



# TECHNICAL MEMORANDUM

PREPARED FOR: Kimley-Horn Associates, Inc.

PREPARED BY: Dewberry Engineers Inc.

DATE: March 24, 2026

SUBJECT: Route 33 Data Center Development Hydraulic Modeling

## 1. Introduction

Kimley-Horn Associates, Inc. (Kimley-Horn) is working on the planning and design of a new data center development near the old Tyson Plant at Route 33. Kimley-Horn contracted with Dewberry Engineers Inc. (Dewberry) to utilize the current Hanover Suburban Water System (HSWS) hydraulic model to evaluate the existing water distribution system for purposes of serving the proposed development and identify any necessary improvements. The hydraulic modeling was based on phasing and water needs provided by Kimley-Horn, as summarized below:

Data Center Phasing:

- 300 MW online beginning of 2030 (Area 1)
- Additional 300MW online beginning of 2031 (Area 2)
- Final 300MW online beginning of 2032 (Area 3)

Full Build-Out Demands:

- 0.6 million gallon per day (MGD) average day demand (ADD)
- 2.0 MGD maximum day demand (MDD)
- Fire Flow Goal - 2,000 GPM for 2 hours
- Minimum Pressure – 40 psi during MDD

This information was utilized to develop the modeling scenarios summarized in Section 3.

## 2. Proposed Development Water Service Overview

The proposed data center development will be served by the Elmont and Lower Elmont Pressure Zones (PZ) within the HSWS. These pressure zones receive water supply from the Elmont Water Storage Tank and Pump Station (Elmont WST), located on Cedar Lane Road and an interconnect with Henrico County at Route 33. The Elmont WST pumps water from the Ashland PZ to create the Elmont PZ and the Lower Elmont PZ is bounded by the Route 33 Pressure Reducing Valve (PRV) and the Henrico County connection, which also has a PRV.

Based on the proposed maximum ground elevation of approximately 250 ft within the data center development, the Lower Elmont PZ would provide service to the development. The first phase (Area 1) would be nearest Route 33 and would be served from the existing 12-inch water main along Route 33. As the data center develops through full buildout, it is anticipated that a new water transmission main would be constructed connecting the existing 12-inch water main along Route 33 to the existing 16-inch water main along Winns Church Road. The sizing of this waterline is evaluated in the scenarios below

Refer to Figure 1 for an overview of the proposed data center development and how it would connect into the existing system.

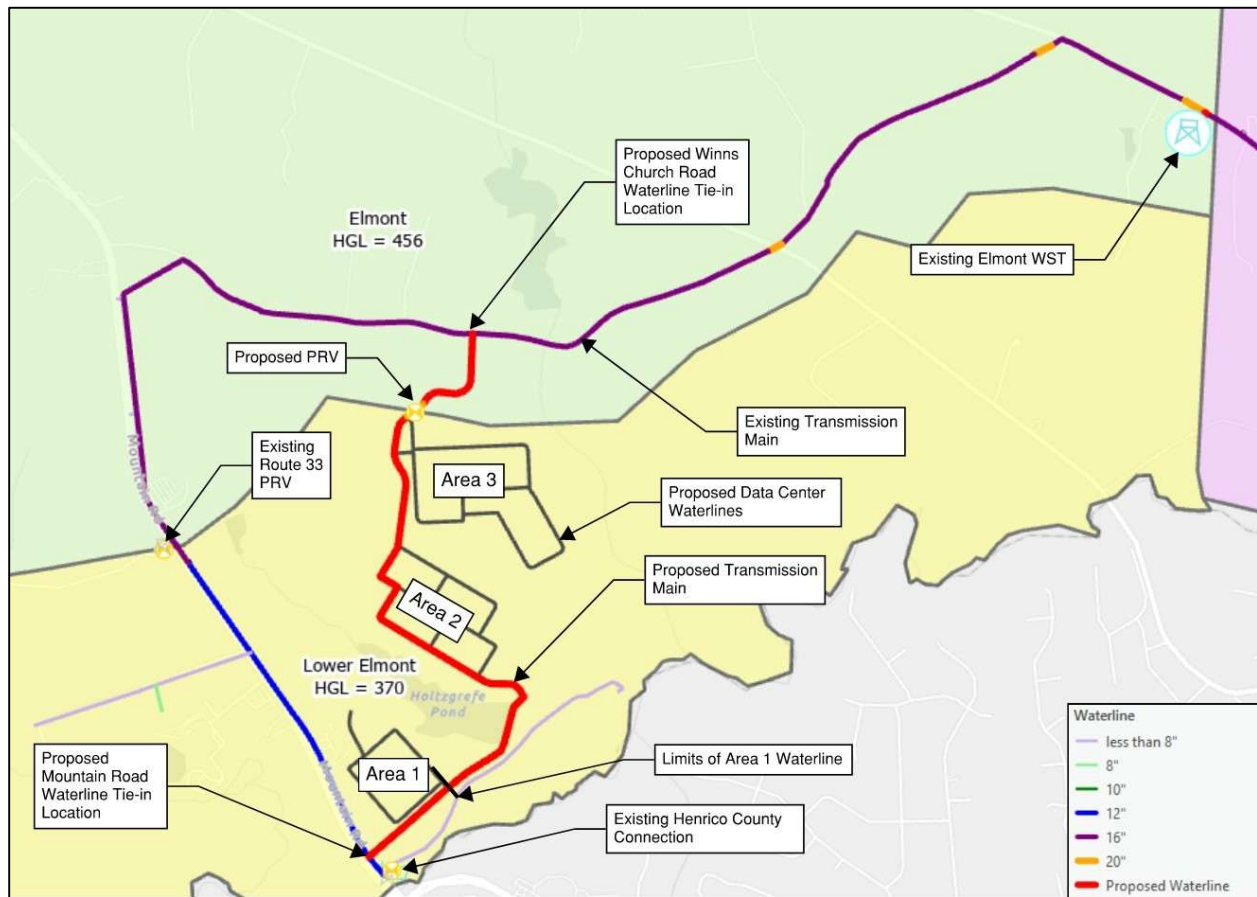


Figure 1 Elmont & Lower Elmont Pressure Zone Map

### 3. Hydraulic Evaluation

The Hanover County hydraulic model was developed in Innovyze InfoWater and converted to Autodesk InfoWater Pro. The model was last updated in 2025, which included reallocation of demands, updates to model elements to reflect the existing water system, and calibration of Hazen-Williams C values based on hydrant testing.

#### 3.1 Modeling Scenarios

To evaluate the ability of the existing HSWS to serve the Route 33 data center development, MDD extended period simulations (EPS) and fire flow EPS scenarios were developed. Each scenario was run using the existing infrastructure, and improvements were identified when necessary.

Table 1 Model Scenarios Summary

| MODEL SCENARIOS SUMMARY |                  |                |                    |                     |
|-------------------------|------------------|----------------|--------------------|---------------------|
| NAME                    | DEMAND CONDITION | DEVELOPMENT    | DATA CENTER DEMAND | WATER SYSTEM STATUS |
| S1a                     | MDD              | Area 1         | 0.67 MGD           | Existing            |
| S1b                     | MDD + Fire Flow  | Area 1         | 0.67 MGD           | Existing            |
| S2a                     | MDD              | Full Build Out | 2 MGD              | Existing            |
| S2b                     | MDD + Fire Flow  | Full Build Out | 2 MGD              | Existing            |
| S3a                     | MDD              | Full Build Out | 2 MGD              | Improved            |
| S3b                     | MDD + Fire Flow  | Full Build Out | 2 MGD              | Improved            |

Each MDD scenario was conducted as a 24 hour extended period simulation (EPS), with the appropriate AWWA diurnal curves applied to all existing demands. The proposed demand for the data center was assumed to be constant over the day. The fire flow scenarios were simulated during an MDD scenario with a 2-hour fire event starting at hour 11 of the 24-hour simulation. The fire event is located near the intersection of Mountain Road and Winns Church Road and requires 2,000 gpm of fire flow availability over the 2-hour duration. The data center development will have a storage tank on-site, so a fire event at the data center site was not modeled.

### 3.2 Level of Service Criteria

Level of service (LOS) criteria were developed for purposes of evaluating improvements necessary for each model scenario. The LOS criteria were based on the VDH Waterworks Regulations, the American Water Works Association Manual of Water Supply Practices M68 Water Quality in Distribution Systems (AWWA M68), Hanover County standards, and industry standards/best practices. The LOS criteria are used for the evaluation of each modeling scenario and the sizing of proposed infrastructure. Refer to Table 2 for a summary of the LOS criteria.

Table 2 Level of Service Criteria

| LEVEL OF SERVICE CRITERIA                      |                       |                          |
|------------------------------------------------|-----------------------|--------------------------|
| LEVEL OF SERVICE                               | CRITERIA              | SOURCE                   |
| Minimum System Pressure (MDD)                  | 40 psi                | Industry Standard        |
| Minimum System Pressure (Fire Flow)            | 20 psi                | VDH Requirement          |
| Maximum Head Loss Gradient for New Water Mains | 2 ft/1,000 ft         | AWWA M68                 |
| Fire Flow Requirement (Commercial)             | 2,000 gpm for 2 hours | Hanover County Standards |

### 3.3 S1 Area 1 – Existing System

Scenarios S1a and S1b evaluate the ability of Hanover County's existing water system to serve Area 1 of the data center development during MDD and fire flow conditions, respectively. In these scenarios, only the Area 1 section of the proposed data center waterline is assumed to be constructed.

Based on the results of this analysis, the existing water system has capacity to supply the water required by Area 1 of the development during MDD conditions. During this MDD scenario, water to the data center is provided entirely by the Elmont WST. Pressures throughout the day remain above 40 psi across the Elmont and Lower Elmont Pressure Zones.

During the fire flow scenario, the County must rely on the Route 33 Henrico Connection to supplement the flow from the Elmont WST and prevent under-pressurization of the Lower Elmont PZ. With both supply sources providing flow to the Elmont and Lower Elmont Pressure Zones, the water system can provide the required 2,000 gpm of fire flow over 2 hours.

### **3.4 S2 Buildout – Existing System**

Scenarios S2a and S2b evaluate the ability of Hanover County's existing water system to serve the buildout of the data center development during MDD and fire flow conditions, respectively. In these scenarios, the completed waterline loop is assumed to be constructed with a PRV located at the northern end of the development to lower the Elmont HGL to the Lower Elmont PZ HGL.

Based on the results of this analysis, the existing water system has capacity to supply the water required by the buildout phase of the development during MDD plus a 2,000 gpm, 2-hour fire event. During this scenario, the flow being supplemented from the Route 33 Henrico Connection (approximately 0.4 MGD) is less than the contractual limit of 0.775 MGD. It should be noted that this scenario utilizes most (approximately 90%) of water supply capacity of the existing Elmont PZ, with approximately 0.25 - 0.3 MGD of maximum day capacity remaining. To support additional high-water users in the Small Area Plan<sup>1</sup>, additional water capacity improvements would be required.

### **3.5 S3 Buildout – Improved System**

To provide additional water capacity within the Elmont PZ, a new tank and booster pump station (Route 33 WST) was modeled at the Route 33 connection to Henrico County. Scenarios S3a and S3b evaluate the ability of Hanover County's water system with improvements to serve the buildout of the data center development during MDD and fire flow conditions, respectively. In these scenarios, Henrico County would supply water into the Route 33 WST, which would repump water into the merged Elmont/Lower Elmont Pressure Zone. The merged PZ could operate with a combined supply from Route 33 WST and the Elmont WST or the Route 33 WST could supply the PZ demand and fill the Elmont WST, which would repump into the Ashland PZ and supplement the County's water supply from other sources.

For the scenario in which the Route 33 WST provides water supply for the all of the merged Elmont PZ demand, the Route 33 WST should have an initial firm pumping capacity of 6 MGD with a storage tank volume of 1.0 MG. This would provide adequate hydraulic capacity to serve a maximum day demand of 3 MGD (1 MGD excess capacity) plus a 2-hour, 2,000 GPM fire event in the PZ. A 20-inch waterline is sufficient to meet all LOS criteria for the 6 MGD pumping station; however, it is recommended that the water main through the data center is 24-inch to provide enough capacity for future buildout of the Route 33 WST. In addition, a segment of 24-inch transmission main is required between the Route 33 WST and the data center water main tie-in location running parallel to the existing 12" water main to provide additional capacity. In this scenario, the 0.775 water supply capacity from Henrico County would be exceeded, and a renegotiated agreement between Hanover and Henrico Counties would be required. Due to the water supply source location at the southern end of the Elmont/Lower Elmont PZ, the PRV at the northern end of the data center site is not needed and the existing Route 33 PRV will be bypassed. Refer to Figure 2 for the location of the Route 33 WST and associated improvements.

1. *Route 33 Gateway Small Area Plan, Draft Plan (BOS Public Hearing), Last Revised August 4, 2025*

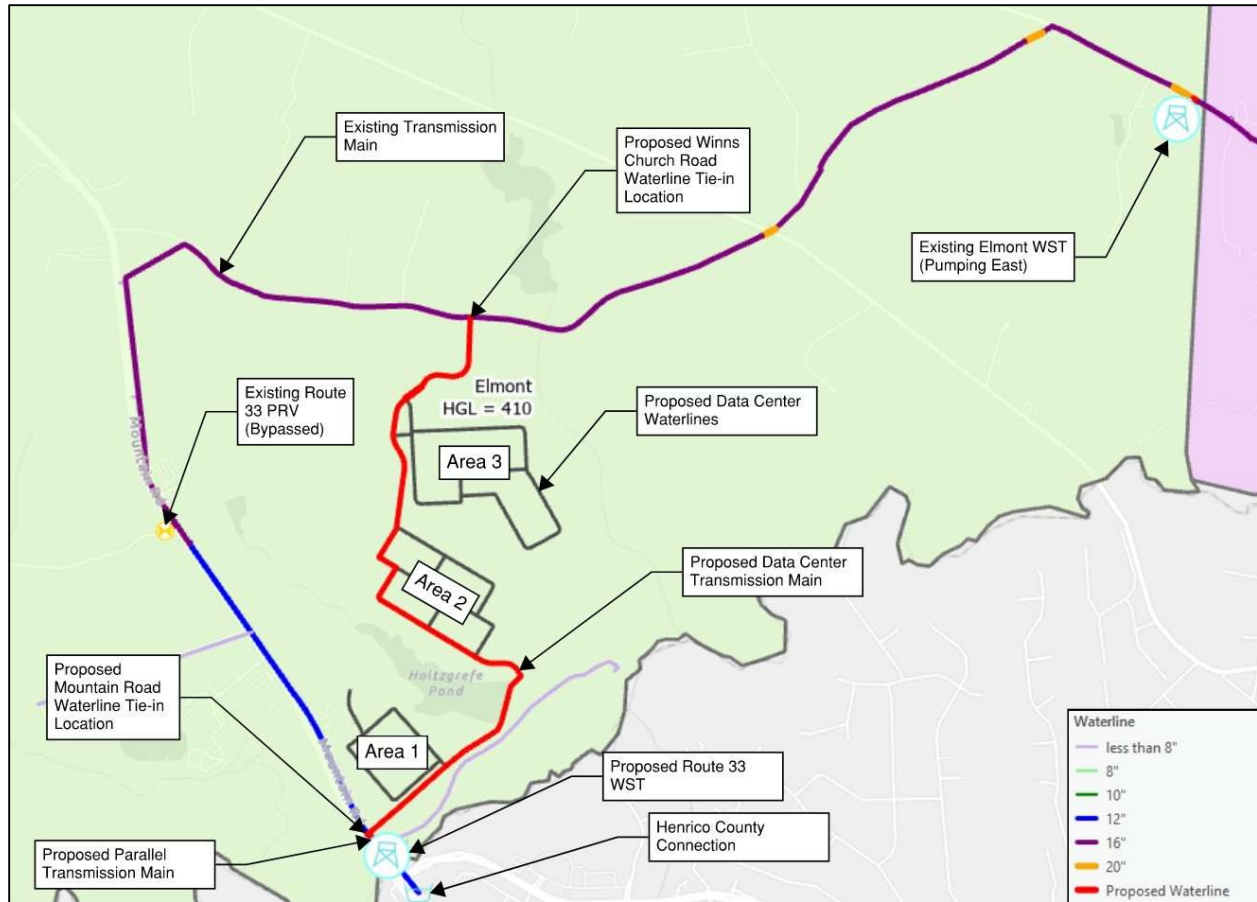


Figure 2 Route 33 WST Location

Based on the results of the analysis, the water system with the improvements outlined above can supply the water required by the buildout of the data center during MDD and fire flow conditions. The Route 33 WST operating at a capacity of 6 MGD can fully supply the data center during MDD conditions and maintain a system pressure above 40 psi throughout the Elmont PZ, while providing an additional maximum day capacity of about 1 MGD in the PZ.

During the fire flow scenario, the Route 33 WST, operating at a capacity of 6 MGD, can maintain system pressures above 40 psi throughout the Elmont PZ, including the data center development, while supplying the required 2,000 gpm of fire flow over 2 hours to the location of the fire event.

## 4. Summary and Conclusions

Based on the results of this evaluation, the existing Hanover County water system has sufficient capacity to supply water to the Route 33 data center development during both MDD and fire flow conditions. However, the proposed data center development is expected to utilize most (approximately 90%) of water supply capacity of the existing Elmont PZ, with approximately 0.25 - 0.3 MGD of maximum day capacity remaining. To support additional high-water users in the Small Area Plan<sup>1</sup>, additional water capacity improvements would be required.

It is recommended that one of two solutions be implemented to allow for additional Elmont PZ capacity. Onsite storage tanks or other means to reduce the maximum day cooling demand or the construction of a new 6 MGD BPS and 1.0 MG WST. The new Route 33 WST would provide a redundant water supply for the data center development and provide additional capacity to serve future demands within the PZ. A future preliminary engineering report should be prepared to further evaluate the final location, and design of the Route 33 WST, as well as align with Hanover County's water supply agreements with Henrico County. The future PER should also evaluate infrastructure sizes to serve the needs of the surrounding service area.

1. *Route 33 Gateway Small Area Plan, Draft Plan (BOS Public Hearing), Last Revised August 4, 2025*