

Black Hills/Colorado Electric Utility Company, LP
2020 Rule 3627 Report – Appendix D – Black Hills Project Summary

Appendix D

Black Hills Project Summary

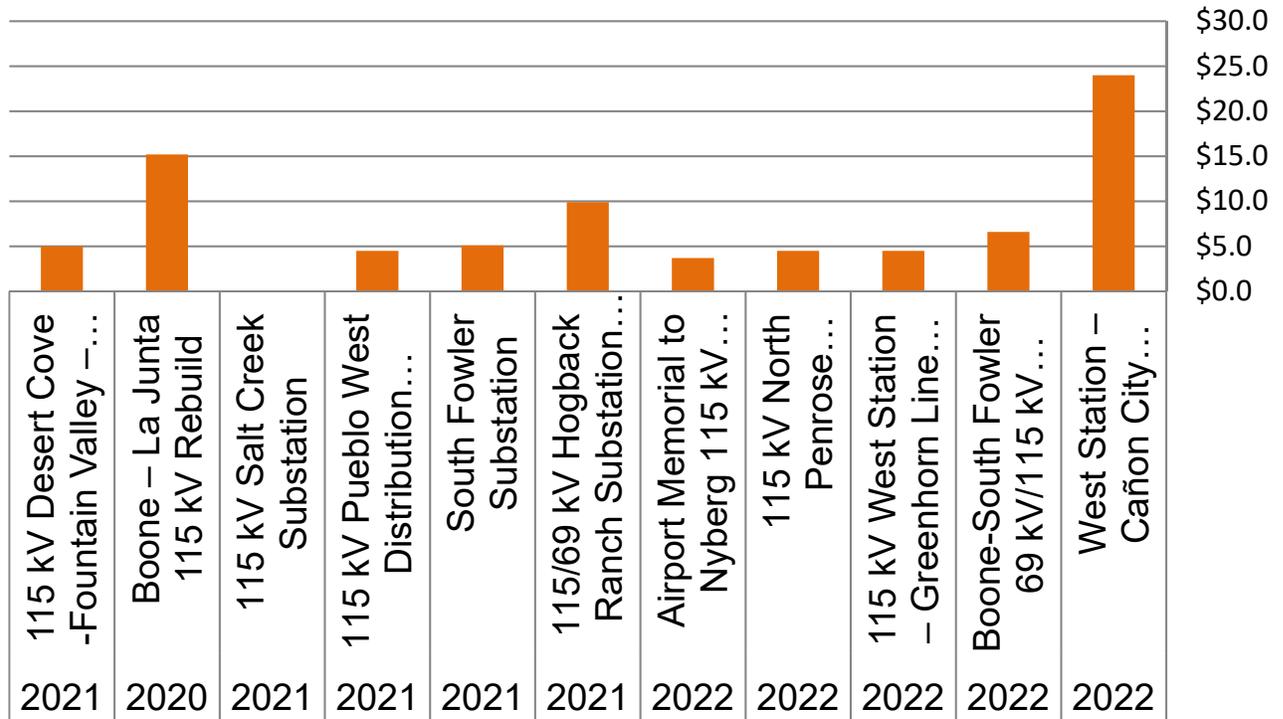
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**Black Hills Colorado Electric - Planned Project
 Timeline
 Est. Cost, in Millions, 2020 Dollars**



Note: Projects completed prior to 2020 were omitted from this chart but included in the detailed project sheets for reference

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Arequa Gulch 115 kV Capacitor Bank Project

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | A 12 MVAR switched shunt capacitor at the Arequa Gulch 115 kV substation for voltage support due to increased load growth |
| Voltage Class: | 115 kV |
| Facility Rating: | 12 MVAR |
| Point of Origin/Location: | Arequa Gulch 115 kV (near Cripple Creek, CO) |
| Point of Termination: | |
| Intermediate Points: | |
| Length of Line (in Miles): | |
| Type of Project: | Substation |
| Development Status: | In-Service |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Improved voltage support and reliability in the Cripple Creek area. |
| Estimated Cost (in 2020 Dollars): | \$850,000 |
| Schedule: | |
| Construction Date: | 2018 |
| Planned Completion/In-Service Date: | 08/27/2018 |
| Regulatory Info: | Approved - Colorado PUC: Decision No. C15-0590 |
| Regulatory Date: | June 24, 2015 |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of Transmission Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

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Arequa Gulch 115 kV Capacitor Project

A 115 kV capacitor was specified for the Arequa Gulch substation to maintain post-contingency voltage levels. The need for the capacitor was driven by planned local load growth. The estimated cost of the capacitor is \$850,000. The in-service date was Aug. 27, 2018, to align with the realization of the planned load growth. In 2015, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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West Station 115 kV Substation Terminal Upgrades

| | |
|--|--|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | Increase terminal ratings at the West Station 115 kV substation |
| Voltage Class: | 115 kV |
| Facility Rating: | 239 MVA |
| Point of Origin/Location: | Black Hills Colorado Electric West Station 115 kV substation |
| Point of Termination: | |
| Intermediate Points: | |
| Length of Line (in Miles): | |
| Type of Project: | Substation |
| Development Status: | In-Service |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Improved reliability and transfer capability in the West Station area. |
| Estimated Cost (in 2020 Dollars): | \$6.5 million |
| Schedule: | |
| Construction Date: | 2018 |
| Planned Completion/In-Service Date: | 03/29/2019 |
| Regulatory Info: | Approved - Colorado PUC: Decision No. C16-0627 |
| Regulatory Date: | July 6, 2016 |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of Transmission Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

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West Station 115 kV Substation Terminal Upgrades

The need to upgrade the terminal ratings at West Station 115 kV have been identified in previous BHCE TCPC and SB-100 studies. The post-contingency loading on the West Station - Desert Cove 115 kV and Hyde Park – West Station 115 kV lines exceed the West Station terminal equipment facility ratings. New substation bays will be added to the newer part of the West Station substation and the lines connected to the old part of the substation will be terminated into the new line positions. The purpose of the project is to increase reliability as well as transfer capability on the lines terminating at West Station. The construction will begin in 2018 with the termination of a portion of the lines into the newer section of the substation, with all lines to be moved to the new part of the substation by Q4 2019. The total cost of the West Station 115 kV substation upgrades is \$6.5 million. In the 2016 Decision C16-0627, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Portland 115/69 kV #2 Transformer Replacement

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | Replace existing 25MVA Portland #2 transformer with an 80MVA unit. Also potentially replace 42 MVA unit with 80 MVA unit. |
| Voltage Class: | 115 kV |
| Facility Rating: | 80 MVA |
| Point of Origin/Location: | Portland 115kV Substation (near Florence, CO) |
| Point of Termination: | |
| Intermediate Points: | |
| Length of Line (in Miles): | |
| Type of Project: | Transformer |
| Development Status: | In-Service |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Improve reliability and add transformation capacity |
| Estimated Cost (in 2020 Dollars): | \$3.7 million |
| Schedule: | |
| Construction Date: | 2018 |
| Planned Completion/In-Service Date: | 11/09/2018 |
| Regulatory Info: | Approved - Colorado PUC: Decision No. C13-0879 |
| Regulatory Date: | July 26, 2013 |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of Transmission Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

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Portland 115/69 kV Transformer Project

The Portland 115/69 kV transformer project was identified to replace the smaller of two existing parallel transformers at Portland with a larger capacity 80 MVA unit to accommodate load growth. A second stage of the project may replace the larger 42 MVA transformer with an 80 MVA unit, but that phase of the project is under review to determine the best overall solution for the area. This project was completed Nov. 9, 2018. In Decision C13-0879, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Boone-La Junta 115 kV Line Rebuild

Project Sponsor: Black Hills Colorado Electric
Additional Project Participants:
Project Description: Rebuild the 115 kV line from Boone to La Junta.

Voltage Class: 115 kV
Facility Rating: 221 MVA
Point of Origin/Location: Boone 115kV
Point of Termination: La Junta 115kV
Intermediate Points:
Length of Line (in Miles): 45
Type of Project: Transmission Line Rebuild
Development Status: In-Construction
Routing:
Subregional Planning Group: CCPG

Purpose of Project: Increased reliability

Estimated Cost (in 2020Dollars): \$15.24 million

Schedule:

Construction Date: 2018
Planned Completion/In-Service Date: 2020
Regulatory Info: Approved - Colorado PUC: Decision No. C17-0539

Regulatory Date: June 28, 2017
Permitting Info:
Permitting Date:

Contact Information: Lindsay Briggs, Supervisor of Transmission Planning
Email: Lindsay.briggs@blackhillscorp.com
Phone: 605-721-2240

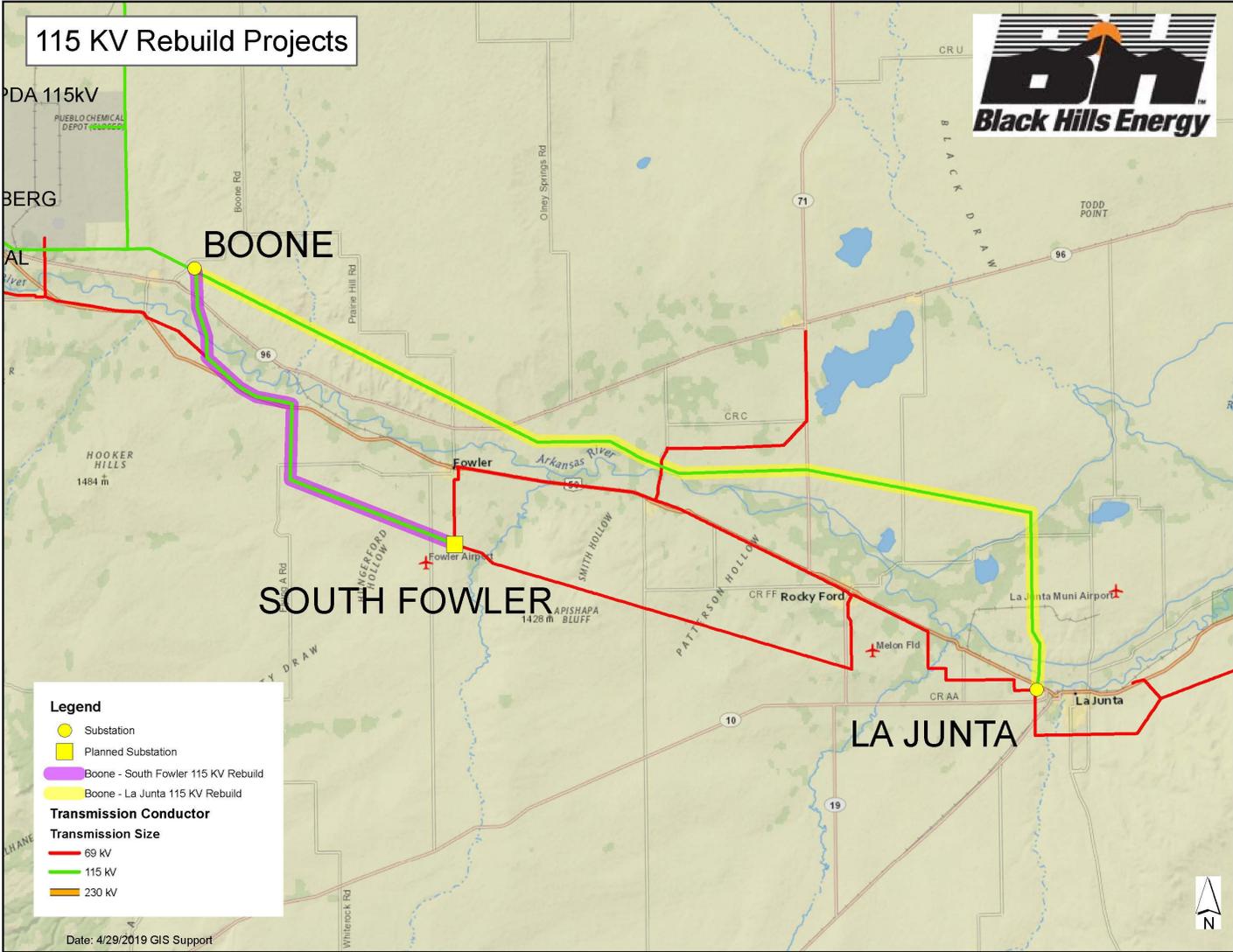
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Boone-La Junta 115 kV Rebuild Project

The Boone-La Junta 115 kV line is at a point late in its lifecycle and needs to be rebuilt. The project will rebuild the 45-mile line with single circuit 115 kV construction utilizing 795 kcmil 26/7 Strand ACSR “Drake” conductor utilizing the existing right-of-way. The noise and emf impacts associated with the West Station-West Cañon transmission project were considered more impactful than this project and still met the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Therefore, that analysis was referenced rather than repeated for this project. See Appendix B, pages 6 and 10 for the detailed report. The project will rebuild approximately 15 miles per year, with construction beginning in 2018 and will continue into 2020.

In Decision C17-0539, the Colorado Public Utilities Commission found that the original project was in the ordinary course of business and that a CPCN was not necessary.

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West Station-Hogback 115 kV Transmission Project

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | New 115 kV line from West Station to a new load service substation in Cañon City (Hogback). |
| | |
| Voltage Class: | 115 kV |
| Facility Rating: | 221 MVA |
| Point of Origin/Location: | West Station 115kV |
| Point of Termination: | New Hogback 115/69 kV Substation |
| Intermediate Points: | Pueblo West Sub (new), N. Penrose Sub (new) |
| Length of Line (in Miles): | 35 |
| Type of Project: | Transmission Line and Substation |
| Development Status: | In-Construction |
| Routing: | |
| Subregional Planning Group: | CCPG |
| | |
| Purpose of Project: | Increased reliability |
| | |
| Estimated Cost (in 2017 Dollars): | \$24 million |
| | |
| Schedule: | |
| | |
| Construction Date: | 2019 |
| Planned Completion/In-Service Date: | Q1 2022 |
| Regulatory Info: | Approved - Colorado PUC: Decision No. C17-0539-E |
| | |
| Regulatory Date: | July 10, 2017 |
| Permitting Info: | |
| Permitting Date: | |
| | |
| Contact Information: | Lindsay Briggs, Supervisor of Transmission Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

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West Station-Hogback 115 kV Line and New Hogback Substation

Given their interrelatedness, we describe these two previously reviewed projects together. The proposed West Station – Hogback 115 kV line (formerly referred to as the West Station-West Cañon 115 kV line) would provide additional import capacity along with increased reliability into the Cañon City 115 kV system. The new line also will provide a second connection into the Penrose distribution system, eliminating the impacts of a single outage loss of load. Additionally, the new line will accommodate a new Pueblo West distribution substation to relieve existing distribution system constraints and facilitate developing load growth in that community. Past TPL-001-4 reliability¹ and interconnection studies along with current summer peak operational studies have shown overloads on the Portland-Skala, Skala-Cañon City, and Portland-West Station #1 and #2 115 kV lines. Also, the West Cañon 230/69 kV transformer, which supports the Cañon City network from the west end, is a long lead time piece of equipment that adds additional overload scenarios to the above mentioned 115 kV lines if the transformer were to fail. A corrective action plan has been developed per the TPL-001-4 standard to provide a solution. A limited number of options to alleviate the 115 kV line overloads were available for consideration due to the geographic challenges and transmission system configuration. Due to the nature of the system, rebuilding the existing 115 kV lines feeding into the Cañon City network would be challenging due to operational constraints, as they are the only source into Cañon City. The best overall option was identified as a new 115 kV line that would feed into the Cañon City network from the 115 kV West Station substation. The new line will provide additional capacity into the load center and eliminate the need to sectionalize the existing 115 kV system to prevent post-contingency overloads. The new line also will provide the ability to reliably rebuild the constrained 115 kV line segments between Portland and Cañon City at a future time. A new 115/69 kV substation west of Cañon City was added to the project since it would decrease the loading issues on the existing Portland & Cañon City 115/69 kV transformers as identified in past reliability studies and provide increased operational flexibility. This substation is labeled as Hogback in the project map below. A summary of project components is as follows:

- The West Station - Desert Cove 115 kV rebuild project was previously completed using double circuit structures to accommodate the new West Station to West Cañon 115 kV circuit up to Desert Cove. The new transmission line will continue on from Desert Cove to a new 115/69 kV substation west of Cañon City (Hogback). This project will be constructed within existing right-of-way where possible, and new right-of-way will be obtained in a manner to minimize disruption.
- Construct a new 115/69 kV Hogback substation located to the west of the Cañon City area to support the Cañon City 69 kV network. Upgrades to the existing 69 kV facilities may be required to integrate the new substation into the 69 kV network.
- Obtain new right-of-way westward from the Desert Cove transmission corridor to the new Hogback substation for 115 kV single circuit H-Frame structures. The Hogback substation will

¹ Including both BHCT TCPC & CCPG studies

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intersect the Cañon City Plant-West Cañon 115 kV line in the northwest corner of Cañon City which will complete the circuit to West Cañon.

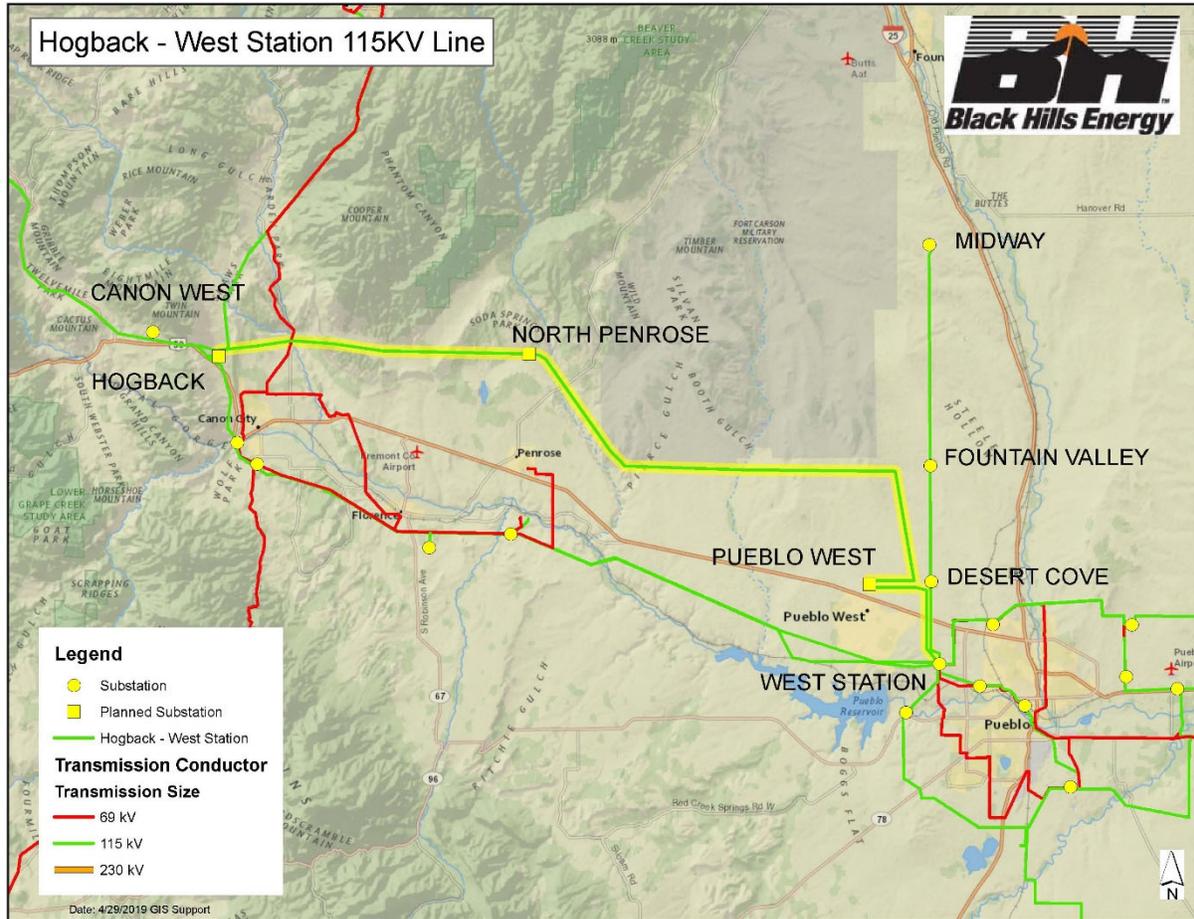
- Since the West Cañon-Arequa Gulch 115 kV line is geographically nearby the proposed site of the new Hogback substation, bisecting it with the new substation would add additional reliability. This option will not be implemented initially, but the new substation will be designed to accommodate the additional terminals later to balance initial cost with future flexibility.
- The routing of the new transmission line will readily accommodate a proposed distribution substation in the Pueblo West community. The accommodation of the new Pueblo West substation will increase reliability and load-serving capability in the Pueblo West area of the Black Hills system without materially impacting project costs or the planned benefits to the Cañon City area. Discussions with impacted customers during the permitting process resulted in changes to the line route to maintain project objectives while preserving customers' viewshed.
- The routing of the new transmission line will accommodate a proposed distribution substation in the Penrose community. Penrose is currently served via single radial 69 kV line. The new North Penrose substation will increase reliability and load-serving capability in the Penrose area of the Black Hills system without materially impacting project costs or the planned benefits to the Cañon City area.
- The facility rating of the West Station – North Penrose-Hogback 115 kV circuit will be at least 221 MVA Summer and 274 MVA Winter (795 ACSR Drake @ 100°C).
- The engineering and design work associated with the substation portion of the project will be performed to ensure that the completed project will meet the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Namely, the noise level of the substation will not exceed 50 db(A) at a distance of 25 feet beyond the property line, and the magnetic field level at the property line, one meter above the ground will not exceed 150 MilliGauss.
- The engineering and design work associated with the transmission line portion of the project was performed and also meets the established noise and magnetic field requirements.

Black Hills initially included these two projects in the 2015 Rule 3206 filing for informational purposes only. Transmission planning analysis has subsequently refined the project scope. Potential joint participation was under consideration in the San Luis Valley Subcommittee within the Colorado Coordinated Planning Group (CCPG). There was absence of interest in joint participation by other entities as well as any foreseeable long-term drivers to justify construction at a higher voltage. The best-cost solution was determined to have the project designed, constructed, and operated as a single 115 kV circuit. The additional right-of-way that will be acquired will be 125 feet wide to accommodate an additional circuit or an increase in operating voltage if needed. The total overall cost is estimated at \$33.3 million, including the transmission line and the new Hogback substation. The completion date of the transmission line and the substation portions of the project are scheduled for January 2022.

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In Decision No. C17-0539-E, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Boone-South Fowler 69 kV to 115 kV Conversion

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|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | Rebuild the existing 69 kV line from Boone to S. Fowler Tap west of Rocky Ford, CO. |
| Voltage Class: | 115 kV |
| Facility Rating: | 221 |
| Point of Origin/Location: | Boone 115 kV |
| Point of Termination: | South Fowler 115 kV (new) |
| Intermediate Points: | |
| Length of Line (in Miles): | 19 |
| Type of Project: | Transmission Line Rebuild |
| Development Status: | Planned |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Asset integrity |
| Estimated Cost (in 2020 Dollars): | \$6.6 million |
| Schedule: | |
| Construction Date: | 2021 |
| Planned Completion/In-Service Date: | September 2022 |
| Regulatory Info: | Approved – Colorado PUC Decision No. C19-0638 |
| Regulatory Date: | July 25, 2019 |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

Boone-South Fowler 69 kV to 115 kV Conversion

This project is to rebuild the existing 69 kV line between Boone and South Fowler Tap substations. The initial portion of line from Boone to Boone Tap will be constructed using 795 ACSR on double circuit

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structures to maintain a connection from Boone to Huerfano on the existing 69 kV line while accommodating the new Boone-South Fowler 115 kV line. From the Boone Tap location, the new line will continue on single circuit H-frame structures to the South Fowler Tap location. The rebuild of the existing 19-mile Boone-S. Fowler Tap 69 kV line is needed to improve reliability on the line. When considering the length of the line and the interest in additional capacity between Boone and the La Junta/Rocky Ford local network for load and generation interconnections, it was decided to construct and operate the line at 115 kV. In order to accommodate the voltage upgrade, a new 115/69 kV substation at South Fowler is planned and described elsewhere in this report.

Noise and EMF analysis was performed for various typical transmission project design configurations, including the same line design as the planned Boone-South Fowler 69 kV to 115 kV Conversion project. This was done to determine the anticipated noise and magnetic field levels of the project for comparison against the standards specified in Rule 3206 (f) and Rule 3206 (e), respectively. That analysis was referenced for this project. See Appendix B, page B-20 for details on the noise and field study.

In Decision C19-0638, the Colorado Public Utilities Commission found that the original project was in the ordinary course of business and that a CPCN was not necessary.

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South Fowler Substation

| | |
|--|--|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | Increase load serving capability and reliability in the La Junta and Rocky Ford areas of BHCE’s service territory. |
| Voltage Class: | 115 & 69 kV |
| Facility Rating: | 80 MVA |
| Point of Origin/Location: | South Fowler Tap |
| Point of Termination: | South Fowler Tap |
| Intermediate Points: | |
| Length of Line (in Miles): | |
| Type of Project: | Substation & Transmission Line |
| Development Status: | In-Construction |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Improved reliability in the Rocky Ford area. |
| Estimated Cost (in 2020 Dollars): | \$5.1 million |
| Schedule: | |
| Construction Date: | 2020 |
| Planned Completion/In-Service Date: | 10/1/2021 |
| Regulatory Info: | Approved – Colorado PUC Decision No. C19-0638 |
| Regulatory Date: | July 25, 2019 |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
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South Fowler 115 kV Substation

The ‘South Fowler 115 kV Substation’ and the ‘Boone-South Fowler 69 kV to 115 kV Conversion’ projects are intended to replace the previously planned La Junta 115 kV Area Upgrades project. Following a recent review of the integrity of the 69 kV infrastructure in the area, it was confirmed that a significant number of lines need to be rebuilt within the near term planning horizon. Additionally, requests for load interconnection and requests to wheel energy across the BHCE transmission and sub-transmission system were evaluated. These developments impact the overall needs of the local transmission system, so several alternatives were studied to develop the best comprehensive solution for the area.

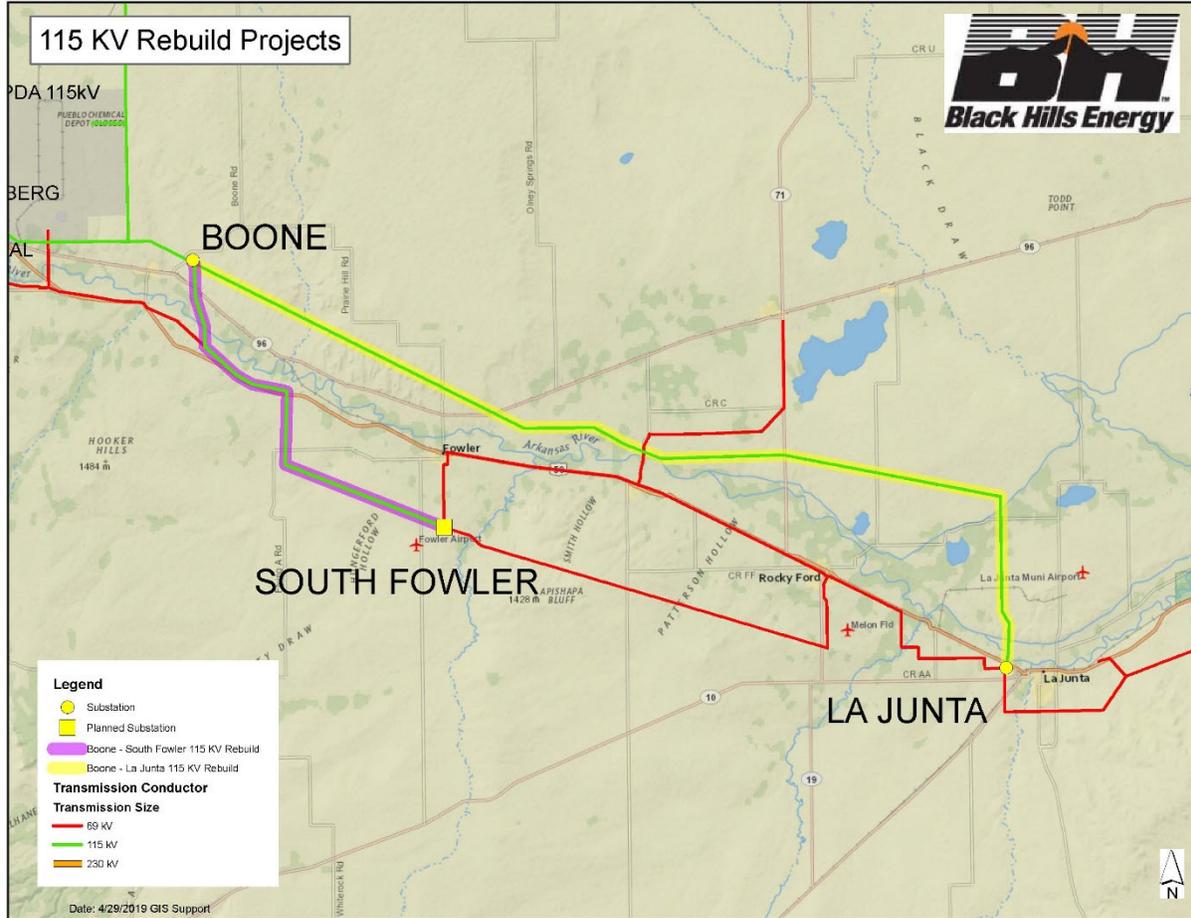
A new 115/69 kV South Fowler substation and 80 MVA transformer was selected as the preferred alternative to the La Junta 115 kV Area Upgrades project. The new substation provides several benefits to the local transmission and sub-transmission system. It allows the Boone-La Junta 69 kV line rebuild, which is an asset integrity project, to be rebuilt as a 115 kV line, offering additional capacity to the area. It also provides operational flexibility when rebuilding other aged 69 kV lines in the local area. Another benefit of the project is that it provides a second, geographically diverse 115/69 kV delivery point to the area, as opposed to adding a second transformer to the existing La Junta 115/69 kV substation. Following a detailed project review, it was determined that expanding the existing 115/69 kV La Substation to accommodate a second transformer as initially planned would be very challenging from both a physical space and construction outage standpoint. The new South Fowler substation would facilitate a La Junta substation outage at a later date to upgrade the existing transformer with a larger one if that project is pursued. Finally, the new South Fowler substation will improve the reliability to the local sub-transmission system by sectionalizing the existing Boone-Rocky Ford 69 kV line. The new substation will be designed to accommodate additional reactive voltage support devices as needed.

The capacity needs of the South Fowler/La Junta electric system are in excess of what can be cost-effectively provided by energy storage alternatives at this time, and storage alternatives were therefore excluded from further consideration.

The engineering and design work associated with the substation portion of the project will be performed to ensure that the completed project will meet the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Namely, the noise level of the substation will not exceed 50 db(A) at a distance of 25 feet beyond the property line, and the magnetic field level at the property line, one meter above the ground will not exceed 150 MilliGauss.

In Decision C19-0638, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Hogback 115/69 kV Substation

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | New 115/69 kV substation west of Cañon City on the West Station – Hogback 115 kV line. Formerly known as “Cañon City Area 115 kV/69 kV Substation” in 2018 Rule 3206 Report. ** |
| Voltage Class: | 115 kV |
| Facility Rating: | 80 MVA |
| Point of Origin/Location: | Hogback 115/69 kV substation |
| Point of Termination: | |
| Intermediate Points: | |
| Length of Line (in Miles): | N/A |
| Type of Project: | Substation |
| Development Status: | In-Construction |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Increased reliability and load growth capacity. |
| Estimated Cost (in 2020 Dollars): | \$9.9 million |
| Schedule: | |
| Construction Date: | 2020 |
| Planned Completion/In-Service Date: | Jan 2021 |
| Regulatory Info: | Approved – Colorado PUC: Decision No. C17-0539-E. |
| Regulatory Date: | July 10, 2017 |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

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West Station-Hogback 115 kV Line and New Hogback Substation

Given their interrelatedness, we describe these two previously reviewed projects together. The proposed West Station – Hogback 115 kV line (formerly referred to as the West Station-West Cañon 115 kV line) would provide additional import capacity along with increased reliability into the Cañon City 115 kV system. The new line also will provide a second connection into the Penrose distribution system, eliminating the impacts of a single outage loss of load. Additionally, the new line will accommodate a new Pueblo West distribution substation to relieve existing distribution system constraints and facilitate developing load growth in that community. Past TPL-001-4 reliability² and interconnection studies along with current summer peak operational studies have shown overloads on the Portland-Skala, Skala-Cañon City, and Portland-West Station #1 and #2 115 kV lines. Also, the West Cañon 230/69 kV transformer, which supports the Cañon City network from the west end, is a long lead time piece of equipment that adds additional overload scenarios to the above mentioned 115 kV lines if the transformer were to fail. A corrective action plan has been developed per the TPL-001-4 standard to provide a solution. A limited number of options to alleviate the 115 kV line overloads were available for consideration due to the geographic challenges and transmission system configuration. Due to the nature of the system, rebuilding the existing 115 kV lines feeding into the Cañon City network would be challenging due to operational constraints, as they are the only source into Cañon City. The best overall option was identified as a new 115 kV line that would feed into the Cañon City network from the 115 kV West Station substation. The new line will provide additional capacity into the load center and eliminate the need to sectionalize the existing 115 kV system to prevent post-contingency overloads. The new line also will provide the ability to reliably rebuild the constrained 115 kV line segments between Portland and Cañon City at a future time. A new 115/69 kV substation west of Cañon City was added to the project since it would decrease the loading issues on the existing Portland & Cañon City 115/69 kV transformers as identified in past reliability studies and provide increased operational flexibility. This substation is labeled as Hogback in the project map below. A summary of project components is as follows:

- The West Station - Desert Cove 115 kV rebuild project was previously completed using double circuit structures to accommodate the new West Station to West Cañon 115 kV circuit up to Desert Cove. The new transmission line will continue on from Desert Cove to a new 115/69 kV substation west of Cañon City (Hogback). This project will be constructed within existing right-of-way where possible, and new right-of-way will be obtained in a manner to minimize disruption.
- Construct a new 115/69 kV Hogback substation located to the west of the Cañon City area to support the Cañon City 69 kV network. Upgrades to the existing 69 kV facilities may be required to integrate the new substation into the 69 kV network.
- Obtain new right-of-way westward from the Desert Cove transmission corridor to the new Hogback substation for 115 kV single circuit H-Frame structures. The Hogback substation will

² Including both BHCT TCPC & CCPG studies

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intersect the Cañon City Plant-West Cañon 115 kV line in the northwest corner of Cañon City which will complete the circuit to West Cañon.

- Since the West Cañon-Arequa Gulch 115 kV line is geographically nearby the proposed site of the new Hogback substation, bisecting it with the new substation would add additional reliability. This option will not be implemented initially, but the new substation will be designed to accommodate the additional terminals later to balance initial cost with future flexibility.
- The routing of the new transmission line will readily accommodate a proposed distribution substation in the Pueblo West community. The accommodation of the new Pueblo West substation will increase reliability and load serving capability in the Pueblo West area of the Black Hills system without materially impacting project costs or the planned benefits to the Cañon City area. Discussions with impacted customers during the permitting process resulted in changes to the line route to maintain project objectives while preserving customers' viewshed.
- The routing of the new transmission line will accommodate a proposed distribution substation in the Penrose community. Penrose is currently served via single radial 69 kV line. The new North Penrose substation will increase reliability and load serving capability in the Penrose area of the Black Hills system without materially impacting project costs or the planned benefits to the Cañon City area.
- The facility rating of the West Station – North Penrose-Hogback 115 kV circuit will be at least 221 MVA Summer and 274 MVA Winter (795 ACSR Drake @ 100°C).
- The engineering and design work associated with the substation portion of the project will be performed to ensure that the completed project will meet the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Namely, the noise level of the substation will not exceed 50 db(A) at a distance of 25 feet beyond the property line, and the magnetic field level at the property line, one meter above the ground will not exceed 150 MilliGauss.
- The engineering and design work associated with the transmission line portion of the project was performed and also meets the established noise and magnetic field requirements.

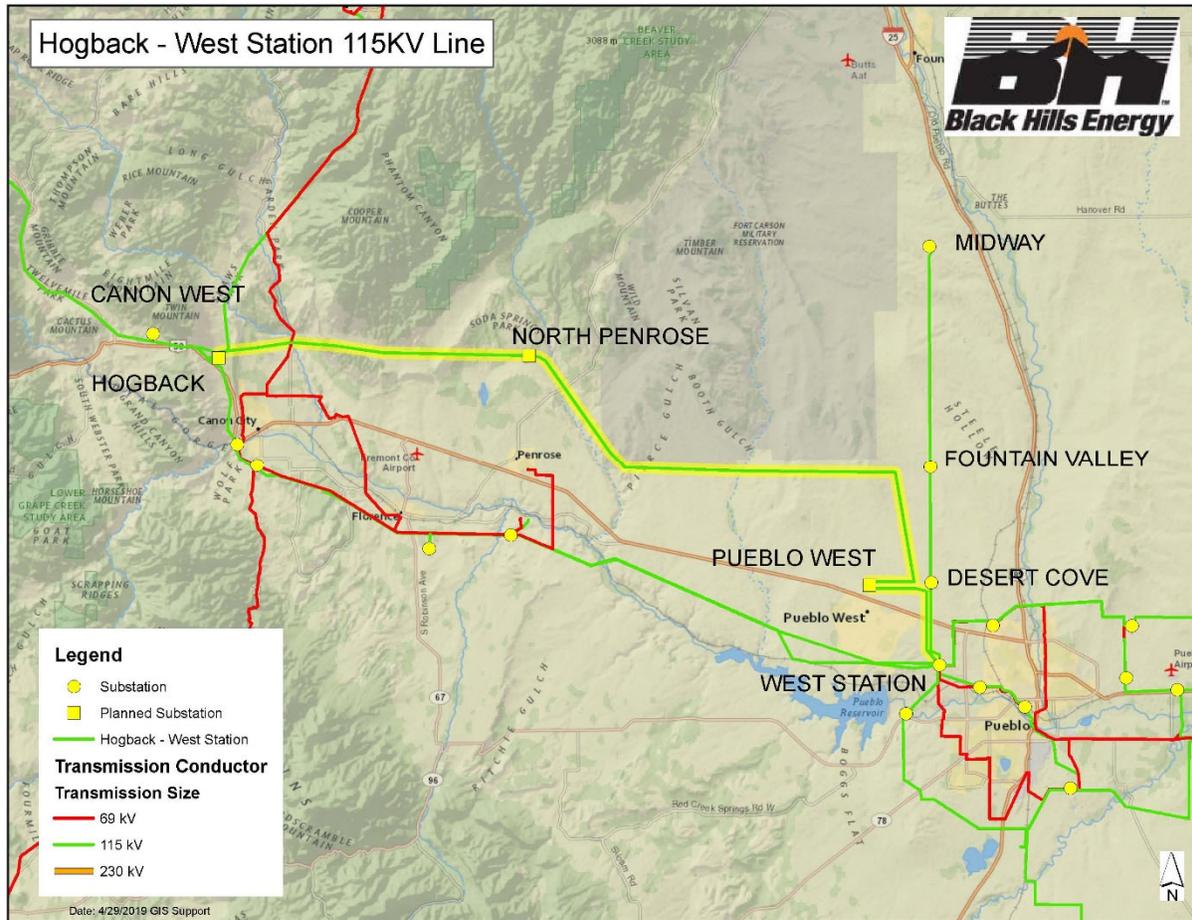
Black Hills initially included these two projects in the 2015 Rule 3206 filing for informational purposes only. Transmission planning analysis has subsequently refined the project scope. Potential joint participation was under consideration in the San Luis Valley Subcommittee within the Colorado Coordinated Planning Group (CCPG). There was absence of interest in joint participation by other entities as well as any foreseeable long-term drivers to justify construction at a higher voltage. The best-cost solution was determined to have the project designed, constructed, and operated as a single 115 kV circuit. The additional right-of-way that will be acquired will be 125 feet wide to accommodate an additional circuit or an increase in operating voltage if needed. The total overall cost is estimated at \$33.3 million, including the transmission line and the new Hogback substation. The completion date of the transmission line and the substation portions of the project are scheduled for January 2022.

Black Hills/Colorado Electric Utility Company, LP
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In Decision No. C17-0539-E, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

**Black Hills is currently referring to this project as the “Reliability Upgrade for Southern Colorado Project”.

Black Hills/Colorado Electric Utility Company, LP
2020 Rule 3627 Report – Appendix D – Black Hills Project Summary



Black Hills/Colorado Electric Utility Company, LP
2020 Rule 3627 Report – Appendix D – Black Hills Project Summary

Pueblo West 115 kV Distribution Substation

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | New 115 kV distribution substation in Pueblo West; will intersect the West Station-Hogback 115 kV line. |
| Voltage Class: | 115 kV |
| Facility Rating: | 50 MVA |
| Point of Origin/Location: | Pueblo West, CO |
| Point of Termination: | |
| Intermediate Points: | |
| Length of Line (in Miles): | 0 |
| Type of Project: | Distribution |
| Development Status: | Planned |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Load service |
| Estimated Cost (in 2020 Dollars): | \$4.5 million |
| Schedule: | |
| Construction Date: | 2020 |
| Planned Completion/In-Service Date: | Jan 2021 |
| Regulatory Info: | |
| Regulatory Date: | |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

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Pueblo West 115 kV Distribution Substation

This project consists of constructing a new distribution substation by intersecting BHCE's planned West Station-Hogback 115 kV transmission line. The substation will be built to ultimately accommodate two 115/13.2kV, 25 MVA transformers, but only one bank will be installed initially. This project is required to serve new industrial agriculture load, as well as contingency back-up for existing distribution infrastructure. The substation location is north of Highway 50 on the western edge of Pueblo West, Colorado.

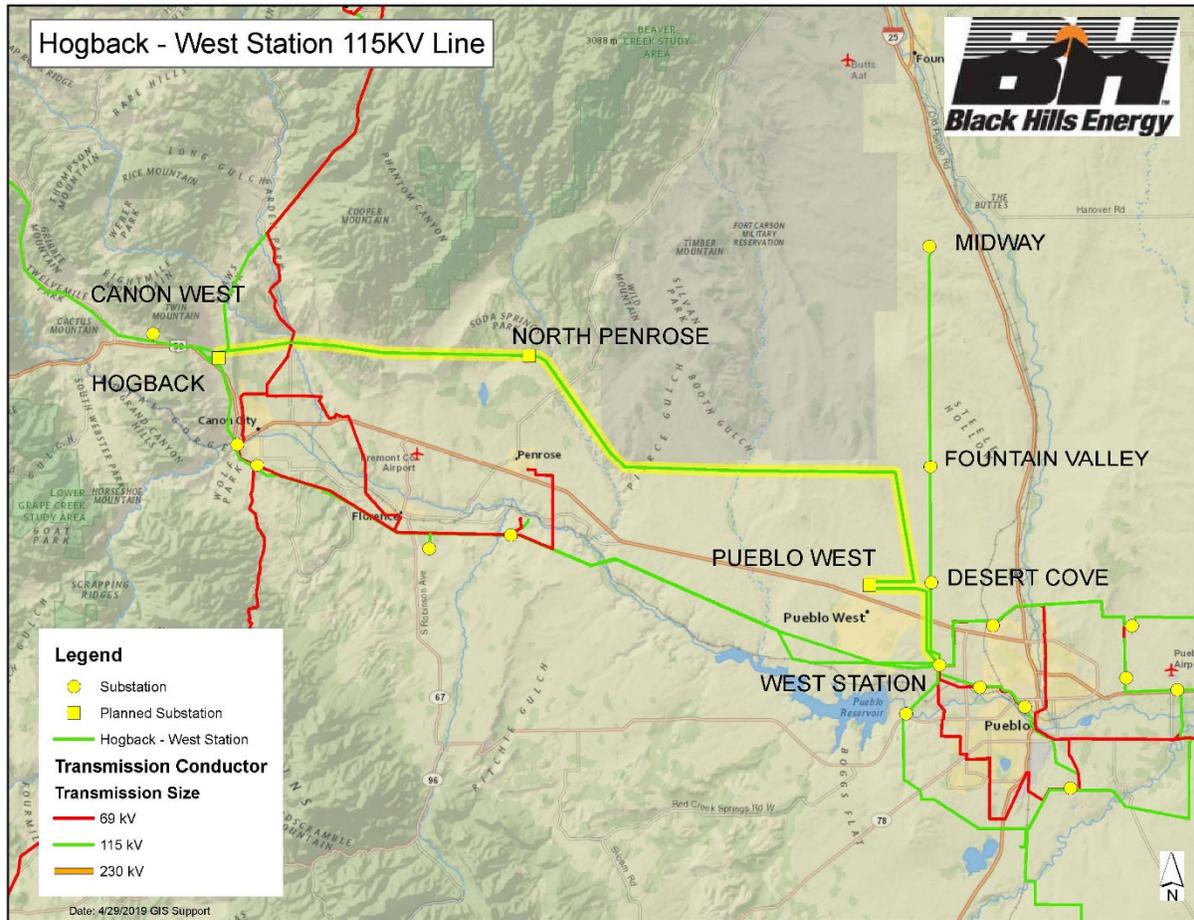
The Pueblo West substation is needed to relieve distribution transformer capacity constraints, as well as low voltage concerns under peak demand conditions. Additionally, significant unanticipated load growth in the area has and will continue to drive the need for increased transformer capacity from an additional source. These drivers, coupled with the relatively short implementation timeframe that is needed, preclude energy storage alternatives from being considered further for this project.

The engineering and design work associated with the substation portion of the project will be performed to ensure that the completed project will meet the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Namely, the noise level of the substation will not exceed 50 db(A) at a distance of 25 feet beyond the property line, and the magnetic field level at the property line, one meter above the ground, will not exceed 150 MilliGauss.

The overall completion date of the West Station-Hogback 115 kV line that this substation will interconnect to is scheduled for January 2022, but the initial segment from West Station to this new Pueblo West substation will be completed by January 2021 to coincide with the same in-service date for the Pueblo West substation.

This project is in the ordinary course of business. Thus, Black Hills requests a determination that a CPCN is not required under Rule 3206(b)(II) because it is designed at 115 kV or below and the facilities will be designed to meet the noise and magnetic field requirements in Rule 3206.

Black Hills/Colorado Electric Utility Company, LP
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North Penrose 115 kV Distribution Substation

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | New 115 kV distribution substation near Penrose, CO; will intersect the West Station-Hogback 115 kV line. |
| Voltage Class: | 115 kV |
| Facility Rating: | 25 MVA |
| Point of Origin/Location: | Penrose, CO |
| Point of Termination: | |
| Intermediate Points: | |
| Length of Line (in Miles): | |
| Type of Project: | Distribution |
| Development Status: | Planned |
| Routing: | |
| Subregional Planning Group: | CCPG |
| Purpose of Project: | Load service |
| Estimated Cost (in 2020 Dollars): | \$4.5 million |
| Schedule: | |
| Construction Date: | 2021 |
| Planned Completion/In-Service Date: | 2021 |
| Regulatory Info: | |
| Regulatory Date: | |
| Permitting Info: | |
| Permitting Date: | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

**Black Hills/Colorado Electric Utility Company, LP
2020 Rule 3627 Report – Appendix D – Black Hills Project Summary**

North Penrose Area 115 kV Distribution Substation

This project consists of constructing a new distribution substation by intersecting BHCE's planned West Station-Hogback 115 kV transmission line on the north side of Penrose, CO. The substation will be built to ultimately accommodate two 115/13.2kV, 25 MVA transformers, but only one bank will be installed initially. The community of Penrose is currently served via radial 69 kV line with limited contingency backup alternatives. This proposed distribution substation would provide an additional source to the community of Penrose as well as offload the 115/69 kV transformers at Portland, deferring the previously identified capacity constraint on the existing 42 MVA Portland #1 transformer.

While providing back-up energy to radial loads under contingency conditions is a benefit provided by energy storage technology, the magnitude of the Penrose substation demand was in excess of what could cost-effectively be served with an energy storage project at this time. For that reason, storage alternatives were not considered further.

The engineering and design work associated with the substation portion of the project will be performed to ensure that the completed project will meet the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Namely, the noise level of the substation will not exceed 50 db(A) at a distance of 25 feet beyond the property line, and the magnetic field level at the property line, one meter above the ground will not exceed 150 MilliGauss.

The completion date of the substation coincides with the completion of the West Station-Hogback 115 kV line in January 2022. This project is in the ordinary course of business. Thus, Black Hills requests a determination that a CPCN is not required under Rule 3206(b)(II) because it is designed at 115 kV or below and the facilities will be designed to meet the noise and magnetic field requirements in Rule 3206.

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Desert Cove-Midway 115 kV Line Rebuild

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | Rebuild the 115 kV line from Desert Cove to Midway north of Pueblo, CO. |
| | |
| Voltage Class: | 115 kV |
| Facility Rating: | 171 MVA |
| Point of Origin/Location: | Desert Cove 115 kV |
| Point of Termination: | Midway 115 kV |
| Intermediate Points: | Fountain Valley 115 kV |
| Length of Line (in Miles): | 14.8 |
| Type of Project: | Transmission Line Rebuild |
| Development Status: | Planned |
| Routing: | |
| Subregional Planning Group: | CCPG |
| | |
| Purpose of Project: | Increased thermal capacity |
| | |
| Estimated Cost (in 2020 Dollars): | \$5.1 million |
| | |
| Schedule: | |
| | |
| Construction Date: | 2020 |
| Planned Completion/In-Service Date: | Jan 2021 |
| Regulatory Info: | Approved – Colorado PUC: Decision No. C18-0843. |
| | |
| Regulatory Date: | September 19, 2018 |
| Permitting Info: | |
| Permitting Date: | |
| | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
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**Black Hills/Colorado Electric Utility Company, LP
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Desert Cove-Midway 115 kV Rebuild Project

The Desert Cove-Midway 115 kV line is commonly identified as an undersized transmission facility in most planning studies. The project will rebuild the 14.8-mile line with single circuit 115 kV construction utilizing 795 kcmil 26/7 Strand ACSR “Drake” conductor utilizing the existing right-of-way.

This project consists of rebuilding the existing 14.8-mile segment of 115 kV line between the Desert Cove and WAPA-owned Midway 115 kV substations, including the intermediate Fountain Valley distribution substation. The project will be located within the existing right-of-way. The project is planned for single circuit 115 kV operation.

The project was identified to mitigate thermal loading issues that arose through various transmission planning assessments. The Desert Cove-Fountain Valley-Midway 115 kV line is one of three parallel paths between the BHCE transmission system and the interconnection point with several other utilities at Midway to the north. Certain conditions involving a prevailing power flow from south to north across the BHCE system, combined with the loss of one or more transmission elements, can result in the thermal loading on the line exceeding the established thermal capacity. Additional capacity is needed to avoid the overload risk, and replacing the existing 336 ACSR conductor with 795 kcmil 26/7 Strand ACSR “Drake” conductor was identified as the proposed solution. In addition to the reliability driver for this rebuild, the line was constructed in 1953 and is late in its expected lifecycle.

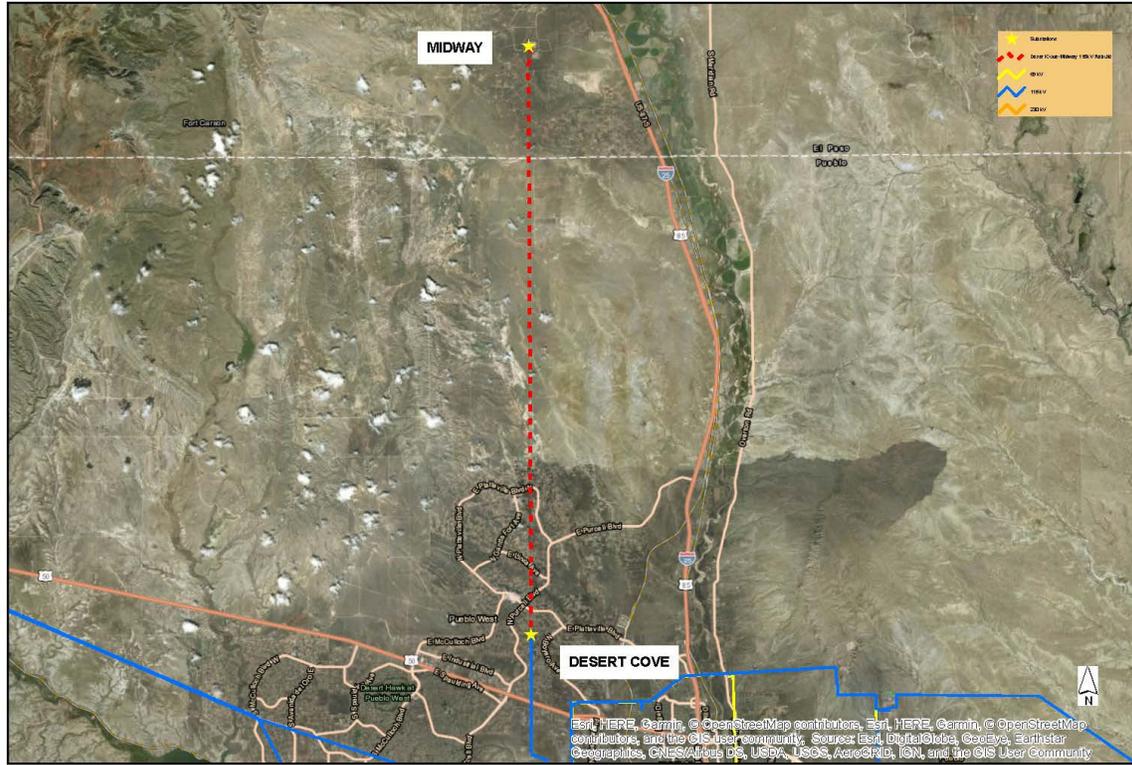
The maximum and winter continuous ratings of the planned 115 kV facility will be 171 MVA, assuming 795 ACSR conductor and line design rating of 100° C, and a maximum continuous operating voltage of 120.8 kV (105% of nominal). The new rating will be based on a non-BHCE terminal equipment limitation. The expected new ratings provide an increase over the current summer/winter rating of 119/153 MVA, respectively.

Noise and EMF analysis was performed for various typical transmission project design configurations, including the same line design as the planned Desert Cove-Midway project. This was done to determine the anticipated noise and magnetic field levels of the project for comparison against the standards specified in Rule 3206 (f) and Rule 3206 (e), respectively. That analysis was referenced for this project. See Appendix B, page B-20 for details on the noise and field study.

In Decision C18-0843, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

Black Hills/Colorado Electric Utility Company, LP 2020 Rule 3627 Report – Appendix D – Black Hills Project Summary

Desert Cove-Midway 115 kV Rebuild



Date: 4/26/2018 GIS Support
Line Route shown is for informational purposes only.

0 2.5 5 Miles



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West Station-Greenhorn 115 kV Line Rebuild

| | |
|--|--|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | Rebuild the 115 kV line from West Station to Greenhorn west and south of Pueblo, CO. |
| | |
| Voltage Class: | 115 kV |
| Facility Rating: | 221 MVA |
| Point of Origin/Location: | West Station 115 kV |
| Point of Termination: | Greenhorn 115 kV |
| Intermediate Points: | Burnt Mill and Pueblo Reservoir 115 kV |
| Length of Line (in Miles): | 12.1 |
| Type of Project: | Transmission Line Rebuild |
| Development Status: | Planned |
| Routing: | |
| Subregional Planning Group: | CCPG |
| | |
| Purpose of Project: | Asset integrity |
| | |
| Estimated Cost (in 2020 Dollars): | \$4.5 million |
| | |
| Schedule: | |
| | |
| Construction Date: | 2021 |
| Planned Completion/In-Service Date: | Sept 2022 |
| Regulatory Info: | Approved – Colorado PUC: Decision No. C18-0843. |
| | |
| Regulatory Date: | September 19, 2018 |
| Permitting Info: | |
| Permitting Date: | |
| | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
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West Station-Greenhorn 115 kV Rebuild Project

The West Station-Greenhorn 115 kV line is at a point late in its lifecycle and will be rebuilt to replace the existing 336 ACSR conductor to increase the line's capacity. The project will rebuild the 12.1-mile line with single circuit 115 kV construction utilizing 795 kcmil 26/7 Strand ACSR "Drake" conductor utilizing the existing right-of-way, and will include the intermediate Burnt Mill and Pueblo Reservoir distribution substations. The project construction will begin in 2021 and will be completed in September 2022.

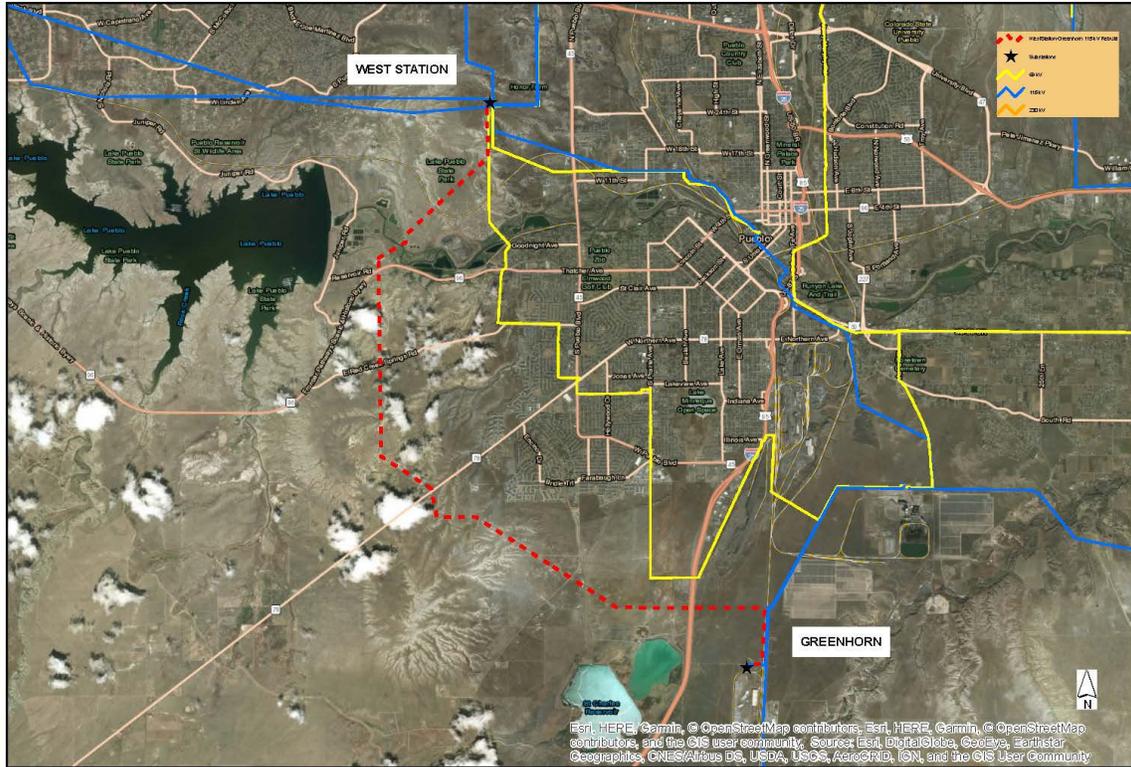
The maximum (summer) continuous rating of the proposed 115 kV facility will be 221 MVA, assuming 795 ACSR conductor and line design rating of 100° C, and a maximum continuous operating voltage of 120.8 kV (105% of nominal). The maximum (winter) continuous rating of the 115 kV line will be 240 MVA. The expected new ratings provide an increase over the current summer/winter rating of 119/153 MVA, respectively.

Noise and EMF analysis was performed for various typical transmission project design configurations, including the same line design as the planned West Station-Greenhorn project. This was done to determine the anticipated noise and magnetic field levels of the project for comparison against the standards specified in Rule 3206 (f) and Rule 3206 (e), respectively. That analysis was referenced for this project. See Appendix B, page B-20 for details on the noise and field study.

In Decision C18-0843, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

Black Hills/Colorado Electric Utility Company, LP 2020 Rule 3627 Report – Appendix D – Black Hills Project Summary

West Station-Greenhorn 115 kV Rebuild



Date: 4/26/2018 GIS Support
Line Route shown is for informational purposes only.

0 2.5 5 Miles



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Airport Memorial to Nyberg 115 kV Rebuild

| | |
|--|--|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | Rebuild the 115 kV line from Airport Memorial to Nyberg in Pueblo, CO. |
| | |
| Voltage Class: | 115 kV |
| Facility Rating: | 221 MVA |
| Point of Origin/Location: | Airport Memorial 115 kV |
| Point of Termination: | Nyberg 115 kV |
| Intermediate Points: | |
| Length of Line (in Miles): | 5 |
| Type of Project: | Transmission Line Rebuild |
| Development Status: | Planned |
| Routing: | |
| Subregional Planning Group: | CCPG |
| | |
| Purpose of Project: | Asset integrity |
| | |
| Estimated Cost (in 2020 Dollars): | \$3.7 million |
| | |
| Schedule: | |
| | |
| Construction Date: | 2022 |
| Planned Completion/In-Service Date: | Sept 2022 |
| Regulatory Info: | Approved – Colorado PUC Decision No. C19-0638 |
| | |
| Regulatory Date: | July 25, 2019 |
| Permitting Info: | |
| Permitting Date: | |
| | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

**Black Hills/Colorado Electric Utility Company, LP
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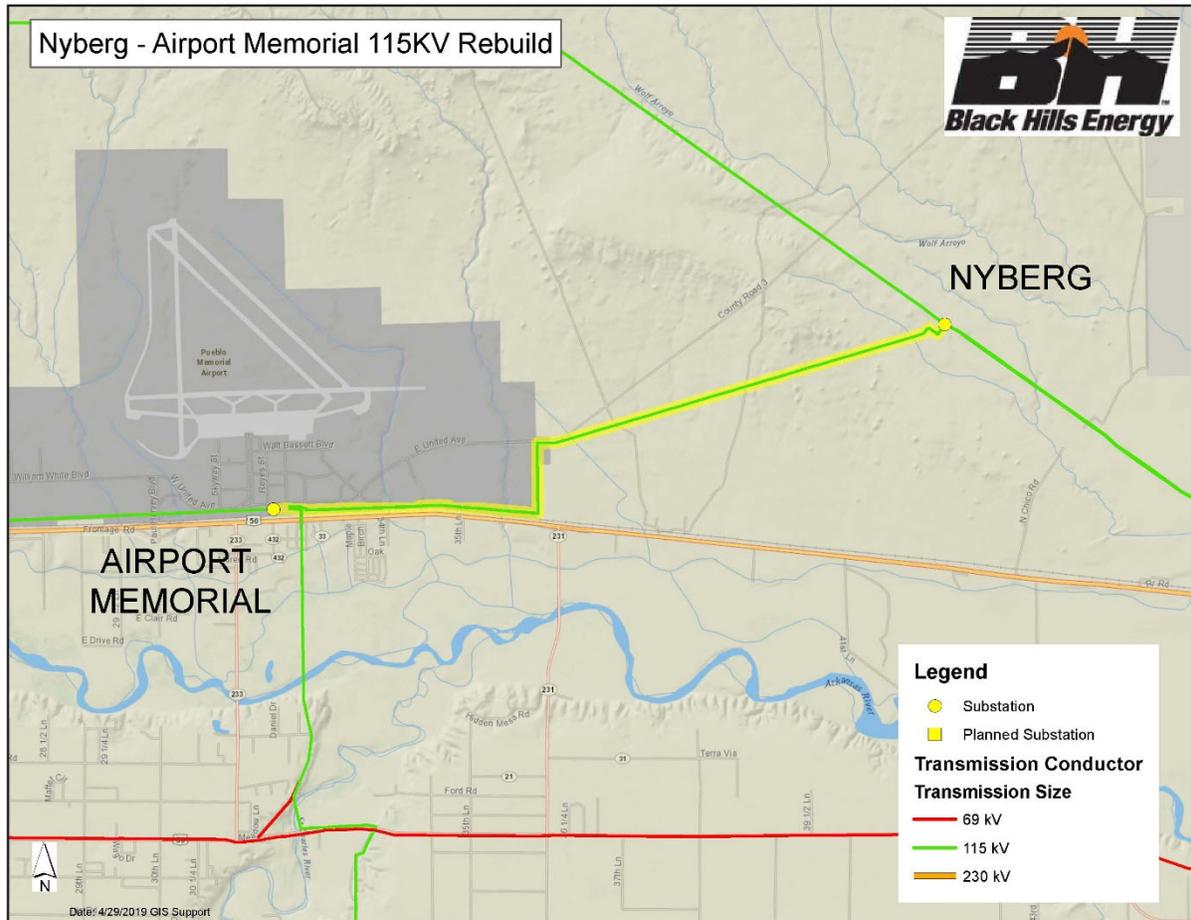
Airport Memorial to Nyberg 115 kV Rebuild

The Airport Memorial-Nyberg 115 kV line currently utilizes 336 ACSR with an operating temperature of 90 degrees C. This line will exceed its thermal rating following the simultaneous loss of the Boone-Comanche 230 kV and Nyberg-Baculite Mesa 115 kV lines during high west-east flows across the BHCE system. Overloads on this line were identified in previous 10-year planning assessments, generation interconnection studies, and the 2015 SB07-100 analysis for resource injections at Nyberg. The total online generation at Baculite Mesa may need to be limited in the operational timescale during periods of high West-East flows and certain outage combinations until the line is upgraded to replace the undersized conductor. This project will rebuild the line with 795 ACSR and replace the limiting breaker CT and line jumpers at Airport Memorial.

Noise and EMF analysis was performed for various typical transmission project design configurations, including the same line design as the planned Airport Memorial-Nyberg project. This was done to determine the anticipated noise and magnetic field levels of the project for comparison against the standards specified in Rule 3206 (f) and Rule 3206 (e), respectively.

In Decision C19-0638, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

Black Hills/Colorado Electric Utility Company, LP 2020 Rule 3627 Report – Appendix D – Black Hills Project Summary



Black Hills/Colorado Electric Utility Company, LP
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Salt Creek 115 kV Distribution Substation

| | |
|--|---|
| Project Sponsor: | Black Hills Colorado Electric |
| Additional Project Participants: | |
| Project Description: | New 115 kV distribution substation in Pueblo; will intersect the Reader-Pueblo 115 kV line. |
| | |
| Voltage Class: | 115 kV |
| Facility Rating: | 25 MVA |
| Point of Origin/Location: | Pueblo, CO |
| Point of Termination: | |
| Intermediate Points: | |
| Length of Line (in Miles): | 0 |
| Type of Project: | Distribution |
| Development Status: | Planned |
| Routing: | |
| Subregional Planning Group: | CCPG |
| | |
| Purpose of Project: | Load service |
| | |
| Estimated Cost (in 2020 Dollars): | \$6.4 million |
| | |
| Schedule: | |
| | |
| Construction Date: | 2020 |
| Planned Completion/In-Service Date: | Dec 2021 |
| Regulatory Info: | Approved – Colorado PUC Decision No. C19-0638 |
| Regulatory Date: | July 25, 2019 |
| Permitting Info: | |
| Permitting Date: | |
| | |
| Contact Information: | Lindsay Briggs, Supervisor of T&D Planning |
| Email | Lindsay.briggs@blackhillscorp.com |
| Phone | 605-721-2240 |

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Salt Creek 115 kV Distribution Substation

The project is driven by the need to increase transformation capacity at the existing Freemary 69/13.2 kV substation. There is limited space to increase transformation capacity at the Freemary substation, so other options were considered. One option is to construct a new Freemary substation on a new, larger parcel of land to the south. A second identified alternative is to construct a new 115/13.2 kV distribution substation (Salt Creek Substation) to the northwest of Freemary and interconnect to the adjacent Reader-Pueblo 115 kV line. The substation will be built to ultimately accommodate two 115/13.2kV, 25 MVA transformers, but only one bank will be installed initially. In addition to meeting the transformer capacity needs at Freemary, the latter option was selected as the preferred option since it would reduce loading on the 115/69 kV transformers serving the Pueblo sub-transmission network. The Salt Creek substation also would provide the benefit of offloading the Blende 69 kV substation, which is anticipated to reach capacity within the 10-year planning horizon. The Salt Creek alternative essentially replaces two 69/13.2 kV projects.

At the time of the 2019 Rule 3206 filing, land availability and corresponding feasibility of connecting to existing distribution feeders to the Salt Creek Distribution Substation is under evaluation. If a viable location is not confirmed, the initial proposal to rebuild the Freemary 69/13.2 kV substation at a new location will be pursued.

Due to the limited timeframe for implementing a solution to this identified need, non-wires alternatives such as energy storage systems were not considered to address the need associated with this project.

The engineering and design work associated with the substation portion of the project will be performed to ensure that the completed project will meet the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Namely, the noise level of the substation will not exceed 50 db(A) at a distance of 25 feet beyond the property line, and the magnetic field level at the property line, one meter above the ground, will not exceed 150 MilliGauss.

In Decision C19-0638, the Colorado Public Utilities Commission found that the project was in the ordinary course of business and found that a CPCN was not necessary.