

**BOARD OF SUPERVISORS  
TRANSPORTATION AND LAND USE COMMITTEE  
ACTION ITEM**

**SUBJECT:** Loudoun County Electrical Infrastructure Study

**ELECTION DISTRICT(S):** Countywide

**STAFF CONTACT(S):** Pat Giglio, Planning and Zoning  
Daniel Galindo, Planning and Zoning

**PURPOSE:** To present the findings and recommendations as presented in the Loudoun County Power Transmission Support-Due Diligence Report to the Transportation and Land Use Committee (TLUC) for discussion. This item will provide an overview of the current electrical infrastructure within Loudoun County (County), including a discussion of existing and planned high voltage transmission corridors (230 kilovolts (kV) and 500 kV), an analysis of existing and potential electrical load growth within the County and the region, and detailed mapping of the existing high voltage transmission and electric infrastructure. This item seeks guidance on a potential Comprehensive Plan Amendment (CPAM) to the *Loudoun County 2019 General Plan* (2019 GP) to consider the adoption of a map identifying all existing high voltage transmission corridors within the County and possible adoption of policies related to electric infrastructure and siting of high voltage transmission corridors.

**RECOMMENDATION(S):**

**Staff:** Staff recommends that TLUC forward the item to the Board of Supervisors (Board) with a recommendation to initiate a CPAM to amend the 2019 GP and direct staff to develop a draft Project Plan.

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**BACKGROUND:** High voltage electrical transmission lines are crucial to the delivery of large volumes of bulk electric power from generating facilities over long distances to local electrical substations where the electric power is reduced to a lower voltage before being conveyed through a network of distribution lines to end-users within the community. In Virginia, the placement of high voltage transmission lines are regulated by the Commonwealth and are defined as any electric line with the capacity equal to or greater than 138 kV. High voltage transmission lines are generally constructed overhead on lattice, H-frame, or monopole towers which range in height from 125 feet to 180 feet and require a cleared right-of-way that is typically the approximate height of the towers. High voltage transmission lines may also be buried and placed underground in some instances, though construction costs are higher, and the engineering, operation, and repair of the lines are more complex. As such, underground lines represent only a small percentage of the number of high voltage transmission lines within Virginia. Approximately 37 miles of 500 kV transmission

lines and 125 miles of 230 kV transmission lines have been constructed overhead, and two miles of 230 kV transmission lines have been constructed underground in the County. The backbone of the transmission system is the 500 kV lines that run north to south through the middle of the County. There are two 500 kV circuits that enter the County from the south and one 500 kV circuit that enters from the north. The primary 230 kV transmission lines are located proximate to portions of the Washington and Old Dominion (W&OD) Trail, the Broad Run, Route 50, and through “Data Center Alley” adjoining Waxpool Road and Loudoun County Parkway (Attachment 1).

Data centers are among the highest consumers of electricity within the County. Data center computing capacity and electric usage is expected to continue to increase exponentially in coming years as the industry expands with additional cloud computing, 5G technology, and new Artificial Intelligence (AI) technology. In recent years, electric providers within the County have completed upgrades to existing high voltage transmission corridors and have received or are seeking State approvals for other routes in eastern Loudoun to deliver electricity to concentrations of data centers where existing and future load growth are forecasted. It is anticipated that additional or upgraded existing high voltage transmission corridors and electrical substations will be required in some portions of the County to meet current and forecasted electric demand and to ensure that reliability standards for the electric grid are maintained within certain limits if one or more components of the transmission system were to fail.

The Loudoun County Power Transmission Support-Due Diligence Report prepared by Kimley-Horn provides an overview of the existing and proposed high voltage electric grid and infrastructure within the County and assesses how currently planned transmission projects will adequately meet electrical demand associated with development and the future growth of the data center industry within the County (Attachment 2). The report includes load growth projections from the Regional Transmission Organization Pennsylvania-New Jersey-Maryland Interconnection (PJM), which coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia that was developed and provided in a Regional Transmission Expansion Plan (RTEP) in 2022. The 2022 RTEP identified significant transmission system upgrades needed throughout the region and within the County to meet the system needs through 2028. Specifically, the 2022 RTEP projected that through 2028, there is expected to be an approximate growth of 5,700 megawatts (MW) of power to serve data centers and other uses in the Dominion Energy (Dominion) territory, which includes the County. As part of the report Kimley-Horn conducted independent research focused specifically on forecasted electric load growth for data centers which are not yet constructed but have active site plan or active legislative applications for data center uses to anticipate future electrical demand within the County.

The Kimley-Horn report identified 148 parcels in the County with active data center applications. 72 of the 148 parcels had active site plan applications which identified 84 proposed data center buildings. The remaining 76 parcels without site plans were estimated to potentially develop with approximately 33 additional data center buildings assuming the same building footprint to parcel size ratio as the other applications with site plans. Assuming 70 MW of electricity are needed per data center building based on the average disclosed size within the applications reviewed by Kimley-Horn, the future load for the 117 potential data center buildings was forecasted to be

approximately 8,190 MW. If constructed, these data centers would likely become operational at varying rates, pending construction schedules and the availability of electricity within the next four to seven years based on current industry trends within the County.

Based on the Kimley-Horn report, the projected electric load growth of 8,190 MW for data centers in the County exceeds the 5,700 MW forecasted by PJM for 2027-2028 in the RTEP for the Dominion territory which includes the County. PJM's long-term forecasts that were completed in 2022 likely did not fully anticipate the sharp increase in the demand for electricity associated with AI and cloud computing to serve existing and future unconstructed data centers in Northern Virginia. The Kimley-Horn forecast more closely aligns with projections by Dominion which forecast electric load growth of 8,346 MW by 2028 in the County.

The Kimley-Horn report anticipates that additional electrical infrastructure will be required for the transmission of electricity to the Dominion territory and County to meet load growth in the region beyond 2028. The report concludes with recommendations for the County to consider proactively planning for future high-voltage transmission corridors and electric infrastructure, recognizing that future forecasted electrical load growths in the County will continue to increase in coming years. The report recommends the County consider the initiation of a CPAM to the 2019 GP to develop policy language supporting the collocation of proposed transmission lines, consideration of underground transmission corridors, reconductoring existing transmission lines for additional capacity, and other innovative approaches for electric transmission to address forecasted and anticipated future demand within the County.

**ISSUES:** Staff offers the following for TLUCs consideration and discussion:

**2019 GP Policy:** The energy policies of the 2019 GP (Attachment 3) support the construction of necessary electrical infrastructure within the County to ensure the structural integrity and reliability of the electrical transmission system to support existing and future business and residential uses.<sup>1</sup> Specifically, the energy policies call for the County to work with electrical providers to identify potential high voltage transmission lines and substation locations that minimize impacts on key travel corridors, sensitive cultural and historic resources, and existing residential communities or to place high voltage transmission lines underground when approaching such areas; and where possible, use existing transmission corridors and substation sites to expand capacity.<sup>2</sup> The County's energy policies call for additional consideration of the appearance of electrical transmission lines and substations to ensure they are adequately screened and that they are sited to reduce the visual impact on the surrounding community and uses.<sup>3</sup> To help minimize community impacts, the County encourages the grouping and burying of electrical lines and substations to the extent possible.<sup>4</sup> The process of collocating new transmission lines and electrical infrastructure within existing overhead high-voltage transmission corridors minimizes

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<sup>1</sup> 2019 GP, Chapter 6, Energy and Communication, text (Attachment 3)

<sup>2</sup> 2019 GP, Chapter 6, Electrical, Action 6.1.C. (Attachment 3)

<sup>3</sup> 2019 GP, Chapter 6, Energy and Communication, text(Attachment 3)

<sup>4</sup> 2019 GP, Chapter 6, Electrical, Action 6.1.B. (Attachment 3)

environmental impacts and the overall visual impact on the surrounding community by grouping these tall structures within an existing and/or expanded transmission corridor right-of-way.

In Virginia, the State Corporation Commission (SCC) regulates the location and construction of high voltage transmission lines (equal to or greater than 138 kV) through the issuance of a Certificate of Public Convenience and Necessity.<sup>5</sup> When reviewing and approving applications for high voltage transmission corridors, the SCC considers several criteria which include the need for the transmission line and the impact on the reliability of electric service, impacts on the environment, including scenic assets, historic and cultural resources, impact on economic development, and local comprehensive plans when requested by an affected locality. Specifically, the SCC review criteria states that “If the local comprehensive plan of an affected county or municipality designates corridors or routes for electric transmission lines and the line is proposed to be constructed outside such corridors or routes, in any hearing the county or municipality may provide adequate evidence that the existing planned corridors or routes designated in the plan can adequately serve the needs of the company.”<sup>6</sup>

The County’s electrical policies in the 2019 GP, which provide guidance on the location of high voltage transmission lines and substations, could be further enhanced through the initiation of a CPAM to adopt a map identifying all existing high voltage transmission corridors within the County as a feature shown in the 2019 GP. The identification and adoption of an electric infrastructure map will direct electrical providers to locations where the County would anticipate and support the collocation and development of new high voltage transmission corridors and substations. The adoption of an electric infrastructure map would also assist electrical providers in the permitting, siting, and regulatory process required for approvals for new high voltage transmission corridors by demonstrating conformance with the County’s policies.

In addition to considering the adoption of a county-wide electrical infrastructure map, the electrical policies in the 2019 GP can be amended and developed to:

- Encourage the collocation of new transmission corridors and electric infrastructure within existing transmission corridors to minimize community and environmental impacts;
- Support the undergrounding of high voltage electric transmission lines where practical to minimize visual impacts on rural landscapes, heritage resources, major travel corridors, mixed-use developments, and residential communities;
- Incorporate design techniques and natural vegetative screens to minimize the visual impact of overhead high voltage transmission corridors and electrical infrastructure, and
- Support the development of passive trails and the incorporation of native plant species within high-voltage transmission corridors.

The expansion and development of the County’s electrical infrastructure to address future load growth and ensure the reliability of the network requires deliberate planning and collaboration

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<sup>5</sup> [SCC Virginia Transmission-Line Projects](#)

<sup>6</sup> [Code of Virginia- 56-46.1. A. & B.](#)

between both the County and electrical providers. The existing electric policies in the 2019 GP provide basic guidance, however, there is an opportunity to better align these policies with community objectives to minimize adverse effects on environmental, historic, and natural resources as well as existing and proposed land uses, particularly for residential communities. A future CPAM to adopt a map identifying all existing high voltage transmission corridors within the County as a feature shown in the 2019 GP as well as additional policy amendments to address location, design, and aesthetics for high voltage transmission corridors and electric infrastructure will assist in planning and managing where and how high voltage transmission corridors will be constructed within the County. The map and policy amendments will provide additional guidance for electrical providers, County staff, elected officials, and other governmental decision-makers when planning and considering improvements to the County's electrical network.

**FISCAL IMPACT:** There is no fiscal impact associated with the Due Diligence report portion of this item. Regarding the proposed CPAM component, the County is currently negotiating a scope of service and fee proposal to support staff with electrical infrastructure mapping, text, and policy amendment to the 2019 GP . The fee is undefined at this time, but is anticipated to be within a range of \$150,000 to \$200,000. Staff will be able to refine the fee proposal value following feedback from the TLUC at this meeting. Assuming the TLUC will endorse this request and forward a recommendation to the Board to proceed with the CPAM, staff will present the consultant scope of work and fee proposal as an attachment to the Board item on this topic seeking Board approval.

**ALTERNATIVES:**

1. TLUC may recommend that the Board initiate a CPAM for electrical infrastructure to amend the 2019 GP and direct staff to develop a Project Plan.
2. TLUC may not recommend that the Board initiate a CPAM for electrical infrastructure to amend the 2019 GP or direct staff to develop a Project Plan and direct staff on how to proceed.

**DRAFT MOTIONS:**

1. I move that the Transportation and Land Use Committee recommend that the Board of Supervisors initiate a Comprehensive Plan Amendment for Electrical Infrastructure to adopt mapping, text, and policy amendments to the *Loudoun County 2019 General Plan* for high voltage transmission corridors as generally described in the October 17, 2024 Transportation Land Use Item and direct staff to develop a Project Plan.

OR

2. I move an alternate motion.

**ATTACHMENT(S):**

1. Map of existing high voltage transmission corridors in the County.
2. Loudoun County Power Transmission Support-Due Diligence Report prepared by Kimley-Horn, September 2024
3. Excerpts from *Loudoun County 2019 General Plan*, Chapter 6, Electrical