



Memorandum from the Office of the Inspector General

September 24, 2019

James R. Dalrymple, MR 3H-C

**REQUEST FOR FINAL ACTION – EVALUATION 2019-15641 – SYSTEM OPERATIONS
CENTER SITE SELECTION**

Attached is the subject final report for your review and final action. Your written comments, which addressed your management decision and actions planned or taken, have been included in the report. Please notify us when final action is complete. In accordance with the Inspector General Act of 1978, as amended, the Office of the Inspector General is required to report to Congress semiannually regarding evaluations that remain unresolved after 6 months from the date of report issuance.

If you have any questions or wish to discuss our findings, please contact J. Lauren Pionke, Senior Auditor, at 865-633-7381 or E. David Willis, Director, Evaluations, at (865) 633-7376. We appreciate the courtesy and cooperation received from your staff during the evaluation.

David P. Wheeler
Assistant Inspector General
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OIG File No. 2019-15641



Office of the Inspector General

Evaluation Report

To the Senior Vice President,
Transmission, Power Supply
and Support

SYSTEM OPERATIONS CENTER SITE SELECTION

Evaluation Team
J. Lauren Pionke
Leslie A. Franks

Evaluation 2019-15641
September 24, 2019

ABBREVIATIONS

GIS	Geographic Information System
NATF	North American Transmission Forum
NERC	North American Electric Reliability Corporation
RE Lamb	Robert E. Lamb, Inc.
ROC	Regional Operations Center
SOC	System Operations Center
TVA	Tennessee Valley Authority

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MEMORANDUM DATED SEPTEMBER 20, 2019, FROM JAMES R. DALRYMPLE TO DAVID P. WHEELER



Evaluation 2019-15641 – System Operations Center Site Selection

EXECUTIVE SUMMARY

Why the OIG Did This Evaluation

In 2011 and 2016, the Tennessee Valley Authority (TVA) retained Robert E. Lamb, Inc., (RE Lamb)ⁱ to conduct studies on TVA's existing System Operations Center (SOC) facilities. RE Lamb determined the existing SOC did not meet current industry standards. TVA decided to build a new facility to serve as the primary control center and address existing security and computer room limitations. Business drivers of TVA's decision also included flooding risk, urban challenges, computer system end of life, space issues, compliance costs, and the complexity of managing the existing SOC footprint. TVA intends to build the new SOC for continuous operation with resiliency, reliability, security, and compliance at the core of the design. To select a site on which to build the new SOC, TVA created a project team consisting of RE Lamb and multiple TVA organizations, including Transmission, Power Supply and Support, River and Resources Stewardship, and Generation Projects and Fleet Services.

As a result of the SOC site-selection process, TVA purchased a 147-acre site in Meigs County near Georgetown, Tennessee, as well as an adjacent 20-acre parcel. TVA purchased all 167 acres for approximately \$1.1 million. As of September 27, 2018, TVA estimated the total project to cost \$245 million.ⁱⁱ Based on the importance of the SOC to the transmission system, we performed an evaluation of the site-selection process to determine if the selected site (1) met regulatory requirements and established criteria and (2) provided financial or operational benefits over other potential locations considered.

What the OIG Found

We determined the site selected for the SOC met established criteria and regulatory requirements. However, we could not determine if the site selected provided financial or operational benefits over other potential locations considered. We identified several issues in the site-selection process, including (1) inaccurate analysis, (2) cost considerations that were high level and not documented, and (3) duplicate parcels. As a result, we determined 4 of the final 6 sites were incorrectly considered for selection by TVA because they did not meet one or more of TVA's established criteria. Additionally, we identified 1 site that was prematurely

ⁱ RE Lamb is a full-service planning, detail design and construction company with expertise in the planning and design of high reliability 24 by 7 facilities, including control centers.

ⁱⁱ Project costs include the power supply and communications infrastructure in addition to the control center facility.



Evaluation 2019-15641 – System Operations Center Site Selection

EXECUTIVE SUMMARY

eliminated from consideration that should have been included in TVA's final site selection evaluation.

What the OIG Recommends

We recommend the Senior Vice President, Transmission, Power Supply and Support, (1) consider the identified issues in the site-selection process and determine if additional analysis is needed to verify the best site was selected and (2) determine if lessons learned could be applied to improve siting processes.

TVA Management's Comments

In response to our draft report, TVA management stated they reviewed topographical maps of over 40 sites along with the notes from the previous review to see if other sites would offer significant improvements over the site selected. They determined the site selected would still be the desirable location. TVA management also provided planned and completed actions for future selection processes. See the Appendix for management's complete response.

Auditor's Response

We concur with TVA management's planned and completed actions.

BACKGROUND

In 2011 and 2016, the Tennessee Valley Authority (TVA) retained Robert E. Lamb, Inc., (RE Lamb)¹ to conduct studies on TVA's existing System Operations Center (SOC) facilities. RE Lamb determined the existing SOC, which is located in Hamilton County, Tennessee, did not meet current industry standards. TVA decided to build a new facility to serve as the primary control center and address existing security and computer room limitations. Business drivers of TVA's decision also included flooding risk, urban challenges, computer system end of life, space issues, compliance costs, and the complexity of managing the existing SOC footprint. TVA intends to build the new SOC for continuous operation with resiliency, reliability, security, and compliance at the core of the design. To select a site on which to build the new SOC, TVA created a project team, which evolved over time, but consisted of RE Lamb and multiple TVA organizations, including: Transmission, Power Supply and Support; River and Resources Stewardship; and Generation Projects and Fleet Services.

Since TVA does not have a process specific to siting a control center, the project team indicated site criteria was developed utilizing (1) TVA's Transmission Siting process; (2) industry best practices based on information from RE Lamb, the North American Transmission Forum (NATF)² and the North American Electric Reliability Corporation (NERC); (3) statutory and associated regulatory requirements such as the National Environmental Policy Act, Clean Water Act, National Historic Preservation Act, and Uniform Act; and (4) project team and employee input. The team defined a "study area" around TVA's existing Regional Operations Center (ROC), which is to serve as the backup control center. TVA determined the SOC should be located at least 15 minutes away (driving distance), but not more than 45 minutes, from the ROC (that is also located in Hamilton County, Tennessee), to be in compliance with the NERC Emergency Preparedness and Operations Standard 008, *Loss of Control Center Functionality*. This resulted in potential locations in three states – Tennessee, Alabama, and Georgia.

Based on site security needs, RE Lamb suggested the site be at least 22 acres. The project team decided to select a site with at least 50 acres. TVA utilized a Geographic Information System (GIS) to compile geographical data (such as parcel data, flood zones, railroads, slope, wetlands, etc.) used to analyze potential sites. Additional site criteria was determined and analyzed by part of the project team in a tiered approach.

Tier I and Tier II analyses consisted of automated tests performed in GIS by TVA's GIS and Mapping group. A manual Tier II desktop review was then performed by two Transmission Siting personnel. Subsequently, a Tier II project team review was performed to assess the remaining sites and narrow it down to a handful of

¹ RE Lamb is a full-service planning, detail design and construction company with expertise in the planning and design of high reliability 24 by 7 facilities, including control centers.

² NATF includes investor-owned, state-authorized, municipal, cooperative, United States federal, and Canadian provincial utilities members and promotes excellence in the reliability and resiliency of the electric transmission system.

sites for final evaluation by the team in Tier III. The tiers and criteria were applied as follows:

Tier I Analysis (Nonnegotiable Criteria or “No-Go Zones”)

Over 4,000 sites of 50 or more acres were initially included in TVA’s study area. These were evaluated in the Tier I GIS analysis utilizing system constraints developed by the team. According to TVA’s Tier I analysis results, 1,992 sites were eligible for further evaluation because they passed established nonnegotiable criteria, which included the following no-go zones:

- Federal Emergency Management Agency flood zones
- Emergency Action Plan flood inundation zones for dam failures and probable maximum flood
- Economic development industrial sites
- Areas within 1 mile of a TVA dam
- Nuclear emergency evacuation sectors
- Areas within 1 mile of the Environmental Protection Agency’s Toxic Release Inventory (i.e., chemical plants)
- Areas within 1 mile of a railroad

Tier II Analysis

The 1,992 sites that passed the Tier I criteria were further evaluated in the Tier II analysis, which yielded 350 remaining sites according to TVA’s analysis results. The Tier II analysis was performed in GIS, which measured the following criteria:

- Within 2 miles of 2 TVA transmission lines
- Within 2 miles of a TVA fiber optic line
- Continuous acres (50+) in areas with less than a 20-percent land slope
- Continuous acres (50+) with no wetlands
- Continuous acres (50+) not divided by streams
- Continuous acres (50+) not divided by pipelines

Tier II Desktop Review

According to TVA, each of the 350 sites were evaluated individually in a desktop review and the following characteristics were considered to exclude potential sites:

- Certain land use (e.g., active farms with dwellings, quarries, recreation)
- Odd parcel shapes or sizes
- High density surrounding areas
- Other miscellaneous constraints such as pivot irrigation systems and sinkholes

Tier II Project Team Review

The Tier II desktop review resulted in 42 sites, which were then reviewed in a group setting by part of the project team. The team considered additional characteristics to exclude potential sites, such as:

- Potential transportation concerns and obstacles (e.g., bridges, I-75 traffic, terrain, railroad crossings, proximity to the Hiwassee River, alternate routes and obstacles to these routes).
- Proximity to airport glide paths.
- Out of state income taxes for employees (if located in Alabama or Georgia).

Tier III Evaluation

The Tier II project team review resulted in 6 remaining sites, which were evaluated further by part of the project team in Tier III. The following criteria was considered:

- Environmentally or culturally sensitive areas
- Proximity to hotels, hospitals, and emergency response services
- Land depressions
- Proximity to fiber splice boxes and water/sewer lines
- Proximity to parks, schools, and recreational areas
- Property on the market for sale
- Potential future expansion of the facility
- Constructability (e.g., access, presence of forestry, streams)

As a result of the SOC site-selection process, TVA purchased a 147-acre site in Meigs County near Georgetown, Tennessee, as well as an adjacent 20-acre parcel. TVA purchased all 167 acres for approximately \$1.1 million. As of September 27, 2018, TVA estimated the total project to cost \$245 million.³ Based on the importance of the SOC to the transmission system, we performed an evaluation of the site-selection process.

OBJECTIVE, SCOPE, AND METHODOLOGY

The objective of our evaluation was to determine if the new SOC site (1) met regulatory requirements and established criteria and (2) provided financial or operational benefits over other potential locations considered. The scope of this evaluation was limited to the process used to select a new site for the control center utilizing the existing ROC as the backup control center. To achieve our objective, we:

³ Project costs include the power supply and communications infrastructure in addition to the control center facility.

- Reviewed TVA's Transmission Siting process and other relevant procedures to determine what process was used to select the site.
- Reviewed guidance documentation from RE Lamb, NATF, and NERC to determine if TVA's criteria aligned with industry best practices.
- Reviewed regulations to identify applicable regulatory requirements for control center sites.
- Conducted interviews with project personnel and obtained documentation related to the site-selection process to determine how the new site was selected, including criteria used in the selection.
- Received access to TVA's site-selection project viewer in GIS to determine TVA's population of potential sites and reperform analysis.⁴
- Performed analysis on eliminated sites at different phases to determine if established criteria was correctly applied.
 - Tier II Analysis – We statistically selected 41 of 1,616⁵ sites eliminated during the Tier II Analysis phase using rate-of-occurrence estimation sampling with a 95-percent confidence level. We did not project the results of our statistical sample due to the inconsistent nature of our findings.
 - Tier II Desktop Review – We statistically selected 39 of 308 sites eliminated during the Tier II Desktop Review phase using rate-of-occurrence estimation sampling with a 95-percent confidence level. We did not project the results of our statistical sample due to the inconsistent nature of our findings.
 - Tier II Project Team Review – We selected all 36 sites eliminated during the Tier II Project Team Review phase.
- Performed analysis on the final 6 sites to determine if (1) they met regulatory requirements and all established criteria and (2) the selected site provided financial or operational benefits over other potential locations considered.

This evaluation was performed in accordance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*.

⁴ According to TVA personnel, the most current and best available data related to parcels, Federal Emergency Management Agency flood zones, Emergency Action Plan flood inundation zones, Environmental Protection Agency's toxic release inventory, etc., was imported into GIS at the time of site selection (2016) and used in TVA's analysis. TVA personnel stated the accuracy and quality of the data varied greatly. We performed our analysis using the same data.

⁵ There were 26 duplicate parcel numbers in the list of 1,992 sites from the Tier I analysis. Of these, 350 sites passed the Tier II analysis.

FINDINGS

We determined the site selected for the SOC met established criteria and regulatory requirements. However, we could not determine if the site selected provided financial or operational benefits over other potential locations considered. We identified several issues in the site-selection process, including (1) inaccurate analysis, (2) cost considerations that were high level and not documented, and (3) duplicate parcels. As a result, we determined 4 of the final 6 sites were incorrectly considered for selection because they did not meet one or more of TVA's established criteria. Additionally, we identified 1 site that met the Tier II criteria that should have been evaluated in Tier III for possible site selection.

INACCURATE ANALYSIS

TVA performed analysis on the parcel data and applied its established criteria in tiers or phases to determine the best site for the new primary control center. We sampled and reviewed 121 of the 1,992 potential locations considered for TVA's new SOC⁶ to determine if TVA's established criteria was correctly applied. We determined some of TVA's analysis was inaccurate. Specifically, sites that did not meet established criteria were incorrectly considered throughout the analysis, including (1) Tier I nonnegotiable criteria, (2) Tier II analysis constraints, (3) Tier II desktop review constraints, and (4) Tier II project team review considerations. Furthermore, it appears 1 site was eliminated prematurely by TVA during the Tier II project team review.

Tier I Nonnegotiable Criteria

We reviewed 121 of the 1,992 sites that passed Tier I and determined 14 did not meet one or more of the nonnegotiable criteria, including (1) study area, (2) flood zones, and (3) railroad buffers.

Study Area – As previously mentioned, TVA defined the study area based on the determination the SOC should be located no more than 45 minutes from the ROC. We identified 35 sites on the outside edge of the study area, either slightly overlapping the study area or just touching the edge. TVA stated they included sites on the edge of the study area in their analysis in order to be inclusive. However, 2 sites appeared to be completely outside the study area. Furthermore, we verified drive times using Google Maps and the official address of the ROC and it appears 1 site had a typical drive time longer than the 45 minute threshold established by TVA.

Flood Zones –TVA evaluated flood zones in GIS to eliminate parcels that intersected flood zones. We found 7 of the 121 sites intersected flood zones, but were not eliminated, including 1 of the final 6 sites.

⁶ We identified one duplicate in our sample that we did not review, resulting in 121 total sites.

Railroad Buffers – TVA developed a 1-mile railroad buffer in GIS to eliminate parcels in close proximity to railroads (1 mile on each side). However, it appears TVA's analysis of the railroad buffer was accidentally cut off at the study area; therefore, sites on the edge or outside the study area were not analyzed appropriately by GIS for the entire railroad buffer. As a result, we found 7 of the 121 sites we reviewed were within the 1-mile buffer but were not eliminated appropriately, including 1 of the final 6 sites.

Tier II Analysis Constraints

We reviewed 80 of the 350 sites that passed TVA's Tier II analysis and determined 7 did not meet one or more of the constraints, including (1) land slope and (2) wetlands. In addition, we identified an issue with the land-slope evaluation.

Land Slope – TVA indicated they wanted to avoid land with greater than 20-percent slope to keep construction costs down. We identified 6 sites that did not appear to have 50 continuous acres of land with less than 20-percent slope, but were not eliminated appropriately.

In addition, we found the slope analysis in GIS was cut off at the study area; therefore, sites on the edge or outside the study area were not evaluated for slope as TVA intended. We were unable to determine land slope for 30 of the 80 sites. As a result, we were unable to determine if those sites had 50 continuous acres outside of sloped areas. Two of the 30 sites made it to the final 6 sites evaluation and had not previously been evaluated for slope.

Wetlands – TVA evaluated wetlands in GIS in order to avoid any potential impacts to these protected areas. We found 1 site that did not appear to have 50 continuous acres outside of wetland areas, but was not eliminated appropriately.

Tier II Desktop Review Constraints

We reviewed all 42 sites that passed the Tier II desktop review and determined 13 did not meet one or more of the constraints assessed by TVA, including (1) certain land use, (2) odd parcel shapes and sizes, and (3) high density areas.

Certain Land Use – According to TVA personnel, certain land use such as recreational areas, quarries, or active farms with dwellings, was to be avoided. We determined 6 of the 42 sites did not appear to meet TVA's criteria for land use. Three of the 6 appeared to be located in the Chattahoochee National Forest. The remaining 3 had buildings on the property, including dwellings and barns, and 1 was owned by a farm partnership.

Odd Parcel Shapes and Sizes – TVA assessed each site's parcel shape and size in order to get a suitable site for building purposes. TVA employees stated they avoided narrow or triangular parcel shapes to ensure a proper site perimeter.

As discussed in TVA's Tier II analysis, TVA analyzed the impact to each site's total acreage after taking in to consideration (1) slope, (2) wetlands, (3) streams, and

(4) pipelines. Each criteria was assessed individually and acreage was recalculated to ensure the site had 50 continuous acres remaining outside that criteria. However, we determined TVA did not consider the impacts of all criteria at once on the site's acreage in total. In addition, it does not appear TVA's criteria included roads or transmission lines that intersected the site that would have impacted usable acreage. As a result, TVA did not get an accurate representation of sites that met the size requirement.

In order to properly assess each site's shape and size, we incorporated all of the potential constraints at once to ensure each site had 50 usable acres remaining. As a result, we found 7 of the 42 sites should have been eliminated due to size restrictions imposed by slope, wetlands, pipelines, streams, roads, and/or transmission lines, including 2 of the final 6 sites.

High Density Areas – TVA reviewed areas surrounding each site in order to avoid sites with high-density areas. Two of the 42 sites we reviewed were on the edge of high-density areas and were not eliminated appropriately, including 1 of the final 6.

Tier II Project Team Considerations

During the Tier II project team review, the team divided the study area and developed quadrants around the remaining sites to perform further analysis. TVA eliminated sites by quadrant based on high-level considerations of criteria specific to those quadrants. We reviewed all 6 sites that passed the Tier II project-team review and it appears 2 did not meet one of TVA's considerations related to potential transportation concerns and obstacles; specifically due to fog and alternate route drive times. According to TVA's analysis, some sites were eliminated due to fog concerns based on the proximity to the Hiwassee River, which had caused a major traffic incident in 1990. However, we determined 1 of the final 6 sites bordered the Hiwassee River, which presented both fog and transportation concerns, but was not eliminated. In addition, we determined 1 of the final 6 sites had limited alternate routes under the 45 minute threshold, but was not eliminated.

Furthermore, it appears 1 site was eliminated prematurely by TVA during the Tier II project team review. We determined the eliminated site met all of the Tier II project team considerations as well as previous criteria and therefore should have been considered further by TVA.

COST CONSIDERATIONS THAT WERE HIGH LEVEL AND NOT DOCUMENTED

TVA's Tier III evaluation of the final 6 involved ranking each site based on certain considerations such as constructability, access points to the site, environmental constraints, proximity to certain establishments, and potential expansion. According to TVA personnel, site selection was not based on cost, but functionality. TVA personnel stated they indirectly considered costs through the use of criteria. For example, slope was analyzed to keep grading costs down

during construction. However, we determined cost considerations at this phase were high level (e.g., site was located near a city so it probably had access to a sewer system) and there was no documentation to support potential costs associated with the purchase or development of the sites. As a result, we could not determine if the site selected provided financial benefits over all other potential locations considered.

DUPLICATE PARCELS

We identified several duplicate parcels in TVA's analyses. According to TVA personnel, TVA used parcel data from the State of Tennessee and County Tax Assessor offices in Alabama and Georgia and imported the data into GIS. TVA confirmed the original parcel data contained duplicate parcels and TVA personnel stated they did not clean up the data prior to analysis. Therefore, the project team did not have an accurate representation of available locations. As a result, we found one duplicate location in our testing of sampled sites not eliminated until the Tier II desktop review.

CONCLUSION

We determined the site selected for the SOC met established criteria and regulatory requirements. However, we could not determine if the site selected provided financial or operational benefits over all other potential locations considered. We determined 4 of the final 6 sites were incorrectly considered for selection because they did not meet one or more of TVA's established criteria. Additionally, we identified 1 site that met the Tier II criteria that should have been evaluated in Tier III for possible site selection.

RECOMMENDATIONS

We recommend the Senior Vice President, Transmission, Power Supply and Support:

- Consider the identified issues in the site-selection process and determine if additional analysis is needed to verify the best site was selected.

TVA Management's Comments – In response to our draft report, TVA management stated they reviewed topographical maps of over 40 sites along with the notes from the previous review to see if other sites would offer significant improvements over the site selected. They determined the site selected would still be the desirable location. Although management acknowledged some inconsistencies in the consideration of the final 6 sites, management stated there was concurrence of the site selected and the site met established criteria and regulatory requirements. See the Appendix for management's complete response.

Auditor's Response – We concur with TVA management's completed actions.

- Determine if lessons learned could be applied to improve siting processes.

TVA Management's Comments – In response to our draft report, TVA management plans to revise the existing siting process to add a joint project team meeting after analysis and prior to the final selection. In addition, TVA management added specifications to the TVA GIS Lessons Learned document to state future analysis using GIS data for the selection of a transmission asset will (1) not clip the reference data to the defined study area and (2) include an additional quality assurance/quality control review. See the Appendix for management's complete response.

Auditor's Response – We concur with TVA management's planned and completed actions.

September 20, 2019

David P. Wheeler
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WT 2C-K

RESPONSE TO DRAFT EVALUATION 2019-15641 – SYSTEM OPERATIONS
CENTER SITE SELECTION

Thank you for the opportunity to respond to Request for Comments – Draft Evaluation 2019-15641 – System Operations Center (SOC) Site Selection. This document provided two recommendations: (1) Consider the identified issues in the site-selection process and determine if additional analysis is needed to verify the best site was selected and (2) Determine if lessons learned could be applied to improve siting processes. This letter will address each of these recommendations.

In general, Transmission Power Supply & Support (TPSS) uses a set of evaluation criteria that represent opportunities and constraints for development of transmission asset locations. The criteria include engineering, social and environmental categories, which are balanced to allow selection of the least overall impact. Analysis is project-specific and performed utilizing best engineering practices. The site selection for the SOC was somewhat unique in that it involved very specific operational and regulatory requirements associated with the control center which supported utilizing a larger project team than typically utilized in the siting process. The project team established defined criteria and analysis constraints to guide the selection process that included a large study area of 2,647 square miles. The intent of this process was to locate a site that met the operations and regulatory requirements as well as consider criteria and constraints developed by the project team.

The preferred alternative site selected by TPSS met established criteria and regulatory requirements. Executive leadership as a result of the Draft Evaluation requested and reviewed topographical maps of over 40 sites along with the notes from the previous review to see if other sites would offer significant improvements over the site selected and determined that the site selected with its location on Highway 58 would still be the desirable location. The report also pointed out that TVA did not do detailed cost evaluations between the top sites. The selection criteria considered factors such as the proximity of TVA's transmission and fiber network, water supply, sewer location, topography of the site and environmental factors all of which are cost drivers. Site 41 was selected as the preferred site due to acreage, accessibility, availability of land, constructability, and lower potential for environmental impacts compared to most of the other sites. Significant onsite engineering studies and field review were known to be required to assess the feasibility of any of the above sites. As a result of this, TVA secured an option to purchase that allowed TVA to proceed with the onsite evaluations and initiate studies specific to the site under evaluation. It was neither cost-effective nor

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practical from a schedule standpoint to apply the same level of field analysis and onsite engineering evaluations simultaneously to all five additional locations. As such Site 41 was secured for more detailed analysis with the understanding that it could be excluded and another site pursued should onsite analysis and field study provided unfavorable results.

TVA acknowledges some inconsistencies in the consideration of the final six alternative sites, but finds that additional analysis is not needed. There was management concurrence of the preferred alternative site selection and as the Evaluation notes, the site selected met established criteria and regulatory requirements. TPSS is confident in its preferred alternative site selection. This project and preferred alternative site is subject to final design, National Historic Preservation Act (NHPA) specified consultation, and completion of the National Environmental Policy Act (NEPA) review.

In regards to findings in the report, TVA will implement actions for future selection processes that utilize similar evaluation tools. These actions are provided below:

1. Siting processes could be improved through an additional level of quality assurance and quality control in the analysis of data sets and selection of preferred location by adding a peer review prior to final selection. Transmission Siting will revise the existing Transmission Siting Process TRANS-ENG-SDP-09.460 to specify a JPT meeting added after the analysis of the alternatives and before the final route/site selection. This action will be completed by January 31, 2020.
2. Future Geographical Information System (GIS) analysis and data used for the selection of a transmission asset will not clip the reference data to the defined study area. This specification has been applied by adding a specific instruction in the TVA GIS Lessons Learned document under the geoprocessing tools used to perform spatial analysis operations on geographic data in a constraint model. The GIS team management confirms that this action has been completed.
3. Future analysis using GIS data for the selection of a transmission asset, will include an additional QA/QC review of the data. This specification has been implemented by adding an internal review to the TVA GIS Lessons Learned documents under Peer Review of Spatial Analysis Operations and Results. The GIS team management confirms that this action has been completed.

David P. Wheeler
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Thank you for the opportunity to review and respond to the evaluation. Please contact me at 423-751-7485 if you have any questions.



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Senior Vice President
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