

Model Simulation Report

Proposed Water Service

Project: Broad Rock Road Subdivision

Location: Broad Rock Road, South Kingstown, Rhode Island

Date: January 22, 2024

Project Details

The proposed project, Broad Rock Road Subdivision, consists of a new domestic service connections and a main extension serving a planned development located at the project address. The main extension will consist of approximately 1,300 linear feet of 8-inch ductile iron pipe. The Developer is proposing to construct a 19-lot single family residential subdivision. 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 elevation of the development will reside at an elevation of approximately 77 feet above sea-level. The Evaluation Location is shown in Figure 2. The nearest existing public hydrant to the project is #3-244, which is located along Broad Rock Rd. Two public hydrants are proposed as part of the project. 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 Figure 3. 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):	3,278 gpd	2.3 gpm
Max Daily Demand (MDD):	6,555 gpd	4.6 gpm
Peak Hour Demand (PHD):	779 gph	13.0 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)	

*For the evaluation, it was assumed that lawn irrigation would occur for two (2) hours between 4am and 6am.

Model Calibration

The existing VWRI 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 system conditions. Fire-flow demands were also simulated in a time variable manner (3-hour duration) to 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 is adequately served and does not present any adverse impacts to the distribution system. The VWRI 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 in accordance with the Ten State Standards.

Model simulation results were evaluated by:

1. Ensuring the post-project results comply with VWRI 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 at the development 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, respectively. The results are summarized as follows in Table 2:

Table 2 – Model Simulation Results

Scenario	MDD Pressure	PHD Pressure	Minimum Required Pressure
Existing Conditions:	62 psi	55 psi	35 psi
Post-Development Conditions:	62 psi	55 psi	35 psi
Fire-Flow Residual*:	32 psi	N/A	20 psi

*Simulated results at the development are based on MDD model computation for a 3-hour duration fire-flow event starting at 8 AM. Note, the simulated fire-flows occur starting at 8 AM, which is after the simulated irrigation demands, which were assumed to occur between 4 AM and 6 AM.

The VWRI 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. Minimizing supply pressure variations to existing and proposed customers resulting from the proposed development impact is also considered in the evaluation. 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. Additionally, during a simulated fire, the residual pressure at the development is predicted to remain above the required 20 psi threshold. Based on these results, VWRI is able to provide service to the proposed development without requiring additional distribution system improvements at the proposed project location.

It is important to note that the estimated pressures and available fire-flow presented in this technical memorandum are based on water distribution system hydraulic computer model simulations. Due to the dynamic nature of a water system, results may differ depending on system conditions at that time. The water system conditions may change based on facility operation, system demand, routine system maintenance, and upon the results of field investigations.

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 no additional distribution system modifications are required to serve the development at this time based on the information provided by the developer.

Figure 1
GIS Imagery of Proposed Project Location
Global View

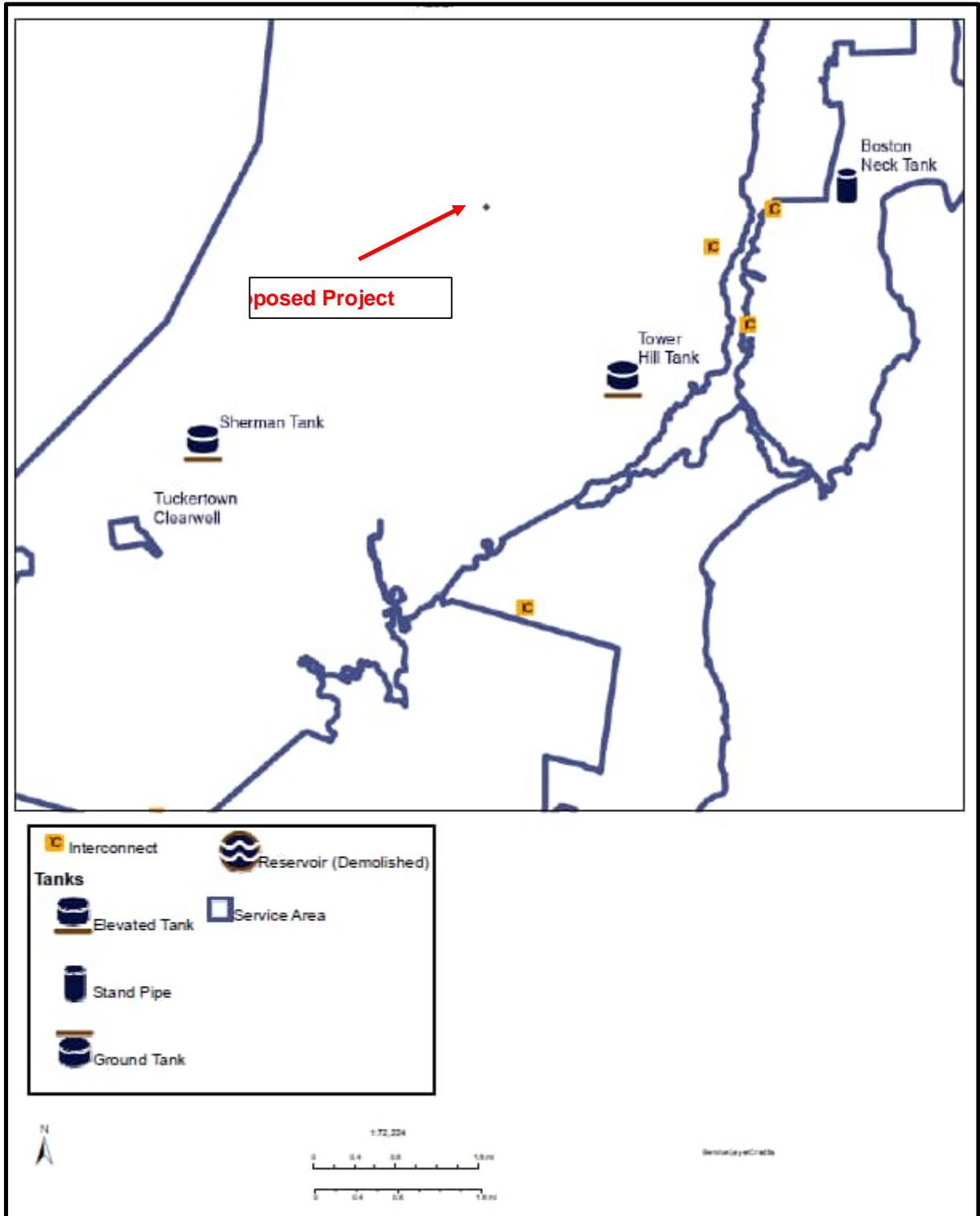
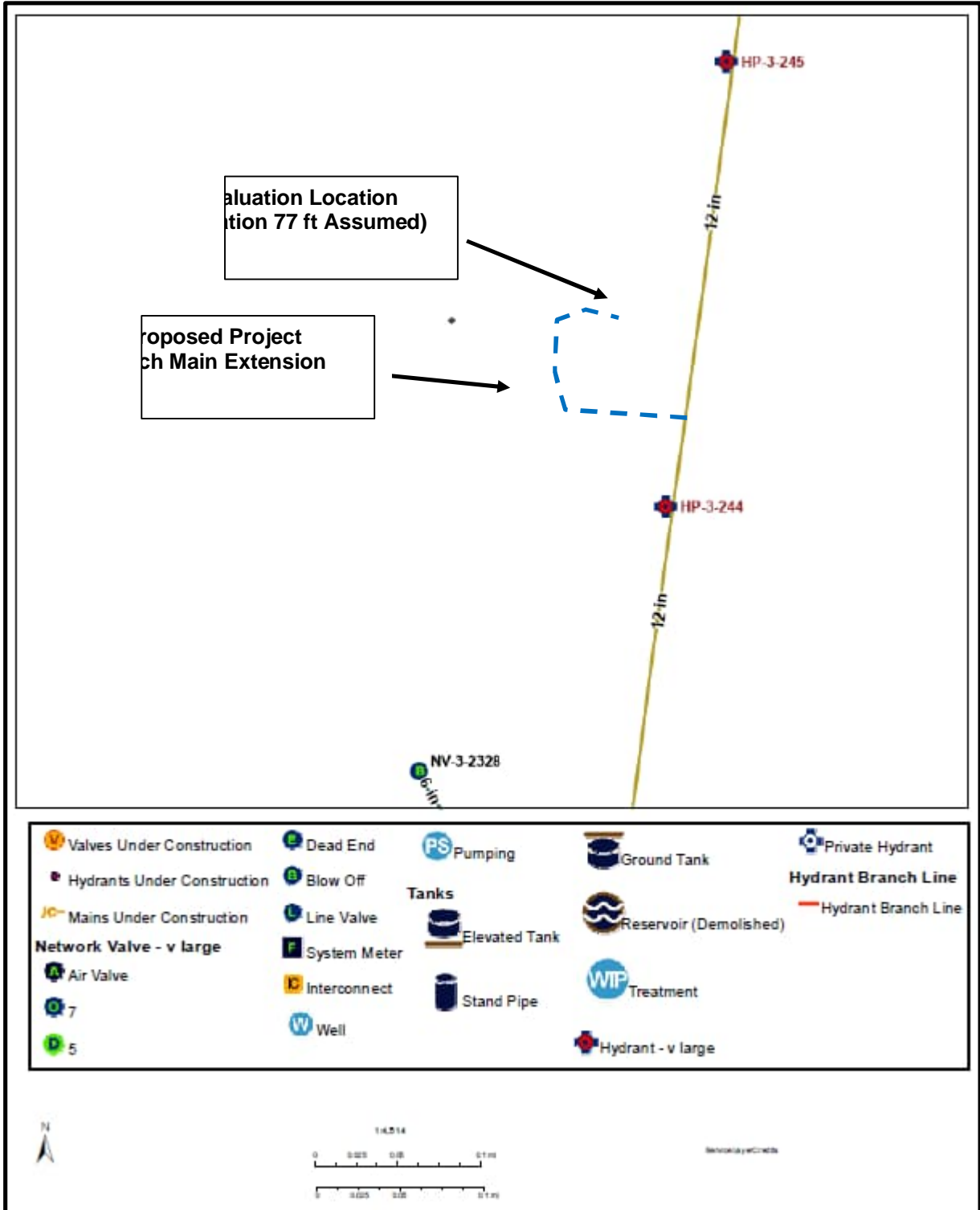


Figure 2
GIS Imagery of Proposed Project Location
Local View



Valves Under Construction	Dead End	PS Pumping	Ground Tank	Private Hydrant
Hydrants Under Construction	Blow Off	Tanks	Reservoir (Demolished)	Hydrant Branch Line
Mains Under Construction	Line Valve	Elevated Tank	Stand Pipe	Hydrant Branch Line
Network Valve - v large	System Meter	WTP Treatment	Hydrant - v large	
Air Valve	Interconnect			
7	Well			
5				

Figure 3
Willingness to Serve Application

Information Required for Willingness to Serve

Date: August 24, 2023

Project Name: Broad Rock Road 19 lot subdivision

Project Address (Street Name/Town): Broad Rock Road, S.K.

Brief Project Description: 19 lot residential subdivision

Size and Length of Main: 8" main, 1,300+/- feet

Number of Hydrants: 2 (to be determined by fire marshal)

Number of Domestic Services: 19

Number of Fire Services: 0

Number of Irrigation services: TBD

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

Residential (Number of Units and Number of Bedrooms per Unit): 19 units, 3 bedrooms/unit

Contact Name: Steven Clarke

Contact Address: 257 WICKFORD CT, NORTH KINGSTOWN, RI 02852

Contact Number: 401-529-4690

Contact Email: sclarke4477RI@gmail.com

Projected Demand Summary (if more than one building, attach a Project Demand Summary Table):

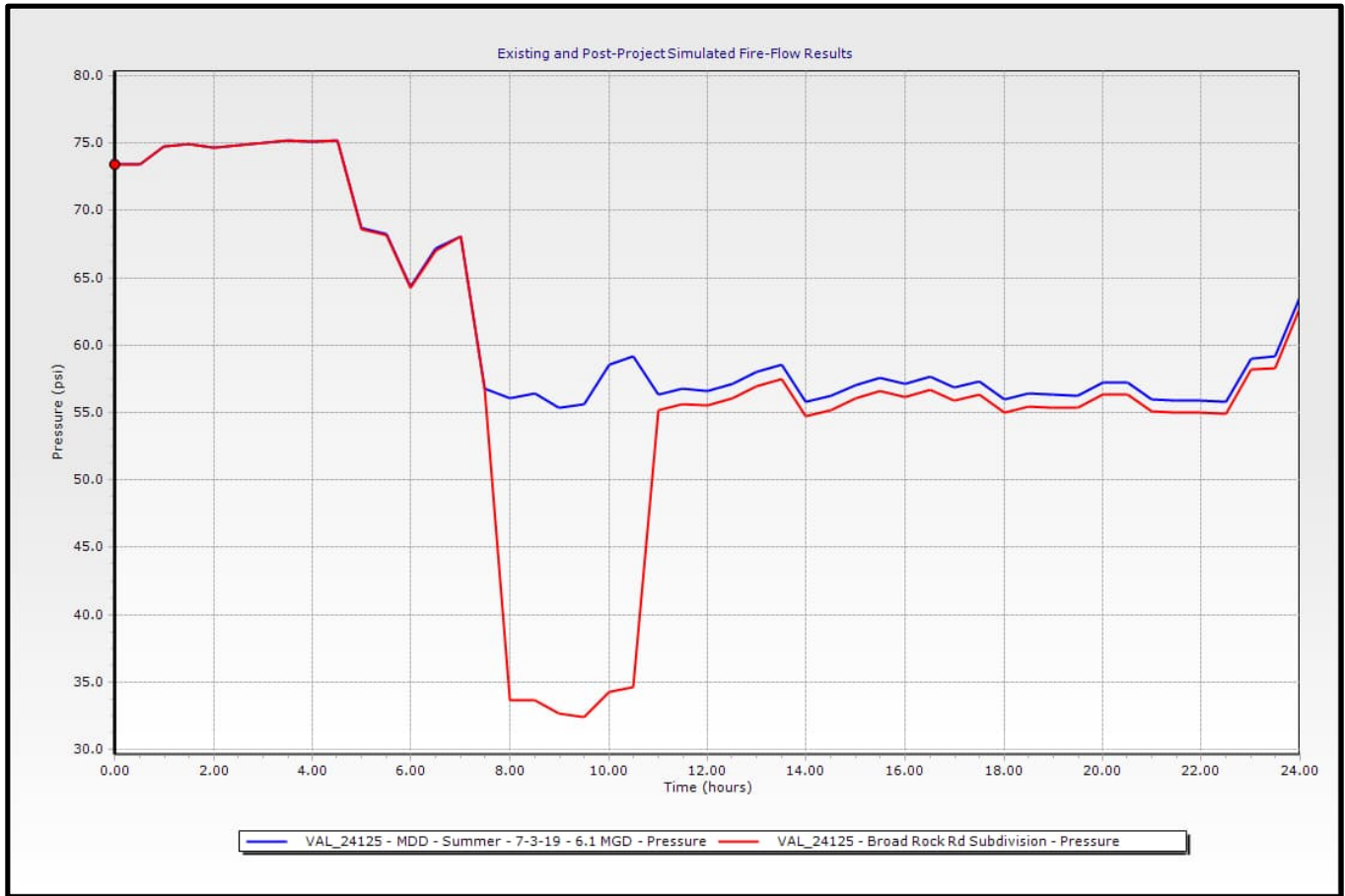
1. Domestic Average Daily Demand (gpd): 3,278 (gpm): 2.28
2. Domestic Maximum Daily Demand (gpd): 6,555 (gpm): 4.55
3. Domestic Peak Hourly Demand (gph): 779 (gpm): 13.0
4. Lawn Irrigation Demand (gpd): TBD (gpm):
5. Required Fire Hydrant Flows (gpm): 1,000 (TBD)
6. Required Fire Sprinkler System Flows (gpm): N/A

Additional Comments: We are at the 'Master Plan' stage so
all numbers above are subject to change by planning process.

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. (elev. are NGVD 88 on plan,
- This form and backup calculations to be signed and sealed by a P.E. E1.100 NAVD88 = 100.91 NGVD 29)

Figure 4
MDD Model Simulation Results



MDD Model Simulation Results at Proposed Development:

1. See Figure 2 for model "Evaluation Location".
2. Fire-flow analysis for 3 hours starting at 8:00 AM with computed residual pressure at the development.
3. Pressure analysis (blue) at the proposed development for existing conditions.
4. Fire-flow analysis (red) with computed residual pressure at the proposed development for post-development conditions.
5. Pressure analysis was performed at the curb line prior to any customer-side metering, service piping, back flow prevention devices, check valves, hot boxes, and other appurtenances.
6. A safety margin in any fire sprinkler design is recommended to accommodate varying supply conditions.