

August 9, 2022

VIA ELECTRONIC DELIVERY

Alex Vanegas, Principal Planner
Prince William County Planning Office
5 County Complex Ct., Ste. 210
Prince William, VA 22192
avanegas@pwcgov.org

Re: PW Digital Gateway CPA #2021-0004

Mr. Vanegas,

This letter shall serve to forward information which we think is relevant to some of the questions raised by Planning Commissioners at their Work Session, held on July 20, 2022. If you agree, use it as you see fit in your drafting of the Plan and please forward it to the Planning Commission at the appropriate time.

It needs to be clarified to the Planning Commission that if the PW Digital Gateway Draft Plan is approved, the area adjacent to Pageland Lane, Lee Highway and Sudley Road – the area in Prince William surrounding the Manassas Battlefield – will be planned for approximately 1,760 acres of Data Center Targeted Industry use and approximately 5,910 acres of public parkland and state forest (including the entirety of the existing Manassas National Battlefield Park, Catharpin Park and the Conway Robinson State Forest). The Draft Plan (excluding its new proposed north-south wildlife corridor) provides a vehicle to add approximately 370 acres of new parkland to the 5,540 acres of existing parkland, as shown on the attached chart.

The Draft Plan (excluding its new north-south wildlife corridor) envisions approximately 800 acres of permanent open space (parks, buffers, private protected Environmental Resource areas & Pageland streetscape areas) and 1,330 acres of Data Center sites. Buildout of the Data Centers is projected to be in 2040.

The attached information is organized into four subjects:

1. Electric infrastructure
2. Viewshed protection and buffers
3. Civil War mass grave and Pageland II (previously provided to you on 8/8/2022)
4. Noise

The attached information is best summarized by the following *takeaways*:

Electric Infrastructure. The *takeaway* we have heard recently from NOVEC and read in industry media confirms one of the many reasons why PWDG is an optimal location for Data Centers. PWDG Data Centers will be powered by new substations that connect directly (less than 1 mile) into the Dominion “Regional Backbone” High Voltage Power Transmission line corridor. They will not rely upon or overburden NOVEC’s wider network of substations and distribution lines, as is apparently happening in Ashburn.

We understand there are two primary questions. The first is what effect, if any, does Dominion Energy’s need to upgrade its transmission infrastructure in Ashburn have on the ability of the “Regional Backbone” Transmission Corridor to serve data centers in the PWDG. The second question is what new electric infrastructure may be needed to support data center developments in the PWDG.

The first question has now been answered:

“Dominion Energy’s warning last week that it may not be able to support future Loudoun County data centers owes to a lack of power lines in the county, not the availability of power itself....Digital Realty Trust Inc.....CFO Andy Power described the limiting factor as “the power line infrastructure, not the actual power,” saying new projects could be delayed through 2026 until new [Loudoun] infrastructure is brought online. In other words, the power is there, it just needs to be brought to users in the affected part of the county. This has been confirmed by Dominion and PJM Interconnection LLC, a federally empowered operator of the impacted area’s grid.” (Washington Business Journal, *Dominion Energy says more power lines needed to support Loudoun data centers*, August 1, 2022)

The second question deals with the additional infrastructure that may be needed to support the PWDG. Industry observers have noted that the location of the PWDG adjacent to the existing transmission lines makes it ideal for data center campus development and minimizes the need to construct or upgrade long-distance transmission lines and conductors dedicated to serve a single or limited number of data centers at far-flung locations.

“Pageland Lane Technology Corridor is the best area for data center development for the following reasons:

1. Dominion’s transmission easement for 500, 320 and 115kV power abuts and bisects the properties....meaning that transmission level power required by data center development would be added with NO NEW OVERHEAD POWER LINES in the county. New NOVEC substations required to power Phase 1 would be built on the property and distribution would be constructed underground on the property.” (Data Energy Consulting, *Pageland Lane Technology Corridor*, 2020)

“The transmission lines that run along Pageland Lane are the backbone of Dominion’s transmission grid, comprising both 500kV and 230kV conductors. As such, they are continually being upgraded and maintained to have adequate ability

to supply the Northern Virginia region with power.” (Data Energy Consulting, *Pageland Lane Technology Corridor*, 2020)

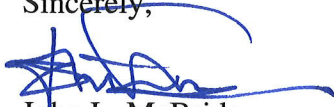
“Data centers require the highest levels of electrical reliability for their mission. As such, the electrical service of choice is transmission level service, which in northern Virginia is served by Dominion Energy Virginia’s (Dominion) 230kV transmission lines and either Dominion or NOVEC substations. Electrical utilities measure electric system reliability with a metric called System Average Interruption Duration Index (SAIDI). This metric is a computation of the average minutes without service per year, so a low number is indicative of reliable performance. The index for Dominion’s bulk transmission system is around ten minutes outage per year, while the three-year rolling average index for Dominion’s distribution system for 2016-2018 was 134 minutes per year. This metric alone tells the story of the 10x level of reliability that a customer can expect when taking power directly from a substation versus routed through a distribution system. Of course, these are only averages, and individual experience varies, but typically transmission is much more reliable than distribution....Since the substation would be driven by the load requested by a data center customer on the property, the power would be distributed underground from the substation to the data center buildings.” (Data Energy Consulting, *Pageland Lane Technology Corridor*, 2020)

Viewshed Protection and Buffers. The *takeaway* is that 2 floor Data Center buildings (including parapets and rooftop mechanical equipment) that are located within the Digital Gateway South rezoning area and west of the Dominion high voltage “Regional Backbone” corridor, cannot be seen from Heritage Hunt or the Manassas National Battlefield Park, if they are limited to no more than seventy (70) feet in height. This is due to the dense tree canopy and ridgeline, which will be preserved as natural area parkland. Heritage Hunt will abut 55 acres of mature forest within the PWDG, which is preserved and donated to the County as public Open Space.

Civil War Mass Grave and Pageland II. The Mass Grave *takeaway* is that the only evidence of possible burials are two small soil anomalies – both of which are located within planned open space, which will not be disturbed. The Pageland II *takeaway* is that the original farmhouse has been enlarged (to triple its original size), altered and modernized to such a great extent that it is ineligible for listing on the National Register of Historic Places.

Noise. The two Data Center providers that have 3/4 of the land within PWDG under contract, QTS Data Centers (QTS Realty Trust) and Compass (H&H Capital Acquisitions, LLC), state that their facilities (including HVAC equipment) will be designed and built in a manner which meets the perimeter noise levels contained in the Noise Ordinance. The exterior noise levels at QTS facilities can be confirmed by a walkaround at their facility next to George Mason University at Innovation or at their facility in Ashburn, which was the subject of tours this year by County officials, residents and staff. A tour was offered to Heritage Hunt residents, but they refused to go. Compass has developed data centers in multiple states and internationally, and it has never (to its recollection) received a complaint about noise at one of its facilities.

Thank you for your careful review and consideration of this new information. Do not hesitate to contact me with any questions or requests.

Sincerely,

John L. McBride

Attachments

cc: Meika Daus
Rebecca Horner
David McGettigan
Nick Blessing, QTS Data Centers
Paul Bradford, QTS Data Centers
Chris Curtis, Compass Data Centers
Mary Ann Ghadban
Antonio J. Calabrese, DLA Piper
Jonelle Cameron, Walsh, Colucci, Lubeley & Walsh
Mark Looney, Cooley, LLP

PW Digital Gateway Parkland Acreage Totals

Existing Parks and State Forest	Acres (estimated)
Catharpin Park	100
Conway Robinson State Forest	440
Manassas National Battlefield Park	5000
	5,540 TOTAL
New Parkland	Acres (estimated)
Northeast Natural Area Park	120
Catharpin Greenway Extension	140
Southern Park (Freedom Park)	90 (some of this may be an expansion of the State Forest)
MNBP Addition	10
Thornton School and Honeywood Plantation archaeological sites	10
	370 TOTAL

PW Digital Gateway CPA #2021-0004

Enclosure 1: Electric Infrastructure

Dominion Energy says more power lines needed to support Loudoun data centers



New data centers in Loudoun County, where much of "the cloud" physically resides, require additional electricity transmission infrastructure.

IMAGINIMA



By [Dan Brendel](#) – Staff Reporter, Washington Business Journal
Aug 1, 2022 **Updated** Aug 3, 2022, 5:11pm EDT

Dominion Energy's warning last week that it may [not be able to support future Loudoun County data centers](#) owes to a lack of power lines in the county, not the availability of power itself.

The electricity-guzzling data center sector, a goliath in Loudoun's economy, and county leaders were blindsided by Dominion's warning, which could put dozens of new data center developments north of Dulles International Airport and tens of millions of dollars

of investment at risk. Dominion (NYSE: D) said the problem had to do “transmission constraints,” but provided few details. But on its earnings call last week, Digital Realty Trust Inc. (NYSE: DLR), a global data center titan with a Loudoun footprint, shed a bit more light on the issue, perhaps providing some modicum of comfort to those trying to build data centers.

Digital’s CFO [Andy Power](#) described the limiting factor as “the power line infrastructure, not the actual power,” saying new projects could be delayed through 2026 until new infrastructure is brought online. In other words, the power is there, it just needs to be brought to users in the affected part of the county. This has been confirmed by Dominion and PJM Interconnection LLC, a federally empowered operator of the impacted area's grid.

If this "comes to fruition, as we've recently learned, it will obviously likely be a slowdown in delivery of new supply in what is our largest and the largest and most consistently in-demand data center market in the world," Power said on the call.

While that's little consolation if a project dies in the interim, overall it's probably better than if Dominion had said it didn't have enough power at all. It’s likely less time-consuming to improve or expand power lines than it is to build an entirely new generating station — even if it’s no political cakewalk to build unsightly towers and lines that homeowners won’t broadly support.

Data center owners themselves may be able to help solve the transmission problem, such as by allowing easements on their land, whereas they could do comparatively little to help build an entirely new power plant, sources told the Washington Business Journal. Power said as much on the call, that Digital Realty is a "very important player in that market to help the power company address this problem given our strategically important land parcels and easements."

It’s worth noting the data center industry isn’t monolithic, so Dominion's pinch is much worse news for the market's newcomers than those already with a foot in the door. Power speculated that Digital Realty, which owns facilities that it rents out to data center tenants, could experience “favorable” pricing power. Generally speaking, keeping out competitors benefits incumbents by preventing downward pressure on the prices incumbents are able to charge.

Some industry players have said the news about Dominion’s transmission capacity shortfall came out of the blue. In reality, it doesn't owe to any particular communication or planning breakdown, but merely to the lag between Loudoun's rapid data center growth and PJM's cycle of modeling infrastructure requirements, [Sami Abdulsalam](#), a senior PJM transmission planner, said in an interview late Monday.

While slated transmission infrastructure upgrades were based on an earlier model of electricity demand and deemed sufficient at the time, a more up-to-date analysis indicates those upgrades would no longer be able to meet ballooning demand.

New data centers report their demand forecasts to Dominion, which reports them to PJM, which then does its modeling before any necessary changes are undertaken. That process takes time, so forecasts don't immediately incorporate new data about rising demand, Abdulsalam said. In order for the present transmission needs to have been known earlier, PJM would need to receive information about future load demands further in advance, he added.

Additional information may become available with Dominion's second-quarter earnings call Aug. 8.



PO Box 2710 • Manassas, VA 20108-0875 • (703) 335-0500

August 4, 2022

Chris Curtis
SVP Development & Acquisitions
Compass Datacenters
14555 N. Dallas Parkway
Suite 125
Dallas, TX 75254

Dear Mr. Curtis:

Northern Virginia Electric Cooperative (“NOVEC”) is pleased to provide you with this response based on your inquiry for a new multiphase datacenter project in our service territory to be located near the Pageland Lane corridor in Prince William County, Virginia. The project will consist of multiple buildings requiring approximately 1,000 MVA of electric service capacity. Please note that all information related to your request is kept in strictest confidence.

The following should be conveyed to your clients who may not be familiar with NOVEC. NOVEC is one of the top fifteen electric distribution cooperatives in the country. At the present, we serve over 175,000 customers throughout Northern Virginia, which include more than 28 separate data center facilities. NOVEC has an extremely reliable electric system consisting of a 115 kV sub-transmission grid that supports the underlying distribution network, which operates at either 12.5 kV or 35 kV at the primary voltage depending on the customer’s capacity requirements. Secondary voltages are available for smaller loads at 208V/120V and 480V/277V. NOVEC has constructed its system with 64 substations linked by distribution ties. This provides increased switching capability furthering overall system reliability and integrity.

In terms of energy supply costs, NOVEC can assure your clients that they will be served under the most applicable attractive tariff on file with the Virginia State Corporation Commission. For loads greater than 5 MWs we offer market-based rates that are competitive with the bulk wholesale power supply market and commensurate with your desired power supply risk profile.

NOVEC will provide the electric service required by you and your clients to this site in Prince William County in a phased approach. We will serve the loads from new substations, designed based on your actual clients load requirements, site plans, and available capacity on the NOVEC system at the time of actual project initiation. Please note that any physical transmission capacity constraints that Dominion may have on its system may also affect the project. NOVEC will require your clients to complete our Data Center Client Request form and provide the required information, detailed load ramp, redundancy requirements, site plan, and actual in-service date before an Electric

Page 1 of 2

Business Center
10323 Lomond Drive
Manassas, VA 20109-3113

Corporate Center
10432 Balls Ford Road, Suite 220
Manassas, VA 20109-2516

Technical Center
5399 Wellington Branch Drive
Gainesville, VA 20155-4004

Northern Virginia Electric Cooperative is an equal opportunity provider and employer.

Service Agreement can be made available. The timeline for NOVEC's electric service delivery will be contained in the Electric Service Agreement. Providing a commitment of electric service delivery to the projects is dependent on your clients providing the requisite information described above along with a thorough understanding of the land permitting and regulatory approvals that will be required based upon the specific information associated with your clients' projects. Grid electric power capacity cannot be reserved and is made available on a first-come-first serve-basis.

Based on the scale of this project and the multiple phases, NOVEC would recommend that Compass Datacenters enter into an Engineering Agreement to plan the infrastructure to service this campus. There would be multiple Electric Service Agreements required with NOVEC. They would be identified as part of the scope of the Engineering Agreement.

In addition to meeting your clients' electrical service requirements, NOVEC is also pleased to offer your clients the opportunity to consider access to our Northern Virginia metro-fiber ring and its interconnection to carrier hotels (e.g., Equinix & NTT) in Ashburn, VA over our existing 300+ miles of dark fiber, new fiber construction builds, or through our 100 Gbps Metro-Ethernet lit fiber network.

In closing, we look forward to working with you and your clients on the site. NOVEC's electric distribution system is designed to support the datacenter critical electrical requirements and is proven by our experience designing, building, and turning-up over 28 datacenters to date. As you progress further with the development of this site, please contact me at (703) 392-1604 or rbarr@novec.com.

Respectfully,



M. Renee Barr
Project Manager, Large Accounts

cc. Gil Jaramillo, NOVEC
Mike Dailey, NOVEC
Kevin Whyte, NOVEC
Heather Anderson, NOVEC



PO Box 2710 • Manassas, VA 20108-0875 • (703) 335-0500

August 3, 2022

Travis Wright
Vice President – Energy and Sustainability
QTS Data Centers
12851 Foster Street
Overland Park, KS 66213

Dear Mr. Wright:

Northern Virginia Electric Cooperative (“NOVEC”) is pleased to provide you with this response based on your inquiry for a new multiphase datacenter project in our service territory to be located near the Pageland Lane corridor in Prince William County, Virginia. The project will consist of multiple buildings requiring approximately 1,000 MVA of electric service capacity. Please note that all information related to your request is kept in strictest confidence.

The following should be conveyed to your clients who may not be familiar with NOVEC. NOVEC is one of the top fifteen electric distribution cooperatives in the country. At the present, we serve over 175,000 customers throughout Northern Virginia, which include more than 28 separate data center facilities. NOVEC has an extremely reliable electric system consisting of a 115 kV sub-transmission grid that supports the underlying distribution network, which operates at either 12.5 kV or 35 kV at the primary voltage depending on the customer’s capacity requirements. Secondary voltages are available for smaller loads at 208V/120V and 480V/277V. NOVEC has constructed its system with 64 substations linked by distribution ties. This provides increased switching capability furthering overall system reliability and integrity.

In terms of energy supply costs, NOVEC can assure your clients that they will be served under the most applicable attractive tariff on file with the Virginia State Corporation Commission. For loads greater than 5 MWs we offer market-based rates that are competitive with the bulk wholesale power supply market and commensurate with your desired power supply risk profile.

NOVEC will provide the electric service required by you and your clients to this site in Prince William County in a phased approach. We will serve the loads from new substations, designed based on your actual clients load requirements, site plans, and available capacity on the NOVEC system at the time of actual project initiation. Please note that any physical transmission capacity constraints that Dominion may have on its system may also affect the project. NOVEC will require your clients to complete our Data Center Client Request form and provide the required information, detailed load ramp, redundancy requirements, site plan, and actual in-service date before an Electric Service Agreement can be made available. The timeline for NOVEC’s electric service

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Business Center
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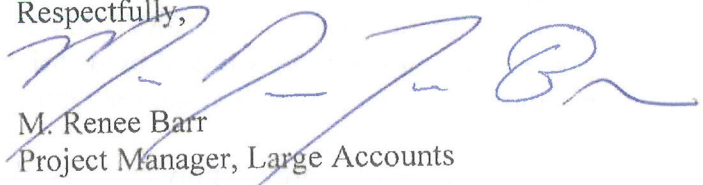
delivery will be contained in the Electric Service Agreement. Providing a commitment of electric service delivery to the projects is dependent on your clients providing the requisite information described above along with a thorough understanding of the land permitting and regulatory approvals that will be required based upon the specific information associated with your clients' projects. Grid electric power capacity cannot be reserved and is made available on a first-come-first serve-basis.

Based on the scale of this project and the multiple phases, NOVEC would recommend that QTS Data Centers enter into an Engineering Agreement to plan the infrastructure to service this campus. There would be multiple Electric Service Agreements required with NOVEC. They would be identified as part of the scope of the Engineering Agreement.

In addition to meeting your clients' electrical service requirements, NOVEC is also pleased to offer your clients the opportunity to consider access to our Northern Virginia metro-fiber ring and its interconnection to carrier hotels (e.g., Equinix & NTT) in Ashburn, VA over our existing 300+ miles of dark fiber, new fiber construction builds, or through our 100 Gbps Metro-Ethernet lit fiber network.

In closing, we look forward to working with you and your clients on the site. NOVEC's electric distribution system is designed to support the datacenter critical electrical requirements and is proven by our experience designing, building, and turning-up over 28 datacenters to date. As you progress further with the development of this site, please contact me at (703) 392-1604 or rbarr@novec.com.

Respectfully,

A handwritten signature in blue ink, appearing to read 'M. Renee Barr', is written over the typed name and title.

M. Renee Barr
Project Manager, Large Accounts

cc. Gil Jaramillo, NOVEC
Mike Dailey, NOVEC
Kevin Whyte, NOVEC
Heather Anderson, NOVEC

Pageland Lane Technology Corridor

Prince William County, Virginia

Data Center Viability Report

Prepared for:

Mary Ann Ghadban

Magland Broker

Coleman Rector

Weber Rector Commercial Real Estate Services, Inc.

Prepared by:

Phillip M Sandino

Owner, Data Energy Consulting

Version/Date:

Draft Version 4.0

July 6, 2020

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Executive Summary: Pageland Lane Technology Corridor

Speed to Market with the Least Utility Infrastructure

Prince William County has benefitted from proximity to Loudoun County's Data Center Alley in that spillover of demand has provided opportunities for development of data centers. But Loudoun County' data centers - and tax base - have grown larger at an increasing rate because of their development of land with obvious physical and geographical attributes are consistent with prime data center development.

The Pageland Lane Technology Corridor shares the characteristics of the most desirable land in Loudoun County, and must be considered for development to increase the competitiveness of Prince William County with other competing jurisdictions and to take advantage of the current demand for data center development, which is not guaranteed to last or to stay focused on counties that do not provide real competitive advantages for developers.

Phase 1 of Pageland Lane Technology Corridor is the best area for data center development for the following reasons:

1. Dominion's transmission easement for 500, 320 and 115kV power abuts and bisects the properties in Phase 1, meaning that transmission level power required by data center development would be added with NO NEW OVERHEAD POWER LINES in the county. New NOVEC substations required to power Phase 1 would be built on the property and distribution would be constructed underground on the property.
2. There are 20 network connectivity options for the Pageland Lane Technology Corridor including metro network carriers, long-haul carriers and dark fiber providers. These carriers give developers access to the major Internet Exchange Point and Interconnection in Ashburn and to the International Subsea cables in Virginia Beach.
3. With Phase 1 being 430 acres, the Pageland Lane Technology Corridor would rival the largest land deals in Loudoun County and give Prince William County the fastest path to tax revenue of any land in the county.
4. At 0.5 FAR and estimated 75 percent usable land, Phase 1 could potentially yield 7 million square feet of building development, exceeding the current size of Prince William County's data center market.
5. Phase 1 would be a digital and physical gateway between Prince William County and Loudoun County, providing ultra low latency connection between the heart of Data Center Alley, Equinix, and Innovation Park.
6. Development of this land for data centers would upgrade sewer and roads, provide hundreds of construction jobs for several years and increase permanent technology and skilled labor jobs for the duration of the projects. These workers would support local businesses and educational institutions.

In order to increase the competitiveness of Prince William County's data center market, which is being threatened by neighboring jurisdictions in Virginia and Maryland, county leaders should consider the technological and geographic benefits of the Pageland Lane Technology Corridor and add this land to the comprehensive plan

History of Data Center Development in Northern Virginia

Northern Virginia has been the largest and fastest growing market over that timeframe, a significant amount of that money has been invested here. [Cushman and Wakefield's 2020 Data Center Global Market Comparison](#) stated that over the last decade \$100 billion dollars has been invested globally in data center development. In 2010, just a few of the established data centers - Equinix, DuPont Fabros and Digital Realty – were large companies using significant amounts of energy to power their clients. In fact, a report by Environmental Systems Design, Inc, *2011 Data Center Technical Market Report*. February 2011 barely mentions Northern Virginia, stating “Reston, VA has excess supply and new construction will be minimal for a few years.”

One of the key catalysts for Northern Virginia to become the leading data center market globally has been its network connectivity. In 1992, the formation of Metropolitan Area Exchange (MAE-East) in Tysons Corner was the first commercial exchange that facilitated networks such as UUNET, PSINet and Sprint. By 1997, more than half of the world's Internet traffic was passing through MAE-East. It was eventually moved from [Tysons Corner to Ashburn](#). Formation of Equinix in 1998 was the other catalyst that further expanded the commercial exchange of Internet traffic in Ashburn. By 2000, more than 70% of the world's Internet traffic was passing through Loudoun County in Northern Virginia. Over the last two decades (2000-2020), the data center explosion in Northern Virginia has been second to none in the world and this growth has not been restricted to Loudoun County, but expanded to Prince William County, Fairfax County, Chesterfield County, Henrico County and more recently to Virginia Beach (due to the landing of trans-Oceanic subsea cables).

In 2018, DuPont Fabros and Digital Realty merged (via the acquisition of DuPont Fabros by Digital Realty) and other data center providers—both ‘third-party’ data center companies and enterprise/Cloud data center companies including Amazon, CyrusOne, Cloud HQ , QTS, Iron Mountain, Sabey Data Centers, Aligned Energy and NTT Data Centers (formerly RagingWire) - have grown to be significant land owners, energy users and tax payers. The change has transformed Northern Virginia into the headquarters of the cloud. It has transformed Loudoun and Prince William Counties into global destinations for data centers and cloud companies seeking low latency access to the Northeastern US.

The addition of Power Loft was the start of data centers for Prince William County. By the mid to late 2010's, Cloud HQ, Iron Mountain and Amazon were building large cloud campuses in PWC, drawn by the availability of land and transmission power lines.

According to [Upstack](#), data centers have been drawn to Northern Virginia because of "unmatched fiber infrastructure, reasonable energy costs, and great tax incentives", along with abundant skilled workforce and state and government tailwinds provided through a stable tax environment and fast-tracked permitting and project delivery.

The two things that have not stopped in Northern Virginia over the last two decades—1) data center construction 2) splicing and digging for laying more fiber optic cables.

The demand for data centers and networks is expected to increase as artificial intelligence, virtual reality/augmented reality, internet of things (IOT), connected cars and self-driving vehicles (autonomous cars) permeate all industries and drive computing demand. According to the NVTC's 2020 [The Impact of Data Centers on the State and Local Economies of Virginia](#), the "large capacity of Northern Virginia's data center market is matched by its growth. Twenty-two percent of the total data center capacity in Northern Virginia was added between the second half of 2018 and the first half of 2019".

Even market disruptors, like subsea cables landing in coastal Virginia and edge computing have benefitted Northern Virginia. While various 2nd tier markets for data centers have emerged, their growth has not matched the demand for new land and projects in Northern Virginia.

These new subsea cables represent economic development and growth opportunities across the entire commonwealth. With high-speed and low-latency capacity from Virginia directly to Europe, South America, Africa and Asia, these 'international runways' provide unique, low-latency and high-capacity fiber routes that span through the ocean beds. Data Centers in the Richmond area and in the Northern Virginia region (including Loudoun and Prince William) have been aggressively working with the subsea industry to have the subsea capacity distributed and accessed from their respective data centers. This makes the data centers 'magnets' for various other players in the connectivity landscape—including terrestrial metro fiber providers, long-haul carriers, Content Distribution Networks (CDNs), content providers, Internet Service Providers (ISPs) and Cloud Service Providers (CSPs). These various connectivity-centric companies each form a crucial part of an Interconnectivity Ecosystem.

Competitive Environment for Data Centers in NOVA

Threats to Data Center development in Prince William County

Northern Virginia has the lion's share of the commonwealth's co-location data centers, which are drawn to the proximity to other data centers and network hubs like Equinix (on Filigree Court, Ashburn). But other parts of Virginia have their own attractions for data centers. Anywhere in Dominion territory enjoys the same low power rates, but the southern part of the state has economic development help from the [tobacco fund](#), a willing partner in [Mid-Atlantic Broadband Communities \(MBC\)](#) and very aggressive [economic development](#) teams. MBC is a fiber provider and was formed in 2004 to solve the rural telecom infrastructure challenge. With the strong support of the Virginia Tobacco Commission (VTC) and the US Department of Commerce Economic Development Administration (EDA), MBC received \$12 million in capital grants to build the first phase of the open-access fiber network in early 2004. Additional capital grants of \$24 million were awarded by the VTC in 2005 and 2006 to finish the first phase of the network.

Enterprise data centers are placed not only based on fiber latency, interconnection capability and power; the developers seek an array of benefits that they often find in more rural settings or second tier cities. Microsoft in Boydton and Facebook in Henrico County are examples of companies that chose placement of mega-campuses (over 100 MW) on criteria that favored more rural environs. For both Microsoft and Facebook, the location of their mega-campuses further strengthened their value-proposition for a diverse subsea cable landing, hence they selected Virginia Beach for landing of the MAREA cable from Spain along with Telxius as the operator. Telxius is a Spanish subsea and tower company representing the Internet Infrastructure sector.

Southwest Virginia's coalition of economic development teams are working to attract data centers to that part of the state. Senator Mark Warner, in an address to the Data Center Coalition in [February 2020](#), stated that *"if any of you were to ever be willing to look at southside or southwest, I will move heaven and earth in terms of state and federal incentives."*

Additionally, Maryland has moved to finally adopt a formidable [tax package](#) to attract data centers. There is activity by developers and site selectors to evaluate land in certain parts of Maryland considered attractive to data centers. And while power rates are typically higher in Maryland, the ease of obtaining green power through the open market in Maryland will be an advantage in Maryland that does not exist in Virginia. According to the Chestertown Spy *"The bill would offer data centers exemptions to Maryland's personal property and sales and use tax, provided they invest \$5 million within three years of filing for the exemption — and hire at least five personnel earning 1.5 times the state's minimum wage."*

Pandemic Effects on the Data Center Market

The COVID-19 pandemic has shocked society with social isolation and work from home. Both of these have been enabled by broadband internet, which allow for remote work, video conference for both professional and personal use, distance learning as schools and university campuses are shut down and social media/ gaming. Most of these services are now considered essential, and will be viewed as resiliency options for any societal disruptions. The quantitative impact of these societal adjustments on the internet are manifold as documented by Rich Miller of Data Center Frontier [here](#).

Multiple experts are bullish on the outlook for increased growth of the sector, ([Miller, April 14, 2020](#)). Some companies that have benefitted from the increase of online tools, like Zoom Videoconferencing, are growing within the cloud. Zoom chose [Oracle](#) to host their cloud presence, and Oracle has a significant footprint in Northern Virginia. Additionally, Zoom also uses Amazon Web Services (AWS); they use AWS Cloud services for back-office traffic and their own dedicated servers for real-time traffic. Corporate enterprises are embracing the Cloud much faster in these past two month, than in the past. They realize that their employees are not coming back to the offices anytime soon, and some may never (this week LinkedIn, Twitter, Square, Spotify announced that they will allow all their employees to work from home forever).

What this really means is that the enterprises have to make more of their corporate data easily and securely accessible to their remote employees. The quickest and probably the safest and most economical way to do this to embrace the Cloud. The increase in demand for Cloud-based services has a direct correlation with the increase in demand for data centers because the Cloud resides in the data center. The Cloud providers (be it Microsoft, AWS, Google or others) are either going to build more data centers on their own or they will outsource and lease data center space from third-party data center providers like Digital Realty, CloudHQ, QTS, Aligned, Sabey, COTP and others.

The effects of this shock happened fast, but the pandemic has acted more as an accelerant of existing trends than an outright disruptor. Work from home, distance learning, gaming were all growing in popularity and driving cloud adoption. Social distancing has put a sharp increase in the usage curve.

There are indications that the largest customers of cloud companies are pulling back on advertising, which challenges a major part of their income. ([Levitsky, April 15, 2020](#)). However, recent leases of data center space in Loudoun show continued strong absorption of data center space.

Data Center Demand for Land

According to Cushman and Wakefield's 2020 Data Center Global Market Comparison, Northern Virginia (inclusive of Fairfax, Loudoun and Prince William Counties) is the largest data center market by square foot of IT floor space in the world, with a top 5 development pipeline and the lowest vacancy rate (less than 4%) of any market. This has been the case for many years now with Ashburn and Prince William developing mega projects larger than other global competitors combined.

Both enterprise and colocation data center developers are competing for land in Northern Virginia, with a premium being placed on land that is closest to the Equinix campus in Ashburn.

While Prince William County's total data center floor space surpassed [5 million square feet](#) in 2019, that number is dwarfed by Loudoun County's ["more than 18 million square feet currently in operation and millions more being planned or developed."](#) The potential for smart, sustainable development in Prince William County is robust especially if the county prioritizes land that is ready for development and causes the least amount of disruption to neighbors. Land adjacent to existing electrical transmission corridors and substations give developers the least expensive and fastest development opportunities. This same land provides the least amount of political exposure because requirements for additional overhead power lines are minimized.

Site Selection Criteria for Power

How far from transmission lines can Data Centers be sited?

Electric utilities are required to serve the electric power needs of their clients. As such, a data center can be located miles from existing and adequate electrical infrastructure, however distance requires additional time and expense to develop. The rule of thumb for above ground electric transmission cost is \$1M/mile. Additionally, there can be significant problems with rights-of-way, easements, and unpopularity of new power lines, which Prince William County experienced with a data center [project](#) in Haymarket. Typically, developers will evaluate the route needed for power lines by talking with the electric utility and will make a decision on effort and cost. Given that the reliability requirement for infrastructure is concrete encased underground conductors or above ground steel structures, developers would like to minimize the expense of the installation.

Data Center Development Without New Overhead Transmission

Data Center developers covet land adjacent to existing transmission lines and substations. A Google Earth map of Ashburn, VA, shows numerous data centers located along the W&OD trail, which houses Dominion's 230kV "backbone" transmission lines. The reason that this corridor was selected for development was for speed, ease and cost of development. Developers knew that if a data center could be placed near substations, the amount of easement and infrastructure would be decreased and speed to develop would be increased. This would make the project more profitable and would allow data centers to begin commercial service sooner. Additionally, there would be less potential for legal issues from easement, quit claims and right of way that occur when new facilities are required to feed one project.

The tiers of land desirability for data center development increase with proximity to transmission level power and substations. Existing substations with capacity are the fastest to develop, but large land tracts may require their own [substations](#).

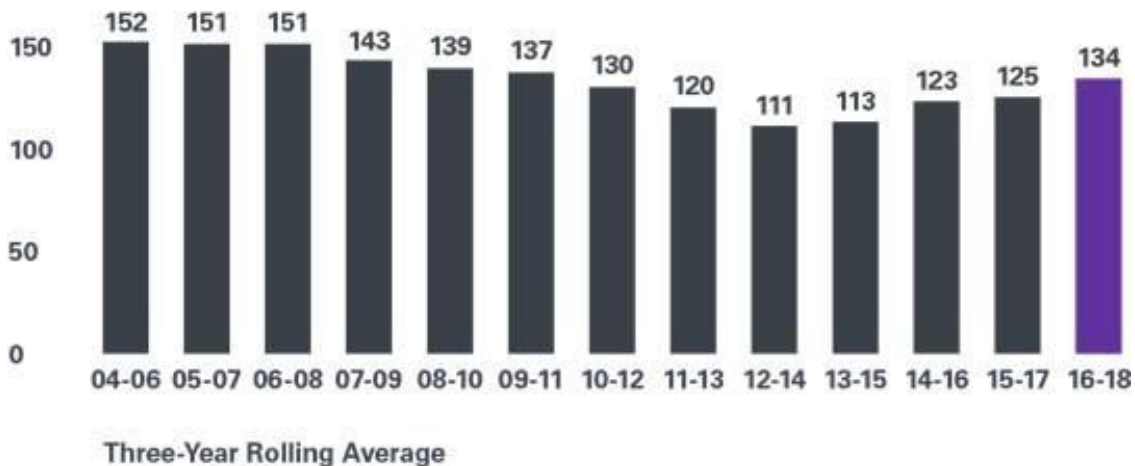
Statements and Evidence of Transmission Level Reliability

Data centers require the highest levels of electrical reliability for their mission. As such, the electrical service of choice is transmission level service, which in northern Virginia is served by Dominion Energy Virginia's (Dominion) 230kV transmission lines and either Dominion or NOVEC substations.

Electrical utilities measure electric system reliability with a metric called System Average Interruption Duration Index (SAIDI). This metric is a computation of the average minutes without service per year, so a low number is indicative of reliable performance. The index for Dominion's bulk transmission system is around ten minutes outage per year, while the three-year rolling average index for Dominion's distribution system for [2016-2018](#) was 134 minutes per year. This metric alone tells the story of the 10x level of reliability that a customer can expect when taking power directly from a substation versus routed through a distribution system. Of course, these are only averages, and individual experience varies, but typically transmission is much more reliable than distribution.

Energy Reliability Performance 2018

Average Number of Minutes Without Power per Customer



Excluding major events, 3-year rolling average, average minutes out per customer.

Source: <https://sustainability.dominionenergy.com/energy-reliability-and-affordability/electric-reliability>

Pageland Lane Existing Transmission Lines

The transmission lines that run along Pageland Lane are the backbone of Dominion's transmission grid, comprising both 500kV and 230kV conductors. As such, they are continually being upgraded and maintained to have adequate ability to supply the Northern Virginia region with power. Dominion files an Integrated Resource Plan ([IRP](#)) every year with the State Corporation Commissions of Virginia and North Carolina to detail how the company will meet system load.

The plans that Dominion makes for the capacity of these lines is based on real assessments of client power demand which is gathered from client load applications and partnership with power cooperatives that Dominion serves, in this case NOVEC.

Phase 1 of Pageland Lane - Requirement for NOVEC Substation

Phase 1 of Pageland Lane development would require substation development on land adjacent to the existing transmission lines. Since the transmission lines bisect one of the phase 1 properties, there would be no additional overhead transmission lines required away from the site. Substations would be sized according to the load that is requested from data center development. Since the properties along Pageland Lane are in NOVEC's franchise service territory, NOVEC would be the substation developer and would take the client's request to Dominion for approval from the State Corporation Commission and local AHJ's.

Since the substation would be driven by the load requested by a data center customer on the property, the power would be distributed underground from the substation to the data center buildings.

The substations would conform to local requirements for setback, view shed and sound.

Water and Sewage Requirements for Data Centers

Data Centers use different types of cooling depending on local conditions and water availability. If water is readily available, the conventional air conditioning with cooling towers for heat transfer are deployed. The alternative in this region is air cooled heat exchangers, which are physically larger but use no water to cool the data center.

Recent conversations with Prince William County Service Authority (PWCSA) were well received. PWCSA stated their need for a new pump station and sewer line today due to the overburdened pump station located at Catharpin Road and the need to expand this station. Plans to increase the station and lines have been delayed for 3 years due to the citizen opposition in Heritage Hunt. Planning this area for Data Centers and locating a new pump station on Snyder property would be a win-win for the PWCSA and citizens of Heritage Hunt. Water and sewer lines for this corridor would be at the developer's expense.

Acreage Needed for Data Center to be Cost Effective

Stand-alone data centers in Northern Virginia have evolved over time from 5 to 10 megawatts in the 1990's and 2000's to single buildings over 65 megawatts. It is common that cloud infrastructure companies seek leases with data centers where they can continue to grow.

Therefore, the ideal development locations are in the hundreds of acres, however smaller sites are still being purchased because of proximity to Ashburn. Pageland Lane Phase 1 is an exceptional property because of both size and proximity.

Early data centers were very utilitarian buildings because of the need to deploy investment money to other aspects of the building and because there were no expectations being set by the local AHJ's.



Image of early data center (Courtesy Loudoun Now)



Modern architecture for Cloud HQ (Courtesy of Data Center Hawk)

Height Variations for Data Centers

Data centers in Northern Virginia have typically been built as single-story buildings. The abundance and affordability of developable land and the increased cost and complexity of building multi-story buildings are the reasons that data centers grew out versus up. This is in contrast to data center markets like New York City, Santa Clara, CA, Tokyo and Singapore, where land is scarce and expensive and the data centers grew vertically.

The recent move in Loudoun County to multi-story data centers originated from the relative scarcity of developable land and the County's request for increased density of IT floor space per acre. This change is recent and obvious in large developments along Loudoun County Parkway and Waxpool Road in Ashburn where Cloud HQ, Digital Realty and QTS have multi-story data centers.

If there were adequate land available and zoning requirements limited height, data centers may decide to build single-story buildings as they are typically less expensive to build. This would take outreach from the County to the developers to assure an abundant amount of land for future development.

Competitive Environment for Taxes and Depreciation

Local leaders should be aware of the fluidity and fungibility of data center infrastructure. The data center is easily mistaken for a factory, with unmovable assets. However, in the co-location data centers that are the majority of all data centers in Northern Virginia, the owners depend on tenant leases for business. So, whenever a lease expires, the tenant is free to move on from that space.

NVTC's study cites Phoenix, AZ as an example of a market that can change rapidly, stating that "A year ago, the data center market in Phoenix had enormous growth, but between the second half of 2018 and the first half of 2019, Phoenix saw net outflows of 26.5 MW worth of tenants, which is almost the same amount that Northern Virginia added in the same period. The computer equipment in data centers is replaced on average every three years. Should circumstances require it, data center tenants can move from one location to another and leave significant vacancies in colocation data centers."

The tax rates for data centers are updated and compared by the Virginia Economic Development Partnership (VEDP). The latest version of the tax comparison is [2018-2019](#). Data Centers focus on real estate taxes and the personal property tax, which is used to calculate the value and tax computer equipment, which is typically worth more than the real estate investment and is refreshed every few years. Further, tax rates must be combined with depreciation factors to fully analyze the cost of ownership for data centers.

Local competitors to PWC have aggressively positioned themselves to compete for data center business as the industry looks more favorably outside of Northern Virginia.

Henrico County, Virginia is home to QTS and Facebook's mega data center at White Oak Business Park. The county is leveraging these success stories and low tax rates, fast track permitting and new connectivity to subsea cables that are routed through the Richmond NAP at QTS. Additionally, there are large parcels in White Oak Technology Park that are publicly controlled.

Stafford County, Virginia has large parcels, they are close to Ashburn, Quantico and Fort Belvoir and they have a relatively low tax rate for Northern Virginia.

The State of Maryland has a new Sales and Use Tax and Personal Property Tax - Exemptions - Data Centers which became effective on July 1, 2020. The compelling case for Maryland lies in proximity to Ashburn and that the qualifying thresholds for investment and jobs are low compared to Virginia. The requirements are \$2M or \$5M, depending on location and five (5) qualifying jobs.

Need to expand District Ordinance 19-24 to Pageland Lane

Overhead transmission line development can cost approximately \$1M per mile, while underground costs are 4x to 5x that cost, depending on barriers to development. This makes land adjacent to existing transmission power lines and substations the fastest, least expensive and least intrusive development opportunity for data centers. Prioritization of developable land in existing electric transmission corridors would ensure that minimal new electrical infrastructure is built to accommodate the additional load. This would minimize development costs and timelines, both of which are high on the list of development priorities for data centers.

Prince William County has the opportunity to open land for data center development that would immediately compete with the most competitive parcels in Northern Virginia based on all the objective criteria for fast, economic and sustainable land development. Pageland Lane would compete favorably with White Oak Technology Park in Henrico, parcels along electric transmission in Stafford and Maryland.

Beneficial Economic Effects of Data Centers

Mangum Economics, based in Richmond, VA, has been the industry go-to for Economic Data on the benefits of data center growth in Virginia. The company was retained to write influential studies for the Northern Virginia Technology Council in recent years, the most recent titled "[The Impact of Data Centers on the State and Local Economies of Virginia](#)" in January 2020.

According to the report:

Taking into account the economic ripple effects that direct investment generated, we estimate that the total impact on Virginia from the data center industry in 2018 was approximately:

- 45,290 full-time-equivalent jobs,
- \$3.5 billion in associated pay and benefits, and
- \$10.1 billion in economic output.

Specific to Prince William, the report states that "for every dollar in county expenditures that the data center industry was responsible for generating in 2018, it provided approximately \$17.80 in tax revenue."

According to Loudoun County Economic Development and the Loudoun County Board of County Supervisors Chair Phyllis Randall, the county has benefitted from:

- More than \$1.2B in transportation improvements
- Full day kindergarten in LCPS
- Strength of public education
- 10,500 full time equivalent jobs paying \$1.6B in wages
- \$3.5B in economic output
- \$300M in annual tax revenue, saving \$2,100 in household taxes per year

Pageland Lane is a Premier Location for Data Centers

Pageland Lane is an excellent location for data center expansion based on objective criteria for data center site selection:

Location - Pageland Lane is approximately 19 miles to Ashburn, VA and less than 8 miles to Innovation Park in Manassas. The estimated latency to either location is less than 4 milliseconds, making this area highly desirable for all forms of computing. There would be little to no marketing required to explain this location to site selectors. Additionally, there are multiple fiber providers—offering both dark fiber and lit services that are both in Prince William and in Loudoun. What that means is that these network carriers are ready to provide services interconnection the two regions, regardless of the use case—be it Enterprise, Colocation or Cloud Data Center. Additionally, access to the subsea cables (which land in Virginia Beach) and be a key differentiator. (Details on that will be included in the Fiber report).

Power - Pageland Lane is served by NOVEC, which is very experienced at handling data center projects including substation additions. The utility is transparent in pricing and offers industrial customers a variety of competitive power supply.

Water - Developers seek designs that apply to any geography and climate to reduce engineering, procurement and permit time. Waterless cooling is typical in modern data centers as a sustainability and energy savings measure. For example, CyrusOne Data Centers, a Dallas, Texas, based company with a large footprint in Northern Virginia, builds only [Waterless Cooling](#) designs. So, data centers can build regardless of large scale water supply and sewage.

Fiber - Proximity to fiber and internet exchange points is covered in the June 11 report by Vinay Nagpal of Interglobix.

Land Acreage - Phase 1 of Pageland Lane is 430 acres, making it a significant potential addition to the data center land portfolio for Northern Virginia. This compares with the large recent transactions made by Digital Realty [near Dulles Airport](#).

Workforce - The Pageland Lane site will benefit from pulling from the same workforce and supplier network as Prince William and Loudoun Counties do now. There will be no lag in finding qualified people to run the facilities and will add to the demand for qualified technicians and leaders from military, NOVA Community College and local universities.

Eco-system - Pageland Lane will be welcomed by the same suppliers, vendors, constructors, fiber providers, utilities and AHJ's as currently exist for Prince William, Loudoun and Fairfax Counties.

Mutual Interests - The County and developers can align on the characteristics of the land making up Pageland Lane Technology Corridor because power intensive development can be done without new transmission lines, which would allow for commercial operations and tax revenue sooner than parcels that are not located adjacent to transmission lines.

PW Digital Gateway CPA #2021-0004

Enclosure 2:

Viewshed Protection and Buffers

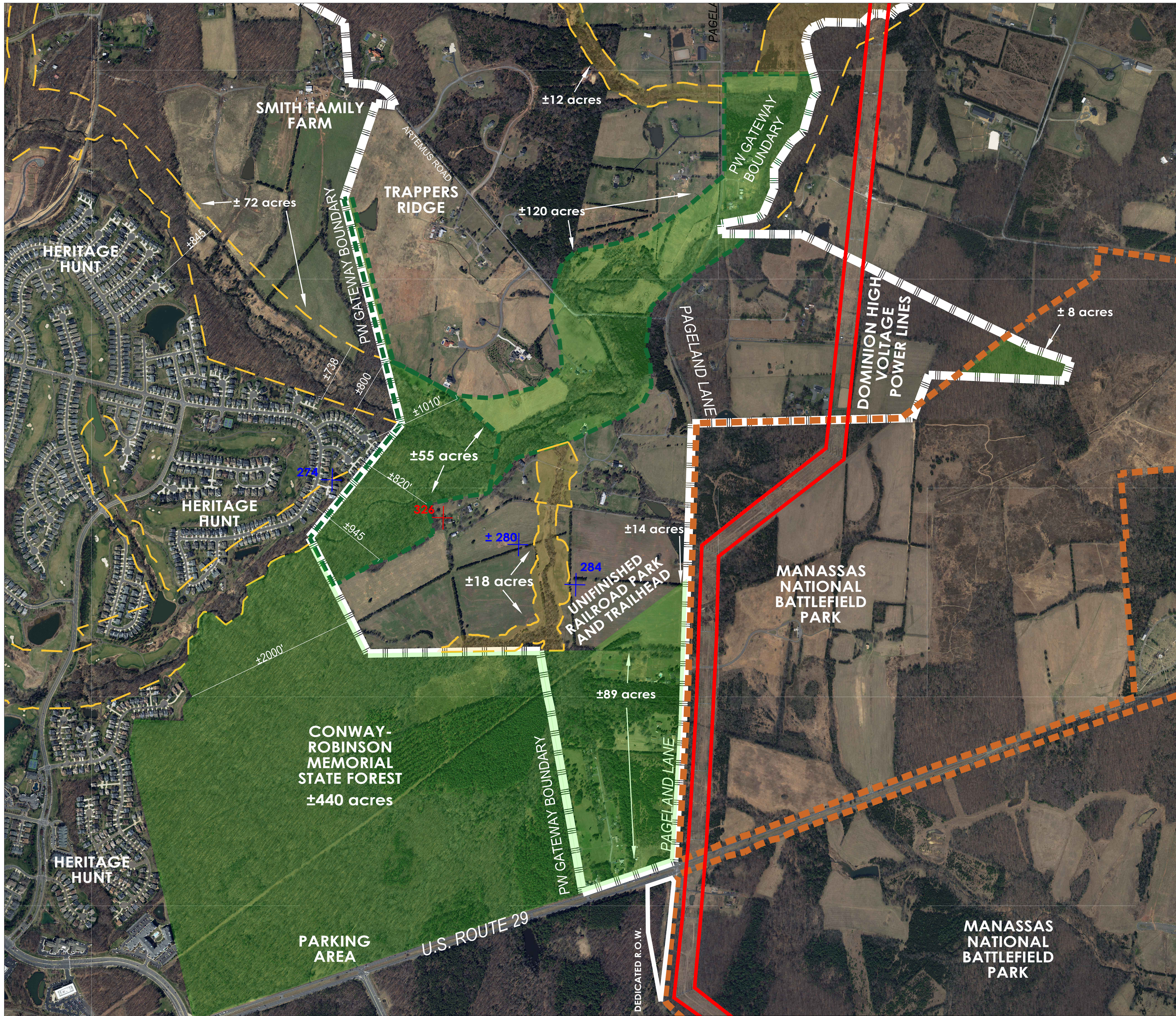


Heritage Hunt Viewshed Protection


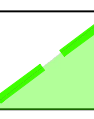


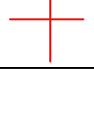
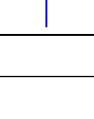
Aerial taken in 2020.

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LEGEND

-  ENVIRONMENTAL RESOURCE (ER)
-  CATHARPIN GREENWAY EXTENSION
-  MANASSAS BATTLEFIELD LEGISLATIVE BOUNDARY
-  PW DIGITAL GATEWAY
-  ELEVATION POINT > 300'
-  ELEVATION POINT < 300'



PW DIGITAL GATEWAY

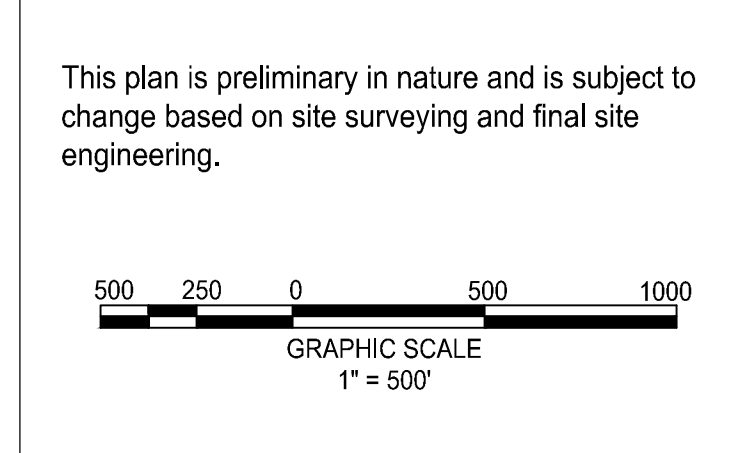
GAINESVILLE MAGISTERIAL DISTRICT, PRINCE WILLIAM COUNTY, VIRGINIA

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 DRAWING No. 111430
 DATE: 08/02/2022
 SCALE: SEE SHEET
 DESIGN: GB
 DRAWN: GB, CL
 CHECKED:

OPEN SPACE SURROUNDING HERITAGE HUNT

SHEET No. **1**



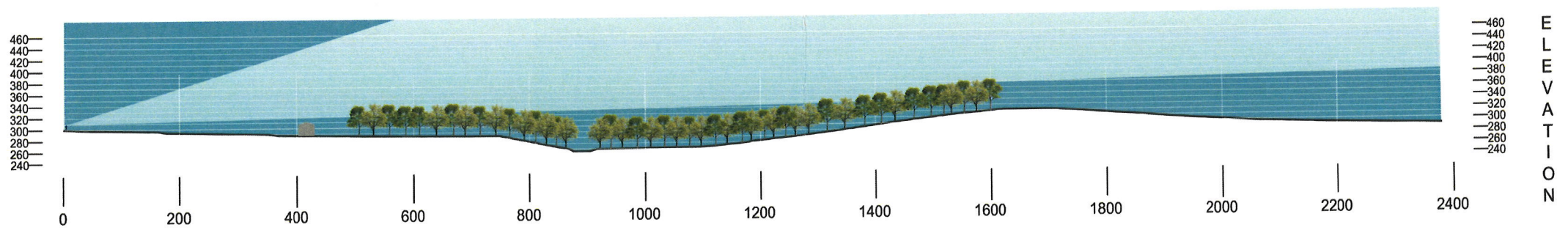
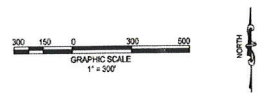


AREA LABEL	VIEW POINT	ELEVATION
①	BRAWNER HOUSE - CEDAR TREE	324 FEET
②	BRAWNER HOUSE - ARTILLERY LINE/UNFINISHED RAILROAD	325 FEET
③	BRAWNER HOUSE - ARTILLERY LINE	327 FEET
④	BRAWNER HOUSE - ENTRANCE DRIVE	309 FEET

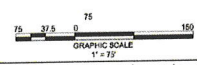


PW DIGITAL GATEWAY
 GAINESVILLE MAGISTERIAL DISTRICT, PRINCE WILLIAM COUNTY, VIRGINIA

CONTEXT PLAN



SITE SECTION



This plan is preliminary in nature and is subject to change based on site surveying and final site engineering.

MARK	DATE	DESCRIPTION

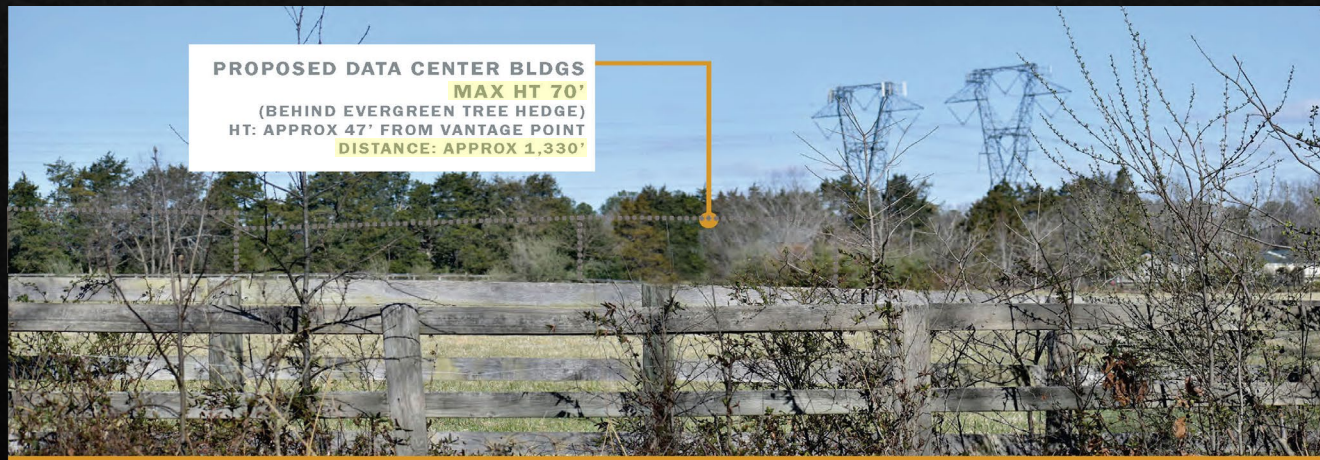
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SIGHTLINE EXHIBIT

Manassas National Battlefield Park Viewshed Protection

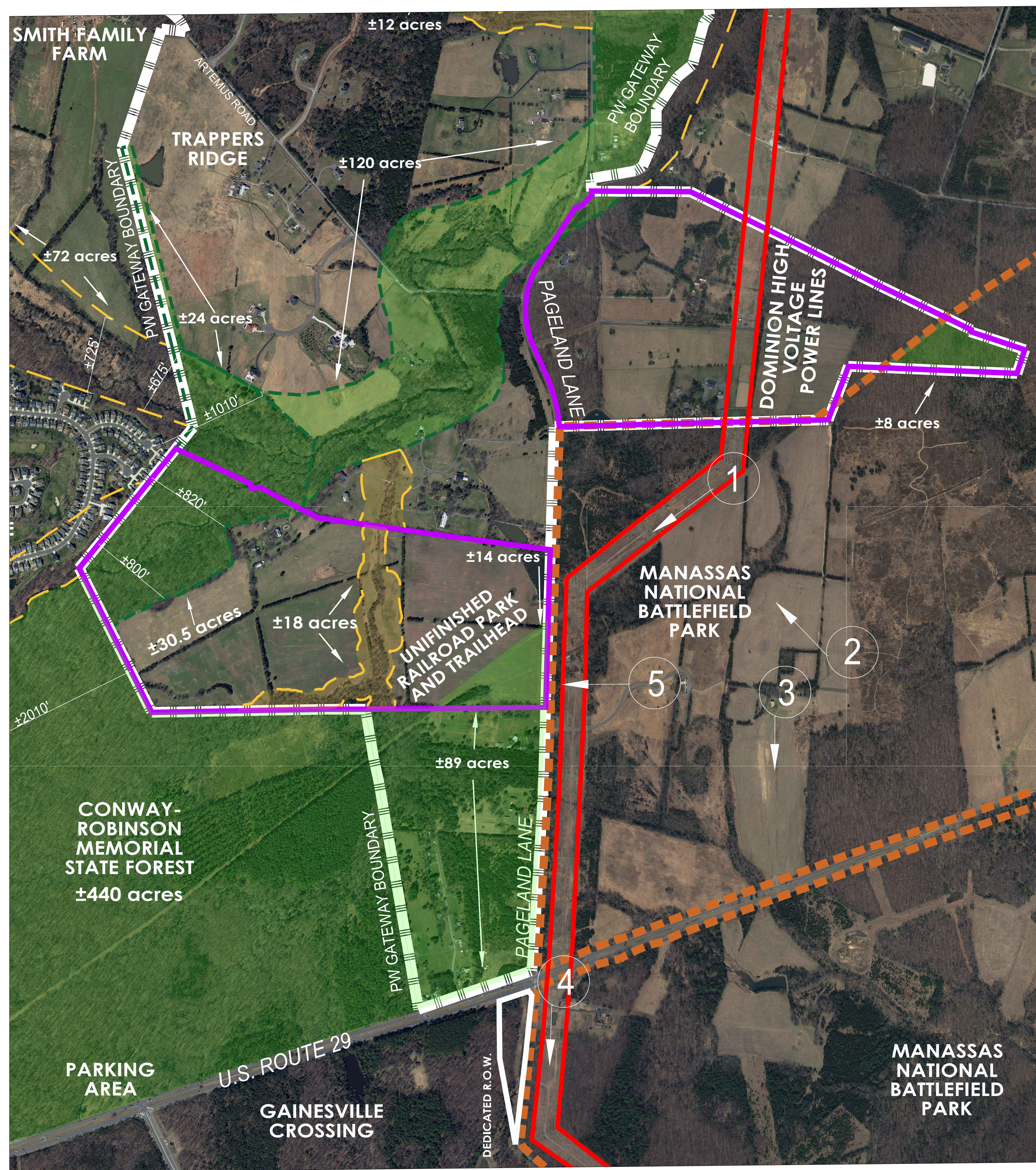
VISUAL IMPACT STUDY - BRAWNER HOUSE - ARTILLERY LINE
PWC DIGITAL GATEWAY



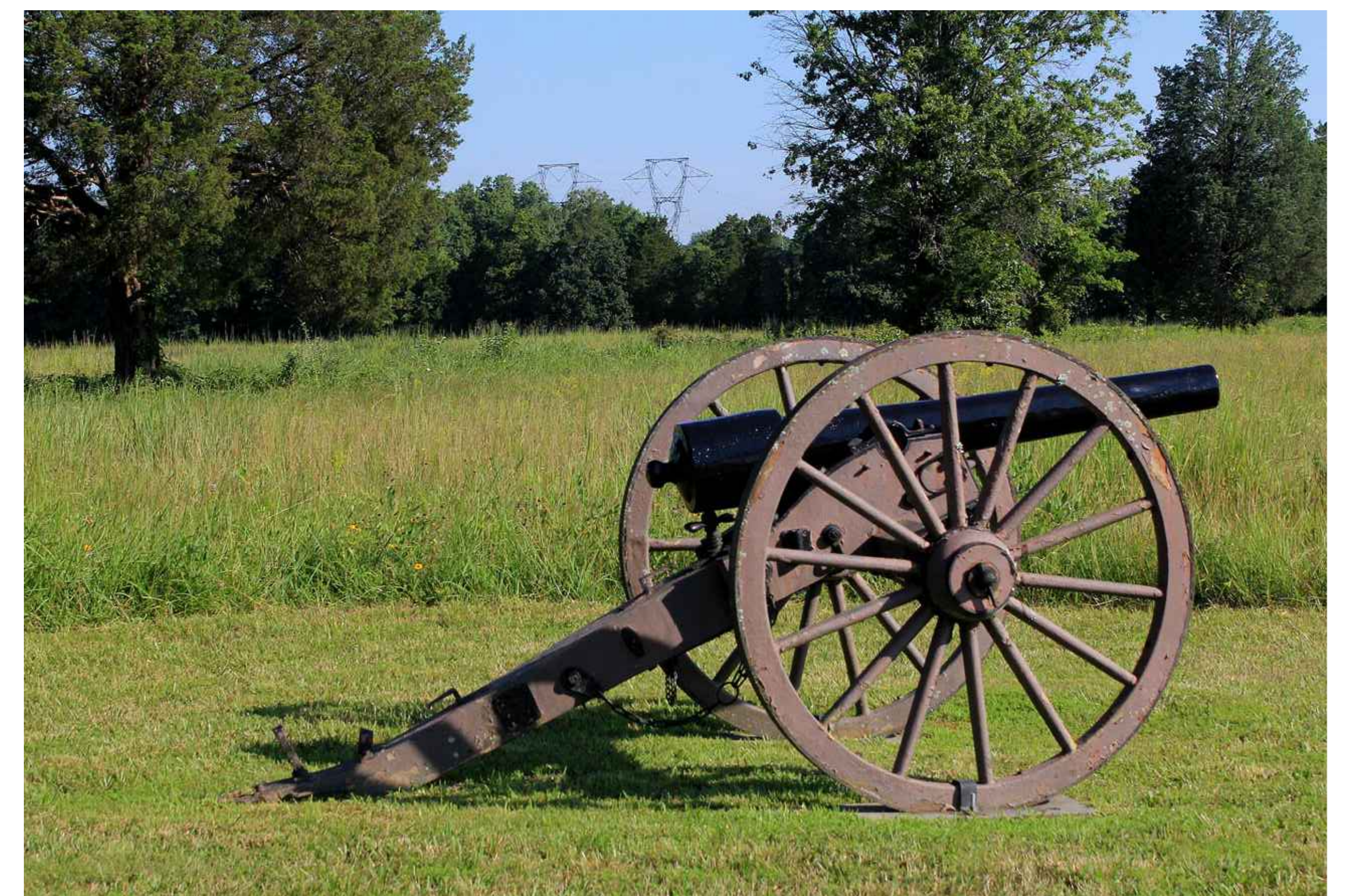
VISUAL IMPACT STUDY - BRAWNER HOUSE - ENTRANCE DRIVE
PWC DIGITAL GATEWAY



VISUAL IMPACT STUDY - BOUNDARY TREE SITE
PWC DIGITAL GATEWAY



1 BRIDLE TRAIL (LOOKING SOUTHWEST)



2 BATTERY HEIGHTS VIEW (LOOKING NORTHWEST)



4 FROM RT. 29 (LOOKING SOUTH)



5 BRAWNER FARM ENTRANCE (LOOKING WEST)



3 BRAWNER HOUSE (LOOKING SOUTH)

MARK	DATE	DESCRIPTION

PROJECT No.: 20143-003.00
 DRAWING No.: 111430
 DATE: 08/02/2022
 SCALE: SEE SHEET
 DESIGN: GB
 DRAWN: GB, CL
 CHECKED:
 SHEET TITLE:

VIEWS FROM BRAWNER FARM