simulation along with shadow gray and shale green colors.

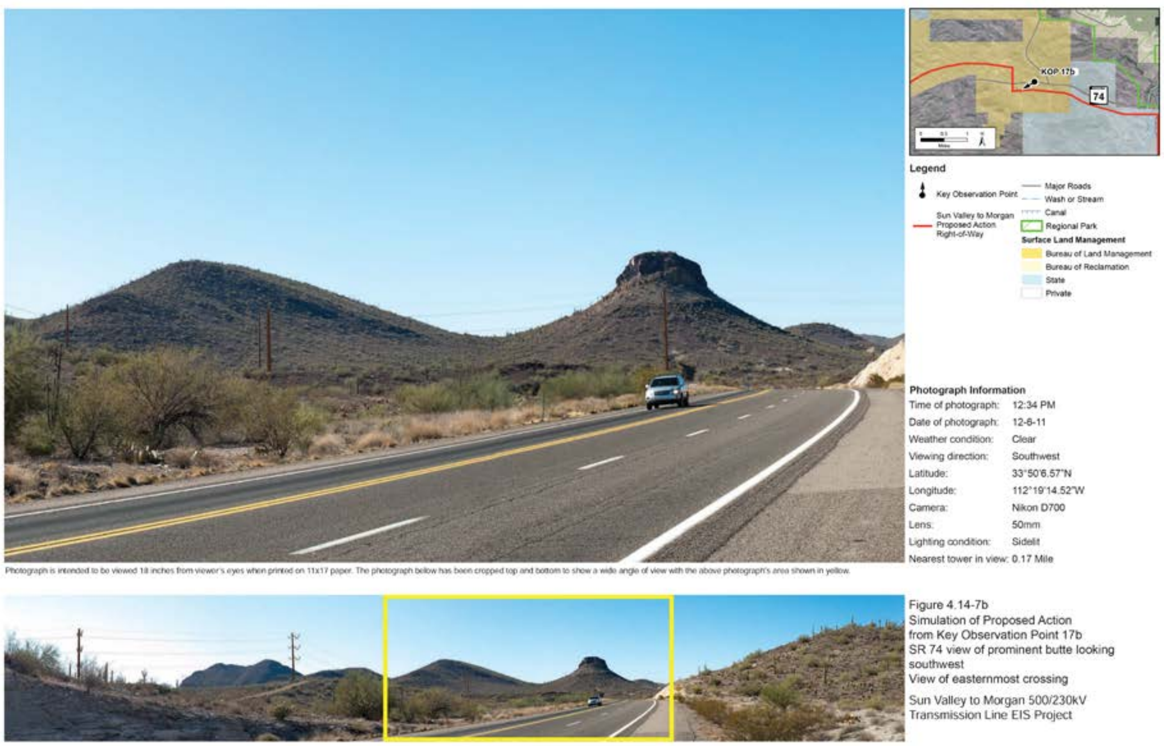


Figure 9 - Simulation of Sun Valley to Morgan 500kV Transmission Line (weathered steel)
(Project Environmental Impact Statement)

Using the original simulations from the EIS, I developed multiple simulations utilizing various overlay techniques to simulate color treatment with the shale green, shadow gray, and weathered steel color tones. The following examples demonstrate these colors on the existing simulations.

As can be seen in Figure 9, the weathered steel does bring a more natural look to the monopole structures. But it is still highly noticeable, drawing viewers' attention, as that color contrasts

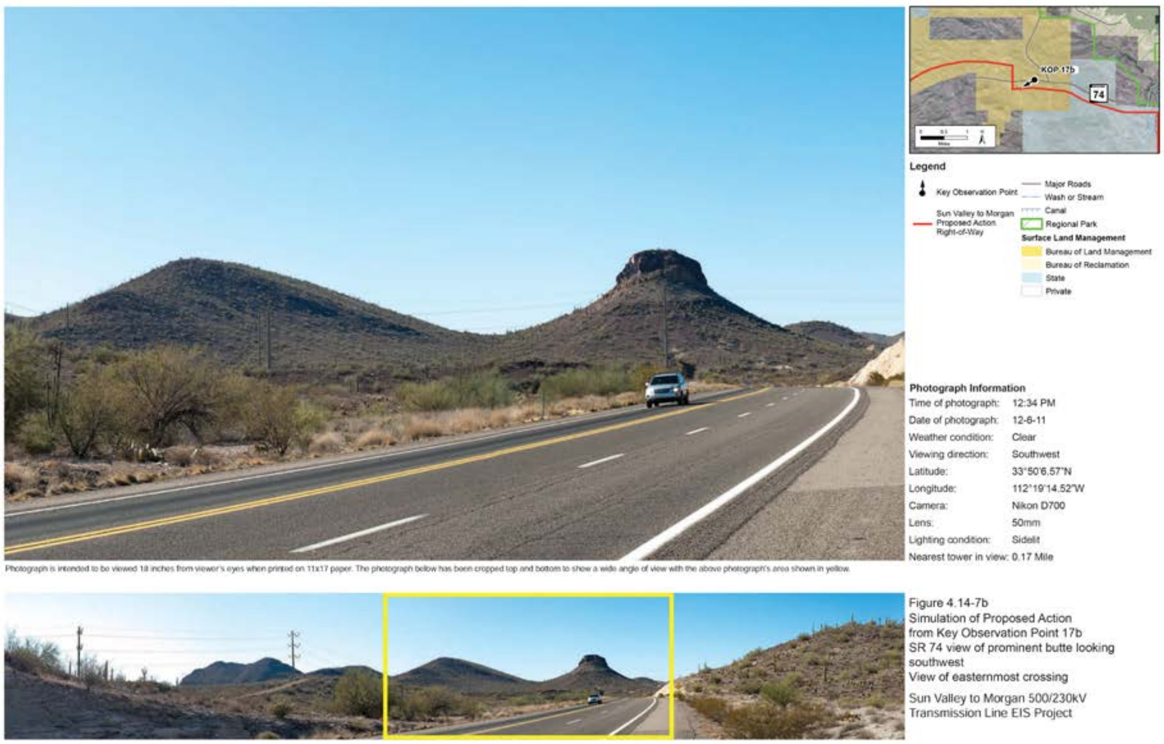


Figure 10 - Simulation of Sun Valley to Morgan 500kV Transmission Line (shadow gray / shale green)
(Project Environmental Impact Statement)

strongly with the surrounding landscape.

The next color tone I simulated was a shale green / shadow gray tone (Figure 1.10). These were done together because the scale of the structures being farther away from this vantage point left little opportunity to decipher between the two. After completing this simulation, it became apparent that these colors clearly performed the best against the existing natural landscape.

I then shared the image with the BLM team, including the field manager. While this provided a good source image to gauge the performance of each color in the existing conditions, it was still important that we assess these colors in the field with actual product samples.

SAMPLE POLE FIELD ASSESSMENT

Within a short period of time, the BLM was informed that the samples were on-site, and were ready for assessment. We made sure we would visit the site both in the morning hours, as well as the afternoon, to ensure we documented a good range of lighting conditions.

As soon as we arrived on-site, we concluded that the weathered steel was not an option. Though it had seemed as a viable alternative to color treatment techniques such as powder coating or painting (one of which would be required to achieve the shadow gray or shale green color) after seeing the level of contrast weathered steel had with the surrounding landscape, we eliminated that material finish from consideration.

The galvanized material finishes were no better than the weathered steel. They had a significant amount of reflectivity, and did not blend with the surrounding landscape. They also did not match the shadow gray or shale green color boards.

Figure 11 - Sample poles from Valmont for review by BLM
(Image source: Brandon Colvin)

What we did find through this on-site assessment, was that the shale green and shadow gray colors, just as described in the EIS analysis, blended very well with the surrounding landscape. Shale green performed especially well due to the density of vegetation in this area, it having a slightly more gray-green base.

Figure 12 - Sample poles from Valmont for review by BLM
(Image source: Brandon Colvin)

After viewing the samples both in the morning and afternoon hours, capturing images looking in eastern and western directions, it was clear which color performed the best in this landscape condition. After brief discussion, it was determined by the BLM team, including the field manager, that the most appropriate color that would reduce the visual contrast in this landscape was BLM standard color shale green.

ADOBE PHOTOSHOP DEVELOPED VISUAL SIMULATIONS

From that point, I wanted to make sure that our conclusion was correct. So using various techniques and tools in Adobe Photoshop, I developed some rough draft visual simulations that would more accurately portray the monopole structures color treated with shale green. I also included shadow gray in the simulation to hopefully solidify our selection.

The following is a progression of the original simulations that I developed. After completing these simulations, it was even more apparent that shale green was the appropriate color selection.

Figure 13 - Existing condition prior to simulation
(Image source: Brandon Colvin)

Figure 14 - Simulation part 1
(Image source: Brandon Colvin)

Figure 15 - Completed simulation matching color boards
(Image source: Brandon Colvin)

After careful consideration and discussion between all BLM staff involved, APS was informed that shale green was the approved color to be applied to the monopole structures. The method of color treatment was left to their discretion, as long as it was a durable, non-reflective surface. APS demonstrated a high level of professionalism in the way they responded. Though this would add cost and complexity to the project, they understood the sensitivity of the resources at hand, and agreed to proceed with the shale green color treatment of the monopole structures on the BLM portion of the project.

ALTERNATIVE MATERIAL FINISH ANALYSIS

Shortly after informing APS of the BLM's selection and approval of the shale green color, APS was contacted by a company that color treats steel with a different type of chemical finish. The company is Natina Products (Natina). Natina and APS had discussed the possibility of using a product such as Natina Steel to color treat the steel monopoles. Though the desert varnish type of color was not in the tonal realm of shadow gray or shale green, the BLM team did feel it would be of value to review a sample of Natina Steel at the project site.

Once the new material sample was in place, the BLM team conducted an assessment, just as had been done with the previous samples. The advantage of this type of material finish was that it was not an additional coating or layer on top of the steel. The product reacts directly with the galvanized steel.

Upon initial review, it appeared that Natina Steel would be a good option. I was surprised at the low level of contrast this material had in the immediate foreground. It seemed to blend very well with the color of the soil and scattered rock. But as the team concluded the assessment in the field, it was determined that additional simulations comparing the shadow gray and shale green with the Natina Steel finish be developed.

Figure 16 - Natina Steel sample
(Image source: Brandon Colvin)

The following images show the progression of the simulation, starting with the new sample material, and comparing that to similar examples using the shale green and shadow gray colors.

The Natina Steel sample did blend well among the existing natural landscape, especially in the

Figure 17 - Existing condition prior to simulation
(Image source: Brandon Colvin)

Figure 18 - Simulation showing Natina Steel, shadow gray, and shale green
(Image source: Brandon Colvin)

Figure 19 - Simulation selected color shale green
(Image source: Brandon Colvin)

immediate foreground. This is evident in the simulations I developed where the sample poles were shown both in the immediate foreground as well as the background of the landscape. Though the three poles all seemed to blend well in the immediate foreground, the Natina Steel pole is the only structure clearly visible in the background. The shadow gray and shale green both appear to fade from visibility. Because of the density of the vegetation in this landscape, shale green remained the preferred color choice between the two remaining colors.

INITIAL COLOR TREATED SAMPLE STEEL PANELS

Figure 20 - Sample galvanized steel and powder coated panels
(Image source: Brandon Colvin)

Figure 21 - Sample powder coated panels
(Image source: Brandon Colvin)

Within a few months, APS had contacted the BLM to notify us that they had received steel panel samples (24”x 48”) that had been powder coated with shadow gray and shale green. They also provided standard galvanized steel panels for our review.

We transported these samples to the original site where we had conducted the on-site assessment of the various samples to make sure we were keeping a consistent landscape for evaluation.

Once we set up the steel panels, it was amazing how well the color treated steel panels matched the BLM color boards. It was also clear that these colors blended very well with the surrounding landscape. The shale green panel especially performed well.

SITE VISIT TO VALMONT MANUFACTURING FACILITY

In the summer of 2016, the BLM was notified that production of the shale green powder coated monopoles had commenced. I was fortunate to join APS staff on a site visit to the Valmont manufacturing facility in Valley, Nebraska, just outside of Omaha. This provided a great opportunity to understand the process these poles go through, from initial steel shaping and welding, all the way through final finish powder coating and transport. Figures 22 through 25 show some of the stages of production.

Figure 22 - Monopole Welding
(Image source: Brandon Colvin)

Figure 23 - Monopole steel work complete
(Image source: Brandon Colvin)

Figure 24 - Monopole ready for powder coat
(Image source: Brandon Colvin)

Figure 25 - Monopole ready for transport
(Image source: Brandon Colvin)

CONSTRUCTION PHOTOS

As construction has now been under way for a few months, some of the shale green powder coated poles have been installed. Having seen the poles up close, and then seeing them assembled in the field, it was amazing how well these structures blended in the surrounding landscape. They perform even better than I thought they would. Yes, the poles are still noticeable from certain vantage points. Yes, when these structures are skylined (structures are above the horizon line) they are still clearly seen. But even in skylined situations, they still read as a more designed/ finished product and fit to the landscape more appropriately.

Figure 26 - Powder coated pole at staging yard
(Image source: Brandon Colvin)

Figure 27 - Poles staged for placement
(Image source: Brandon Colvin)

Figure 28 - Erected powder coated monopole
(Image source: Brandon Colvin)

Figure 29 - Erected powder coated monopole
(Image source: Brandon Colvin)

Figure 30 - Powder coated poles back lit
(Image source: Brandon Colvin)

Figure 31 - Powder coated poles front lit from same perspective as simulations
(Image source: Brandon Colvin)

But the true test of the success of the color selection for these monopoles is when the structures are backdropped with the surrounding mountains. In this scenario, as is seen in Figure 31, the powder coated poles almost completely blend into the landscape. One pole in particular is not even discernible. The galvanized pole on the right side of the image clearly stands out and attracts attention. The powder coated poles in the center and left side of the image, often go completely unnoticed. This was exactly what we were working to achieve. It is a great feeling to know that we met that objective.

CONCLUSION

With so many energy transmission lines being constructed across the landscape of the United States, many of which utilize public lands, it is important that we utilize the tools so readily accessible to simulate these projects to make more informed project decisions.

While simulations are often used in project analysis and assessment, they are rarely used in the initial stages of project planning and design. This leads to missed opportunities to use visual simulations to make informed decisions about what aspects of a project can be modified to reduce impacts to resources.

As the current trend of energy transmission development shows no signs of slowing in the near future, we must utilize these simulation techniques to reduce the contrast of these infrastructure projects. With some basic Photoshop skills, a little time, and some persistence in working with proponents, we can work together to develop an energy infrastructure that both meets the needs of the United States public, while preserving the natural scenic character of our amazing public lands in a more sustainable way.

REFERENCES

Bureau of Land Management. APS Sun Valley to Morgan 500/230kV Transmission Line Project Final Environmental Impact Statement and Proposed Resource Management Plan Amendment (June 2013).

Bureau of Land Management. Bradshaw-Harquahala Resource Management Plan. Retrieved July 20, 2017.
https://eplanning.blm.gov/epl-front-office/projects/lup/1350/13345/13413/Bradshaw-Harquahala_Record_of_Decision_and_Approved_Resource_Management_Plan_pdf.pdf

Bureau of Land Management. Record of Decision for the APS Sun Valley to Morgan 500/230kV Transmission Line Project and Bradshaw-Harquahala Resource Management Plan Amendment (January 2014).

Madrigal, Alexis. June 3, 2010. Wired. June 3, 1889: Power Flows Long-distance. Retried July 20, 2017.
https://www.wired.com/2010/06/0603long-distance-power-line/

Office of Electricity Delivery and Energy Reliability at the U.S. Department of Energy. Annual US Transmission Data Review (October 2016). Retrieved July 20, 2017.
https://www.energy.gov/sites/prod/files/2017/04/f34/Annual%20US%20Transmission%20Data%20Review%202016_0.pdf

Tucson Electric Power
P.O. Box 711, Mail Stop HQE613
Tucson, AZ 85702

April 16, 2018

Pima County
Attn: Sandi Garrick
Utility Liaison, Pima County Public Works
201 N. Stone Avenue, 2nd Floor
Tucson, AZ 85701

RE: Irvington to Kino 138 kV Transmission Line Project

Ms. Garrick,
Tucson Electric Power Company (TEP) would like to thank Pima County (the County) for reviewing and providing comments related to its plans to construct and operate a 138 kilovolt (kV) transmission line from the Irvington Substation located at East Irvington Road and South Contractor's Way to the future Kino Substation located at East 36th Street and South Kino Parkway (the Project).

TEP conducted extensive outreach related to the Project including briefings and presentations with community leaders and agencies, stakeholder workshops, public open house meetings, newsletters with comment forms, a project information telephone line and a project-specific webpage with online commenting available.

TEP completed an alternative analysis that considered 11 criteria that are aligned to the Arizona Transmission and Power Plant Line Siting (Line Siting Committee) Certificate of Environmental Compatibility (CEC) decision factors (Arizona Revised Statute § 40-360.06) and TEP's design philosophy and standards including:

1. Presence / absence of an existing corridor and ability to use;
2. Existing and planned land use that is compatible with its use as a transmission line corridor;
3. Residential development adjacent to the corridor as measured by distance to existing residences and planned future development;
4. Presence/absence of sensitive receptors as measured by distance to existing sensitive receptors and distance from corridor;
5. Room for separation from existing utilities in the corridor as measured by existing and planned utilities and ranked by degree of mitigation required;
6. Viewshed associated with the corridor as measured by number of people viewing and type of viewing experience (i.e., commuter, recreationist, resident);
7. Known or potentially eligible cultural resources in the corridor as measured by documentation through previous survey effort and ranked by degree of mitigation required;
8. Special status species and / or habitat as measured by the presence / absence of potentially suitable habitat;

9. One-hundred-year floodplain as measured by location and engineering design;
10. Ability to construct and maintain the transmission line; and
11. Cost of Construction.

The results of that assessment indicated Alternative A as TEP's preferred alternative for a number of reasons. This alternative:

- Has the least impact on residential development.
- Is entirely in an existing corridor (road right-of-way).
- Has superior access for construction and maintenance.
- Has greater room for separation from existing utilities.
- Is less expensive than Alternative B.

In the event this alternative is approved, TEP will coordinate closely with the County to address its concerns about Alternative A.

In response to the County's concerns relating to Alternative A and the potential conflict with the expansion of the Kino South Sports Complex and related economic development impacts, TEP did assess whether the line could be routed around this gateway segment of Benson Highway. However, if the route were to continue west on Irvington Road to Campbell Avenue, north on Campbell Avenue and then west on Benson Highway, construction costs would increase by approximately 14 percent. In the segment between Tucson Boulevard and Campbell Avenue, the transmission line would be placed on the south side of Benson Highway; an existing 46 kV line with distribution underbuild occupies the north side of the highway.

TEP's project engineer coordinated with Mr. Flores from the Pima County Regional Wastewater Reclamation Department and determined placement of the line is not anticipated to impact county sewer lines. The power lines will be placed on the opposite side of the road from these sewer lines, except along 36th Street, where the line would be offset by the required distance onto private land (The Bridges).

Pima County's preference for Alternative B is understood, however this alternative has been identified as TEP's least preferred. It scored lowest (20/33) for a number of reasons:

- It has a greater impact on residential development than A;
- It has less room for separation from existing utilities than A;
- It has a greater impact on visual resources, as the Interstate 10 corridor has long-distance views of the mountains that would be broken up by the new transmission poles;
- The segment along I-10 would be sandwiched between the I-10 right-of-way and commercial development and the existing sports complex, making it difficult to access for construction and maintenance;
- Although it is the shortest route, it would be the most expensive to build; and
- Its only access to the Kino Substation beyond the I-10 segment is along Campbell Avenue (for the reasons discussed below), which has proven to be a very controversial segment.

The County has suggested a modification to Alternative B that continues along I-10 to Park Avenue and then follows the same path as Alternative A, instead of turning north at Campbell Avenue. This option was reviewed early on in the alternative analysis and found to be too difficult to construct. Due to the amount of existing underground utilities (4-inch and 6-inch gas lines, 6-inch petroleum line, 16-inch potable water main, a wastewater line, and electric distribution)