

## Water Model Update Existing System Analysis

### 4.4.1 Discussion on Existing System Night Filling Analysis

Filling of the Glendale Reservoir in the WTP Pressure Zone at a rate of 180 L/s resulted in the following impacts:

1. A group of junctions located in the Glendale Park Estates and Johnstone Park neighborhoods showed pressures below 300 kPa with a minimum of 260 kPa (37.7 psi). As the filling happens in night, the low pressure is considered acceptable.

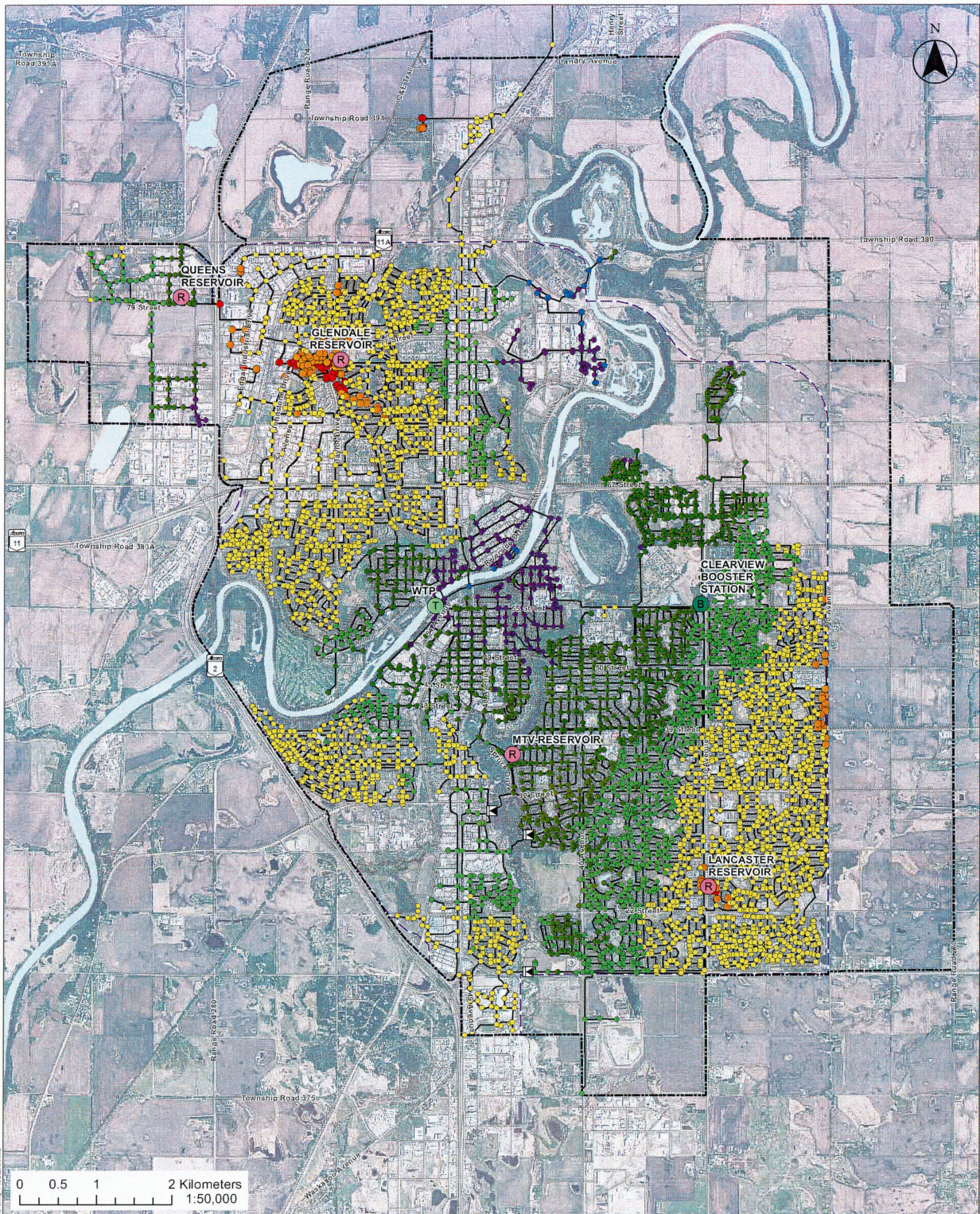
Filling of the Lancaster Reservoir in the East Hill Pressure Zone at a rate of 150 L/s resulted in the following impacts:

1. Pressures of 10 junctions on 30 Avenue surrounding the Lancaster Reservoir dropped slightly below 300 kPa with a minimum of 280 kPa (40.6 psi).
2. Pressures of 16 junctions on 20 Avenue between Dubois Crescent and Ramage Close dropped marginally below 300 kPa with a minimum of 294 kPa (42.7 psi).
3. Pressures of 5 junctions directly upstream of the Clearview Pump Station dropped marginally below 300 kPa with a minimum of 260 kPa (37.6 psi).
4. Four junctions upstream of the Mountview Pump Station showed pressures below 300 kPa, ranging between 263 kPa (38.1 psi) and 297 kPa (43.0 psi).


The headloss gradient is high in the filling pipe to the Mountview Reservoir when the reservoir is being filled. To conserve energy, the City can replace the existing 133 m 350 mm diameter ductile iron filling pipe installed along the Spruce Drive with a 400mm diameter PVC pipe, however it is not deemed a priority as the replacement would only be for operational energy use optimization.










The results from the night filling analysis are illustrated in **Figure 4-20**, **Figure 4-21**, and **Figure 4-22**.





 Pressure Reducing Valve  
 Pipe Network

**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)

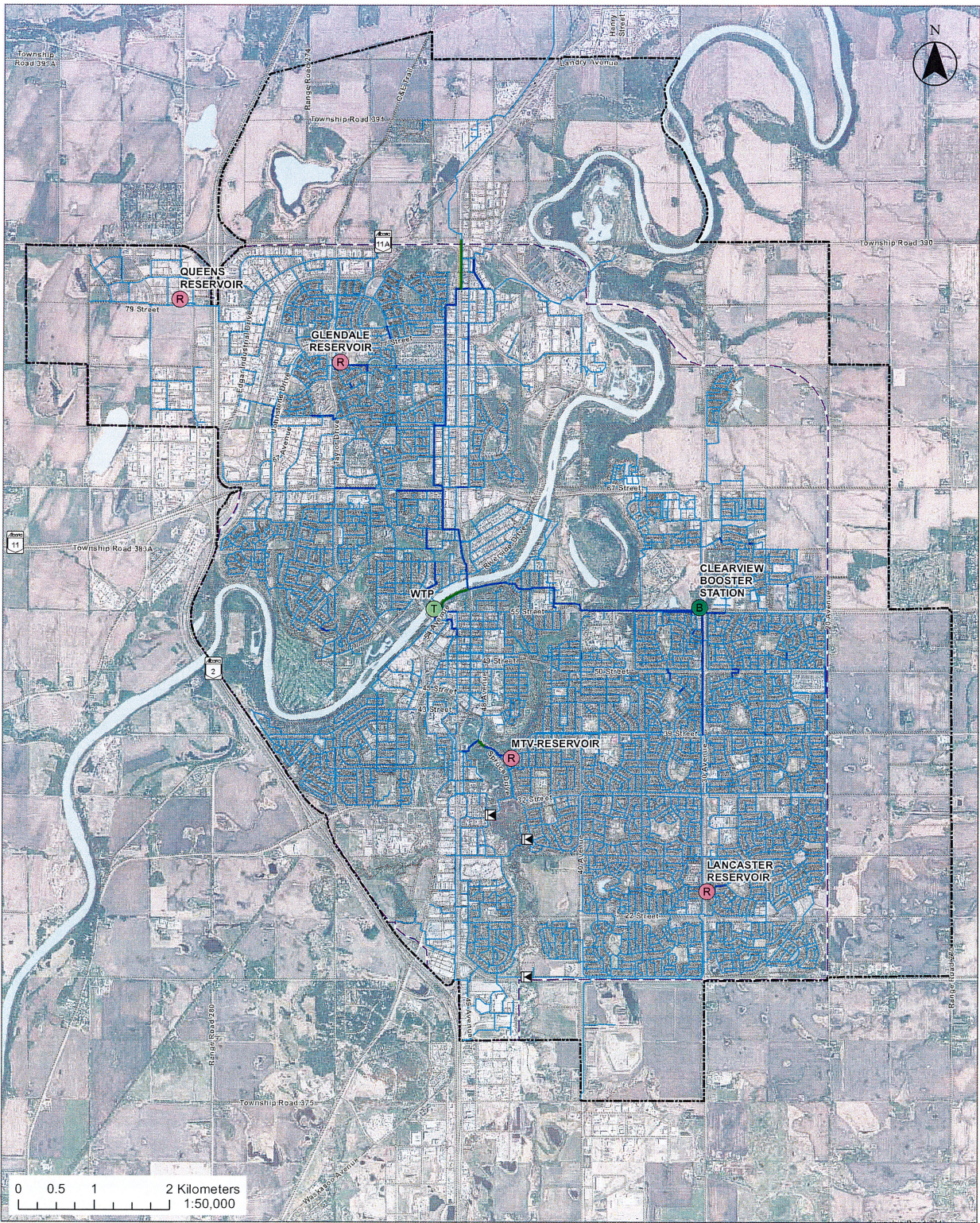
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**Figure 4-20: Existing System - Night Filling Demand System Pressure**  
 City of Red Deer Water Model Update  
 City of Red Deer



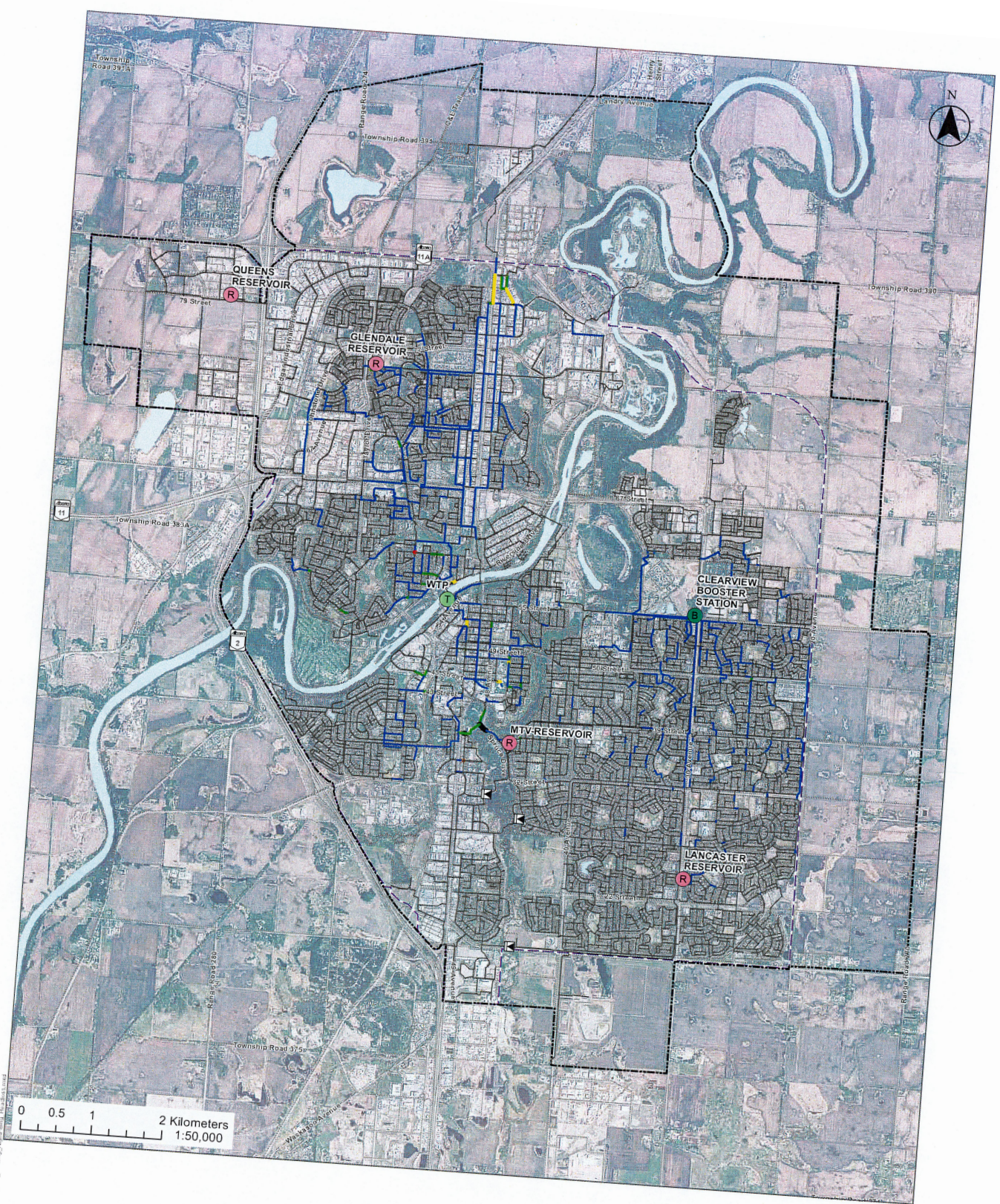
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**Figure 4-21: Existing System - Night Filling Demand Pipe Velocity**  
 City of Red Deer Water Model Update  
 City of Red Deer



-  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

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 Project: 110170064 - City of Red Deer Water Model Update  
 File: 110170064 - City of Red Deer Water Model Update - Infill Development

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Figure 4-22: Existing System - Night Filling Demand Headloss Gradient  
City of Red Deer Water Model Update  
City of Red Deer

Project No.: 110170064

#### **4.5 Existing System Available Fire Flow Analysis**

The model of the City's existing water distribution system was utilized to calculate the available fire flows during maximum day demands in the system. The required fire flows at the demand nodes were assigned based on the current land use designation.

The criteria outlined in **Table 2-6** was used to evaluate fire flow requirements based on land use for the existing system.

The current City's design standards for water indicate a maximum flow velocity of 2.5 m/s is permitted for fire flows for new designs, and flows exceeding 2.5 m/s could be acceptable for existing infrastructure. The available fire flows in the system were calculated based on a minimum system pressure constraint of 150 kPa (21.8 psi) without a velocity constraint as fire fighters normally monitor the residual pressure but not the velocity in the watermains.

**Figure 4-23** shows the fire flow requirements based on land use for the existing system.

