



Model Simulation Report

Proposed Water Service

Project: 571 Main St Development

Location: 571 Main St, South Kingstown, Rhode Island

Date: October 4, 2023

Project Details

The proposed project, the 571 Main St Development, consists of new domestic service connections and a main extension serving a planned development located at the project address. The project includes two main extensions, which consist of 1,110 feet of 6-inch ductile iron pipe tapped on Belmont St and 430 feet of 6-inch ductile iron pipe tapped on Belmont St. The proposed development includes the construction of 32 residential units. Figure 1 and Figure 2 show a global view and local view of the project, respectively.

The development will reside in the main pressure district. It was assumed that the maximum elevation of the service connections would be at an elevation of approximately 90 feet above sea-level. The primary supply of water for this project originates from a 6-inch main located on Belmont Ave. The local fire marshal may specify required fire flows. The nearest existing hydrant to the project is #3-74, which is located along Main St. The project will conform to the Veolia Water Rhode Island Inc. (VWRI) standards.

Proposed Demands

The VWRI distribution system model incorporates calibrated demand pattern data, which allows an extended period simulation (24-hour) to be performed. The developer's Engineer provided VWRI with a Willingness to Serve Application, which is included as Figures 3A and 3B. The application included the following estimates of the projected demands associated with this development, which are shown in Table 1.

Table 1 – Total Projected Demand Summary

Projected Demand	Total Demand Rate	
Avg. Daily Demand (ADD):	7,360 gpd	5.1 gpm
Max Daily Demand (MDD):	24,080 gpd	16.7 gpm
Peak Hour Demand (PHD):	1,687 gph	28.1 gpm
Lawn Irrigation Demand*:	0 gpd	0 gpm
Required Fire Hydrant Flow:	1,000 gpm	
Required Fire Sprinkler Flow:	- gpm	
Total Required Fire Flow**:	1,000 gpm (at 20 psi residual)	

*It was assumed that lawn irrigation would occur between 4am and 6am.

**** The developer's engineer did not provide a required fire hydrant flow. If additional fire protection for the development is required, the developer will be required to submit a revised application with updated fire flow demands. For the analysis, it was assumed 1,000 gpm would be required.**

Model Calibration

The existing VVRI distribution system model was modified to include the appropriate consumption and fire-flow data associated with this project. The model was calibrated to reflect maximum day and peak hour demand requirements, simulating worst-case scenario conditions. This calibration incorporates time-variable supply and demand data providing the capability for WaterGEMS to calculate storage tank levels based on the SCADA system supply and demand rates, simulating actual system conditions. Fire-flow demands were also simulated in a time variable manner (3-hour duration) to accurately simulate storage level and pressure fluctuations.

Evaluation Criteria

Changes in node pressure and pipe velocity were reviewed during the analysis to ensure that the proposed development does not present any adverse impacts to the distribution system. The VVRI service standards establish a minimum normal working pressure of 35 psi at the service tap location at ground level and a minimum residual pressure of 20 psi during emergency and fire flow conditions.

Model simulation results were evaluated by:

1. Ensuring the post-project results comply with VVRI service standards.
2. Analyzing local / global effects to the system modification and residual pressures.
3. Identifying any necessary distribution system improvements or modifications to accommodate the proposed project demands (if any).

Simulated Local Results

The proposed development scenario was analyzed by running several post-development and existing condition simulations with the assumptions stated. The pressure analysis was performed at the curb line prior to any customer-side metering or back flow prevention devices that may be proposed. Fire-flows were evaluated to determine the impact of the project on existing and post-project conditions. Figure 4 shows the impact of the project on pressure at the curb-line during simulated fire-flow conditions under existing and post-project conditions. The results are summarized in Table 2:

Table 2 – Model Simulation Results

Scenario	MDD Pressure	PHD Pressure	Minimum Required Pressure
Existing Conditions:	70 psi	66 psi	35 psi
Post-Development Conditions:	70 psi	66 psi	35 psi
Fire-Flow Residual*:	8 psi	N/A	20 psi

* Simulated results at Development based on MDD model computation for a 3-hour duration at 8 am.

The VVRI service standards establish a minimum pressure of 35 psi at the service tap location and a minimum residual pressure of 20 psi during fire-flow conditions. As shown in Table 2, the proposed project is predicted to have a minimal impact on MDD and PHD pressure as compared to existing conditions. However, during a simulated fire flow event, the residual pressure at the development is predicted to drop below the required 20 psi threshold. Based on these results, VVRI is not able to provide service to the proposed development without requiring additional distribution system improvements within the proximity of the proposed development.

System-Wide Impact

The production facilities and transmission mains that would supply the proposed development were evaluated to determine if any improvements at those locations would be required to adequately serve

the proposed development. It was determined that additional distribution system modifications are required to serve the development at this time based on the information provided by the developer.

- At 1,000 gpm fire flow, the developer will be required to install 8-inch main instead of 6-inch main.

As previously stated, the developer's engineer did not provide a required fire hydrant flow. If fire protection for the development is required, the developer will be required to submit a revised application with updated fire flow demands. For the analysis, it was assumed 1,000 gpm would be required.

Figure 1
GIS Imagery of Proposed Project Location
Global View

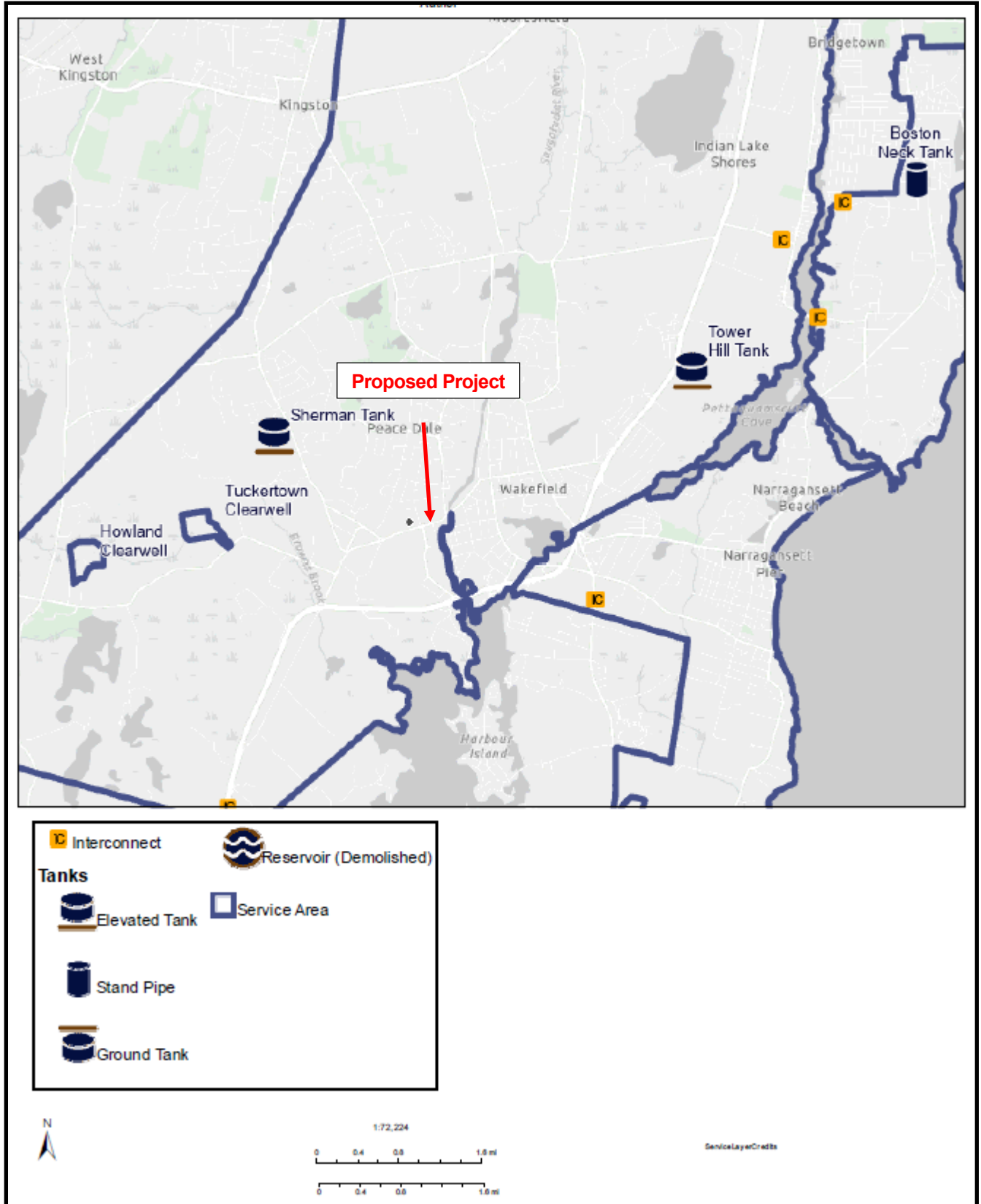
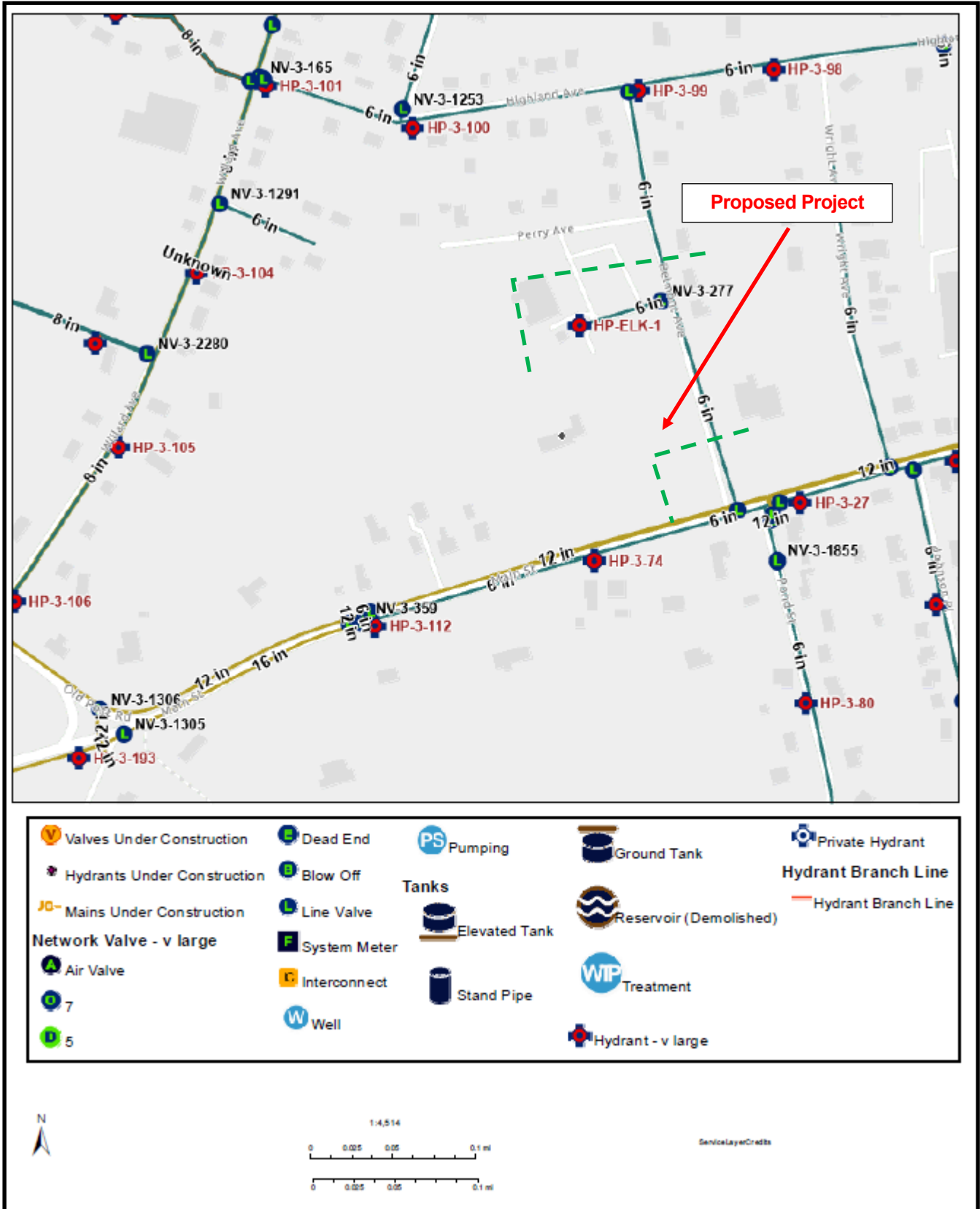


Figure 2
GIS Imagery of Proposed Project Location
Local View



**Figure 3A
Willingness to Serve Application**

Information Required for Willingness to Serve

Date: August 15, 2023

Project Name: 571 Main Street

Project Address (Street Name/Town): 571 Main Street, South Kingstown, RI

Brief Project Description: Proposed residential development: Total Units 32 (2 bedrooms Each)

Size and Length of Main: Perry Avenue Street Portion (Units 1-18) - 6" CLDIP 1,100 LF

Number of Hydrants: To be Coordinated with Fire Department

Number of Domestic Services: 18 (1 for each unit)

Number of Fire Services: 1 (from Water Main Extension)

Number of Irrigation services: 0

Commercial (Type and Number Square Feet): N/A

Residential (Number of Units and Number of Bedrooms per Unit): 18 units / 2 bedrooms / unit
On Behalf of the Applicant:

Contact Name: Molly R. Titus, P.E., DiPrete Engineering

Contact Address: 2 Stafford Court, Cranston, RI 02920

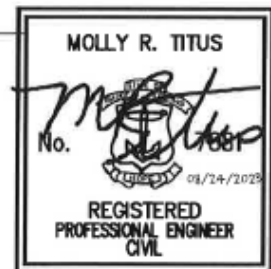
Contact Number: 401-943-1000

Contact Email: mtitus@diprete-eng.com

Projected Demand Summary (if more than one building, attach a Project Demand Summary Table): Using RIDEM OWTS Regs.

1. Domestic Average Daily Demand (gpd): 36 bedrooms (4,140) (gpm): 2.9 115 gpd per bedroom
2. Domestic Maximum Daily Demand (gpd): 12,420 (gpm): 8.6
3. Domestic Peak Hourly Demand (gph): 22,770 gpd (5.5 peaking factor) (gpm): 15.8
949 gph
4. Lawn Irrigation Demand (gpd): 0 (gpm): _____
5. Required Fire Hydrant Flows (gpm): To be coordinated with Fire Department
6. Required Fire Sprinkler System Flows (gpm): Not Applicable

Additional Comments: _____



Additional Requirements:

- Attach a detailed project description including detailed project demand calculations and back-up information supporting all project demand calculations.
- Attach a copy of site plan calling out the block and lots and local vicinity with elevations in NGVD 1929, if elevations are not in NGVD 1929, please provide conversion factor.
- This form and backup calculations to be signed and sealed by a P.E.

**Figure 3B
Willingness to Serve Application**

Information Required for Willingness to Serve

Date: August 15, 2023

Project Name: 571 Main Street

Project Address (Street Name/Town): 571 Main Street, South Kingstown, RI

Brief Project Description: Proposed residential development: Total Units 32 (2 bedrooms Each)

Size and Length of Main: Belmont Street Portion (Units 19-32) - 6" CLDIP 430LF

Number of Hydrants: To be Coordinated with Fire Department

Number of Domestic Services: 14 (1 for each unit)

Number of Fire Services: Water Main Extension

Number of Irrigation services: 0

Commercial (Type and Number Square Feet): N/A

Residential (Number of Units and Number of Bedrooms per Unit): 14 units / 2 bedrooms / unit
 On Behalf of the Applicant:

Contact Name: Molly R. Titus, P.E., DiPrete Engineering

Contact Address: 2 Stafford Court, Cranston, RI 02920

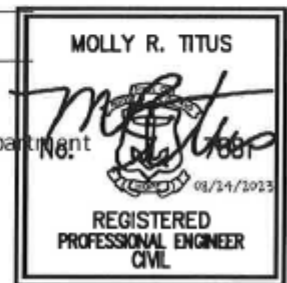
Contact Number: 401-943-1000

Contact Email: mtitus@diprete-eng.com

Projected Demand Summary (if more than one building, attach a Project Demand Summary Table): Using RIDEM OWTS Regs.

1. Domestic Average Daily Demand (gpd): 28 bedrooms (3,220) (gpm): 2.2 115 gpd per bedroom
2. Domestic Maximum Daily Demand (gpd): 9,660 (gpm): 6.7
3. Domestic Peak Hourly Demand (gph): 17,710 gpd (5.5 peaking factor) (gpm): 12.3
738 gph
4. Lawn Irrigation Demand (gpd): 0 (gpm): _____
5. Required Fire Hydrant Flows (gpm): To be coordinated with Fire Department
6. Required Fire Sprinkler System Flows (gpm): if required, to be coordinated with Fire Department

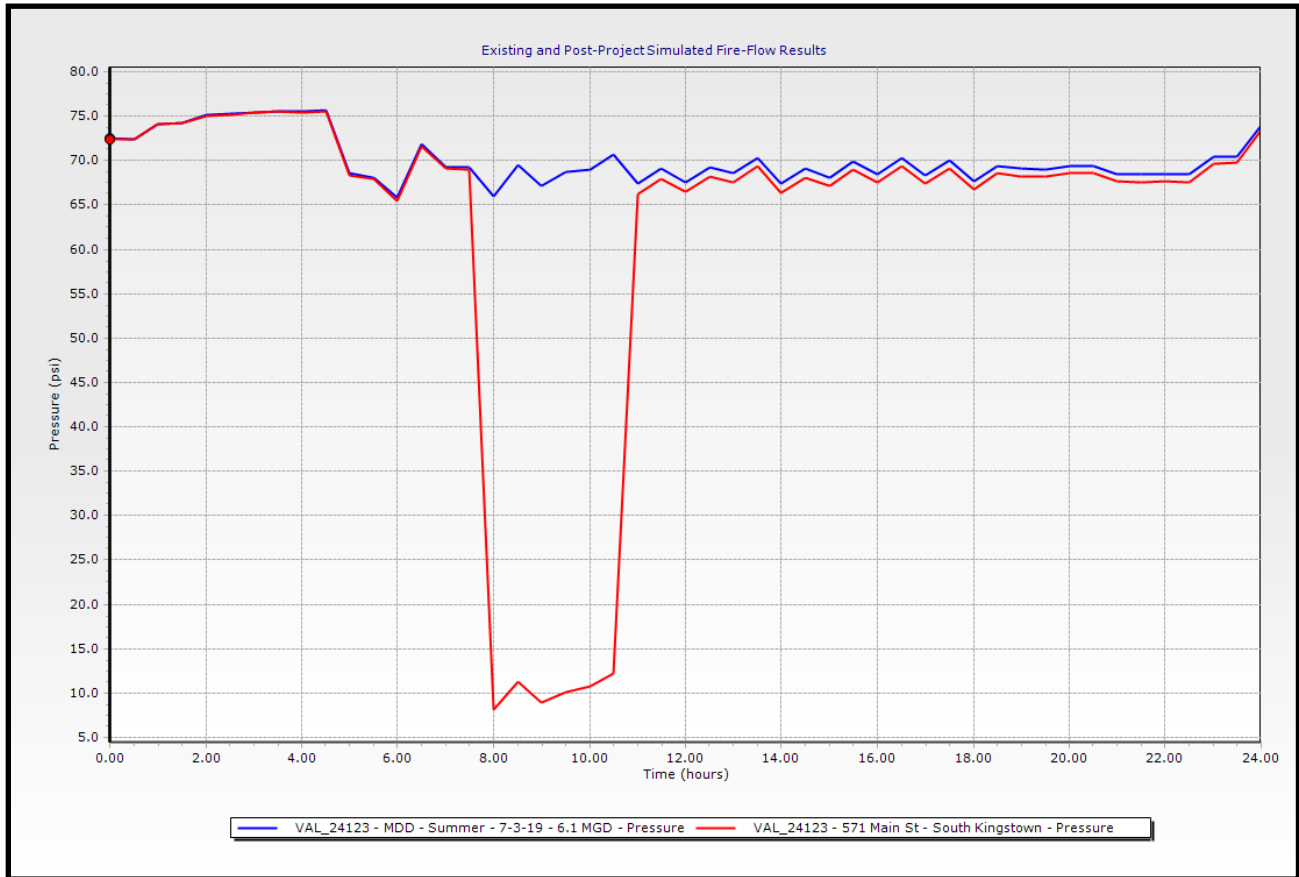
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- This form and backup calculations to be signed and sealed by a P.E.

Figure 4
MDD Model Simulation Results



MDD Model Simulation Results at Proposed Development:

1. Fire-flow analysis for 3-hours at 8:00AM with computed residual pressure at the proposed development for Existing Conditions.
2. Pressure analysis (blue) at the proposed development for existing conditions.
3. Fire-flow analysis (red) with computed residual pressure at the proposed development for post-development conditions.
4. Pressure analysis was performed at the curb line prior to any customer-side metering and back flow prevention devices.