

# **City of Waukesha Diversion Application – Water Supply Service Area Plan**

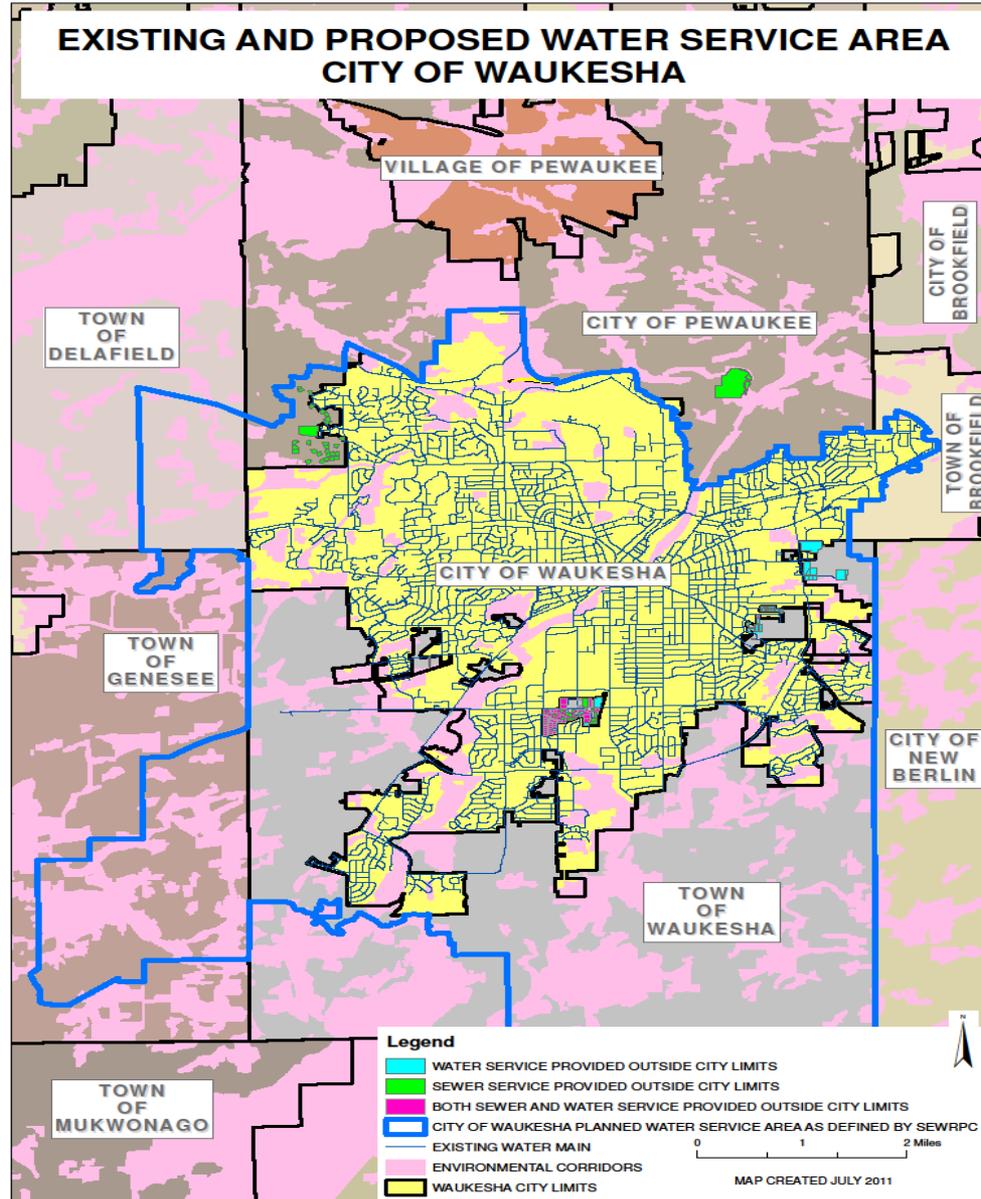
These slides are adapted from a display at the July 26, 27, and 28, 2011 public hearings on the City of Waukesha diversion application.

# Waukesha Water Supply Service Area Plan

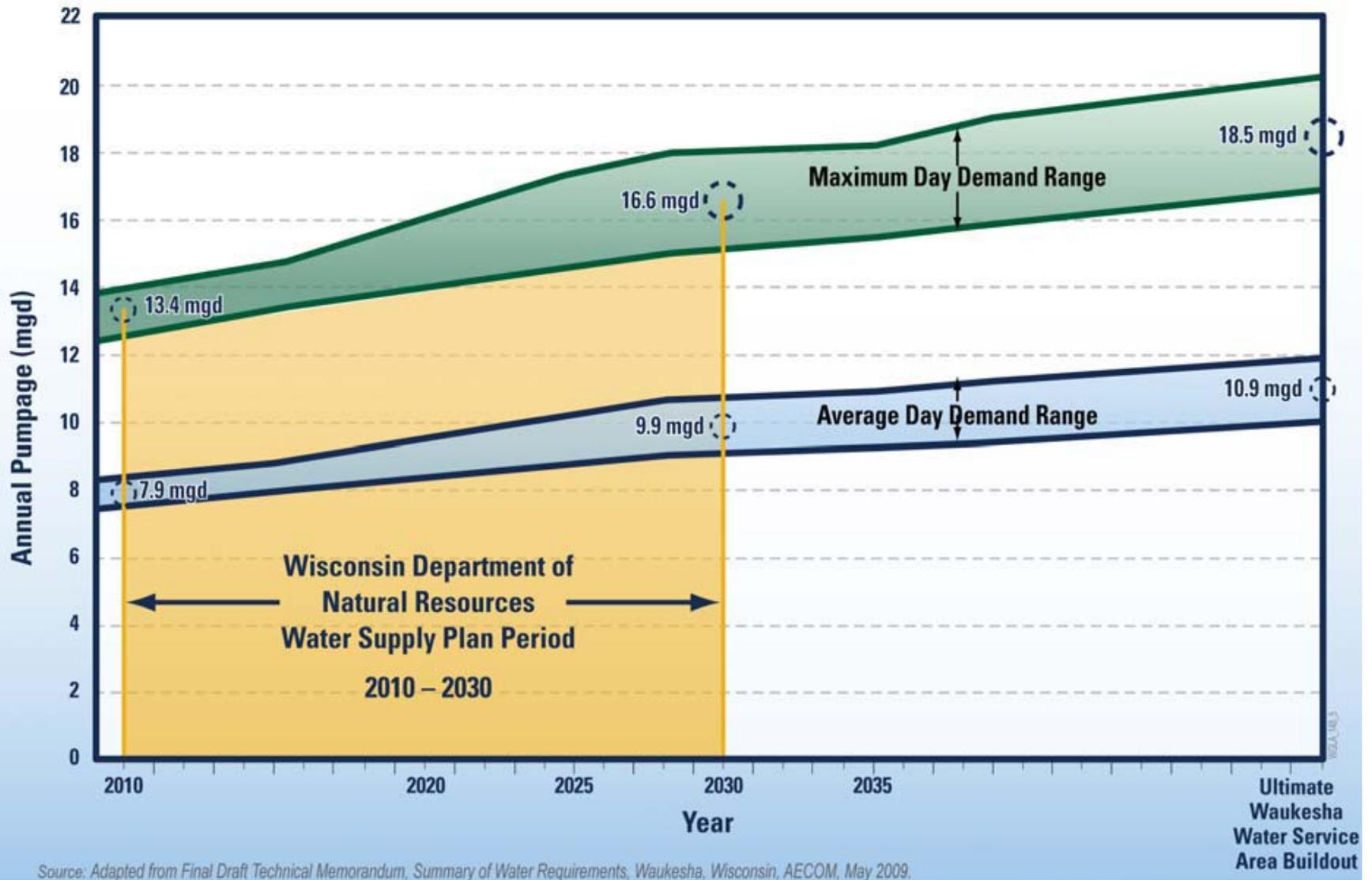
## **The Water Service Area Plan must provide:**

1. A delineated water supply service area.
2. An analysis of water supply alternatives
  - Source Alternatives
  - Assessment of Environmental Impacts
3. Water Demand Projections
4. Population Projections

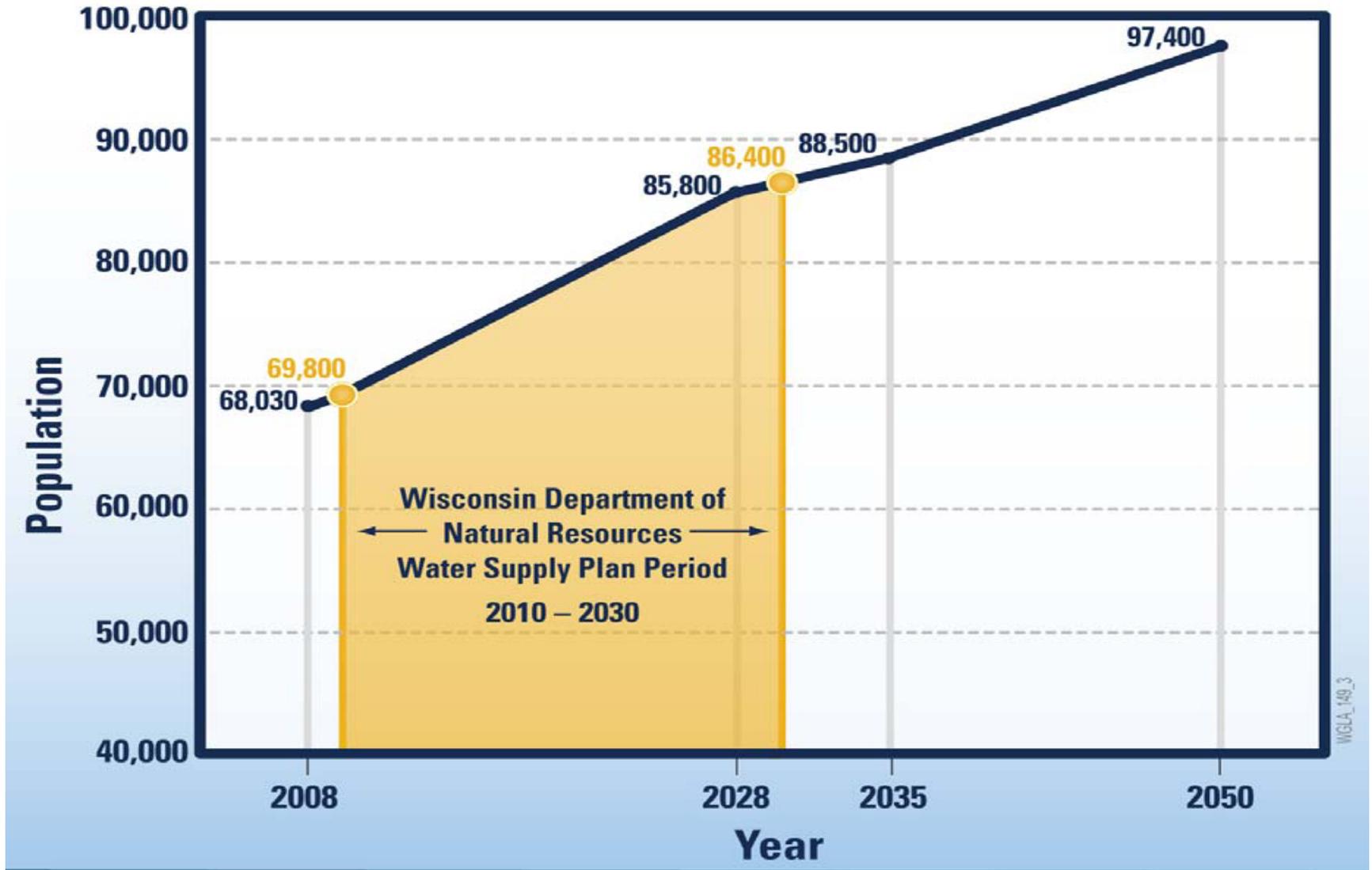
# City of Waukesha Water Utility Planned Water Supply Service Area



# City of Waukesha– Water Demand Projections



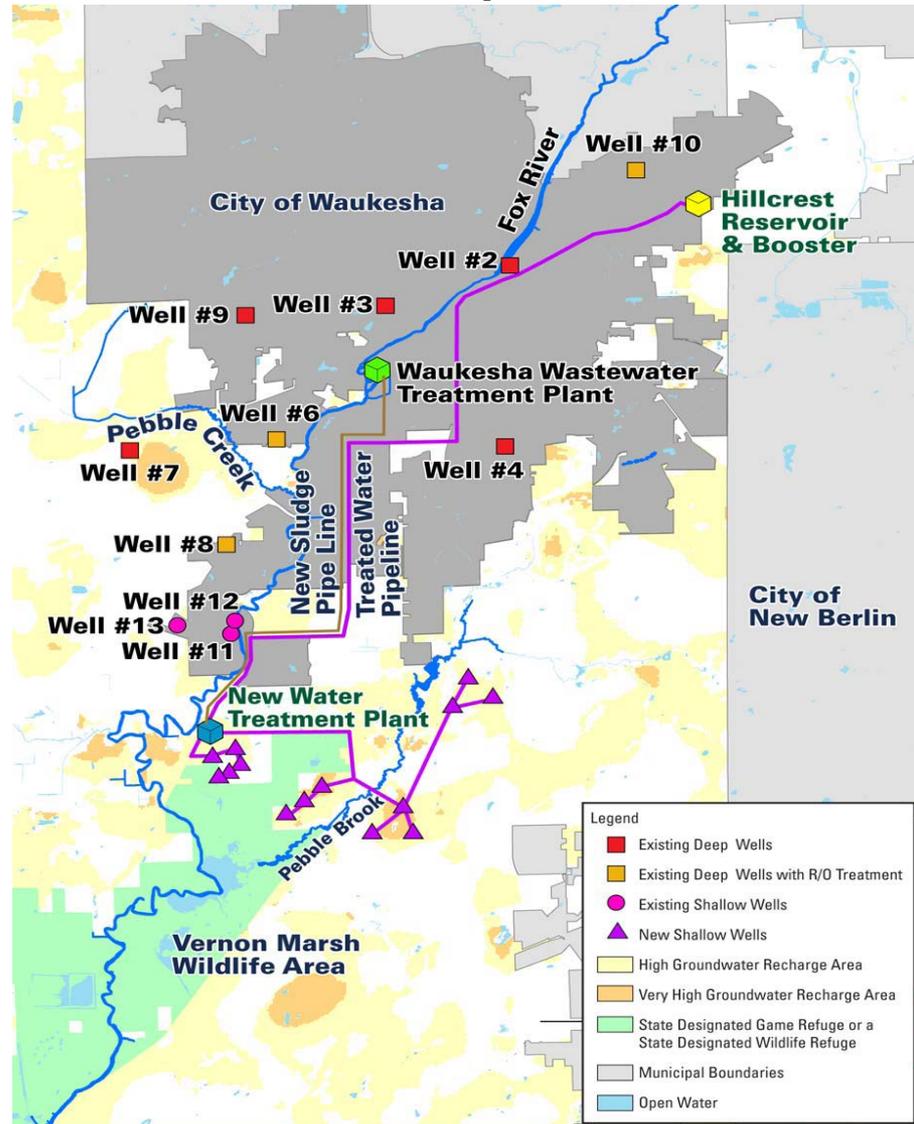
# City of Waukesha – Population Projections



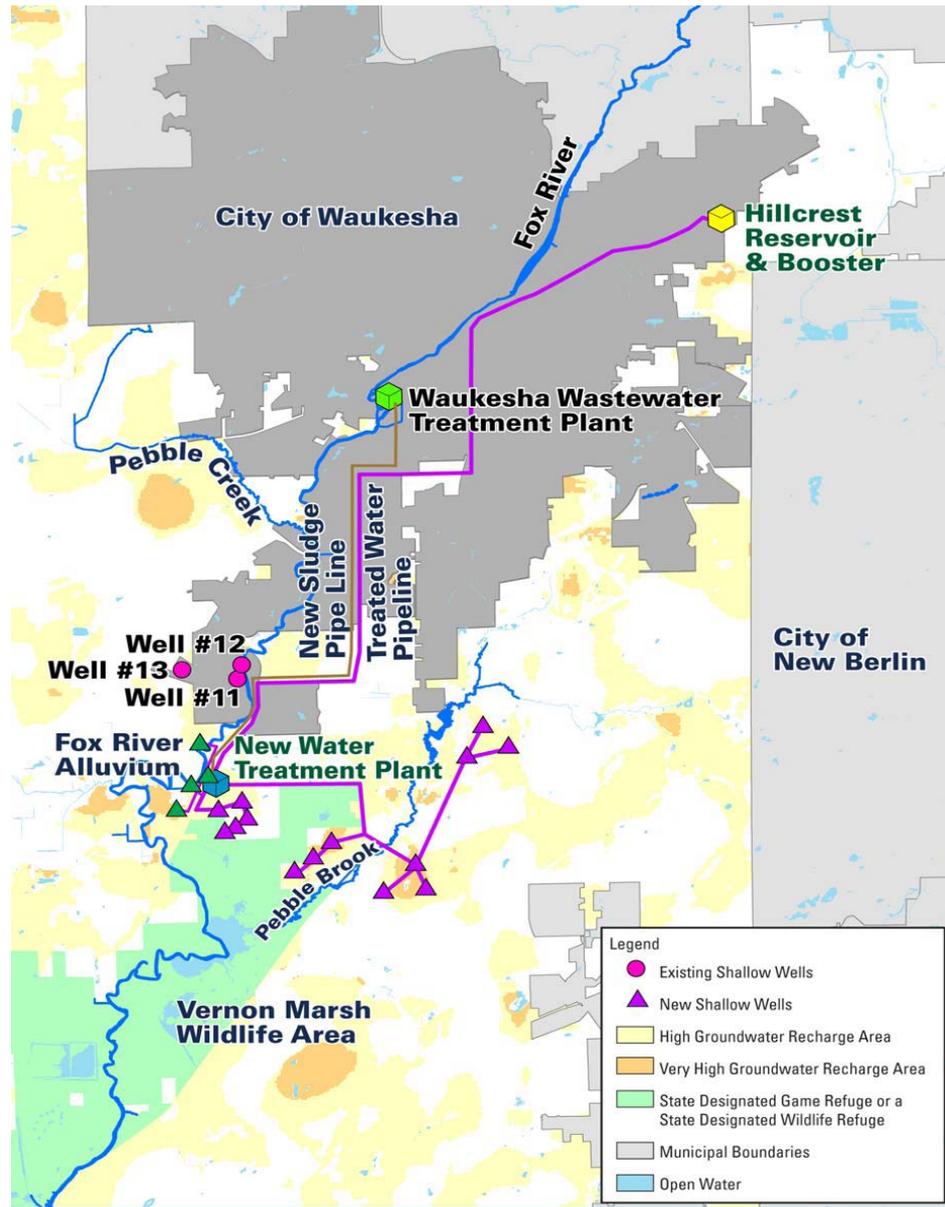
# Water Supply Service Area Plan & Water Supply Alternatives

## Alternative 1: Deep and Shallow Aquifers

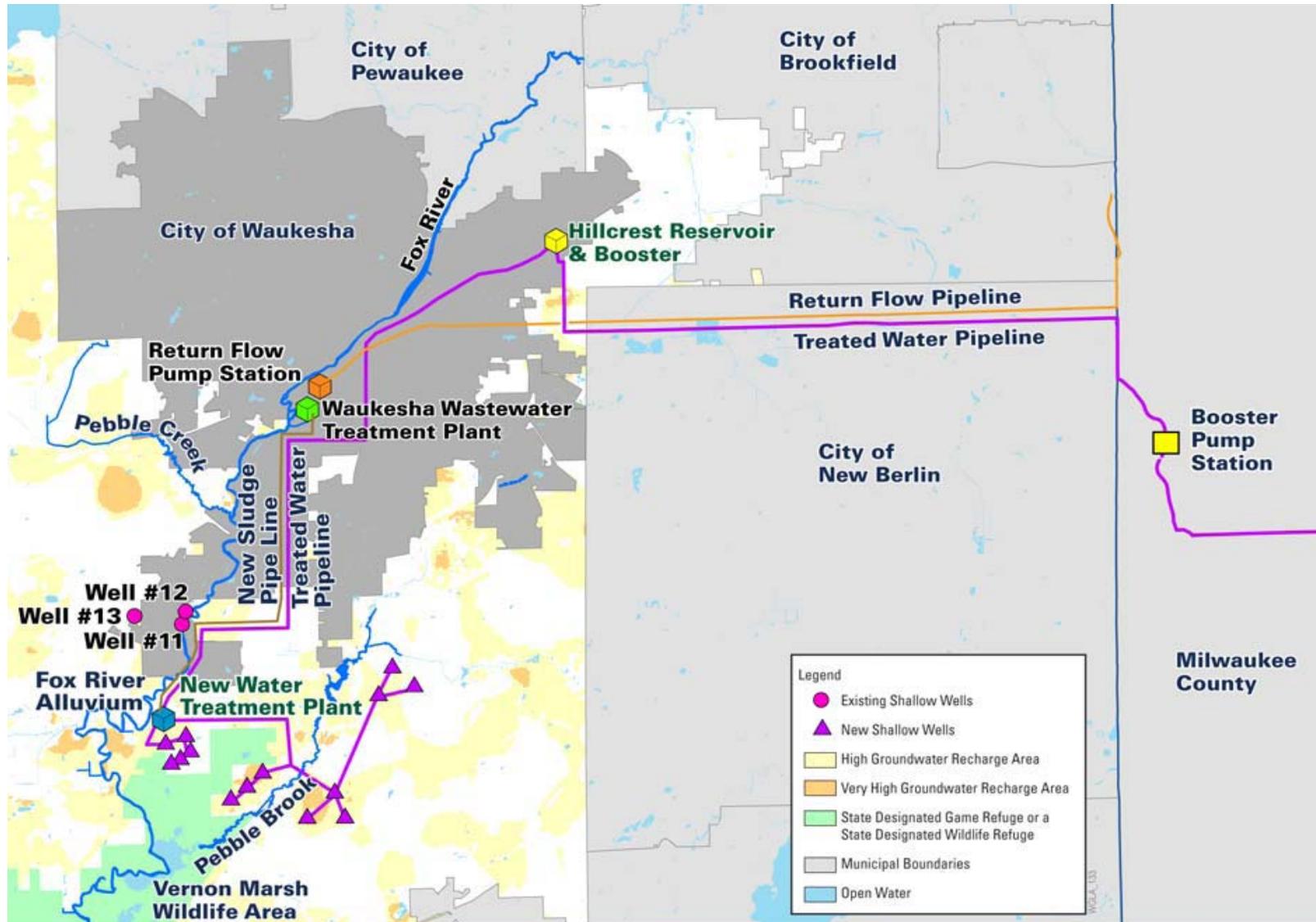
Eight deep aquifer wells & 17 shallow aquifer wells



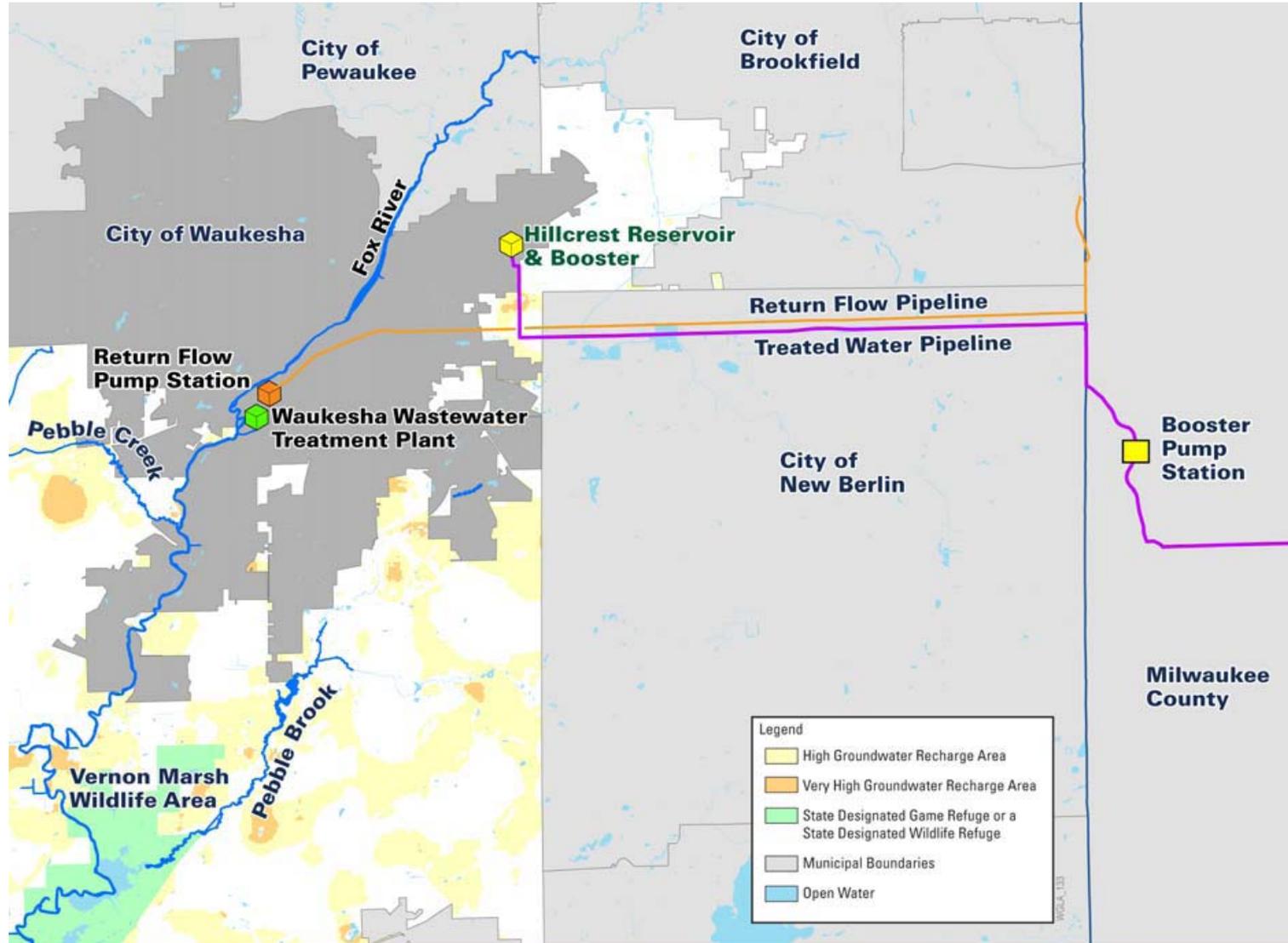
# Alternative 2: Shallow Aquifer & Riverbank Inducement (RBI) – 4RBI wells & 17 shallow aquifer wells



# Alternative 3: Lake Michigan and Shallow Aquifer Treated water pipeline & 17 shallow aquifer wells

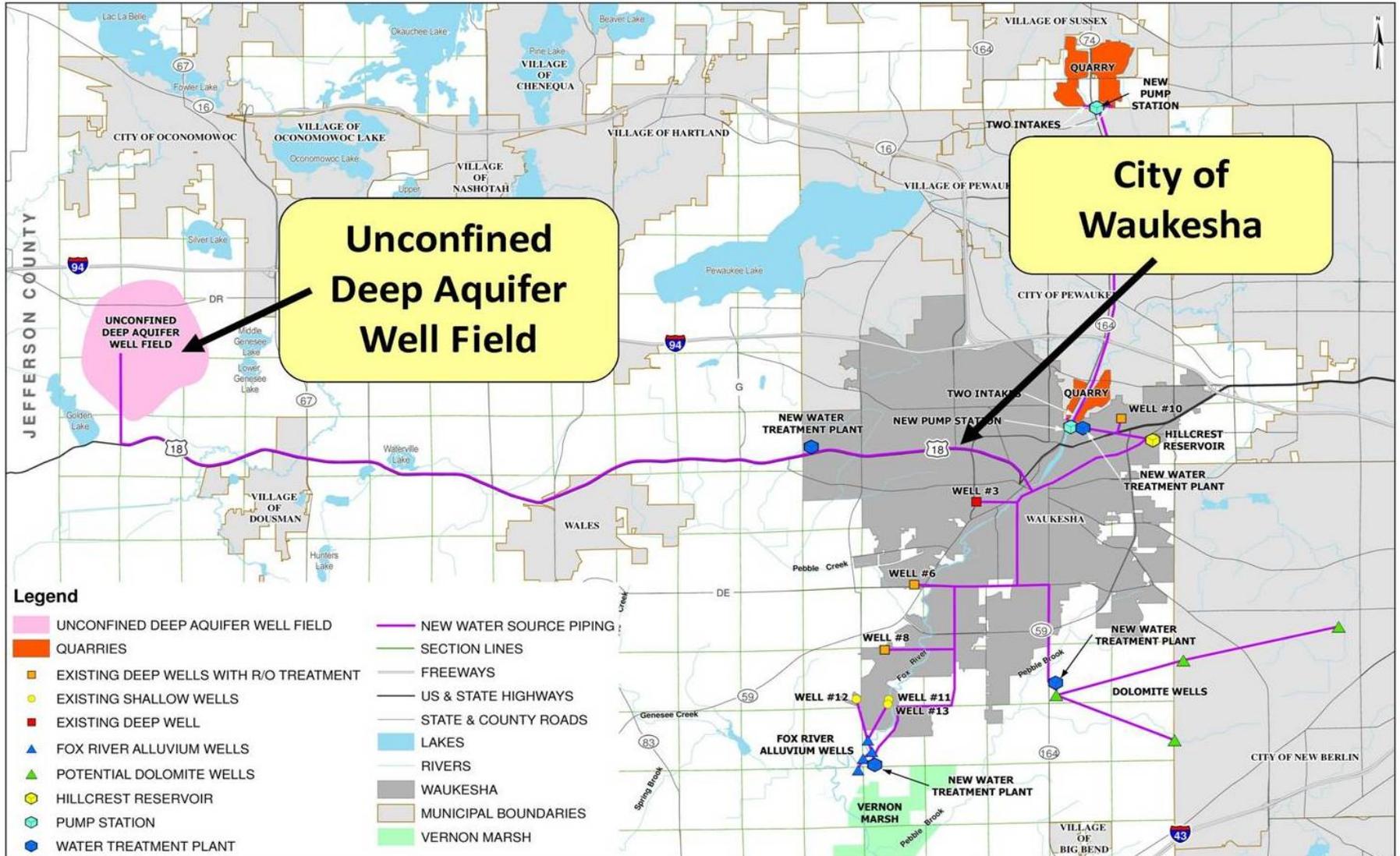


# Alternative 4: Lake Michigan Treated water pipeline



# Alternative 5: Unconfined Deep Aquifer

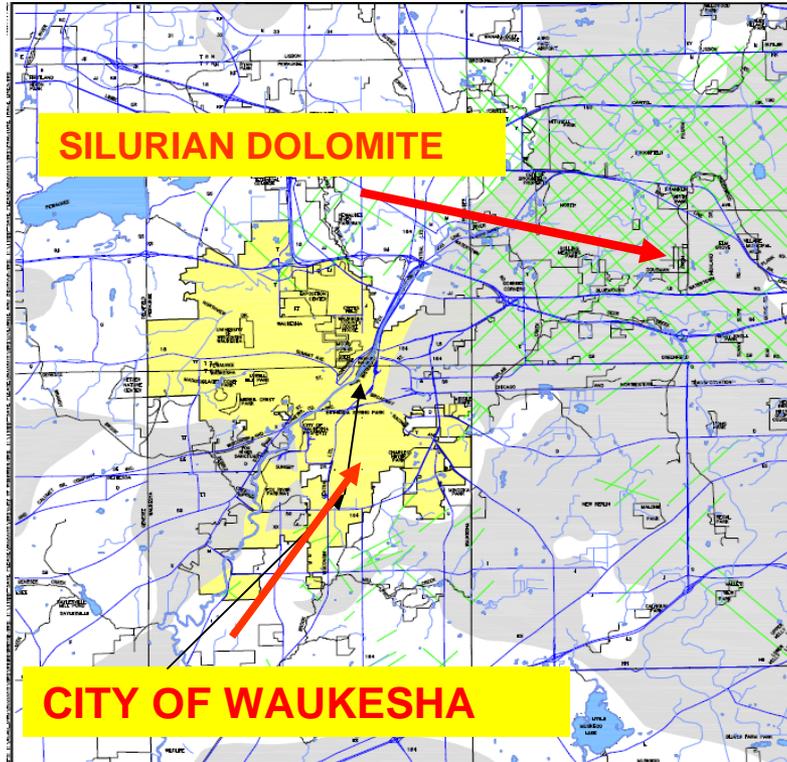
## 13 Unconfined deep aquifer wells



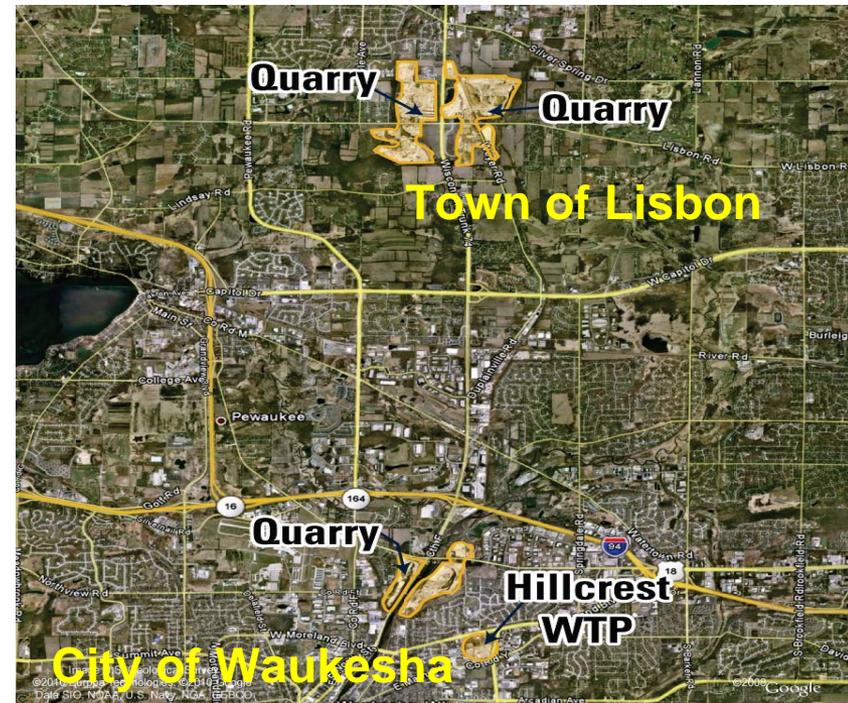
# Alternative 6: Multiple Sources

Multiple Sources Alternative Include:

- Silurian Dolomite Quarry
- Unconfined Deep Aquifer
- Deep Aquifer
- Shallow Aquifer & Riverbank Inducement



**Silurian Dolomite**  
Silurian Dolomite greater than 50 feet thick shown in grey.  
- Identified fracture traces in Silurian Dolomite shown in green.



**Quarry Locations**

# Cost Estimates for Water Supply Alternatives

## Cost Estimates for Primary Alternatives

### Water Supply Alternative Cost Estimates

Water Supply Alternative	Capital Cost <sup>a</sup> (\$ million)	Annual Operation/Maintenance Cost (\$ million)	20 yr Present Worth Cost (\$ million, 6%)	50 yr Present Worth Cost (\$ million, 6%)
Deep and shallow aquifers	189	7.2	272	302
Shallow aquifer and riverbank inducement	184	7.4	269	301
Unconfined deep aquifer	228	6.6	304	332
Multiple sources	319	7.9	410	444
Lake Michigan and shallow aquifer	238	7.5	324	356
Lake Michigan with return flow to Underwood Creek	164	6.2	235	262

<sup>a</sup>Includes direct construction cost, contractor administrative costs (insurance, bonds, supervision etc), 25% contingency, and costs for permitting, legal, engineering, administrative.

# Costs Associated with Individual Components of the Multiple Water Source Alternative:

## Cost of Multiple Water Sources

	<b>Deep Aquifer</b>	<b>Shallow and Riverbank Inducement</b>	<b>Quarries</b>	<b>Unconfined Deep Aquifer</b>	<b>Silurian Dolomite</b>
Capital cost, \$ million	65	75	67	85	28
O&M cost, \$ million	2.1	1.9	1.9	1.4	0.6
Average day, mgd	3	2.5	2.5	2	1

# Unit Cost of Multiple Water Sources

Unit Cost of Multiple Water Sources

