Merchant Transmission Request
System Impact Study Report

For

PJM Generation Interconnection Request
Queue Position AB1-103

Fieldale-Thornton 138 kV, Franklin-Thornton 138 kV, and Danville-East Danville 138 kV

September 2016

Network Impacts

The AB1-103 merchant transmission request submitted by H-P Energy Resources LLC on October 16, 2015, proposes advancing projects B2697.1 and B2697.2. These projects were approved to relieve congestion.

The B2697.1 project consists of mitigating violations identified by sag study to operate the Fieldale – Thornton - Franklin 138 kV overhead line conductor at its Maximum Operating Temperature (MOT). The required in-service date for this work as approved by PJM is June 1, 2019. AEP was designated to be the Designated Entity for this project. Consistent with section 4.2.2 of the Consolidated Transmission Owners Agreement, AEP proposed an engineering start date of June 1, 2016 and a construction start date of June 1, 2017 for this project. The AB1-103 request is to advance the in-service date to June 1, 2016.

The present ratings for the Fieldale – Thornton 138 kV and Franklin – Thornton 138 kV line sections are as follows: SN 150 MVA, SE 150 MVA, WN 189MVA, WE 189 MVA. The summer emergency (SE) rating of 150 MVA is the result of a de-rating of the overhead conductor until a higher allowable operating temperature can be verified. This operating temperature is determined by verifying the conductor clearances as part of a sag clearance study. If inadequate clearances are identified, changes must be made to obtain at least the minimum required clearance between the conductor and other objects at the desired operating temperature.

Assuming the overhead conductor can operate at its MOT the summer emergency rating of the conductor could reach 211 MVA.

The new ratings for the Fieldale – Thornton 138 kV and Franklin – Thornton 138 kV line sections are expected to be the following after mitigation identified by the sag study is completed: SN 150 MVA, SE 211 MVA, WN 189 MVA, WE 236 MVA. These line sections are portions of the Blaine – Fieldale 138 kV circuit.

A preliminary clearance evaluation, a.k.a. tabletop study, has already been conducted. This tabletop study uses the Plan and Profile drawings created when the line was built to help anticipate any clearance issues before field confirmation of actual clearances are obtained, generally using LiDAR (Light Detection and Ranging). The results of the tabletop study identified six line crossings that potentially need to be addressed to operate at the conductor's MOT. The results of the tabletop study are used to prioritize further investigation and for budgetary purposes, but cannot be used to approve operating the conductor at higher temperatures. Field survey information such as LiDAR data is needed to determine the present conductor clearances, and what upgrades are needed to operate the conductor at higher temperatures including up to its MOT.

The cost to perform a sag clearance study is approximately $4,000 per mile and includes collecting and analyzing the LiDAR data. For projects associated with PJM queue studies, the sag clearance study is typically performed during the Facilities Study. While this typically may take up to 6 months, expediting it for completion in as little as 3 months is expected to be an issue of favorable weather and adjusting scheduling of other ongoing work, not incremental cost. Any costs (and time) to mitigate clearance issues (if identified) would be additional. The

approximate cost to fly and analyze the data would be approximately $75,200 ($4k * 18.8 mi.). Until this sag clearance study is completed, any mitigation has been identified and designed, and appropriate outages necessary to accomplish any required mitigation have been identified and scheduled, there is no way of conclusively determining a specific completion date prior to June 1, 2019. Availability of any outages required to implement mitigation is also a major consideration, especially in view of other work already scheduled in the vicinity.

The B2697.2 project consists of replacing terminal equipment at AEP's Danville and East Danville substations to improve the thermal capacity of the Danville – East Danville 138 kV circuit.

Today, the current ratings for the Danville – East Danville 138 kV circuit are as follows: SN 275 MVA, SE 361 MVA, WN 352 MVA, WE 429 MVA.

The ratings for the Danville – East Danville 138 kV circuit after replacing the terminal equipment are expected to be as follows: SN 275 MVA, SE 415 MVA, WN 352 MVA, WE 429 MVA. Due to the volume of construction work already scheduled in the vicinity of the AEP footprint which borders Dominion Virginia Power and Progress Carolinas, availability of outages to significantly advance the work associated with the B2697.2 upgrades is uncertain, especially prior to the completion of work associated with projects B1660 and B1660.1 at Cloverdale.

Additional Considerations

AEP will be making every effort to complete these Market Efficiency upgrades as early as possible, consistent with other system needs, including reliability. Therefore, no advancement under the AB1-103 request is possible.

Conclusions

Project completion by the requested 6/1/2016 date is not possible in light of the commitment AEP made when submitting the baseline projects' acknowledgement to PJM, further advancement under the AB2-103 request is not available.