

Project Technical Requirements

The Department of Public Services purchases drinking water from the Great Lakes Water Authority (via a regional water authority) provides water, wastewater, and storm water, roads, pathways and traffic engineering services to the City of Rochester Hills, Michigan (The Owner). The City’s 76,300 residents live in a service area encompassing approximately 33 square miles with 8 pressure zones (see Fig. 1 below). There are Thirty-Five water and sewer system sites currently monitored by SCADA, comprised of:

1. 4 Inter-Agency System Meters
2. 20 Pressure Reducing Valve Sites
3. 2 Water Booster Pumping Stations
4. 3 Customer Meter Pits
5. 6 Sewage Pumping Stations

The SCADA-monitored sites communicate nearly 400 digital and analog inputs and outputs (IO). The variety and count of data are listed below in Table 1:

IOCategory	Analog	Digital	Count
Pressure	X		49
Hz	X		6
Flow	X		1
Rainfall	X		1
Temperature	X		1
Water Level	X	X	4/17
Valve Position	X		16
Runtime	X		6
Entry		X	27
Flood		X	28
Station Power		X	34
PLC Fault		X	33
PLC Battery		X	33
Pump Status		X	21
Battery Backup		X	1
VFD Status		X	6
UPS Power		X	32
Valve Status		X	2
Communication Fail		X	34
Generator Status		X	3
Level Sensor Failure		X	2

Table 1 – IO Type and Count

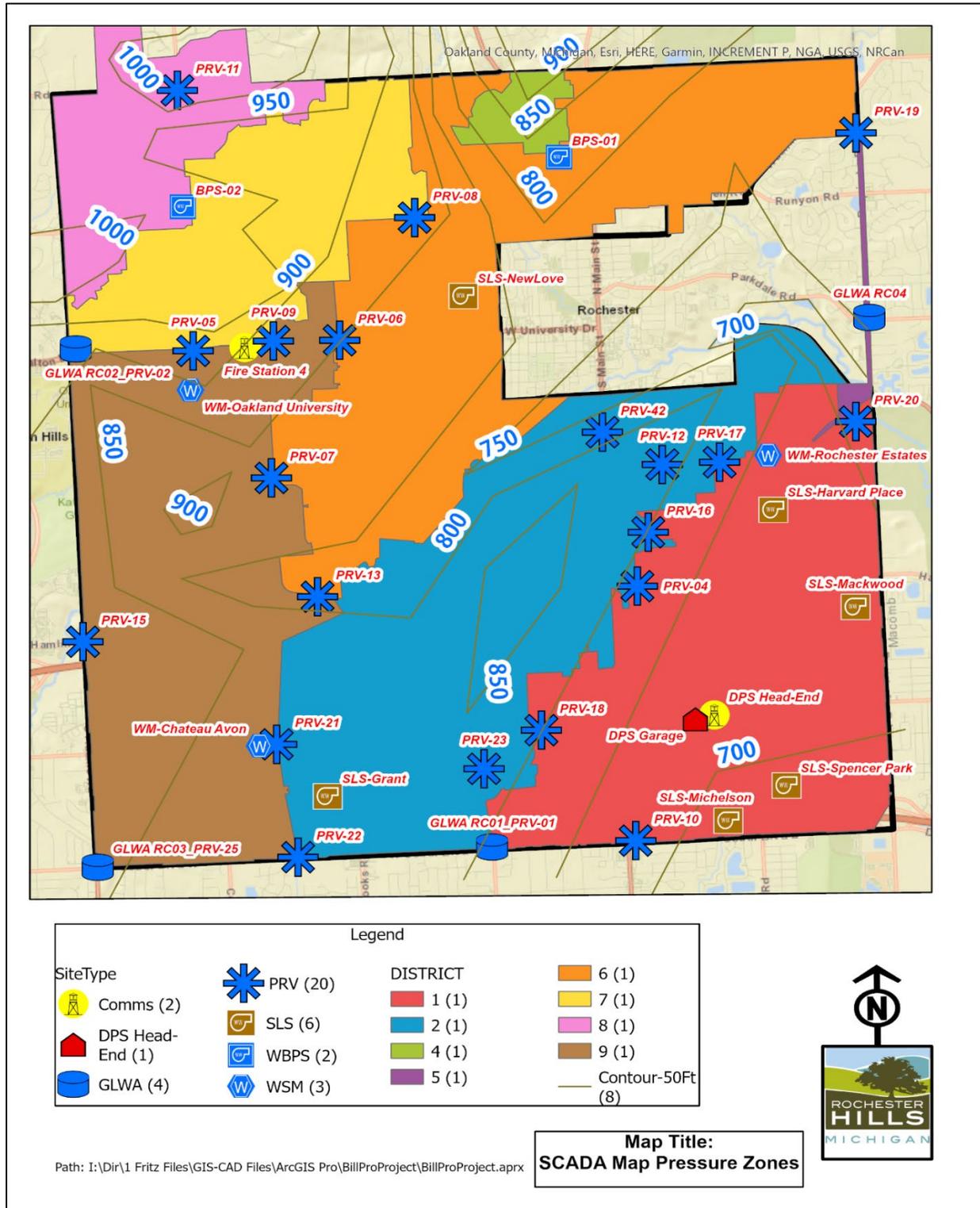


Figure 1 - SCADA Pressure Zones

All but one of the sites listed above communicate with the server via unlicensed 900MHz spread-spectrum radios. One site communicates via cellular network. The map below (Figure 2) shows the locations of the SCADA sites, the 50-Foot ground contours, communication linkages, and a table of the site data.

A previous evaluation study was prepared in 2013 at which time several sites were experiencing communication issues, largely due to line-of-sight conditions. The communications issues have continued and expanded, as the tree canopy has continued to mature. Per the 2013 study, other undesirable conditions at that time which still persist include:

1. The radio network reports-by-exception, polled by the head-end site on 5-minute intervals. Each RTU radio polls surrounding radios. Each RTU has mesh-network-enabled, allowing it to seek available surrounding radios to send data. This may require several “hops” and utilize radios outside of the Rochester Hills network.
2. The network currently relies heavily upon the neighboring radios for reliable radio communication back to the head end site.
3. The existing 900 MHz radio system has inadequate radio coverage without the support of neighboring radio networks.
4. The existing 900 MHz radio equipment is obsolete and not readily serviceable.
5. The existing 900 MHz radio equipment programming is cumbersome and not user friendly.

The existing legacy SCADA monitoring application is several years old, with unsupported HMI software. DPS has utilized third-party support services to maintain the existing infrastructure. In 2015 the system received new servers and the HMI software was upgraded to Proficy iFix v5.8 . The Proficy ifix HMI is currently available on a handful of workstations only. The HMI is made up of 42 screens displaying the hundreds of IO data points, calculated fields, and navigation buttons .

The SCADA Network is purposely insulated from the City’s Information infrastructure. DPS also utilizes Teledac WIN-911 Alarm Notification Software to monitor the database and for alarm notification.

About 30 of the sites have on-site cabinets housing the radios, back-up power supply, Allen-Bradley MicroLogix PLCs, heaters, etc.
