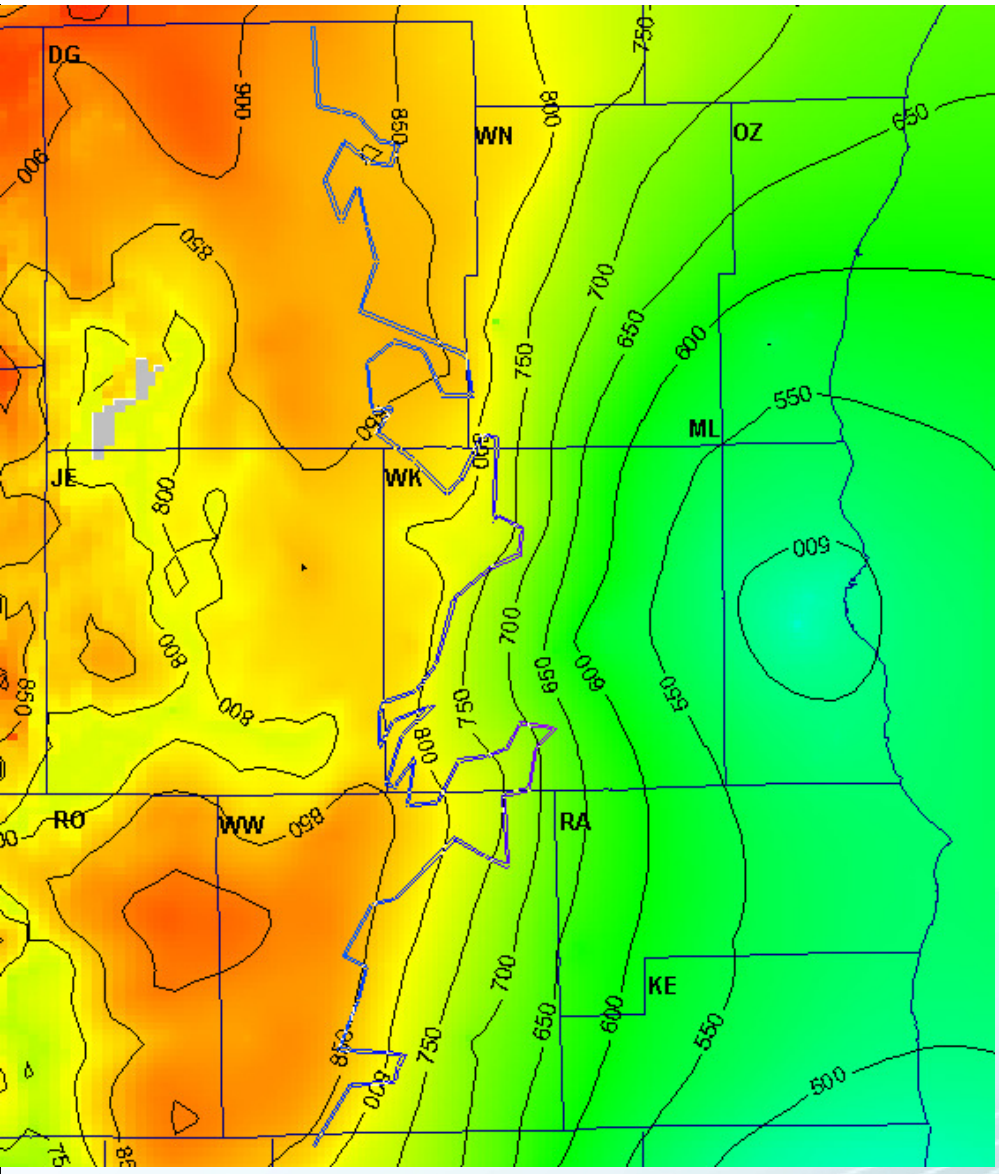
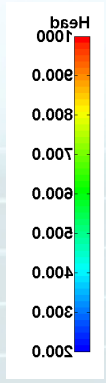
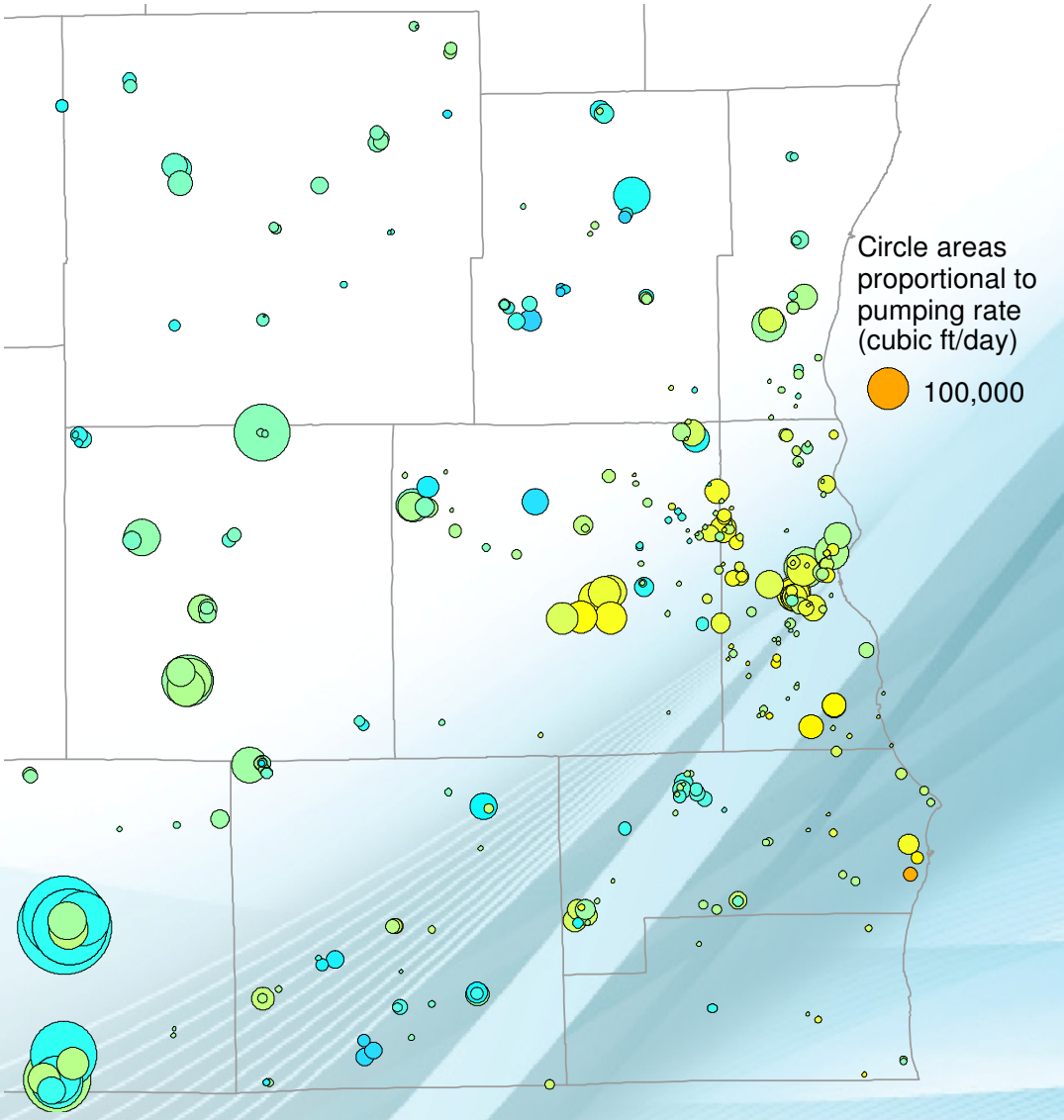




Water Levels in the Sandstone Aquifer
(feet above sea level)

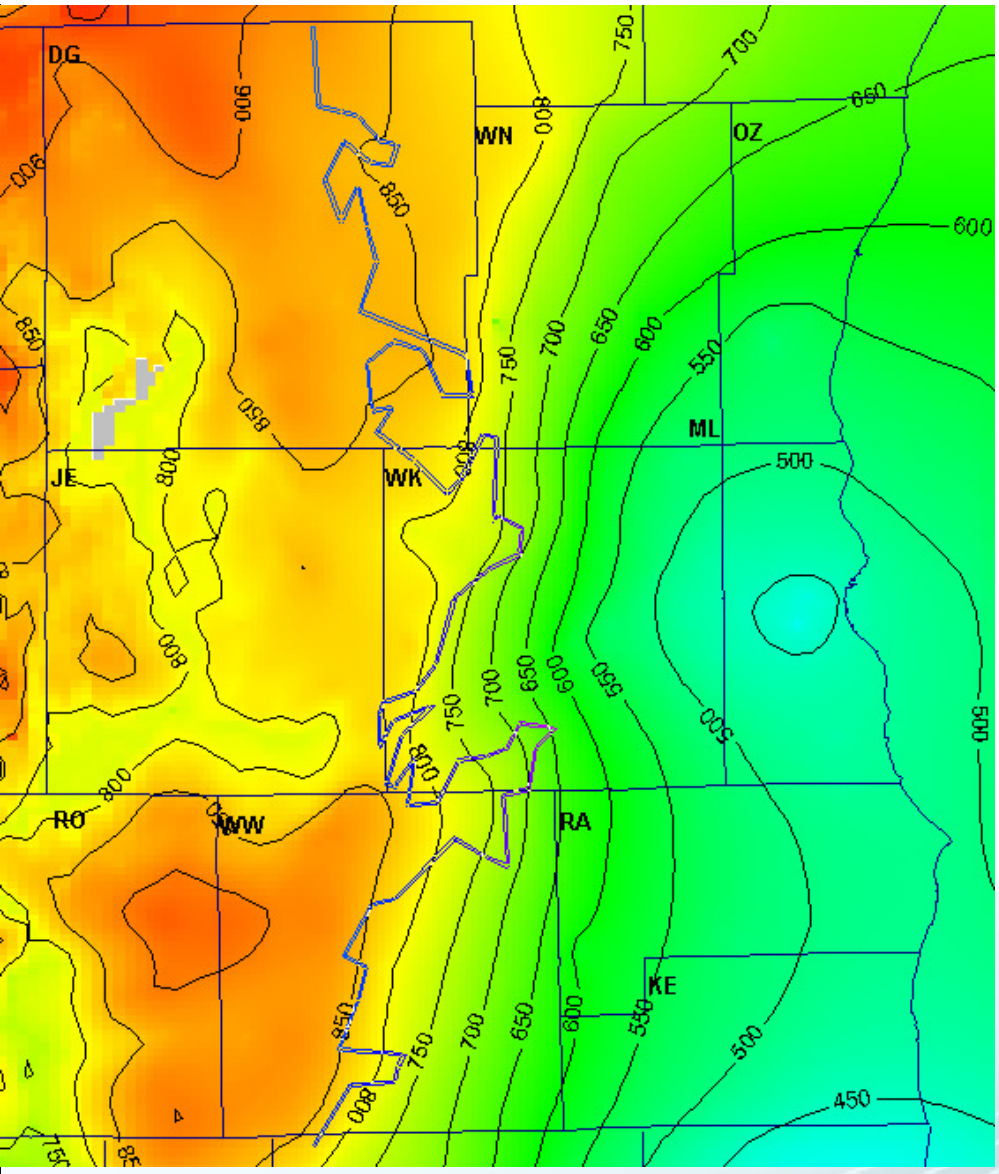


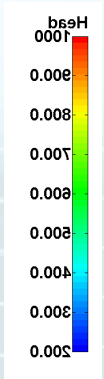
Well Locations and Pumping Rates

Shallow Deep

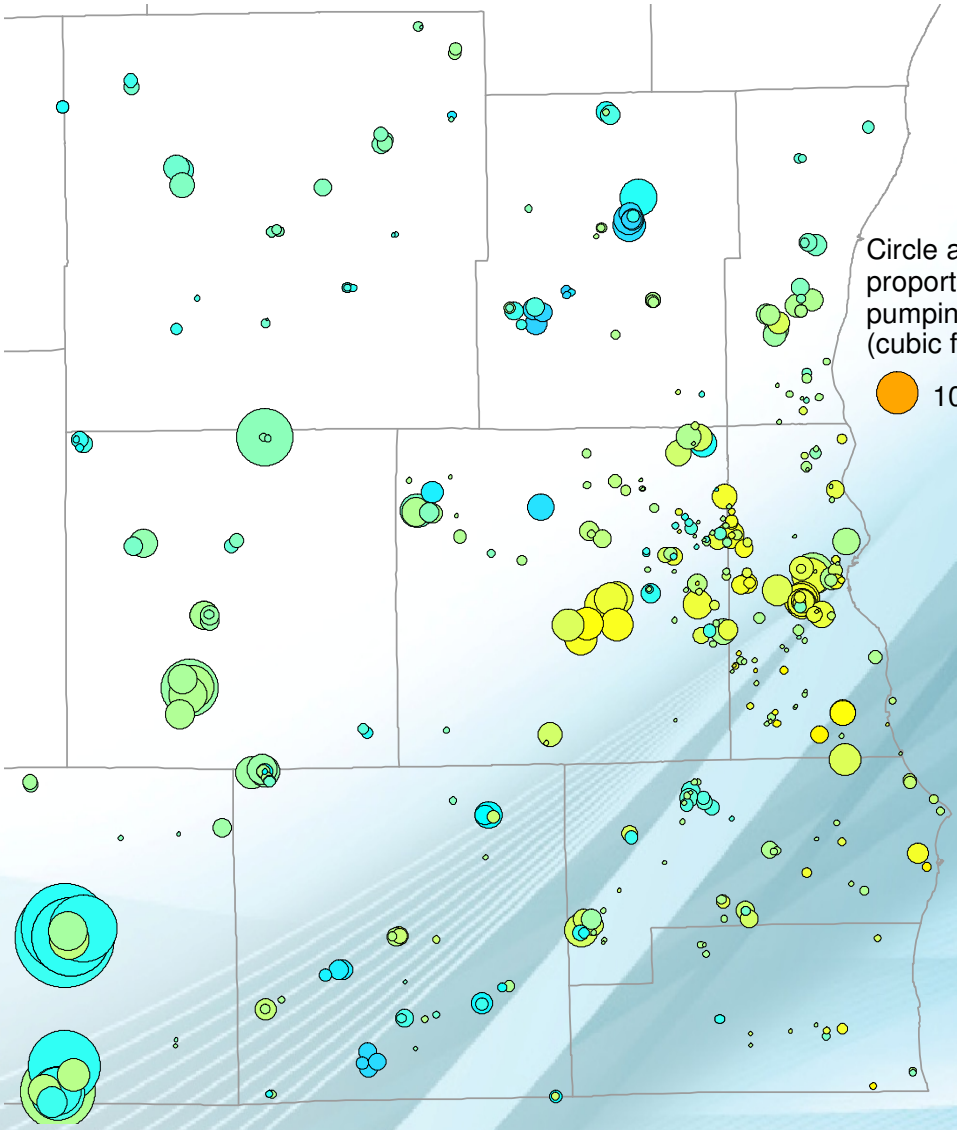
1961-1965

Waukesha Water Utility





Water Levels in the Sandstone Aquifer
(feet above sea level)

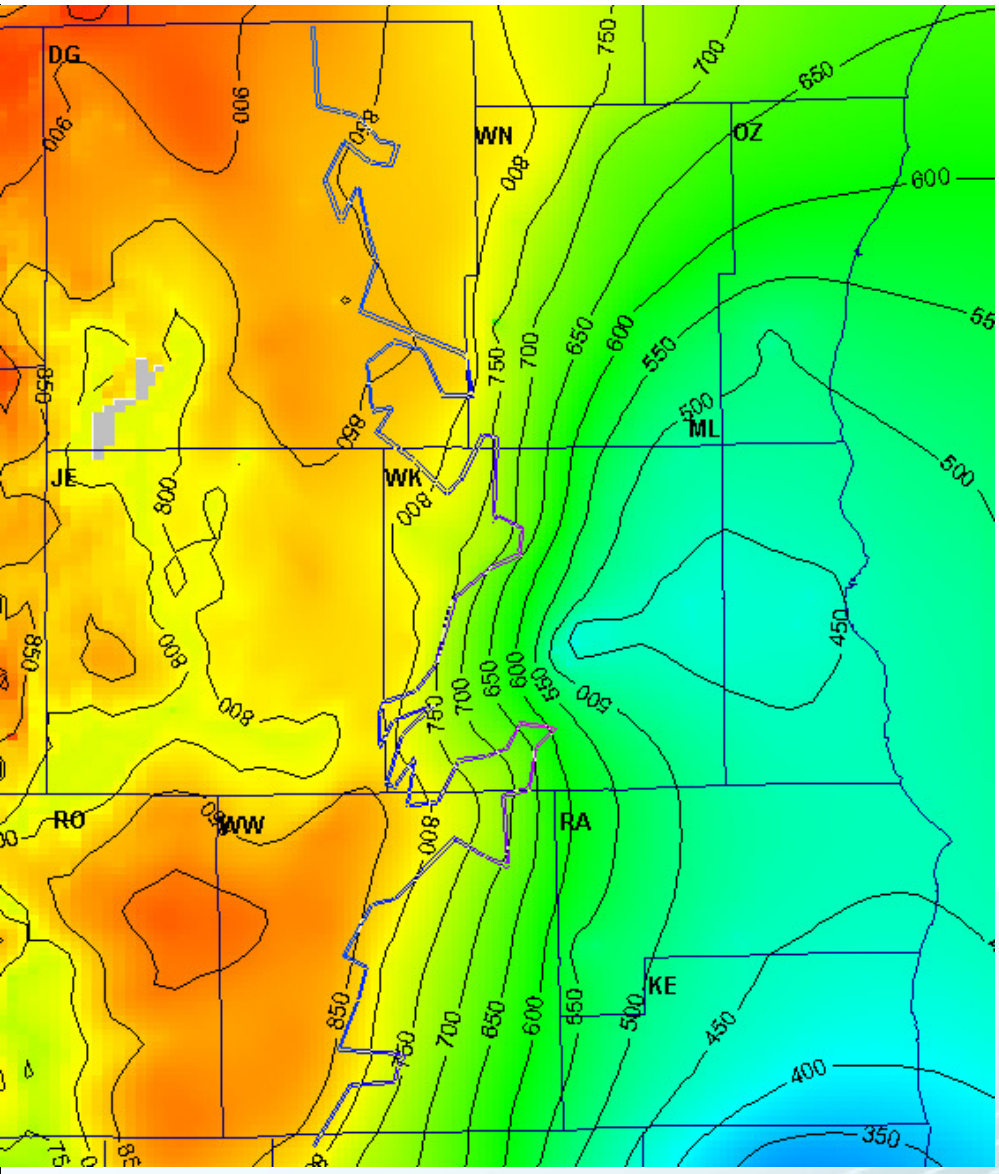


Well Locations and Pumping Rates

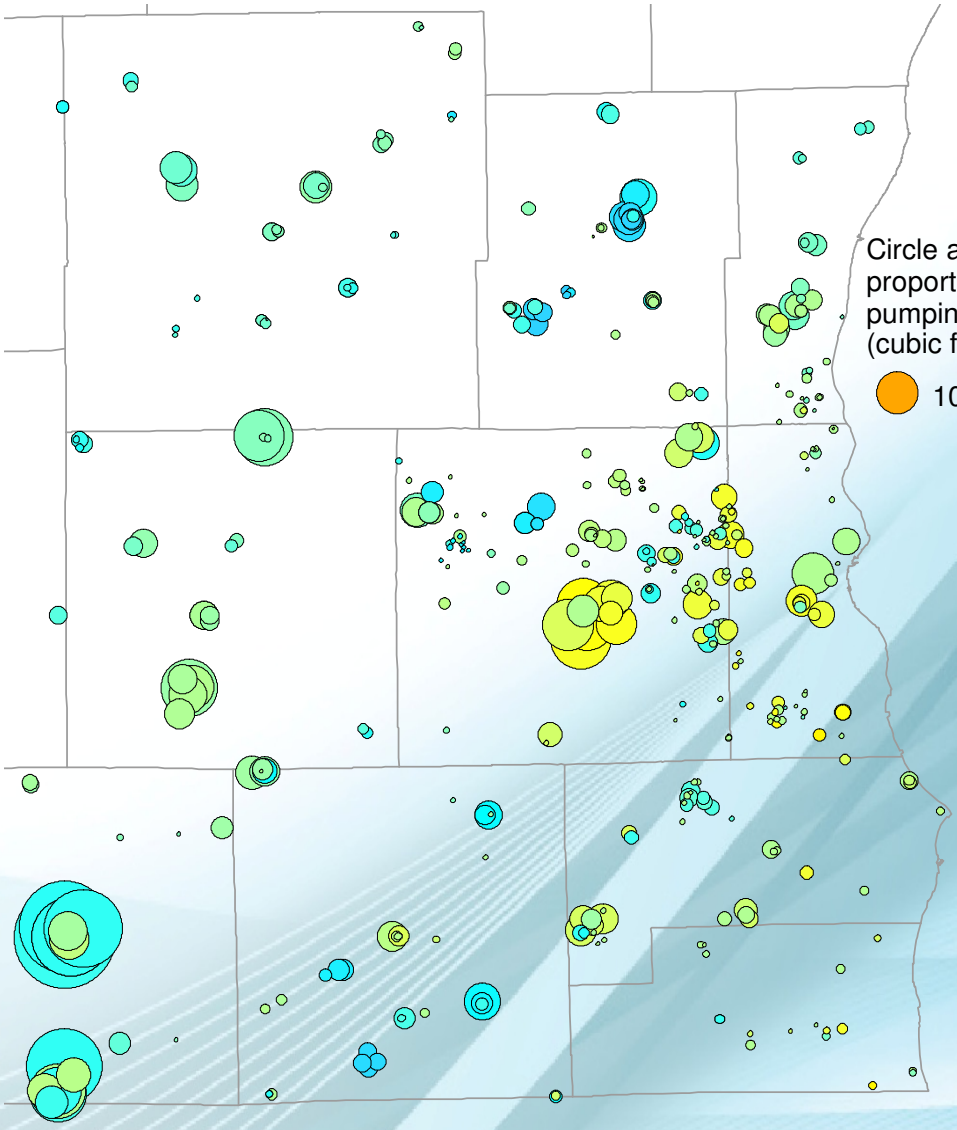
Shallow Deep

1965-1970

Waukesha Water Utility



Water Levels in the Sandstone Aquifer
(feet above sea level)

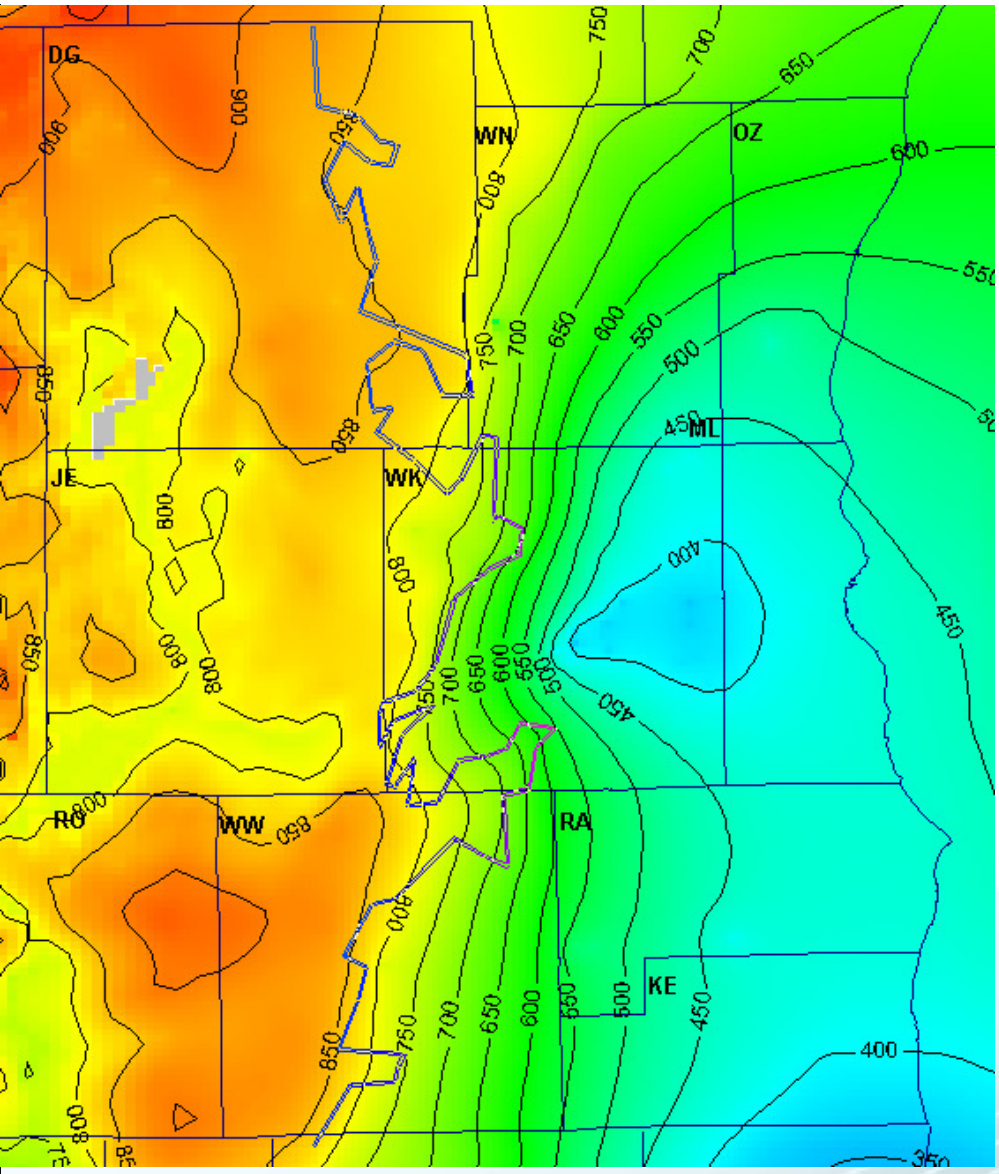


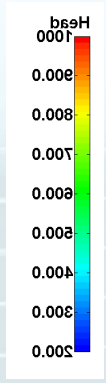
Well Locations and Pumping Rates

Shallow Deep

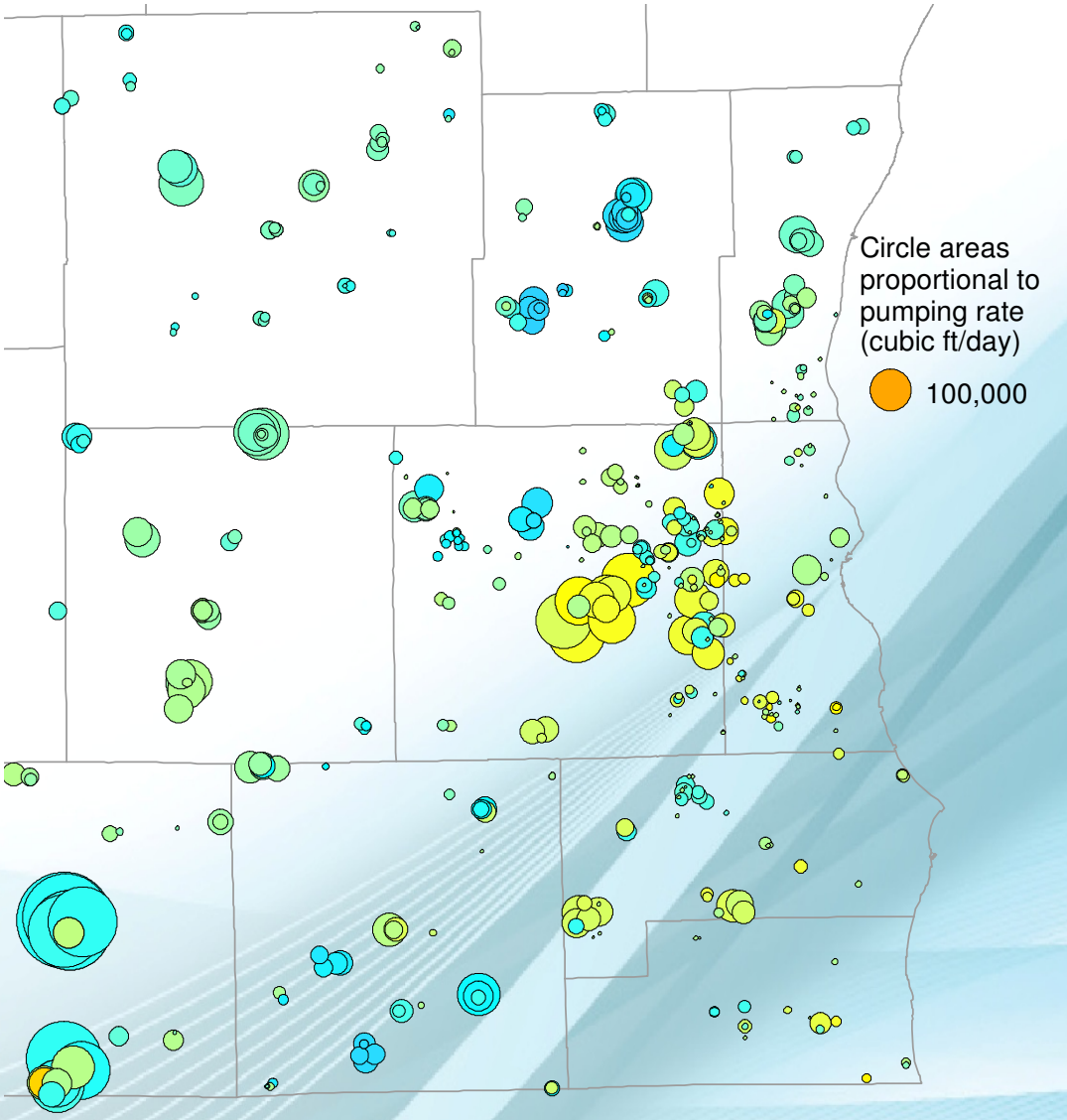
1970-1980

Waukesha Water Utility





Water Levels in the Sandstone Aquifer
(feet above sea level)

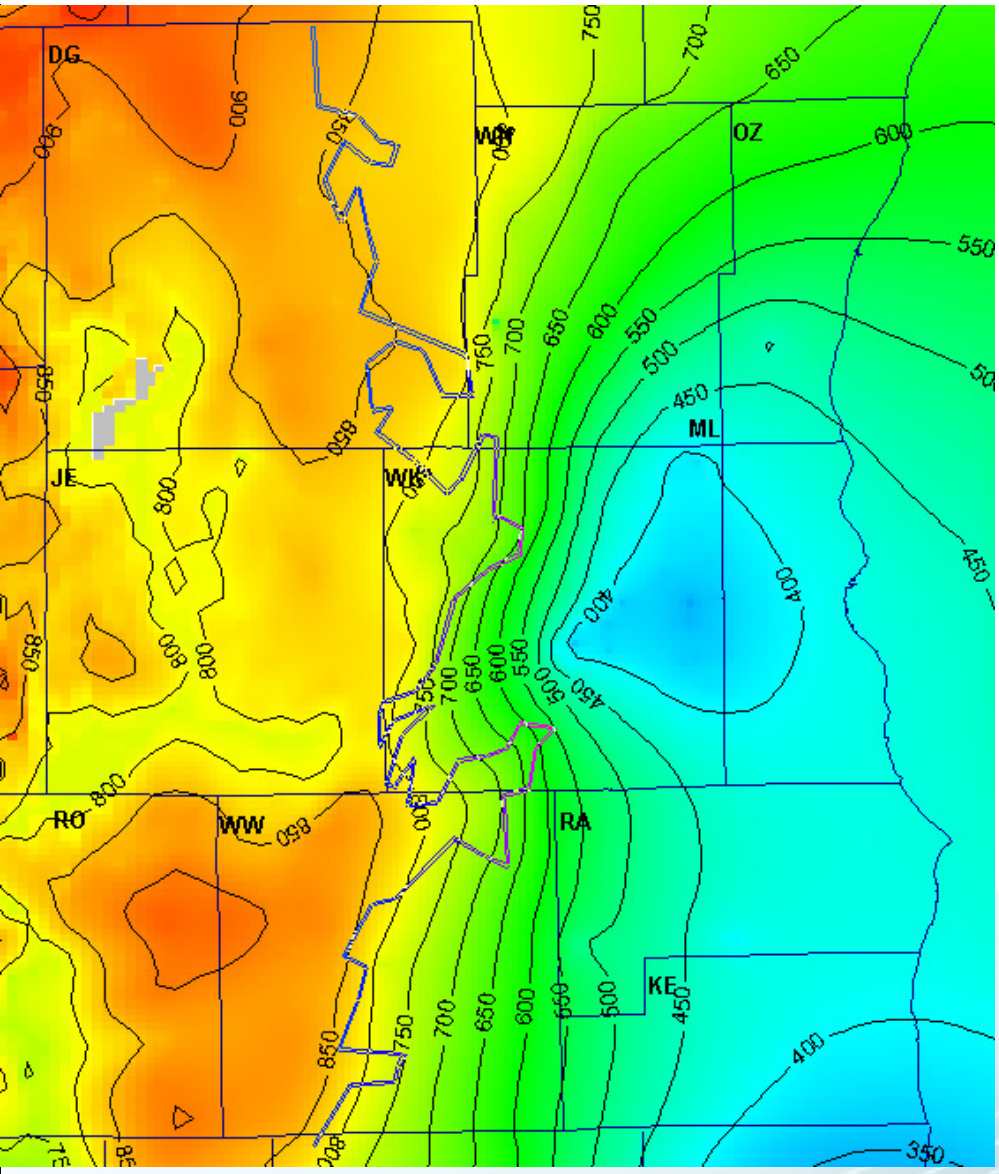


Well Locations and Pumping Rates

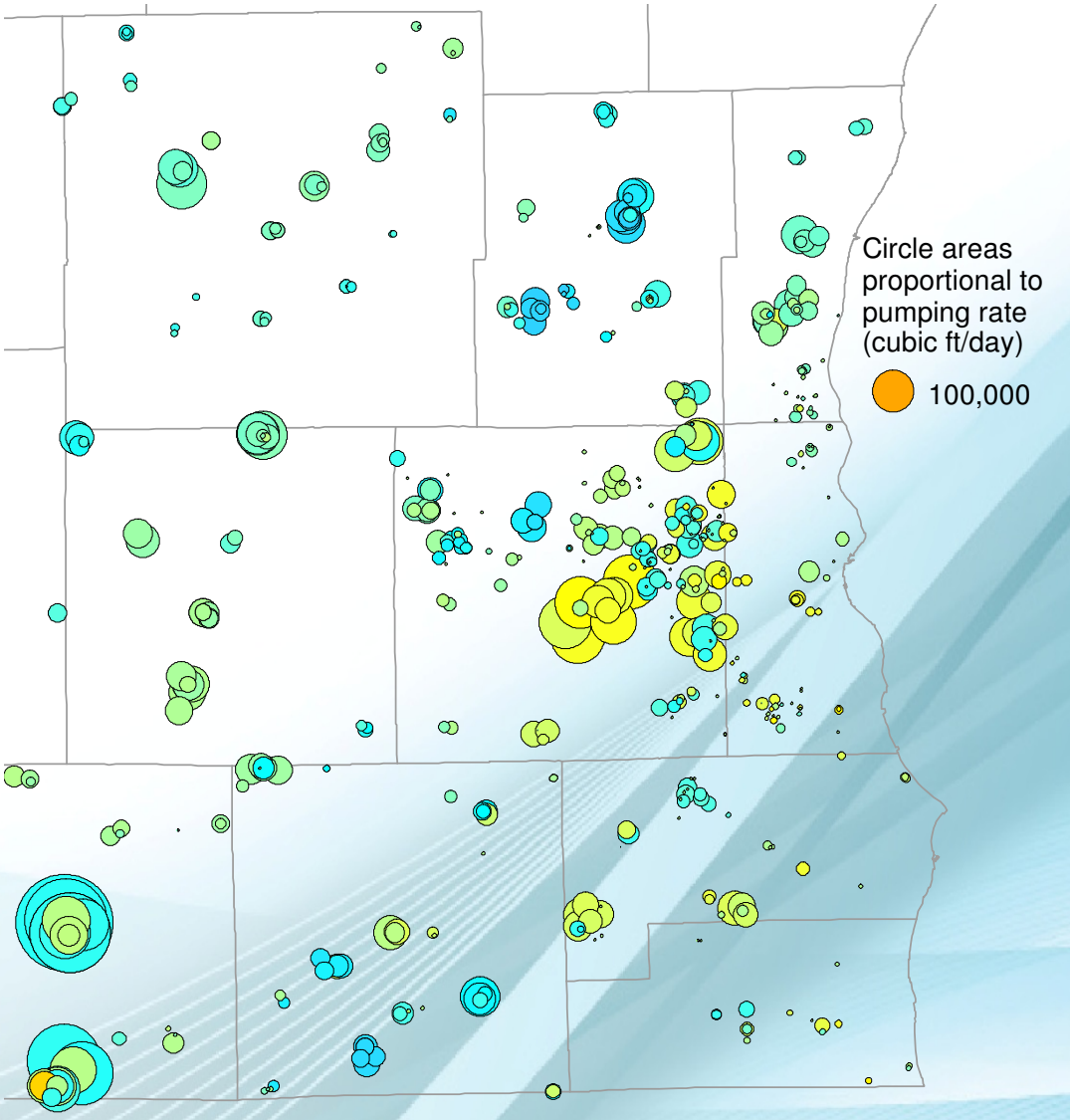
Shallow Deep

1980-1985

Waukesha Water Utility



Water Levels in the Sandstone Aquifer
(feet above sea level)

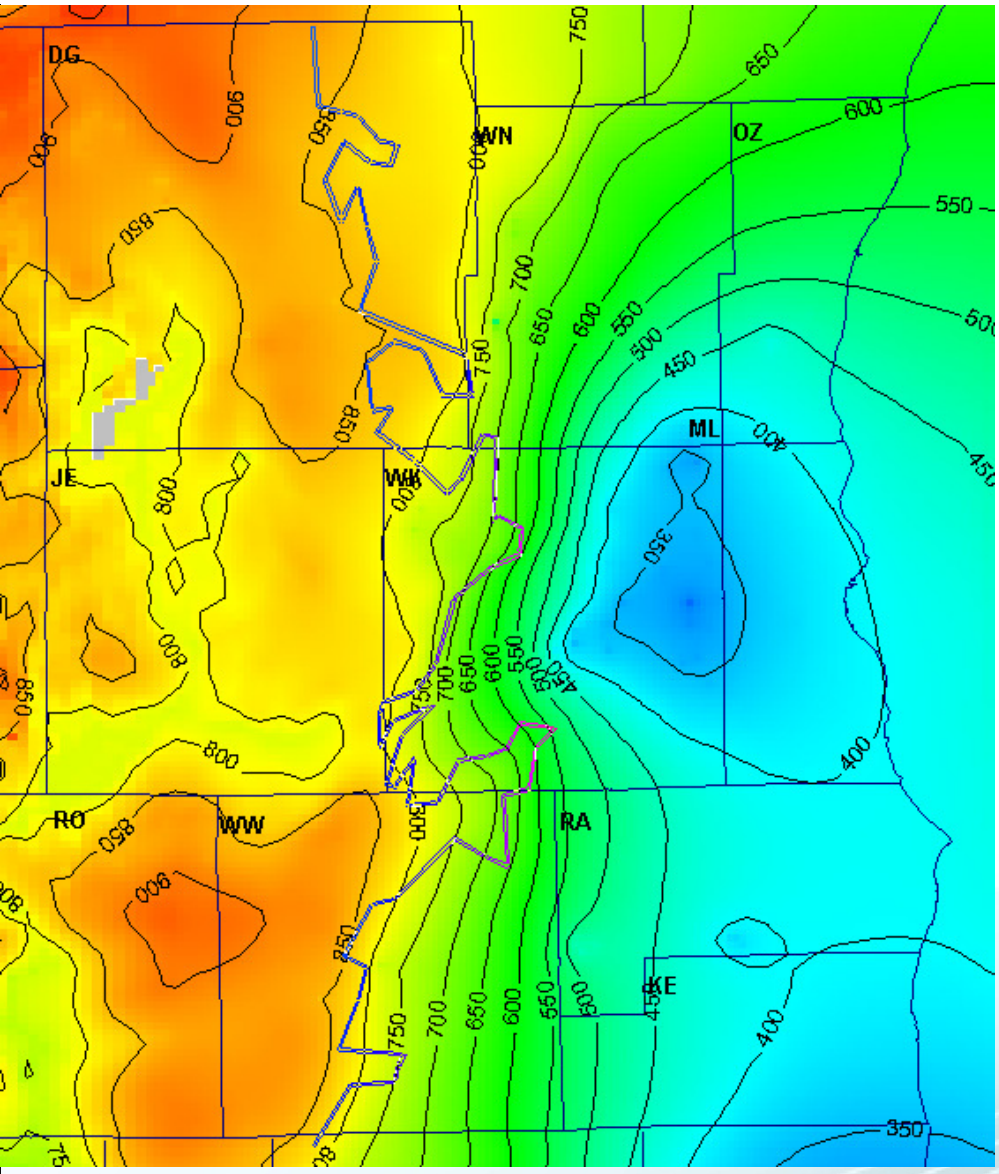


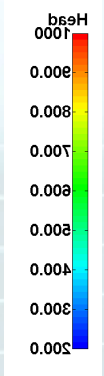
Well Locations and Pumping Rates

Shallow Deep

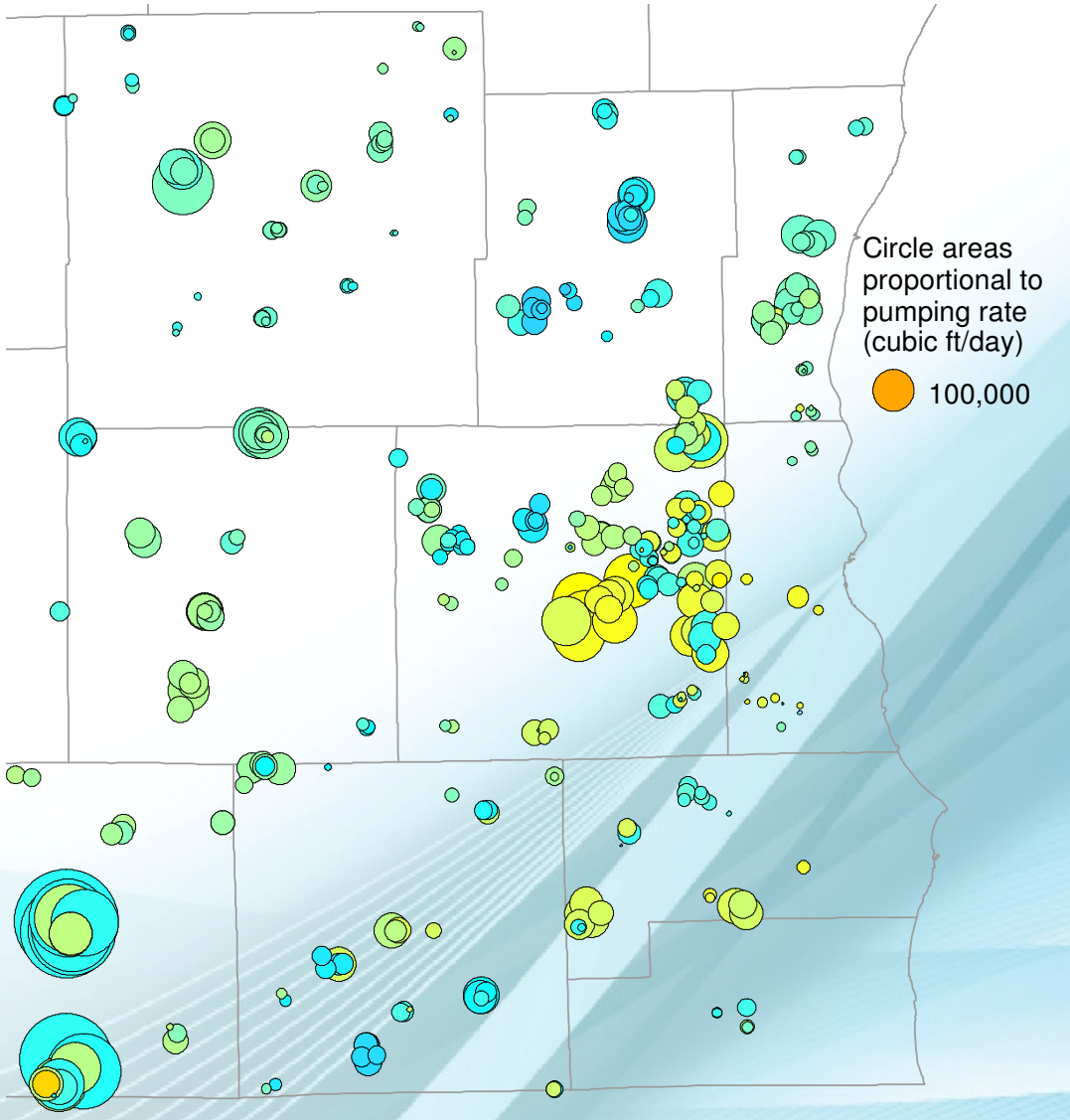
1985-1990

Waukesha Water Utility





Water Levels in the Sandstone Aquifer
(feet above sea level)

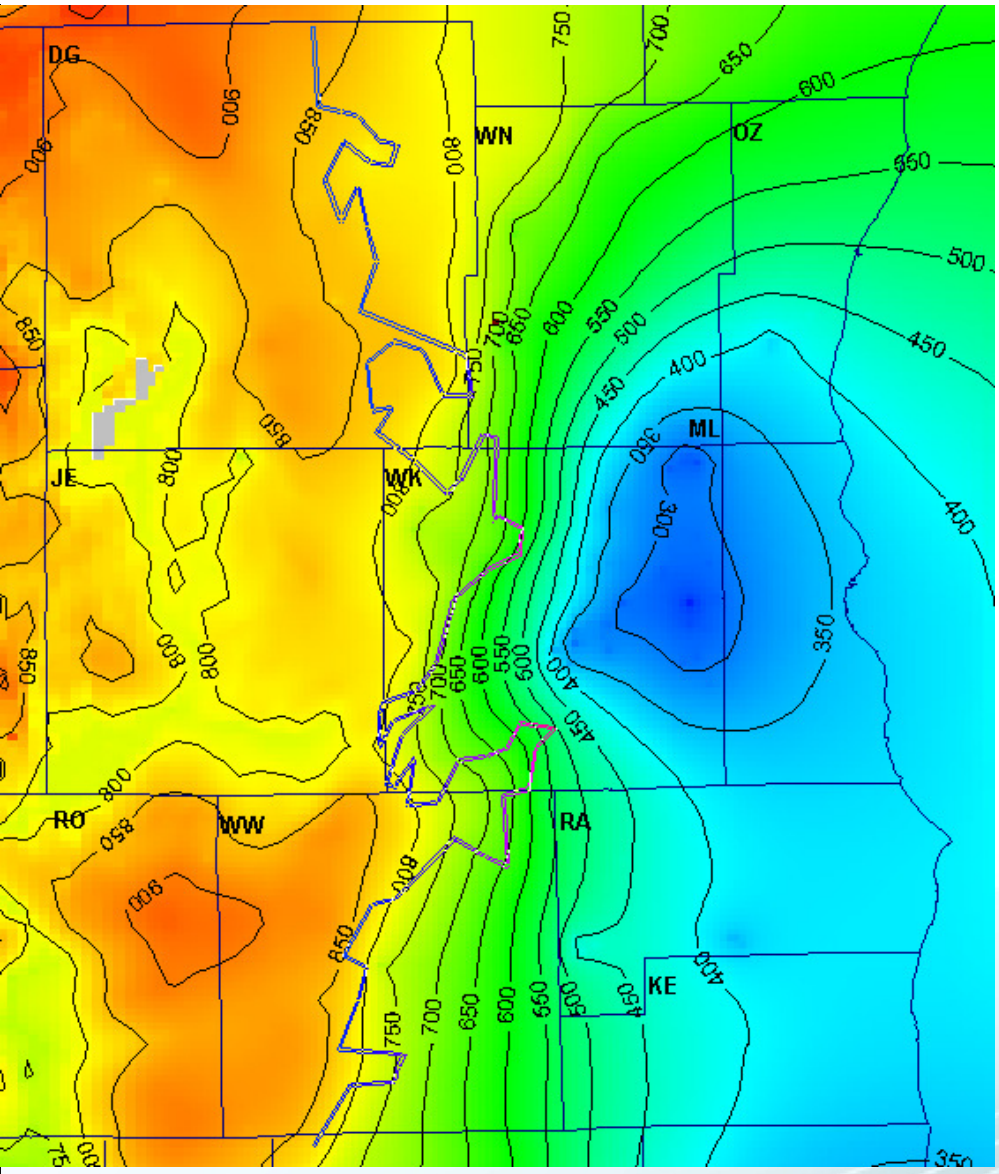


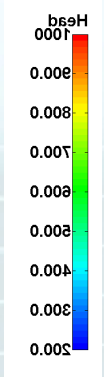
Well Locations and Pumping Rates

Shallow Deep

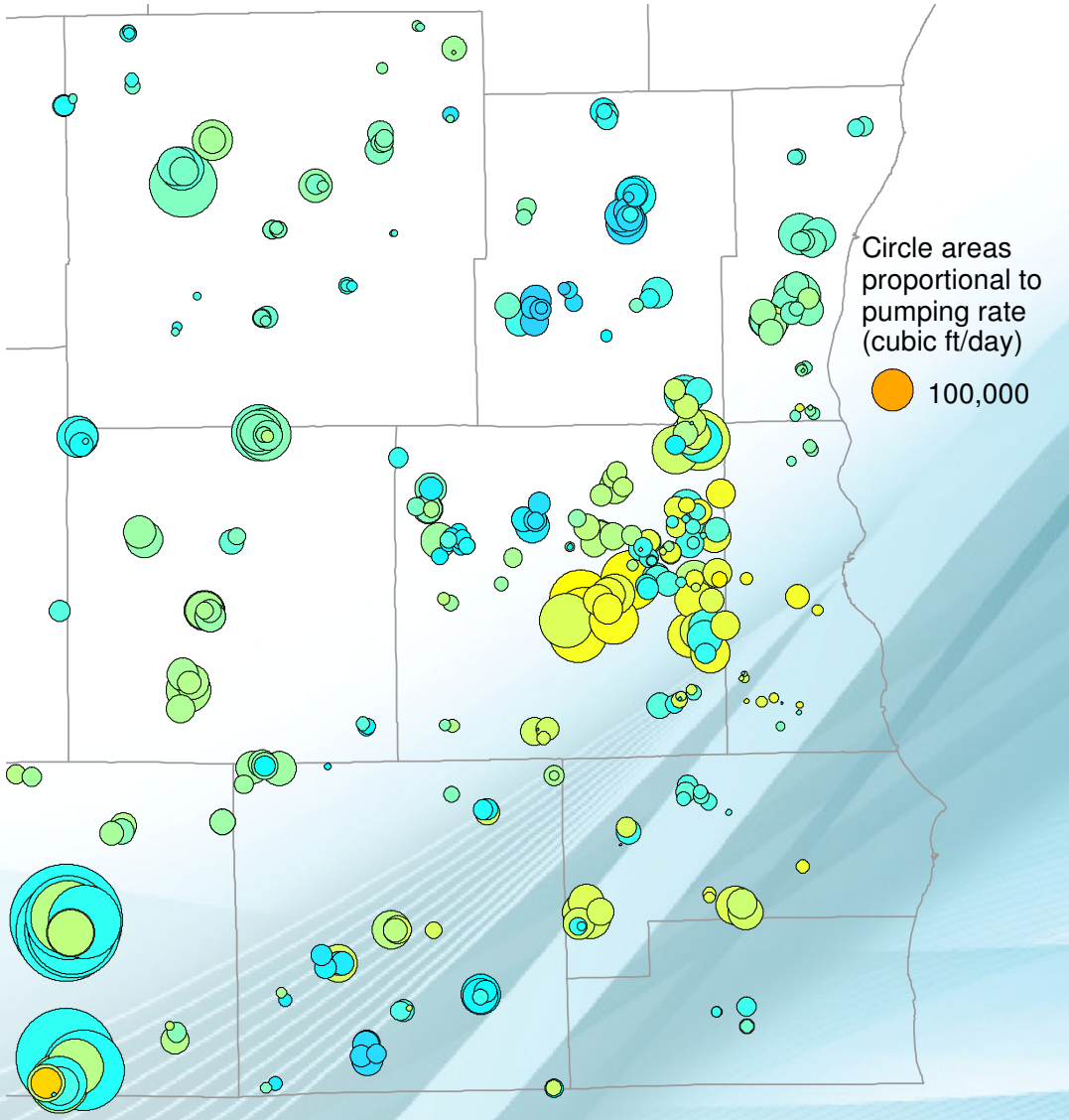
1990-2000

Waukesha Water Utility





Water Levels in the Sandstone Aquifer
(feet above sea level)



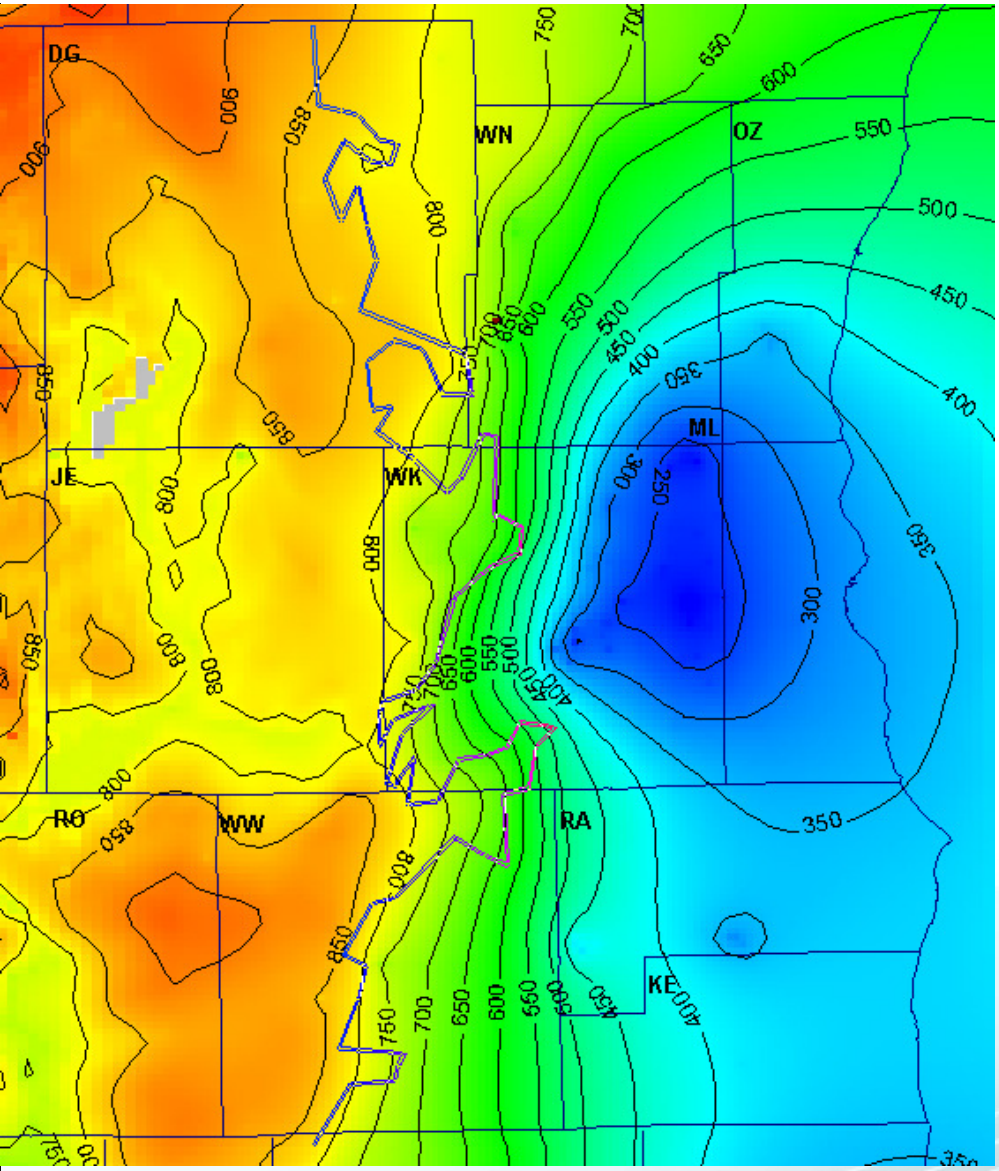
Well Locations and Pumping Rates

Shallow Deep

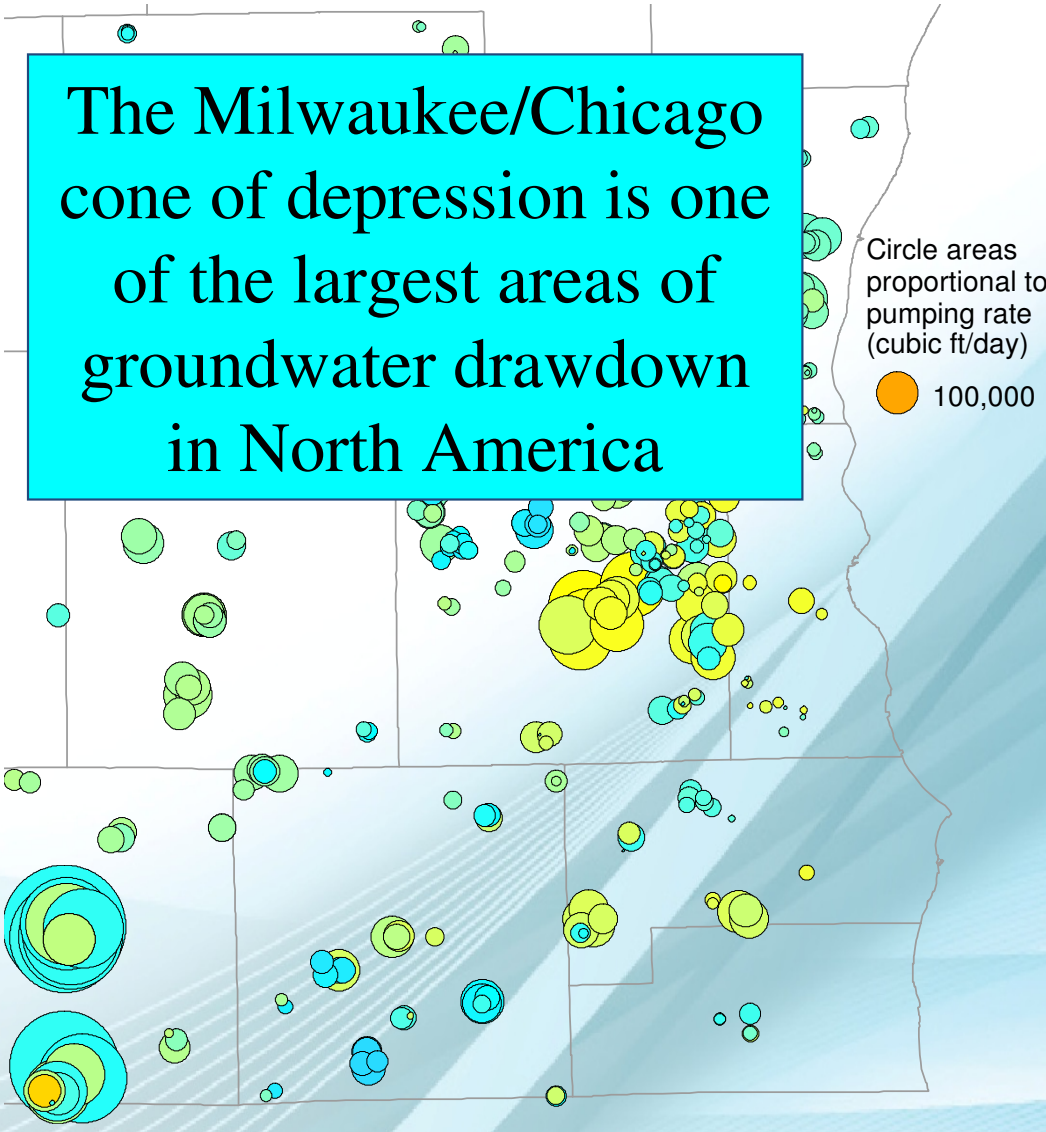
2000-2010

Waukesha Water Utility

The Milwaukee/Chicago cone of depression is one of the largest areas of groundwater drawdown in North America



Water Levels in the Sandstone Aquifer
(feet above sea level)



Well Locations and Pumping Rates

Shallow Deep

2010-2020

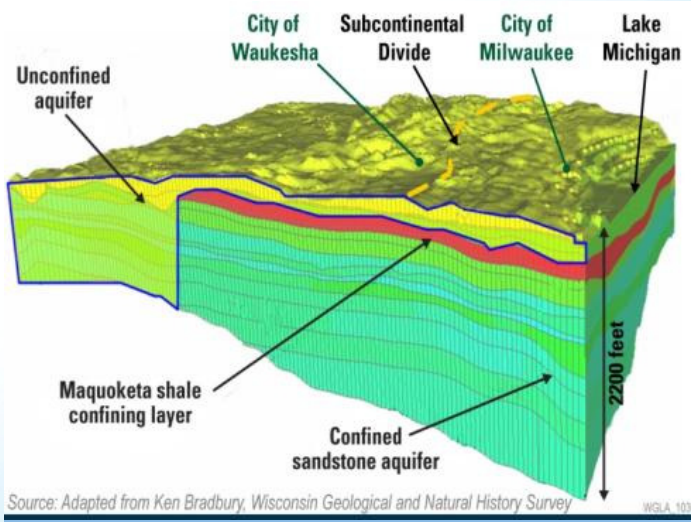
Waukesha Water Utility

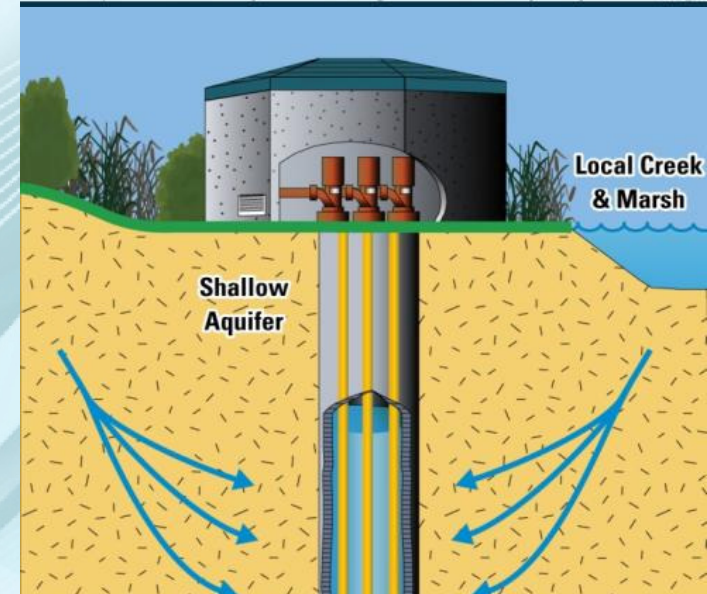
Legislative and Legal Impacts

- Act 310 – Groundwater Quantity Act (2003)
  - Groundwater Advisory Committee (Completed 2007)
- Great Lakes Compact
  - Wisconsin Implementation Legislation
- Lake Beulah Management District
  - State Supreme Court Decision
    - DNR Must consider impacts when issuing high capacity well permits
- Shallow Test Wells
  - Town of Waukesha Action
- All New Water Supply Alternatives are Outside the Current City Limits

Our Need for Water

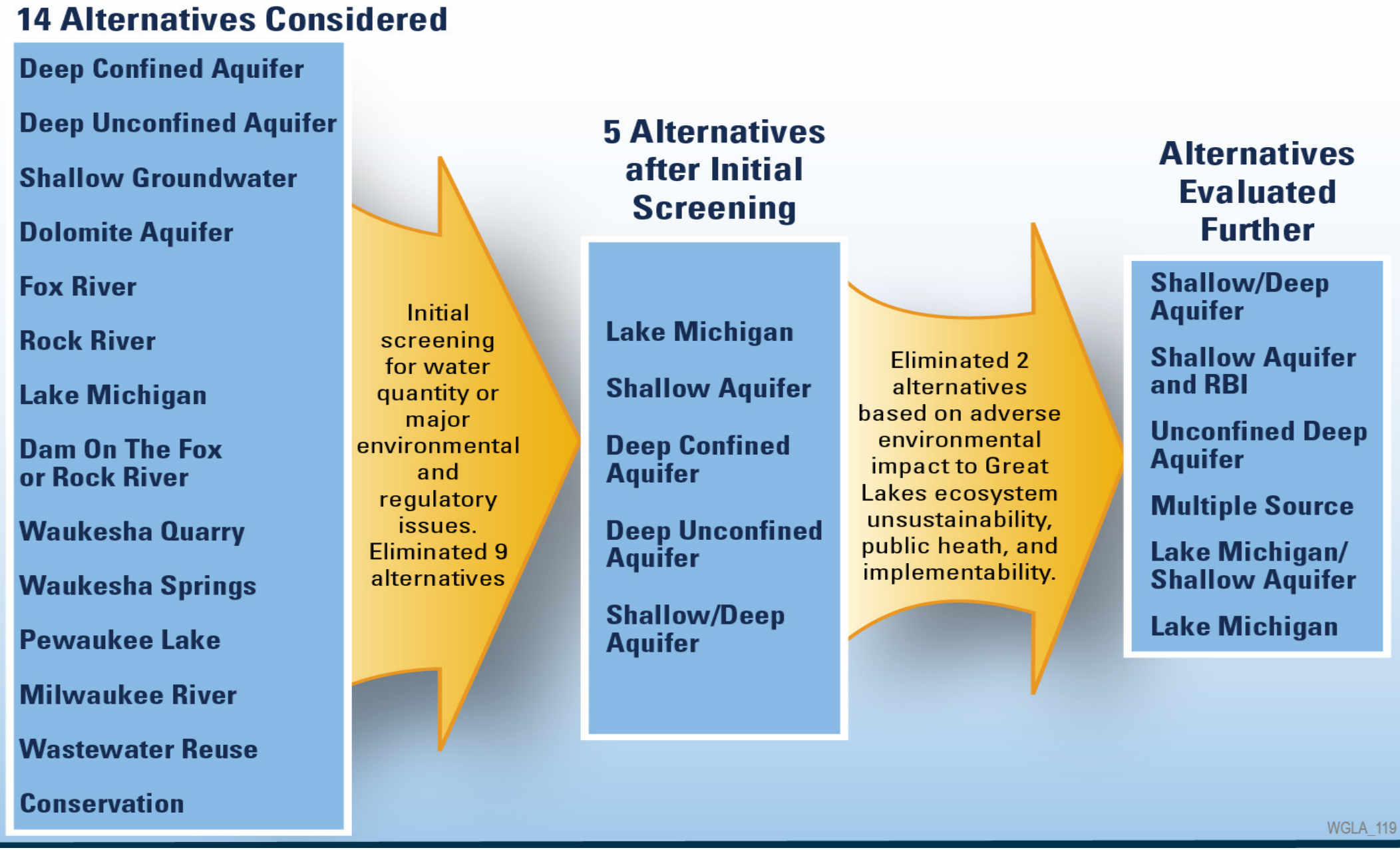
- Deep groundwater levels are declining (over 600 ft below ground) and capacity decreasing.
- Deep groundwater water quality is getting worse (High radium, salts). Court order to comply with radium by 2018.
- Deep groundwater wells are old (30 to 60 years). Several are no longer usable.
- Deep groundwater is not sustainable for the long-term.
- Shallow wells treat for iron/manganese, and recently arsenic has been discovered.
- Pumping shallow wells adversely impact wetlands and streams.
- Conservation has reduced water demand, but Waukesha needs more water for the future.





WHAT ALTERNATIVES HAVE BEEN EVALUATED?

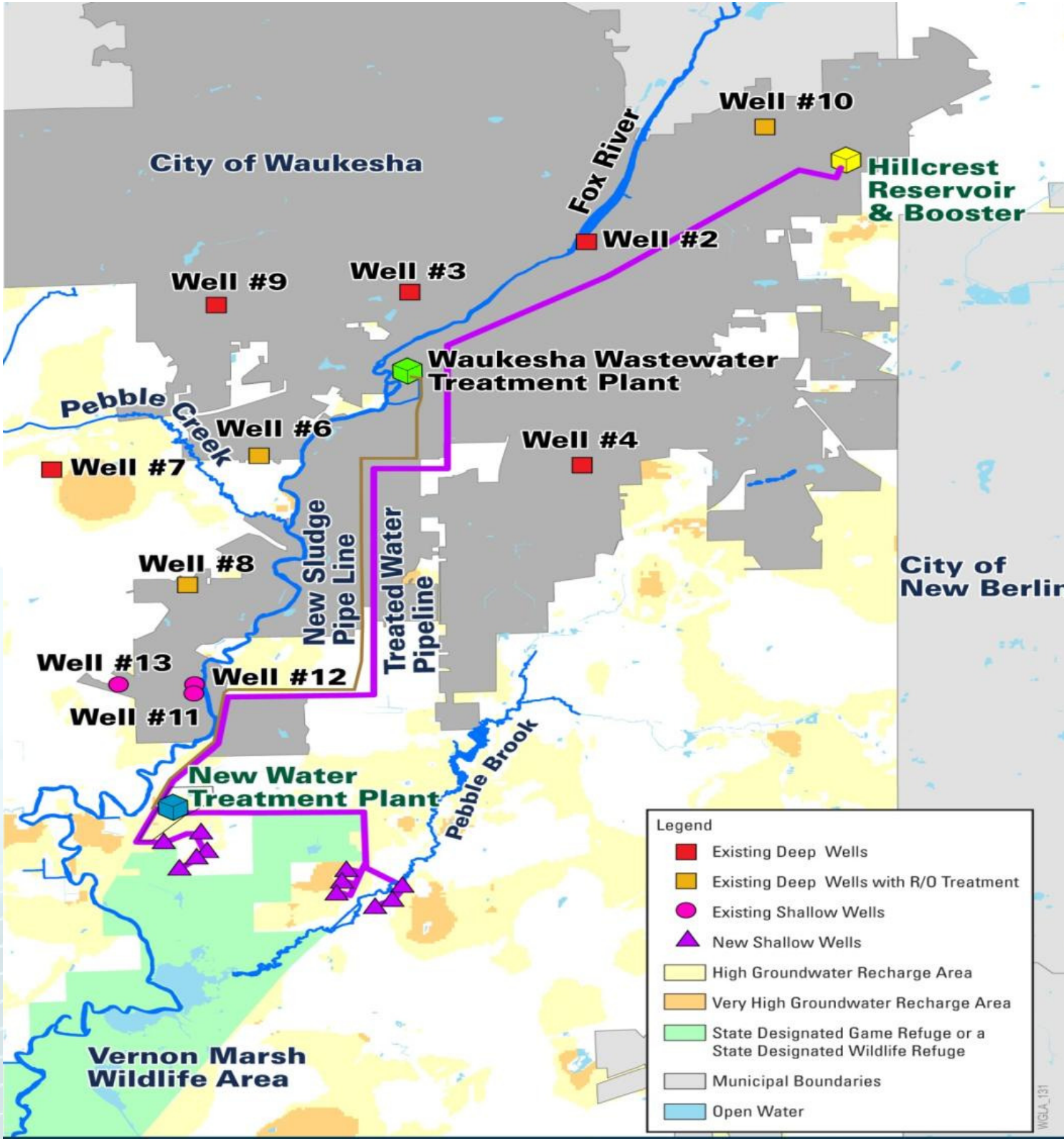
Water Supply Alternatives Screening



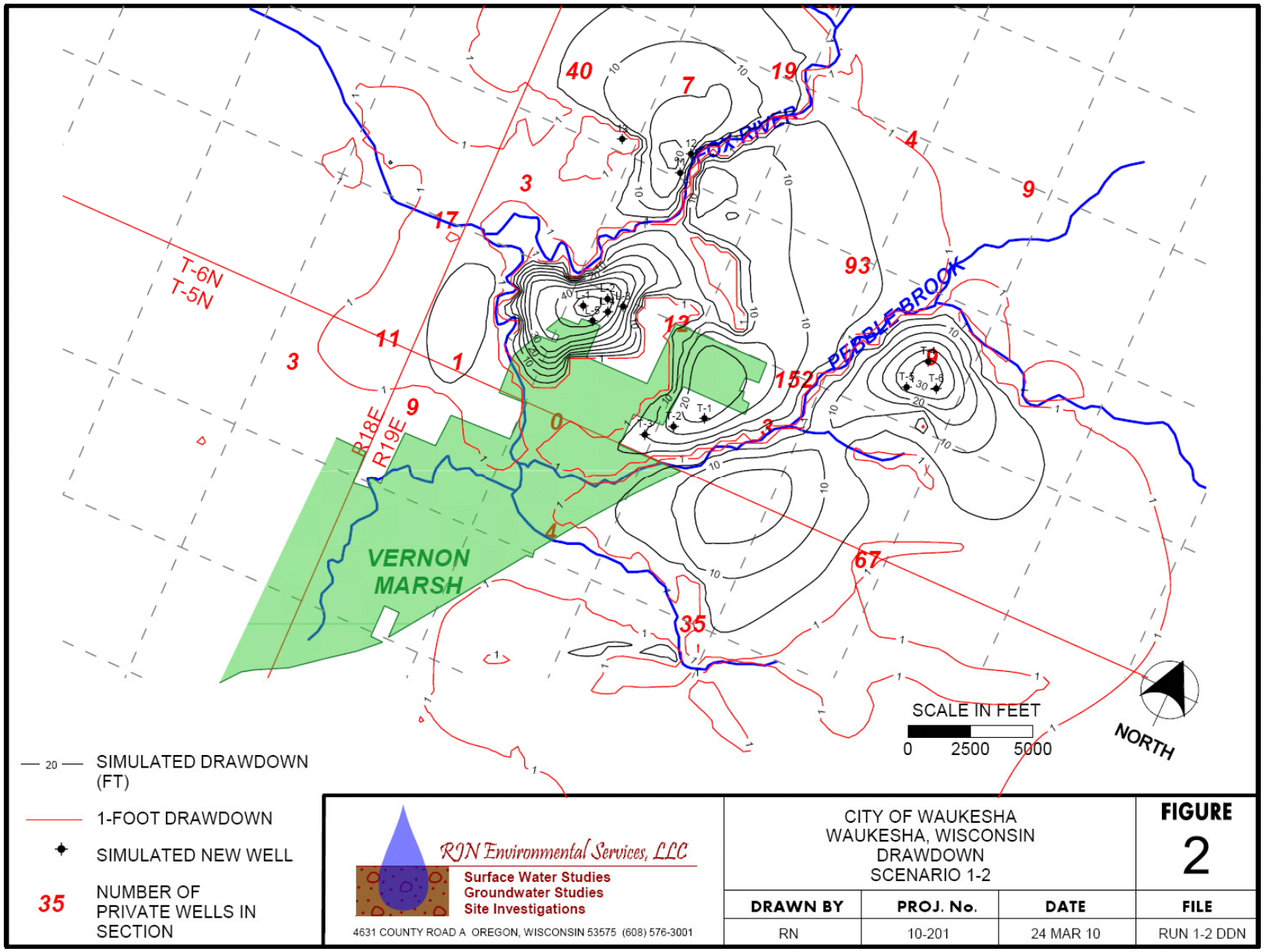
Water Supply Alternative 1 – Deep and Shallow Aquifer

($189 Million)

- Continued use of deep wells with additional treatment.
- Develop shallow wells south of Waukesha near Vernon Marsh
- New groundwater treatment plants



Shallow/ Deep Combination
6.4 MGD Total Shallow (4.5 MGD Deep) –
1.9 MGD Lathers, 1.1 MGD Existing Wells, 3.4 MGD New Wells

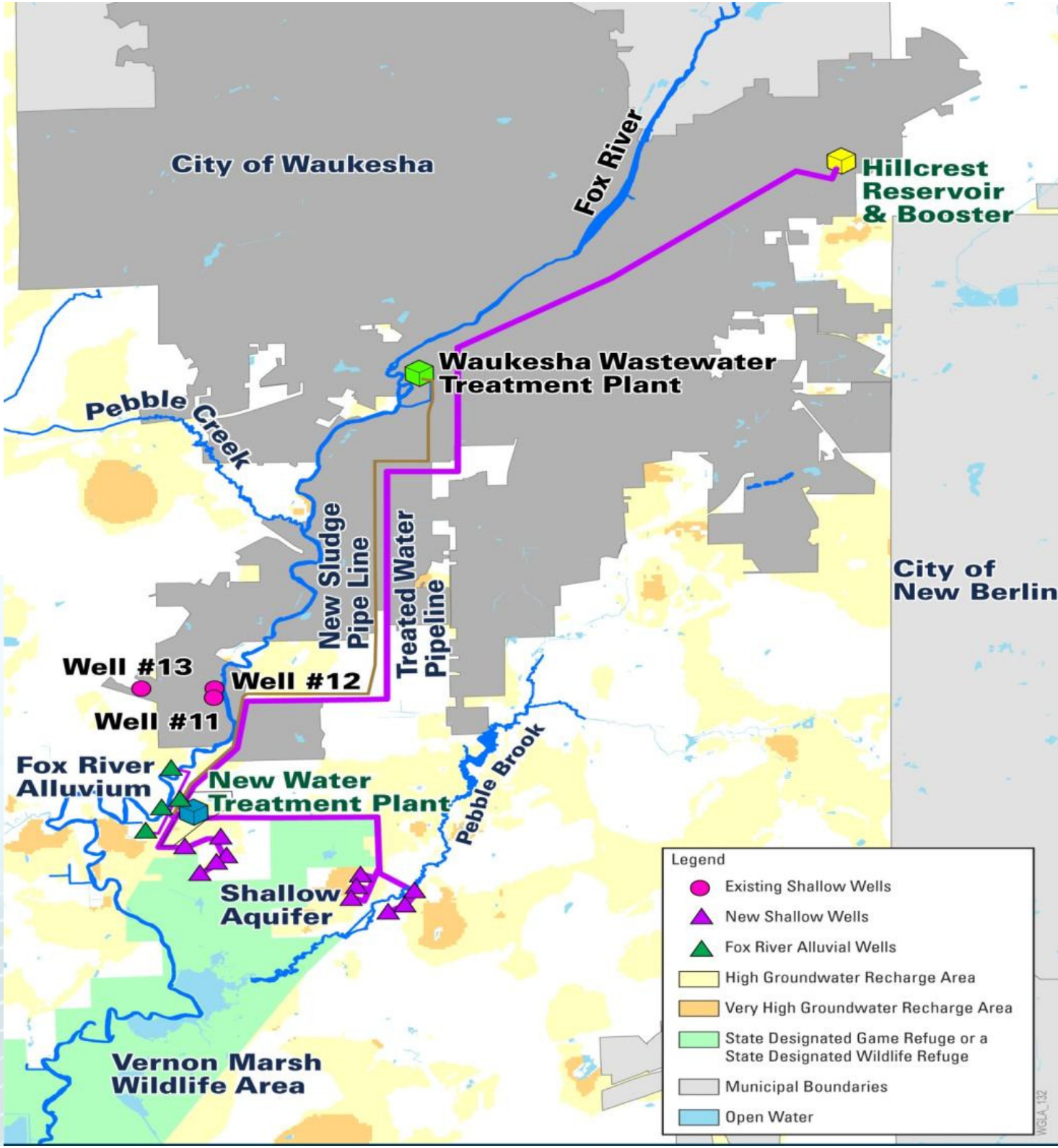


- **Maximum Drawdown exceeds 50 feet**
- **Baseflow Reduction to Fox River greater than 140%**
- **Baseflow Reduction to Pebble Brook greater than 60%**
- **Pebble Brook is designated a trout stream and is given special protections by Wisconsin Law**

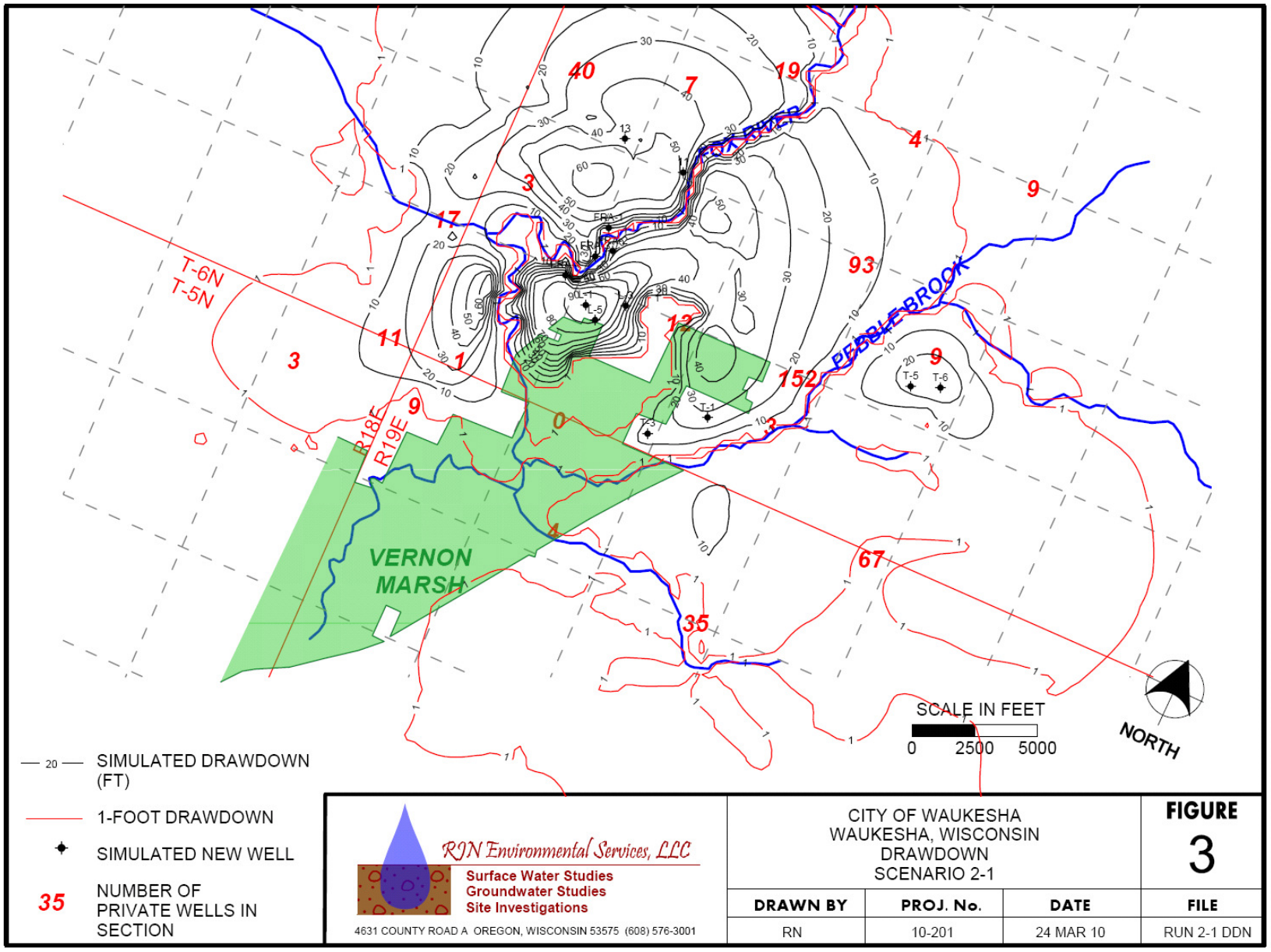
Water Supply Alternative 2 – Shallow Aquifer and RBI

$184 Million

- Discontinue use of deep wells
- Add shallow wellfield South of Waukesha near Vernon Marsh and along the Fox River
- New central treatment plant

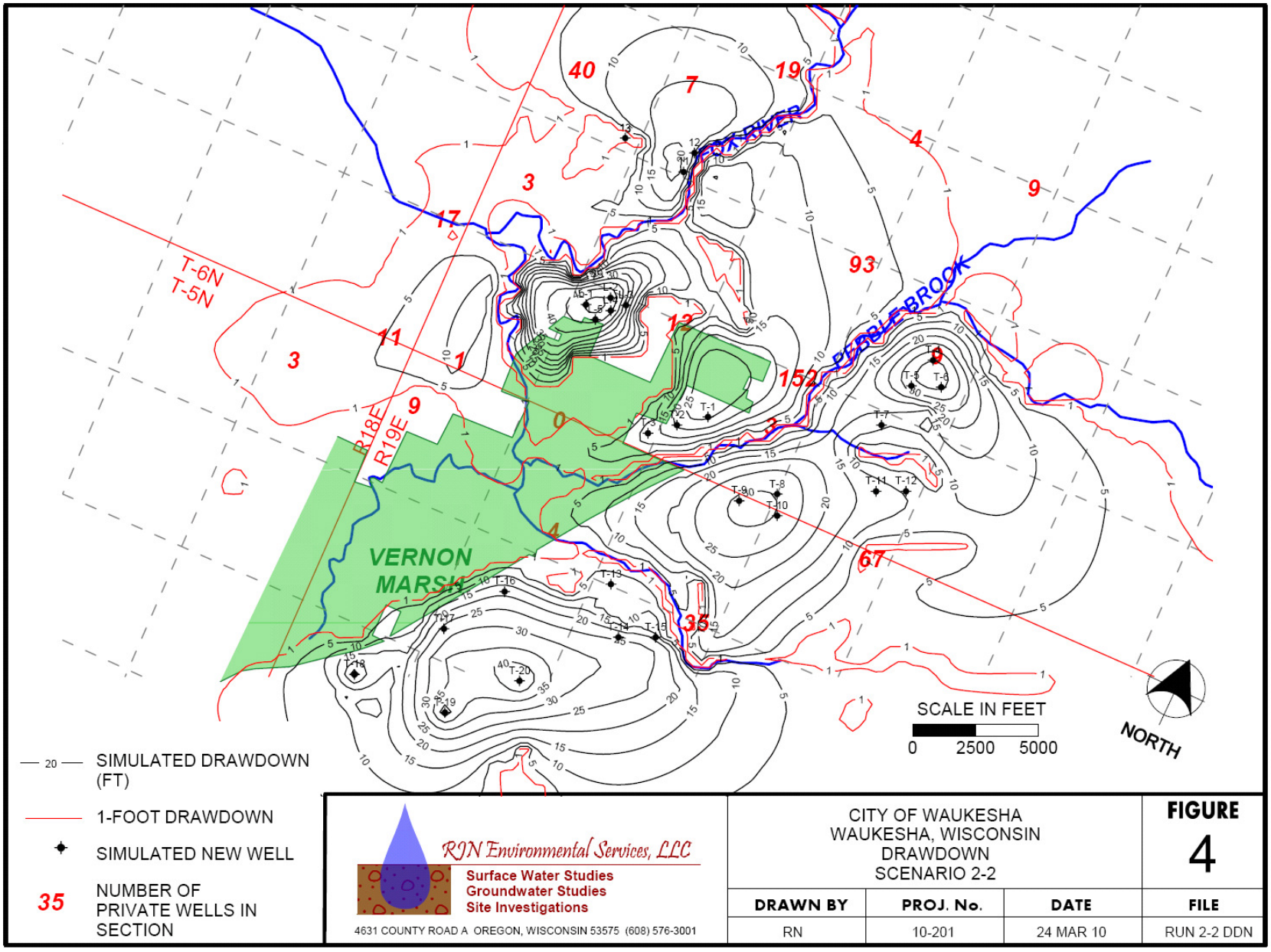


Shallow/RBI Combination
10.9 MGD Total – 3 MGD Lathers, 1.2 MGD Existing Wells, 2.2 MGD New Wells, 4.5 MGD Fox River Alluvium



- **Maximum Drawdown exceeds 100 feet**
- **Baseflow Reduction to Fox River greater than 340%**
- **Baseflow Reduction to Pebble Brook greater than 50%**
- **Pebble Brook is designated a trout stream and is given special protections by Wisconsin Law**
- **Vernon Marsh and Mill Brook are significantly impacted**

Shallow Well Alternative
10.9 MGD Total –
1.95 MGD Lathers, 1.2 MGD Existing Wells, 7.8 MGD New Wells



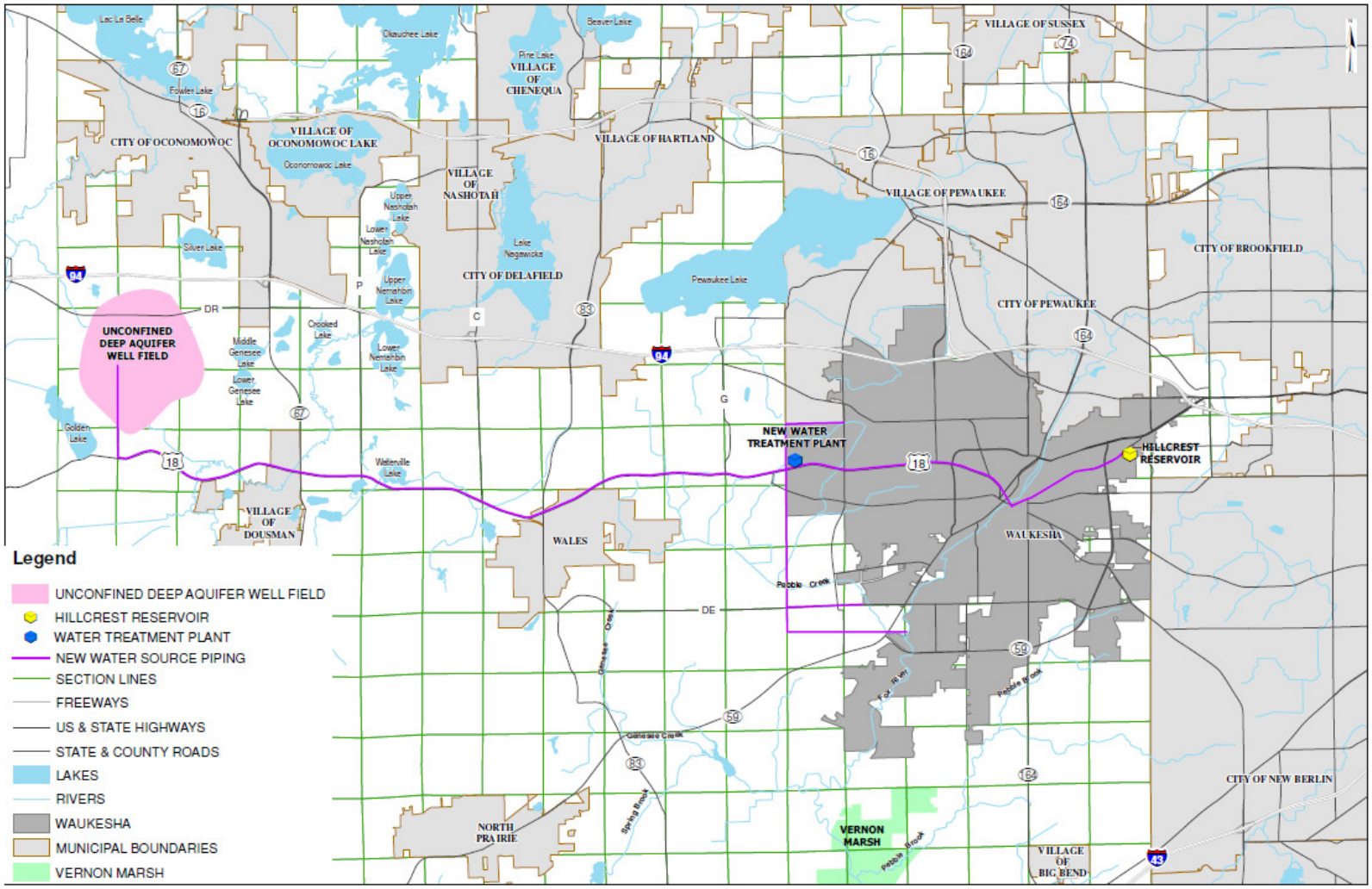
- **Maximum Drawdown exceeds 55 feet**
- **Baseflow Reduction to Fox River greater than 150%**
- **Baseflow Reduction to Pebble Brook greater than 80%**
- **Pebble Brook is designated a trout stream and is given special protections by Wisconsin Law**
- **Vernon Marsh and Mill Brook are significantly impacted**

ter Utility

Water Supply Alternative 3 – Unconfined Deep Aquifer

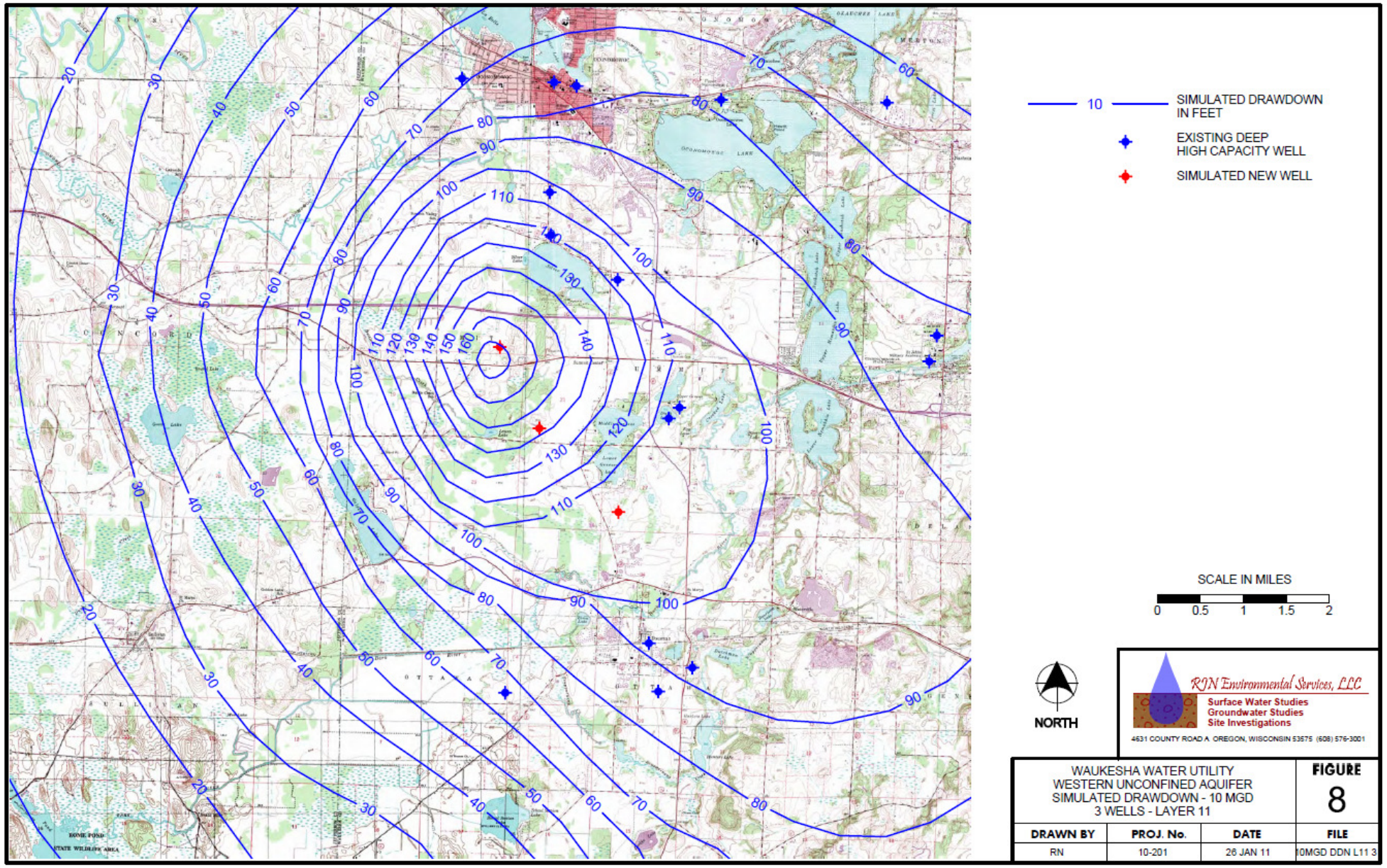
$228 Million

- Supply pipeline from Unconfined Aquifer West of Waukesha
- New water pump station
- New water supply main
- New water treatment plant
- New distribution system infrastructure



Waukesha Water Utility

Western Unconfined Aquifer
10 MGD from 3 High Capacity Wells
Deep Aquifer Impacts



Western Unconfined Aquifer
10 MGD from 3 High Capacity Wells
Shallow Aquifer Impacts