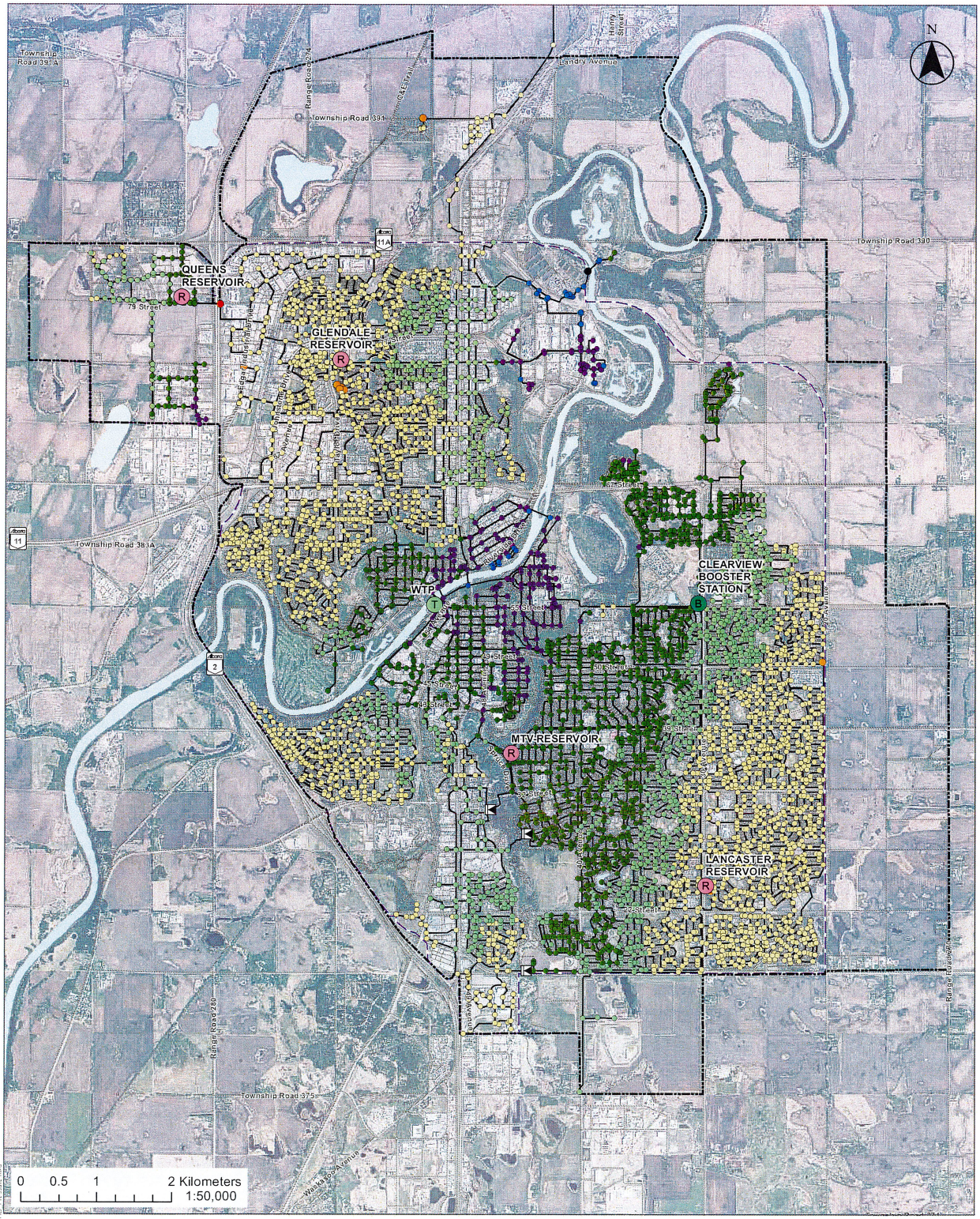

Pressure Reducing Valve
Pipe Network
Red Deer City Limits
Existing Service Boundary (Infill Development)

Facilities
- Booster Station
- Reservoir
- Water Treatment Plant\Reservoir

Pressure
- 280 kPa (<40.6 psi)
- 280 - 300 kPa (40.6 - 43.5 psi)
- 300 - 400 kPa (43.6 - 58.0 psi)
- 400 - 500 kPa (58.0 - 72.5 psi)
- 500 - 600 kPa (72.5 - 87.0 psi)
- 600 - 650 kPa (87.0 - 94.0 psi)
- 650 - 700 kPa (94.0 - 101.5 psi)
- 700 - 750 kPa (101.5 - 105.8 psi)
- >750 kpa (105.8 psi)

Completed By: AL
Date: 07/29/2022

Project No.: 110170064

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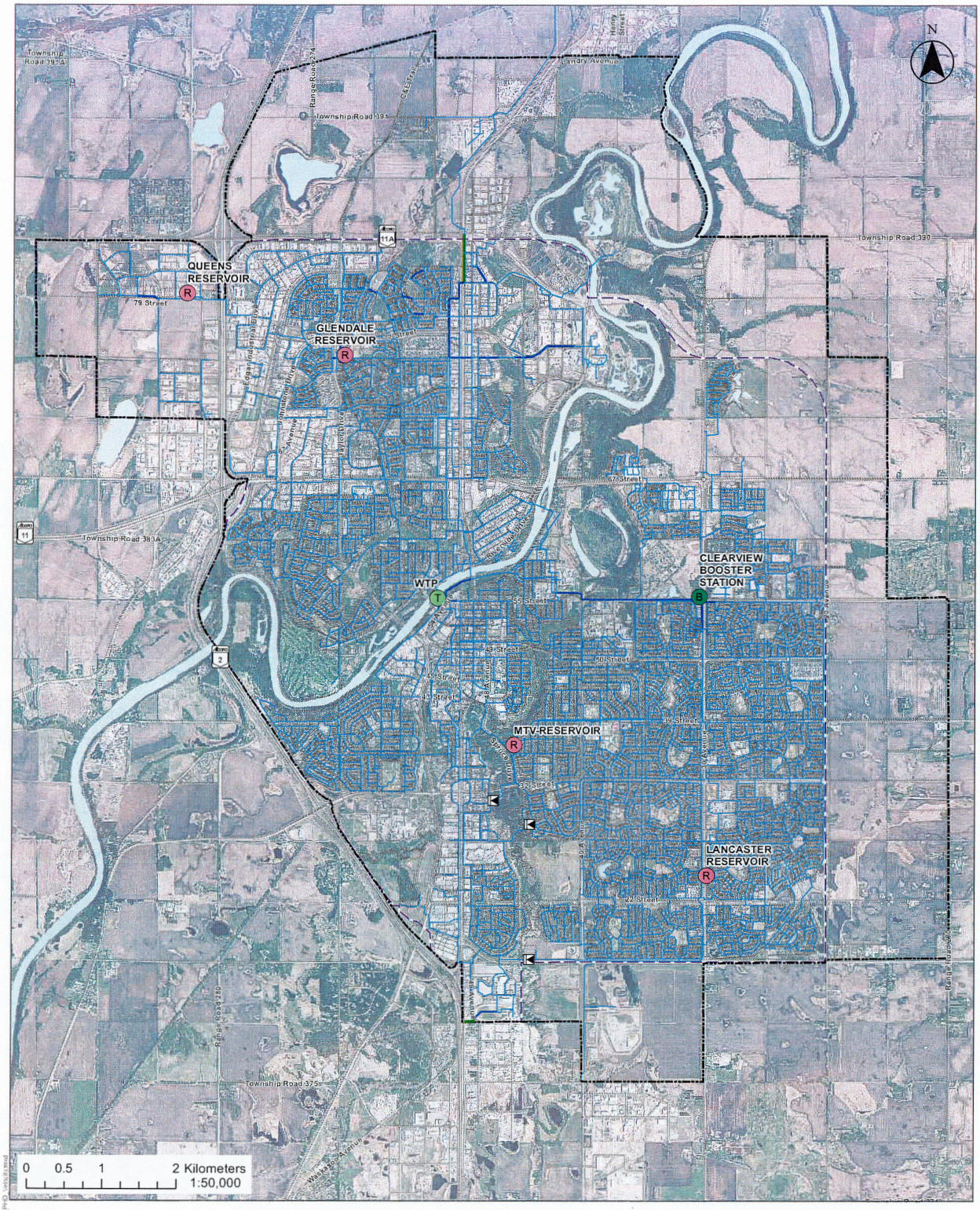
Figure 4-15: Existing System - Peak Hour Demand System Pressure

City of Red Deer Water Model Update
City of Red Deer



Pressure Reducing Valve (Active)
Red Deer City Limits
Existing Service Boundary (Infill Development)

Facilities
- Booster Station
- Reservoir
- Water Treatment Plant

Velocity
- >1.5 m/s
- 1.25 - 1.5 m/s
- 1.0 - 1.25 m/s
- 0.5 - 1.0 m/s
- 0.0 - 0.5 m/s

Completed By: AL
Date: 07/29/2022

Project No.: 110170064

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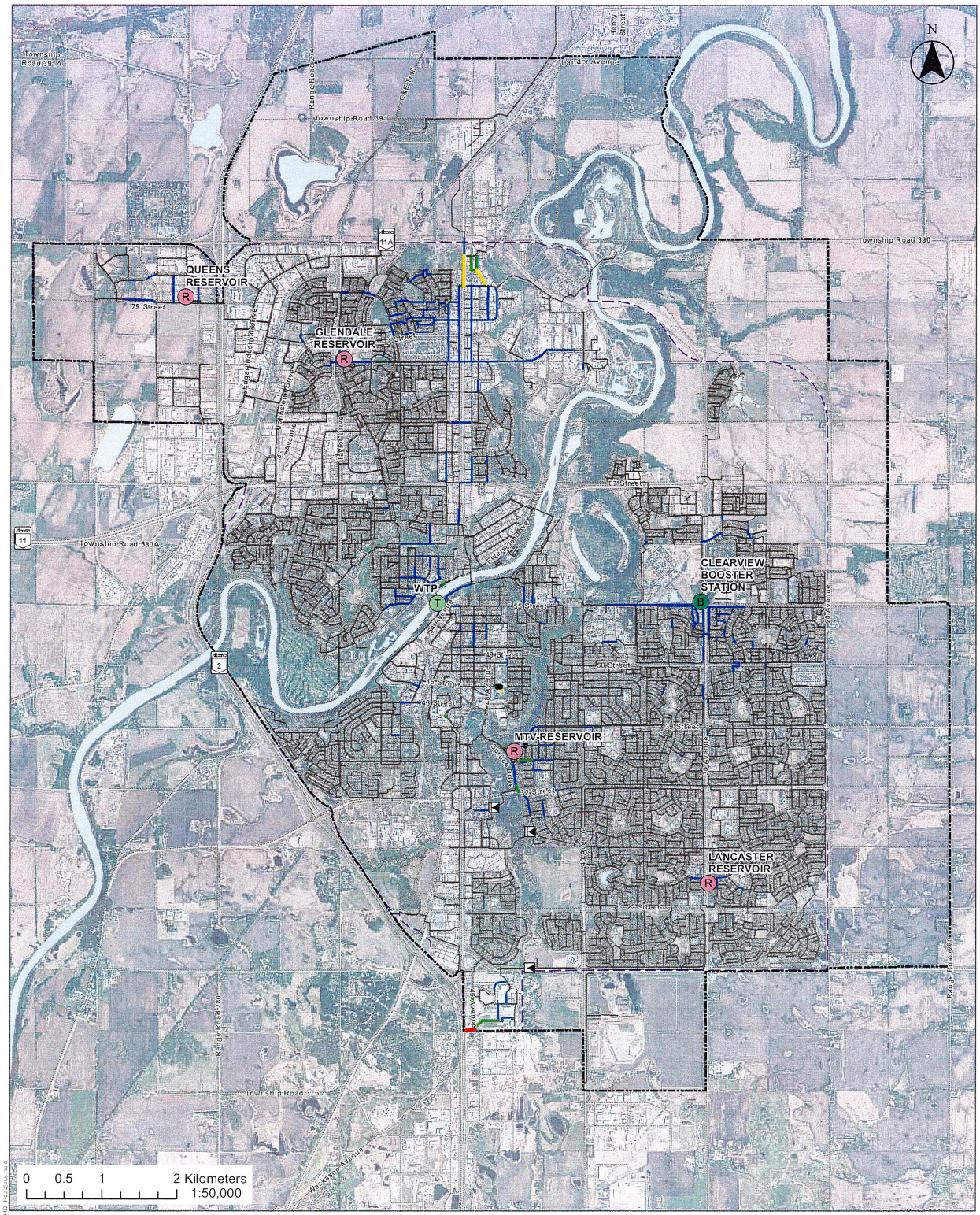
Figure 4-16: Existing System - Peak Hour Demand Pipe Velocity

City of Red Deer Water Model Update
City of Red Deer



Pressure Reducing Valve
Red Deer City Limits
Existing Service Boundary (Infill Development)

Facilities
- Booster Station
- Reservoir
- Water Treatment Plant

Headloss Gradient
- 0.0 - 0.5 m/km
- 0.5 - 2.5 m/km
- 2.5 - 5.0 m/km
- 5.0 - 7.5 m/km
- 7.5 - 10 m/km
- >10 m/km

Completed By: AL
Date: 07/29/2022

Project No.: 110170064

Stantec

Figure 4-17: Existing System - Peak Hour Demand Headloss Gradient

City of Red Deer Water Model Update
City of Red Deer

4.4 Reservoir Filling Analysis

The Glendale and Lancaster reservoirs do not have dedicated filling lines as the same line is also used for discharge. Therefore, these two stations must fill their reservoirs from the distribution system during off-peak hours while the distribution pumps in these two facilities are put offline. The pumps only operate when the filling stops. Typically, the Lancaster and Glendale reservoirs are filled during the night between the hours of 12 am and 6 am. During this filling period, the reservoirs must fill the full active volume of water that the reservoir pumps during the day.

Data from the City's SCADA system showed that filling rate of the Glendale reservoir ranged between 24 and 171 L/s (excluding the highest and lowest 1% of the recorded values) for the period from December 2020 to January 2022, with an average of 90 L/s. For the Lancaster reservoir, the filling rate was below 152 L/s for the same period (excluding the highest 1% of the recorded values), with an average of 84 L/s. For modeling of the night filling scenario for the existing system, filling rates of 180 and 150 L/s were used for the Glendale and Lancaster reservoirs, respectively, as per **Table 2-2**.

A summary of the boundary conditions used in the WaterCAD hydraulic analysis for each facility in the water distribution system for the night filling scenario are shown in **Table 4-4**.

Table 4-4: Existing System Night Filling – WaterCAD Hydraulic Analysis Boundary Setpoints

Water Treatment Plant			**Mountview Reservoir and Pump Station**	
HLP 101 - 900 HP	ON		P1 - 150 HP	OFF
HLP 102 - 700 HP	ON		P2 - 150 HP	OFF
HLP 103 - 350 HP	OFF		P3 - 150 HP	OFF
HLP 104 - 900 HP	OFF		Station Outflow	0.0 L/s
Station Outflow	761.4 L/s		Hydraulic Grade Setpoint	940 m
Hydraulic Grade Setpoint	919 m		Reservoir Fill Rate	120.0 L/s
Glendale Reservoir and Pump Station			**Lancaster Reservoir and Pump Station**	
P1 - 200 HP - Emergency Pump	OFF		P1 - 75 HP	OFF
P2 - 125 HP	OFF		P2 - 75 HP	OFF
P3 - 125 HP	OFF		P3 - 75 HP	OFF
P4 - 125 HP	OFF		P4 - 75 HP	OFF
Station Outflow	0.0 L/s		Station Outflow	0.0 L/s
Hydraulic Grade Setpoint	919 m		Hydraulic Grade Setpoint	940 m
Reservoir Fill Rate	180.0 L/s		Reservoir Fill Rate	150.0 L/s
Clearview Booster Station			**Queens Business Park Reservoir and Pump Station**	
P1 - 125 HP	ON		P1 - 75 HP	ON
P2 - 125 HP	ON		P2 - 100 HP	OFF
P3 - 125 HP	OFF		P3 - 150 HP	OFF
P4 - 125 HP	OFF		P4 - 150 HP	OFF
Station Outflow	244.4 L/s		Station Outflow	16.0 L/s
Hydraulic Grade Setpoint	940 m		Hydraulic Grade Setpoint	950 m
			Reservoir Fill Rate	50.0 L/s

The residual water demands in the system for the night filling scenario was assumed to be 1/3 MDD. A review of data from the City's SCADA system showed that an assumed demand of 1/3 MDD is reasonable between the hours of 12 am and 6 am.

A summary of the system pressures and velocity in the existing system during the NF scenario are presented in **Figure 4-18** and **Figure 4-19**.

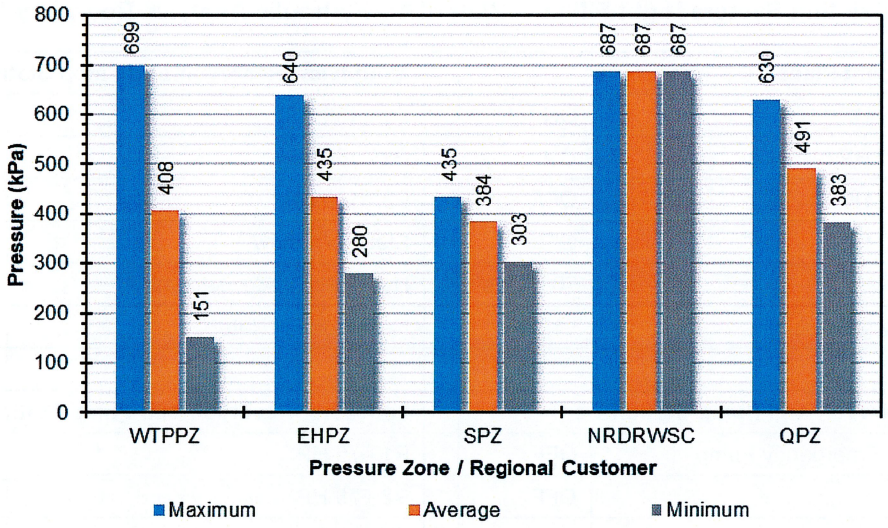


Figure 4-18: Existing System Night Filling - Pressure

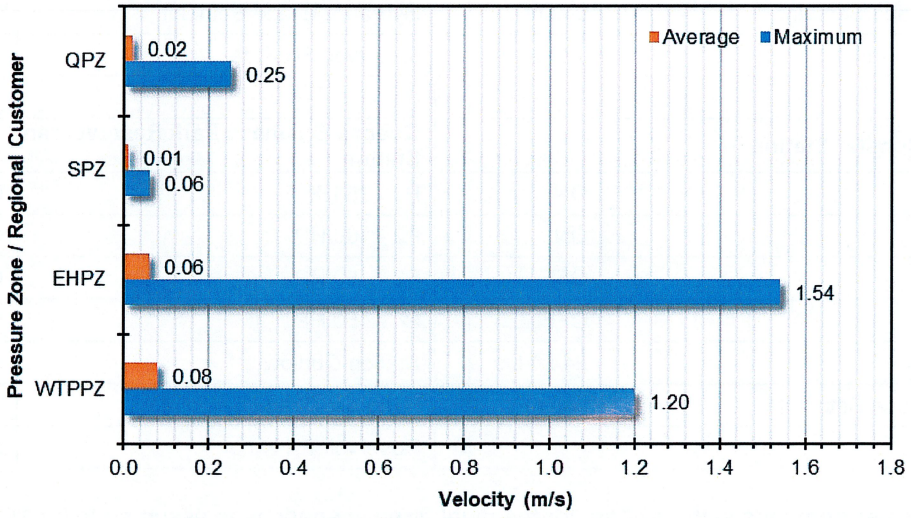


Figure 4-19: Existing System Night Filling – Flow Velocity

Note: The line feeding the NRDRWSC was included in the WTPPZ.