

## **APPENDIX F: Project Need and Description**

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<b>Name</b>	<b>Lugo – Victorville 500 kV Upgrade (SCE portion)</b>
<b>Brief Description</b>	The project was submitted by Southern California Edison. The Lugo-Victorville 500 kV transmission line is jointly owned by SCE and the Los Angeles Department of Water and Power (LADWP). The upgrade will be funded and performed for facilities owned by each respective party. This project increases the rating of the 500 kV line by upgrading terminal equipment at both substations and removing ground clearance limitations. SCE's portion includes upgrading four transmission towers and replacing terminal equipment at the Lugo substation. The exact scope of LADWP's portion of upgrade was not provided but the cost of LADWP's portion was provided as part of the RW submission.
<b>Type</b>	Reliability
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1) The project is expected to contribute to an increase in the WECC Path 46-West of River rating by approximately 1000 MW as well as an increase in the WECC Path 61-Lugo-Victorville 500 kV line.</li> <li>2) This project is designed to address the thermal overload on Lugo-Victorville 500 kV transmission line identified by the CAISO for the following contingencies: <ul style="list-style-type: none"> <li>• N-1 of Eldorado – Lugo 500 kV</li> <li>• N-1-1 of Eldorado – Lugo 500 kV line and Lugo - Mohave 500 kV line</li> <li>• N-1-1 of Eldorado – Lugo 500 kV line and Eldorado - Mohave 500 kV line</li> <li>• N-1-1 of Eldorado – Lugo 500 kV line and Delaney – Colorado River 500 kV line</li> </ul> </li> <li>3) The 33% RPS policy-driven studies also identified Lugo-Victorville 500 kV line as a limiting constraint for delivering resources from multiple renewable zones.</li> <li>4) The accrued congestion cost of Lugo-Victorville 500 kV constraint since January 2013 was found to be approximately \$61 million.</li> </ol>
<b>Project Need Date</b>	06/01/2019
<b>Expected In-service Date</b>	12/31/2018
<b>Interim Solution</b>	Existing Lugo – Victorville RAS will mitigate the N-1 overload. For N-1-1 overloads, operators can rely on fast DR resources in the LA Basin area after first contingency, operating procedures and congestion management.

<p><b>Project Cost</b></p>	<p>Approximately \$34 million (\$18 million for SCE portion; \$16 million for LADWP portion)</p>
<p><b>Alternatives Considered but Rejected</b></p>	<p>The following alternatives to the Lugo-Victorville 500 kV Upgrade were considered:</p> <ol style="list-style-type: none"> <li data-bbox="440 390 1317 772"> <p>1) Congestion Management                      This alternative involves dispatching LA Basin generation after the first contingency. The alternative along with Lugo – Victorville RAS and operating procedure 6610 will work until 2021. Beyond 2021, with the retirement of the bulk of OTC generating units in the western LA Basin, as well as potential retirement of generating units in the eastern LA Basin due to its age (i.e., more than 40 years old), congestion management on this path will become much more challenging. By the end of 2016, the accrued congestion cost of Lugo-Victorville 500 kV constraint since January 2013 was found to be over 60 million. The cost of the recommended project is approximately \$34 million.</p> </li> <li data-bbox="440 863 1317 1100"> <p>2) Bypassing series capacitors on LADWP lines as described in Operating Procedure 6610                      This alternative involves relying on an existing operating procedure to bypass series capacitors on LADWP lines if Lugo-Victorville 500 kV overload persists after generation re-dispatch. This operating solution along with activating Lugo – Victorville RAS may not be able to mitigate the N-1-1 overload by 2021.</p> </li> </ol>

<b>Name</b>	<b>Big Creek Corridor Rating Increase</b>
<b>Brief Description</b>	The project was submitted by Southern California Edison, to achieve capacity increases building upon other activities SCE is undertaking for other purposes that are not subject to the ISO's transmission planning purposes. In early 2016, SCE decided to re-conductor the Magunden-Vestal No. 1 and No. 2 and Rector-Vestal No. 1 and No. 2 230 kV lines in the Big Creek corridor using an Aluminum Conductor Composite Core (ACCC) conductor (714 kcmil "Dove") as part of the Transmission Line Rating Remediation (TLRR) program coordinated with the CPUC to address the GO95 clearance issues. Southern California Edison (SCE) proposed the Big Creek Corridor Rating Increase Project, which will increase the conductor rating of the Magunden-Vestal No. 1 and No. 2 and Rector-Vestal No. 1 and No. 2 230 kV lines in the Big Creek Corridor from a 4-hr emergency capacity of 936 amps to 1520 Amps. These circuits are among the locations on SCE's CAISO controlled overhead transmission lines that did not meet clearance requirements per CPUC's General Order (GO) 95 that SCE provided to NERC in January, 2011. Additional upgrades are needed on the remaining limiting elements of the lines in order to mitigate the P1 (N-1) load shed during low hydro conditions
<b>Type</b>	Reliability
<b>Objectives</b>	CAISO included a scenario in the 2016-17 TPP with 330 MW of Big Creek area generation to represent extreme low hydro drought conditions. SCE and CAISO study results indicated a P1 (N-1) contingency of either the Magunden-Vestal No. 1 or No. 2 230 kV line would result in an overload requiring up to 170MW of load shed. The Big Creek Corridor Rating Increase project will increase the rating of the four TLRR ACCC lines from a 4-hr emergency capacity of 936 amps to 1520 Amps. Once completed, the Big Creek Corridor Rating project will eliminate the P1 (N-1) load shed during low hydro conditions. This project will be incorporated into the TLRR project and will have the same completion date of December 31,2018.
<b>Project Need Date</b>	12/31/2018
<b>Expected In-service Date</b>	12/31/2018
<b>Interim Solution</b>	<ul style="list-style-type: none"> <li>• The ISO recommends managing big creek generation to utilize it during peak hours during drought periods.</li> <li>• If deemed necessary, shed load as instructed in operating procedures for the existing Big Creek RAS.</li> </ul>
<b>Project Cost</b>	Approximately \$6 million

<p><b>Alternatives Considered but Rejected</b></p>	<p>The following alternatives to the Big Creek Corridor Rating Increase was considered but rejected:</p> <p>1) Pittman Hill 230 kV Substation</p> <p>NextEra Energy Transmission West, LLC (NEET West) proposed a \$65 Million project to build a new Pittman Hill 230 kV substation that will tie the following transmission lines together:</p> <ul style="list-style-type: none"> <li>• Helms – New E1 230 kV #1 &amp; #2 Lines (PG&amp;E)</li> <li>• Big Creek 3 - Rector 230 kV Line #2 (SCE)</li> <li>• Big Creek 4 - Springville 230 kV Line (SCE)</li> <li>• Big Creek 1 - Rector 230 kV Line (SCE)</li> </ul> <p>NEET West study results indicate that the proposed NEET West new 230 kV Pittman Hill substation resolves the CAISO identified P1, P3, and P6 contingency overloads identified in the CAISO 2016-2017 TPP analysis for low hydro sensitivity case.</p> <p>Several key factors were carefully considered in the evaluation of potential mitigation options for the Big Creek area and a narrative is provided below regarding the ISO's analysis of the Pitman Hill project alternative and the Big Creek Corridor Rating Increase Project alternative. Please refer to Appendix B for greater details.</p> <ol style="list-style-type: none"> <li>1. Economic Factors:             <ol style="list-style-type: none"> <li>a. Project Cost: Both the project proposals submitted through the 2016 Request Window mitigate the P1 (N-1) load shed during extreme low hydro conditions. The estimated cost of the proposed NEET West Pitman Hill substation is \$65 million and the cost estimate for SCE Big Creek Corridor Rating Increase project is \$6 million.</li> </ol> </li> <li>2. Big Creek Corridor Rating Increase project             <ol style="list-style-type: none"> <li>a. Stakeholder's raised concerns regarding the long outage that would be involved in reconductoring of the four 230kV lines under Big Creek Corridor Rating Increase project. However, the reconductoring of the transmission lines is not part of the proposed project and is proceeding in any event. SCE intention to reconductor the lines is a part of the CPUC approved Transmission Line Rating Remediation (TLRR) program to address the GO95 clearance issues. Additional outage time to increase the rating of the lines, that would resolve overload and N-1 load drop, is minimal.</li> <li>b. NEET West proposal also highlights power flow case divergence under couple of P6 outages in the Big Creek area with Big Creek Corridor Rating Increase project modelled. ISO observed this issue only in the extreme low</li> </ol> </li> </ol>
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	<p>hydro sensitivity scenario for N-1-1 and can be mitigated by system adjustments before the second contingency.</p> <ol style="list-style-type: none"> <li>3. Transient stability issues             <ol style="list-style-type: none"> <li>a. The reliability assessment results show local instability following an outage of the Big Creek 1-Big Creek 2 230 kV line or the Big Creek 3 bus. As per the proposal submitted by NEET West, the Pittman Hill project will have a positive impact upon the local dynamic performance. However, SCE will be installing second (dual) high speed protection for this line with an in-service date of December 2017, so the instability issue needs no further mitigation.</li> <li>b. Midway extreme outage- The ISO did not indicate any transient stability performance issues in and around Midway in this year's assessment.</li> </ol> </li> <li>4. PG&amp;E system benefits             <ol style="list-style-type: none"> <li>a. The Pitman Hill project submission states that the project appears to also mitigate thermal loading concerns in the PG&amp;E 115 kV system around E1 substation following the simultaneous loss of Gregg-E1 230 kV Lines 1 &amp; 2. Study results for PG&amp;E Greater Fresno area, as listed in Appendix C of this report, identify overloads only under one sensitivity scenario. ISO identified no overloads under for any of the Base Case scenarios that were studied, and hence is proposing no upgrades.</li> </ol> </li> <li>5. Path 26 Benefits             <ol style="list-style-type: none"> <li>a. The NEET West project proposal outlines benefits of this project in providing reduction to Path 26 flow by 450MW as an alternate/relief to Path 26 upgrades required for 33% and 50% RPS evaluation. The ISO has identified no Path 26 constraints as part of 2016-2017 reliability assessment. The ISO has also identified that no new system upgrades are needed to achieve 33% RPS profile. Also, the 50% RPS portfolios are not final and special study results are for information only.</li> </ol> </li> </ol>
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