TOWN OF FOND DU LAC

FOND DU LAC COUNTY, WISCONSIN

WATER SUPPLY STUDY

WATER SERVICE AREA EVALUATION

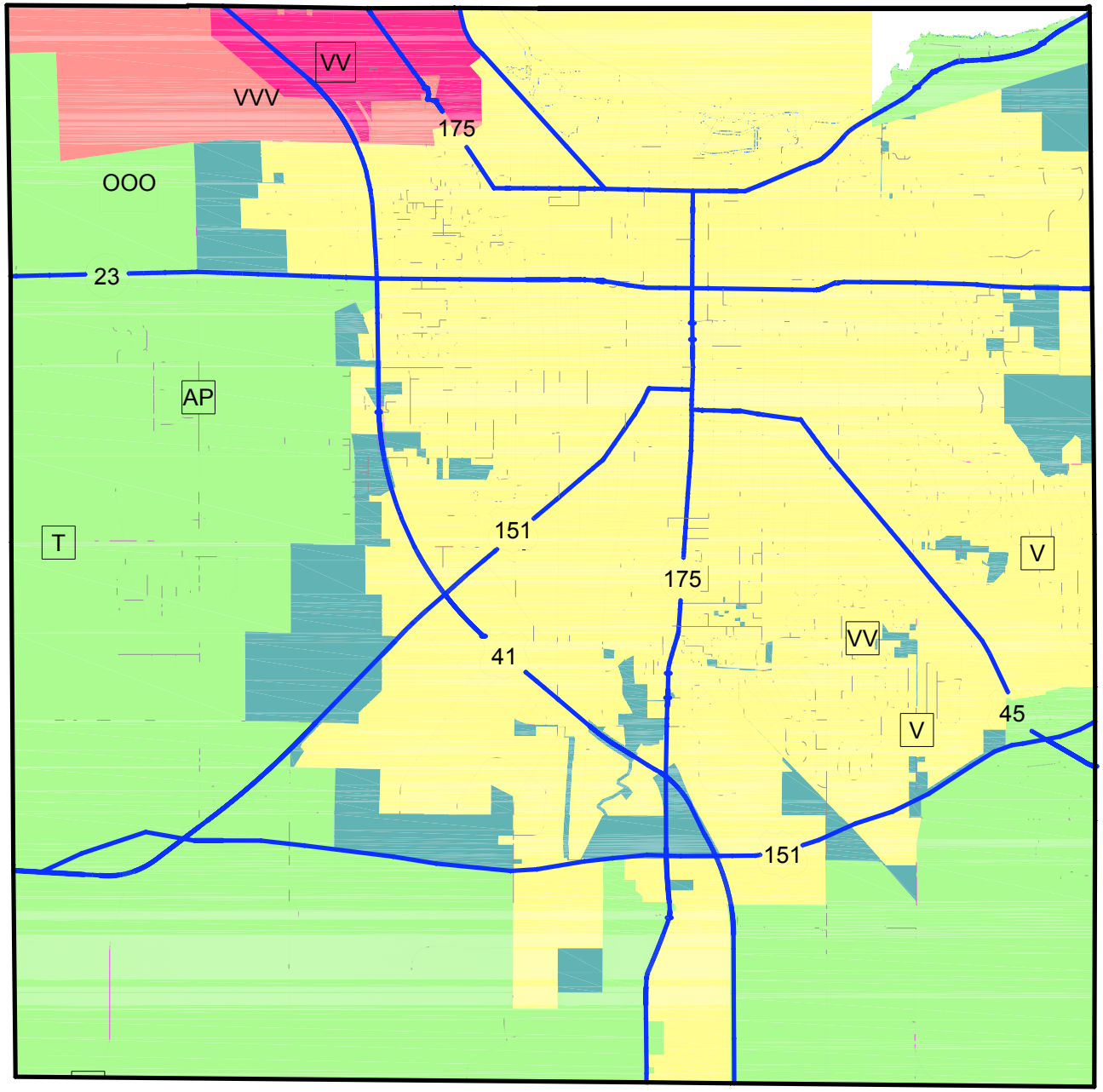
June 7, 2007

Kaempfer & Associates, Inc.

Consulting Engineers

Oconto Falls, Wisconsin

Study Area



NORTH

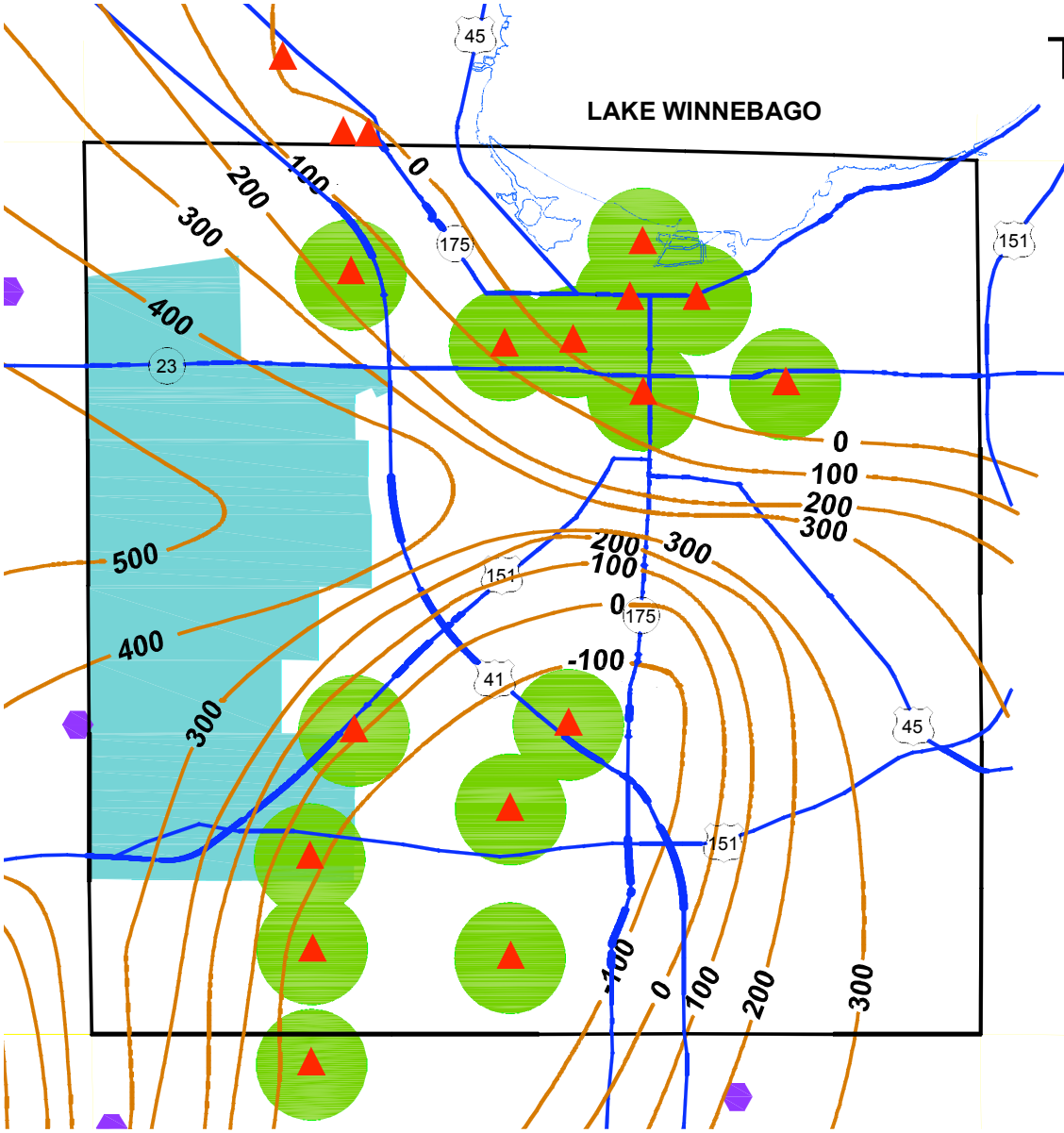
LEGEND

- STUDY AREA BOUNDARY
- TOWN OF FOND DU LAC
- CITY OF FOND DU LAC
- VILLAGE OF NORTH FOND DU LAC
- CITY GROWTH AREA
- VILLAGE GROWTH AREA


Town
of
Fond du Lac
NORTH
Study Area
Land Use

TOWN OF FOND DU LAC

HYDROGEOLOGY

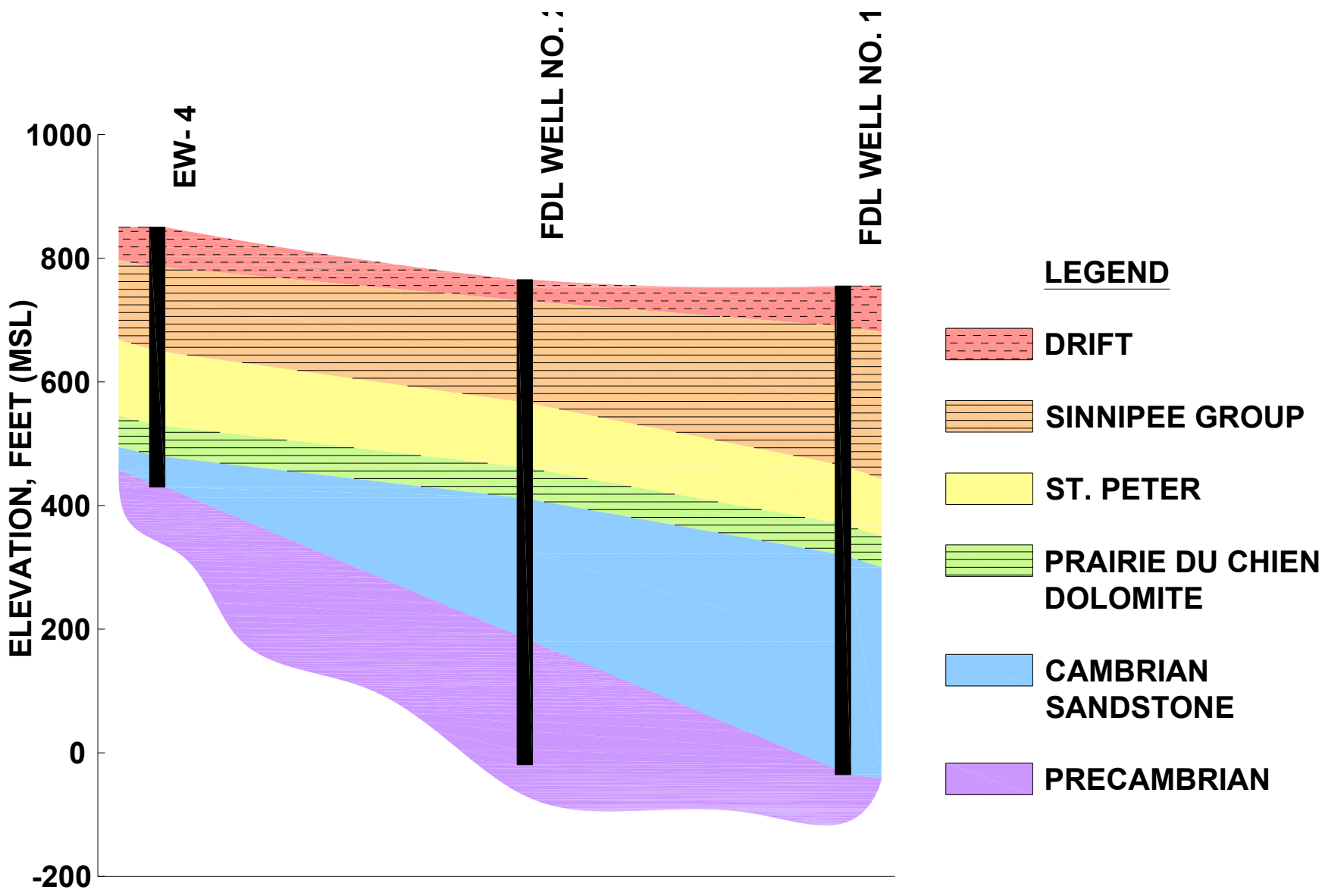


NORTH

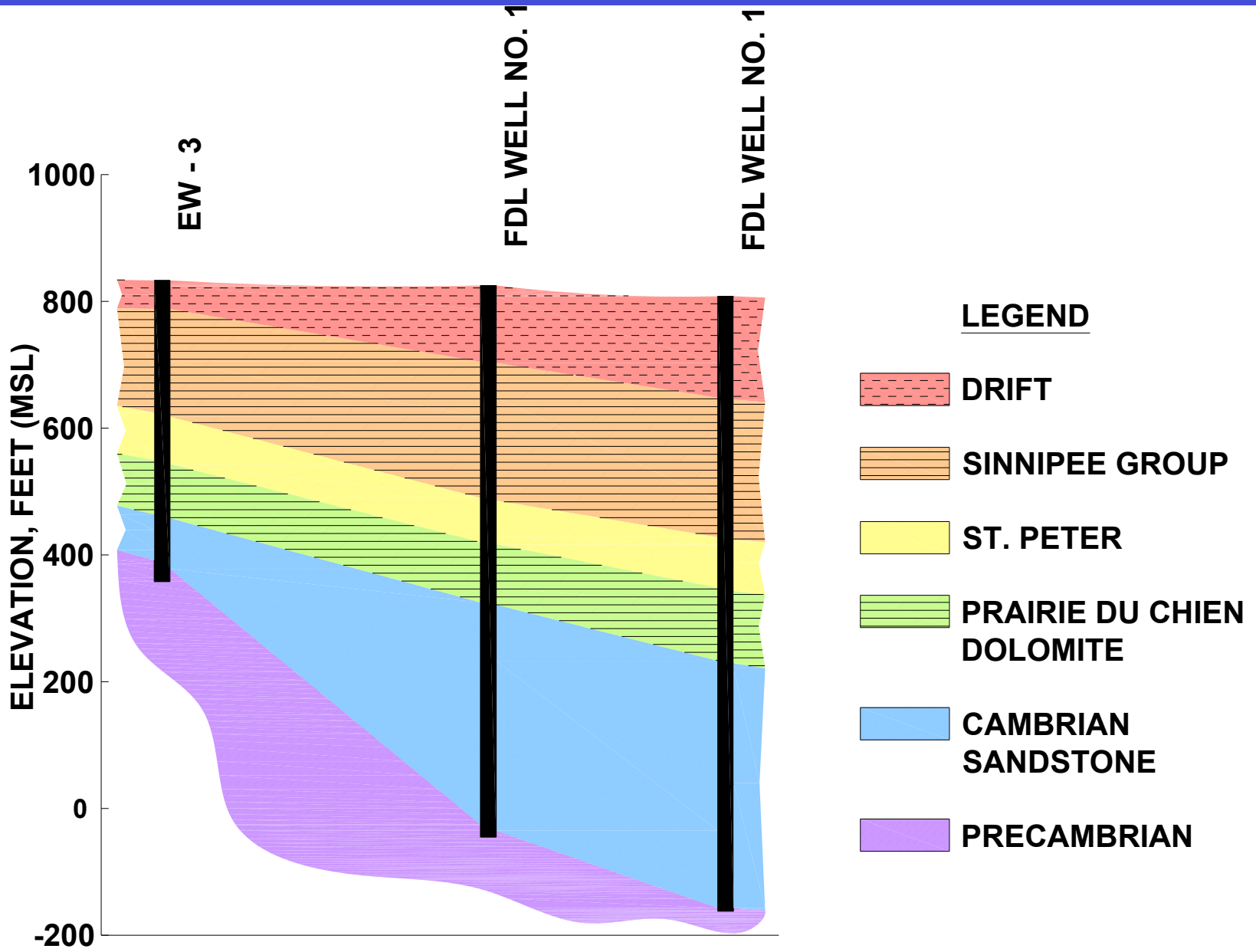
LEGEND

- STUDY AREA BOUNDARY
- PROPOSED WATER SERVICE PLANNING AREA
- EXISTING CITY OF FOND DU LAC WELL SITES
- PRECAMBRIAN ROCK SURFACE CONTOURS
- MUNICIPAL PRODUCTION WELL
- FOND DU LAC EXPLORATORY WELL

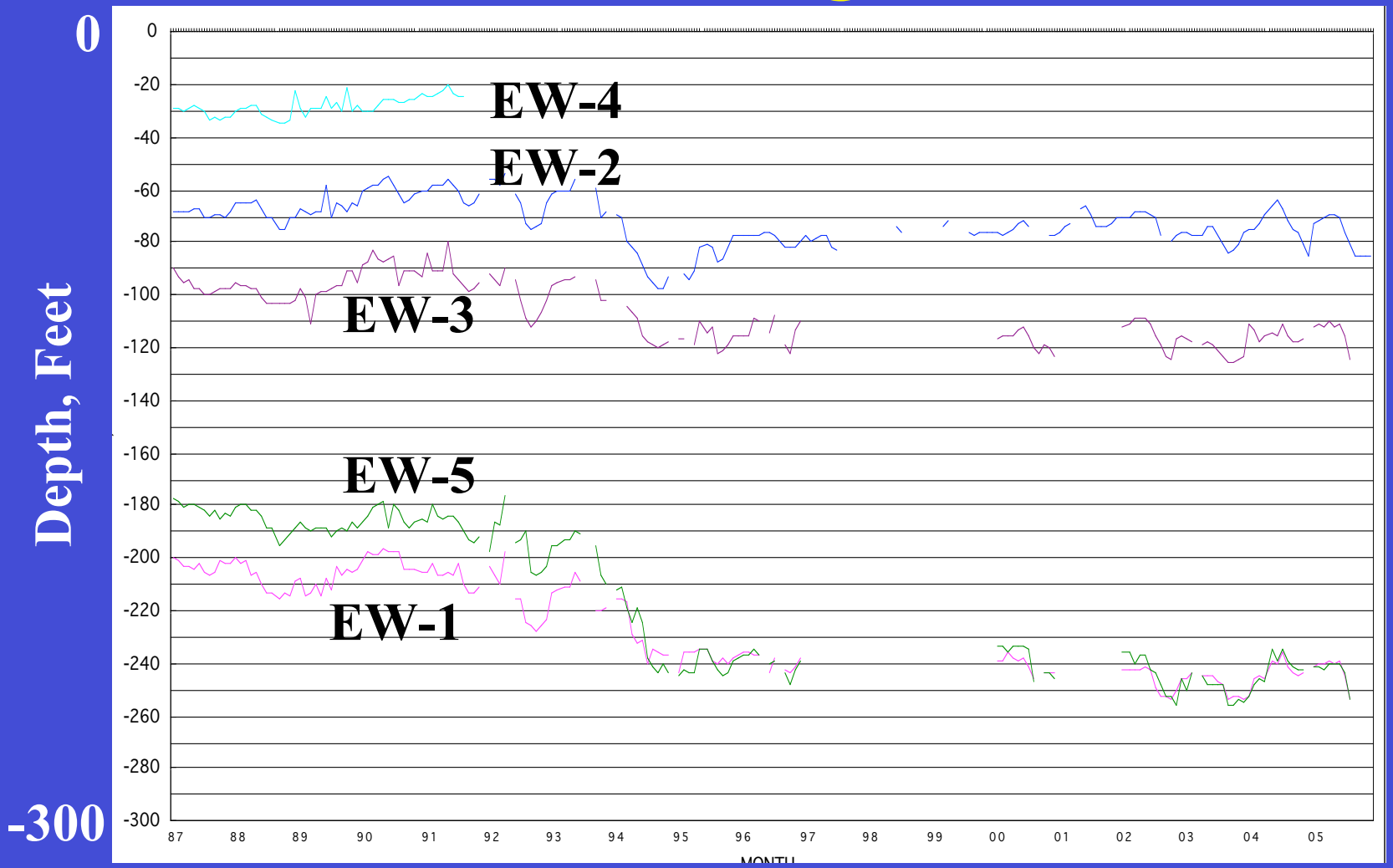
East-West Geologic Cross Section-1



East-West Geologic Cross Section-2



Exploratory Well Water Level Monitoring 1987 Through 2005



Groundwater Characteristics

Characteristic	Well			Standards	
	FDL-19	FDL-21	EW-3	MCL (c)	SS (d)
Inorganic Characteristics					
Alkalinity, Total ($CaCO_3$), mg/l	158	233	--	--	--
Arsenic, mg/l	0.0079	<0.002	--	0.0100	--
Barium, mg/l	0.051	0.064	--	2.0	--
Cadmium, mg/l	<0.00009	<0.0001	--	0.005	--
Calcium, mg/l	96	119	58	--	--
Chloride, mg/l	170	130	3.0	--	250
Chromium, mg/l	<0.0004	<0.0004	--	0.1	--
Fluoride, mg/l	0.39	0.43	0.62	4.0	2.0
Hardness, Total ($CaCO_3$), mg/l	362	449	268	--	--
Iron, mg/l	0.11	0.33	0.26	--	0.3
Lead, mg/l	<0.00073	0.005	--	0.015 (b)	--
Magnesium, mg/l	30	37	30	--	--
Manganese, mg/l	0.062	0.068	0.030	--	0.050
$NO_3 + NO_2$, mg/l	<0.0046	<0.0046	--	10	--
Sodium, mg/l	56	40	5	--	--
Sulfate, mg/l	110	110	22	--	250
Total Solids, mg/l	500 (a)	798	475 (a)	--	500
Radiological Characteristics					
Gross Alpha, pCi/l	32	31	13	15	--
Combined Radium, pCi/l	9.9	11.6	8.7	5	--
Uranium, ug/l	4.7	1.8	NT	30	--
Radon, pCi/l	472	NT	NT	--	--

(a) Estimated from chemical characteristics
(b) Action Level
(c) Maximum Contaminant Level
(d) Secondary Standard

NT - Not Tested

Town of Fond du Lac
Summary of Residential Wells Terminating in the Sandstone Formation

	Minimum	Average	Maximum
Depth to Dolomite	42	76	119
Depth to Sandstone	215	261	320
Total Depth of Well (ft)	255	294	345
Upper Drill Hole Diameter (ft)	8	9	10
Depth of Upper Drill Hole (ft)	10	30	73
Casing Diameter (in)	6	6	6
Depth of Casing (ft)	42	76	119
Depth of Grout (ft)	20	48	73
Grout (Sacks)	1	8	29

Town of Fond du Lac
Average Individual Residential Well Cost
$7,300-$7,900

Individual Residential Well

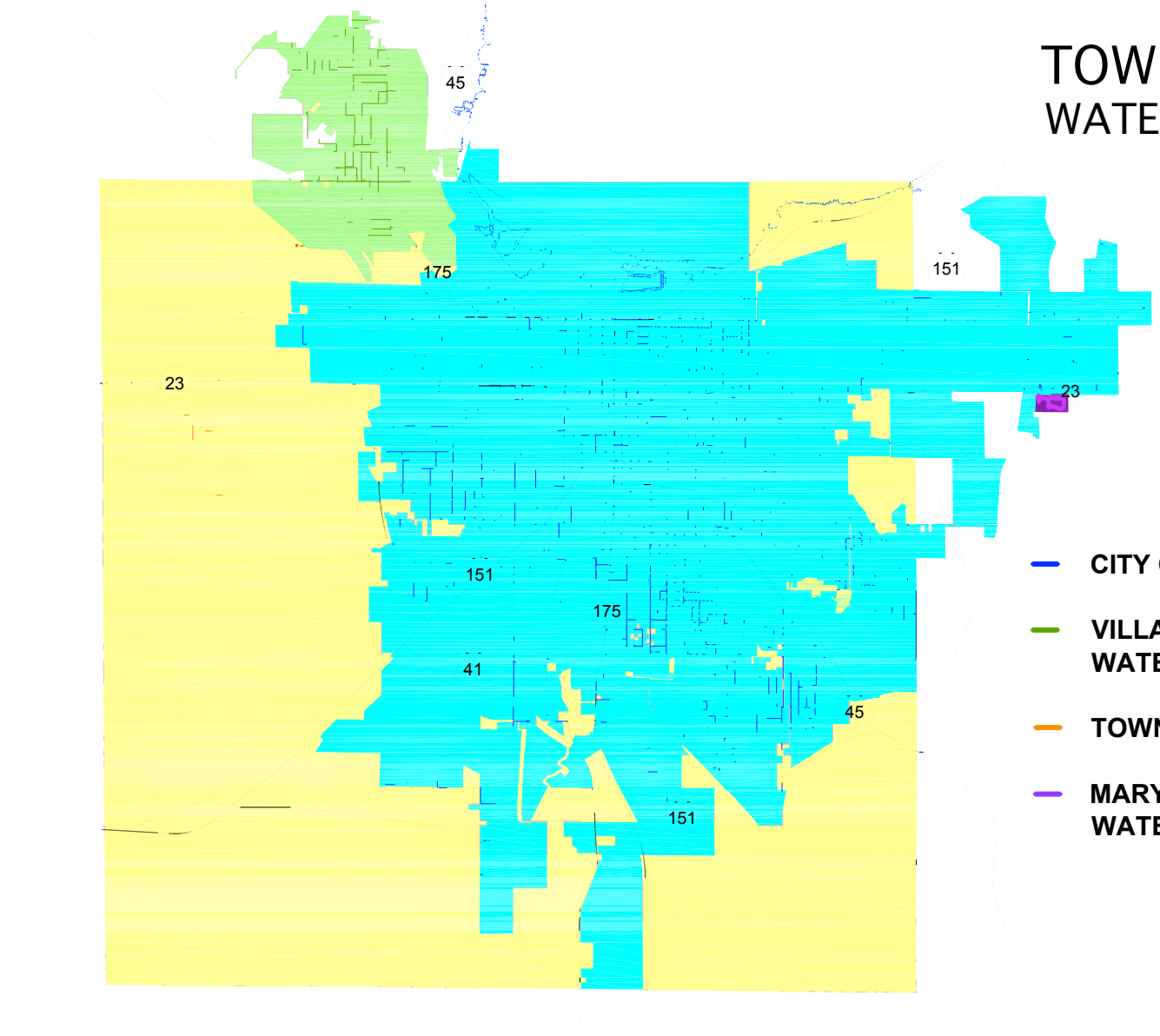
Item No.	Description	Unit Price	Total Cost
1	300 - lineal feet of 6-inch diameter drill hole	$12.00	$3,600.00
2	80 - lineal feet of 6-inch diameter steel casing	$15.00	$1,200.00
3	1 - provide drive shoe, well cap, sample, and WDNR permit	$200.00	$200.00
4	8 - bags of bentonite	$12.50	$100.00
5	1 - provide 1/2 hp well pump, pressure tank, and pitless adapator	$2,200.00	$2,200.00
6	1 - provide 1 hp constant pressure well pump, pressure tank, and pitless adapator	$2,800.00	$2,800.00
	Subtotal, 1/2 hp Pump System, Items 1-5		$7,300.00
	Subtotal, Constant Pressure Pump System, Items 1-4, & 6		$7,900.00

Town of Fond du Lac
Average Shared Residential Well Cost
$10,550-$11,750

Shared Residential Well

Item No.		Description	Unit Price	Total Cost
1	300	- lineal feet of 6-inch diameter drill hole	$12.00	$3,600.00
2	80	- lineal feet of 6-inch diameter steel casing	$15.00	$1,200.00
3	1	- provide drive shoe, well cap, sample, and WDNR permit	$200.00	$200.00
4	8	- bags of bentonite	$12.50	$100.00
5	150	- lineal feet of trenching	$7.00	$1,050.00
6	2	- provide 1/2 hp well pump, pressure tank, and pitless adapator	$2,200.00	$4,400.00
7	2	- provide 1 hp constant pressure well pump, pressure tank, and pitless adapator	$2,800.00	$5,600.00
		Subtotal, 1/2 hp Pump System, Items 1-6		$10,550.00
		Subtotal, Constant Pressure Pump System, Items 1-5, & 7		$11,750.00

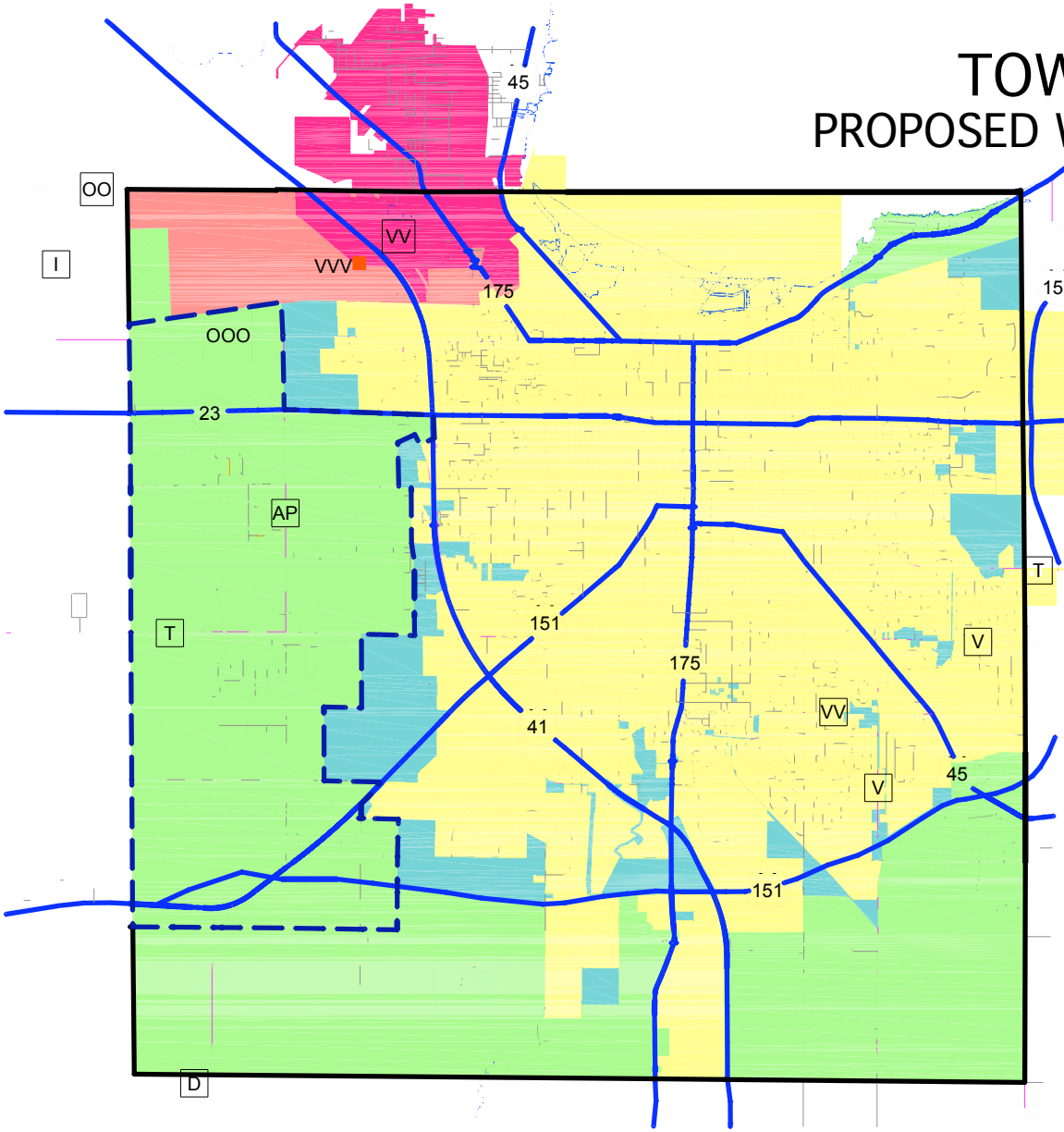
TOWN OF FOND DU LAC
WATER SYSTEM OWNERSHIP



LEGEND

- **CITY OF FOND DU LAC WATER MAIN**
- **VILLAGE OF NORTH FOND DU LAC WATER MAIN**
- **TOWN OF FOND DU LAC WATER MAIN**
- **MARY HILL PARK SANITARY DISTRICT WATER MAIN**

TOWN OF FOND DU LAC
PROPOSED WATER SERVICE PLANNING AI



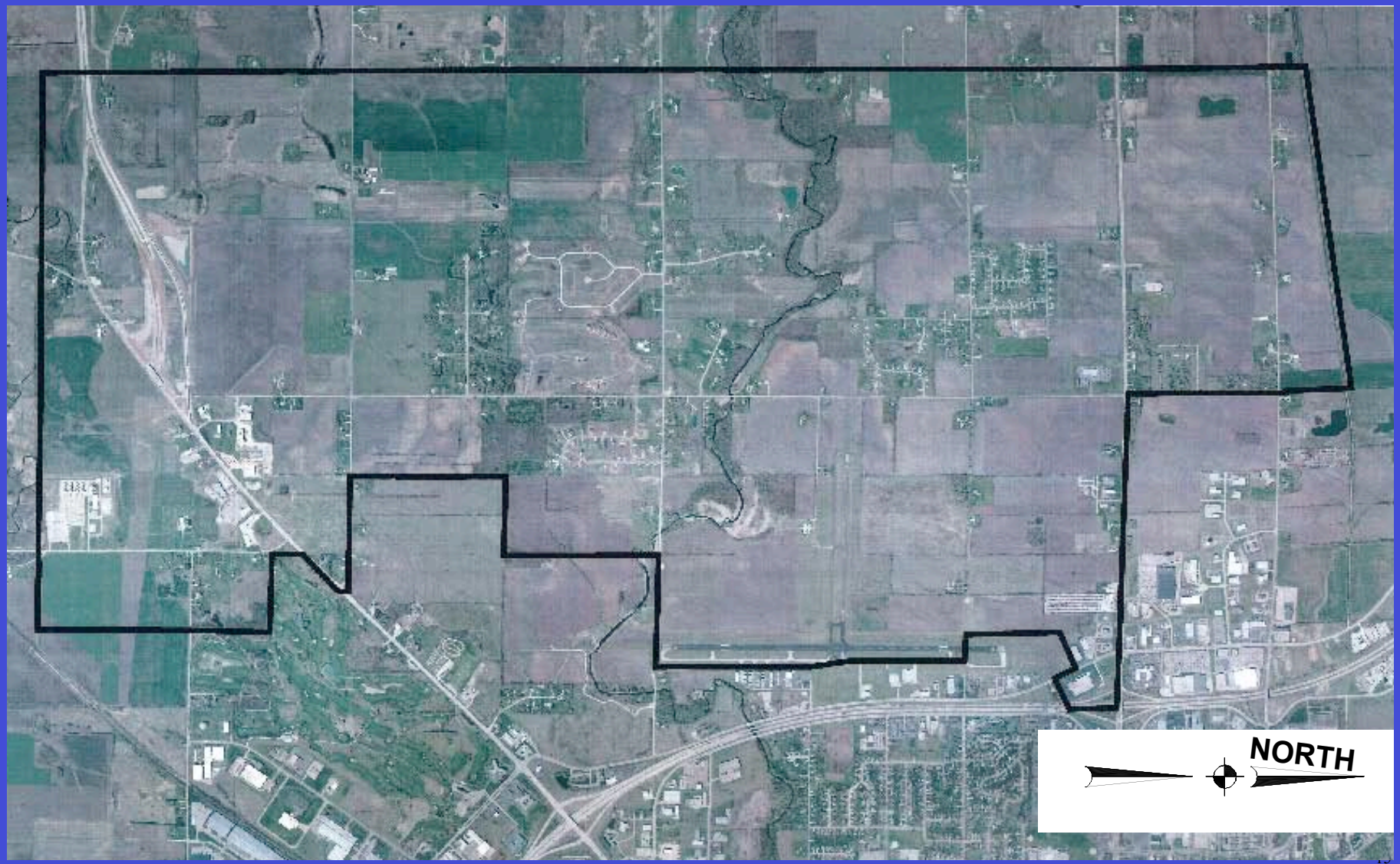
LEGEND

- STUDY AREA BOUNDARY
- PROPOSED WATER SERVICE PLANNING AREA
- TOWN OF FOND DU LAC
- CITY OF FOND DU LAC
- VILLAGE OF NORTH FOND DU LAC
- CITY GROWTH AREA
- VILLAGE GROWTH AREA
- TOWN OF FOND DU LAC WATER MAIN

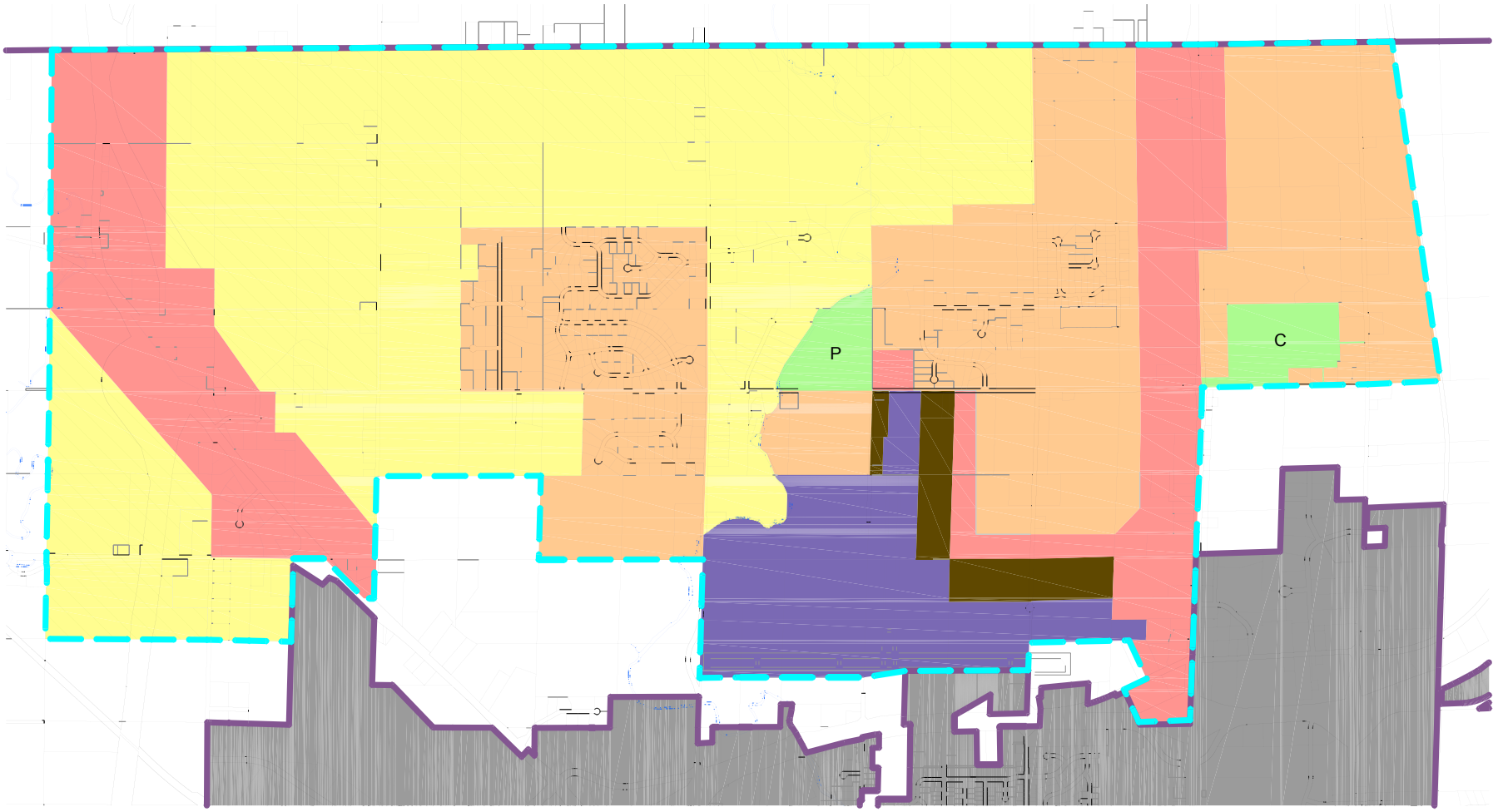
Proposed Water Service Planning Area

- **The proposed water service planning area would be approximately 4,360 acres (6.8 square miles).**
- **The proposed water service area contains about 350 properties served by private wells.**
- **The proposed water service area contains about 150 properties served by the municipal water system.**
- **The population of the proposed water service planning area is about 1,250 persons.**

Proposed Water Service Planning Area
Land Use



Proposed Water Service Planning Area Land Use Plan



LEGEND

- PROPOSED WATER SERVICE PLANING AREA
- TOWN OF FOND DU LAC
- INCORPORATED AREA
- AGRICULTURAL
- AGRICULTURAL TRANSITION
- AIRPORT
- PARK - P / CEMETERY - C
- COMMERCIAL / OFFICE
- INDUSTIAL
- RESIDENTIAL RURAL
- RESIDENTIAL SEWERED

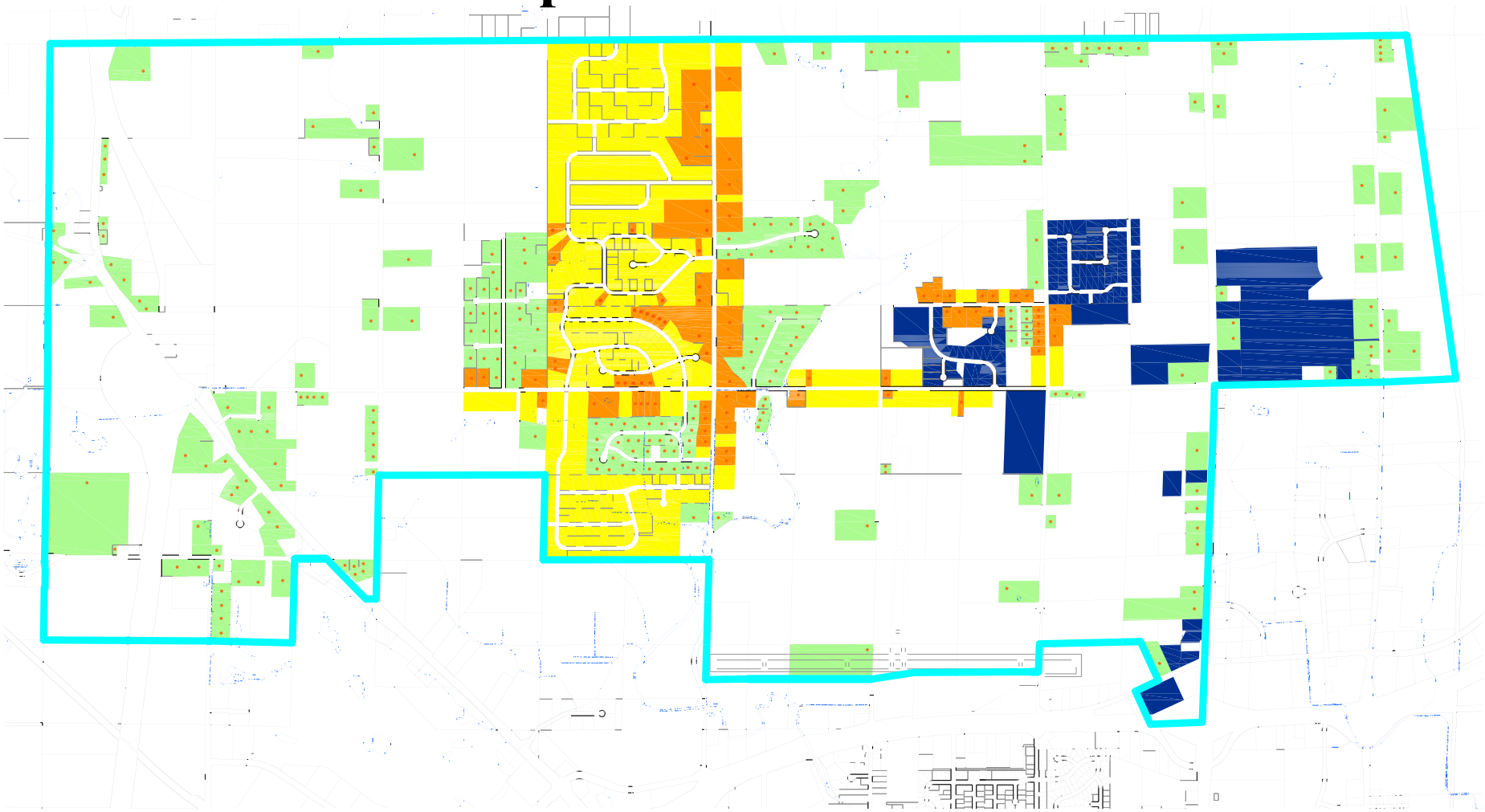
Proposed Water Service Planning Area Land Use Plan

- **Land use plan includes:**
  - **1,800 acres of residential land use**
  - **850 acres of commercial land use**
  - **80 acres of industrial land use**
- **Ultimate population of water service planning area, based on proposed land use, is 6,000 to 9,000 persons.**

Proposed Water Service Planning Area Private Water Systems

- **Highest concentration of private wells (140) in the proposed water service planning area is in the vicinity of Esterbrook Road and Rogersville Road.**
  - **Prairie View Subdivision (13)**
  - **River View Subdivision (15)**
  - **Esterbrook Estates Subdivision (43)**
  - **Fox Drive Development (31)**
  - **Town / County Roads (38)**
- **Potential for an additional 390 to 600 private wells in the vicinity of Esterbrook Road and Rogersville Road.**
  - **Meadow Estates (106)**
  - **Westfield Hideaway (89)**
  - **Stillwater Estates (51)**
  - **Esterbrook Estates Addition #1 (106)**
  - **Adjacent Properties (???)**

Proposed Water System Improvements
Properties to be Served



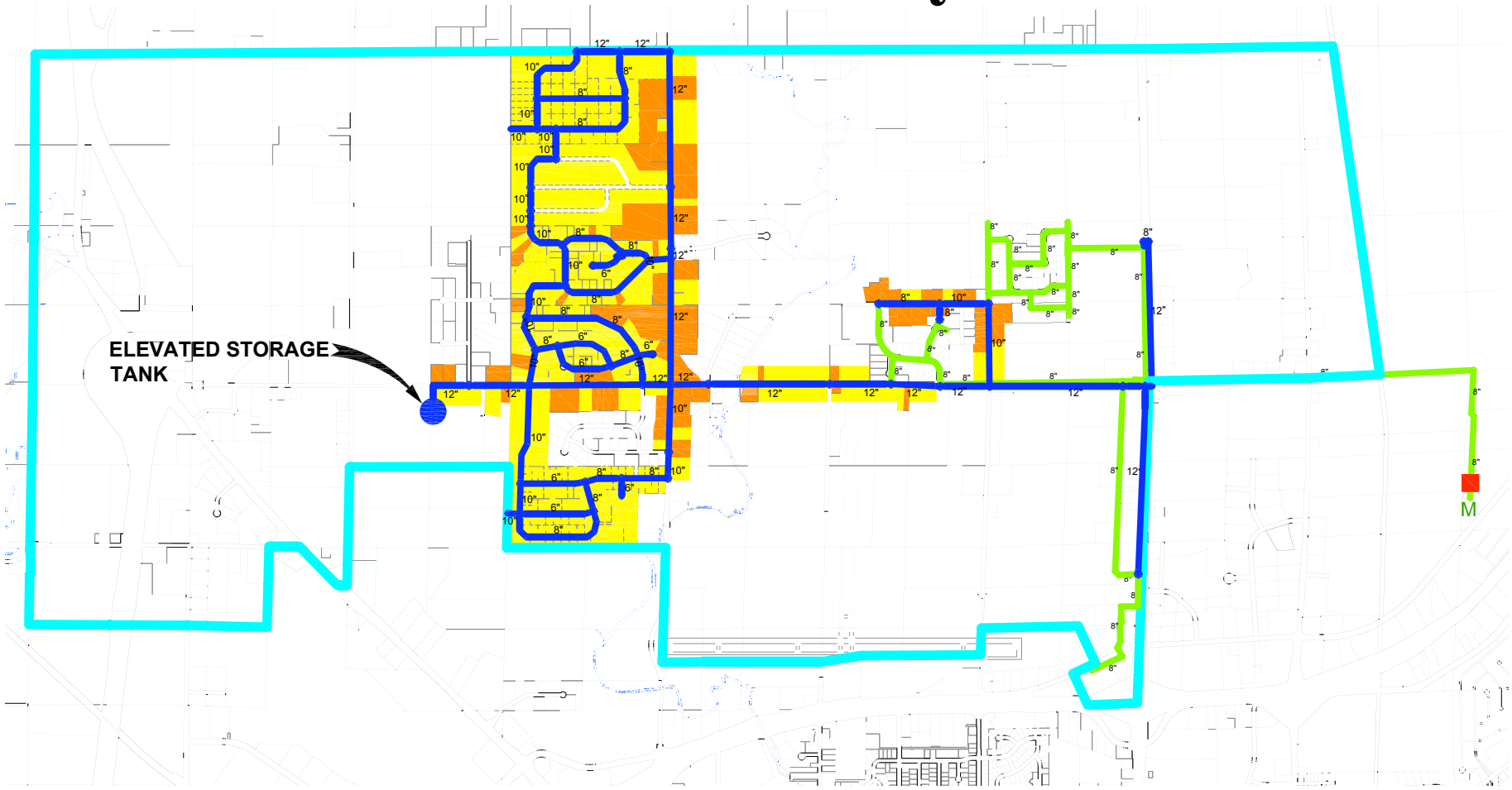
LEGEND

- PROPOSED WATER SERVICE PLANNING AREA
- PRIVATE WELL
- VACANT PROPERTY TO BE SERVED BY PUBLIC WATER SYSTEM
- OCCUPIED PROPERTY TO BE SERVED BY PUBLIC WATER SYSTEM
- OCCUPIED PROPERTY SERVED BY PUBLIC WATER SYSTEM
- OCCUPIED PROPERTY SERVED BY PRIVATE WELL

Proposed Project Scope

- **Make municipal water service available to approximately 90 occupied properties and approximately 390 vacant properties.**
- **Provides available fire flow of 2,000 gpm to the majority of the water system customers.**
- **Correct deficiencies in existing municipal water distribution system.**

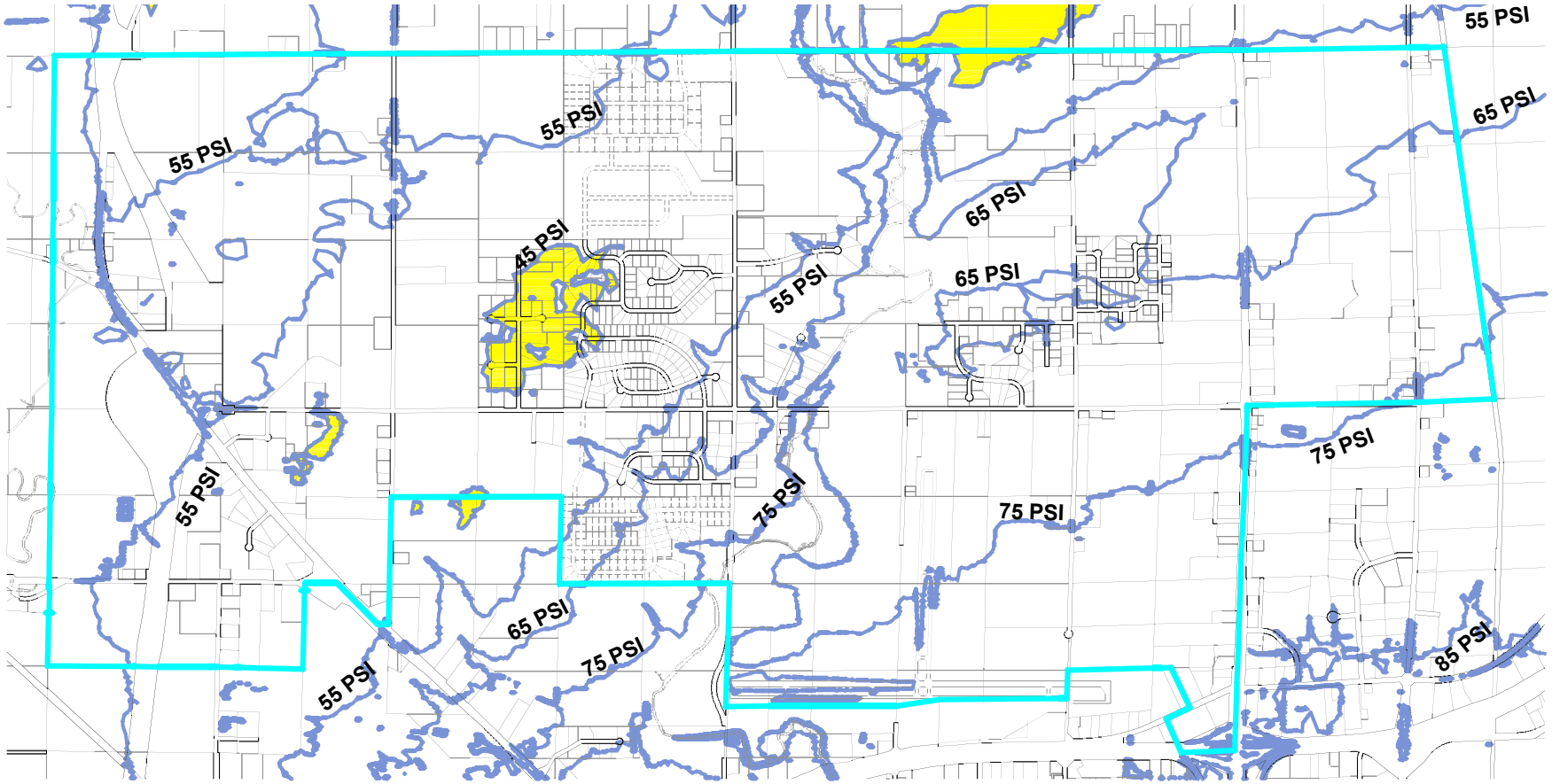
Proposed Water System Improvements
Water Distribution System Plan



LEGEND

- PROPOSED WATER SERVICE PLANNING AREA
- TOWN OF FOND DU LAC EXISTING WATER MAIN
- TOWN OF FOND DU LAC PROPOSED WATER MAIN
- VACANT PROPERTY TO BE SERVED
- OCCUPIED PROPERTY TO BE SERVED
- PROPOSED ELEVATED STORAGE TANK
- BOOSTER PUMP STATION
- M METERING STATION

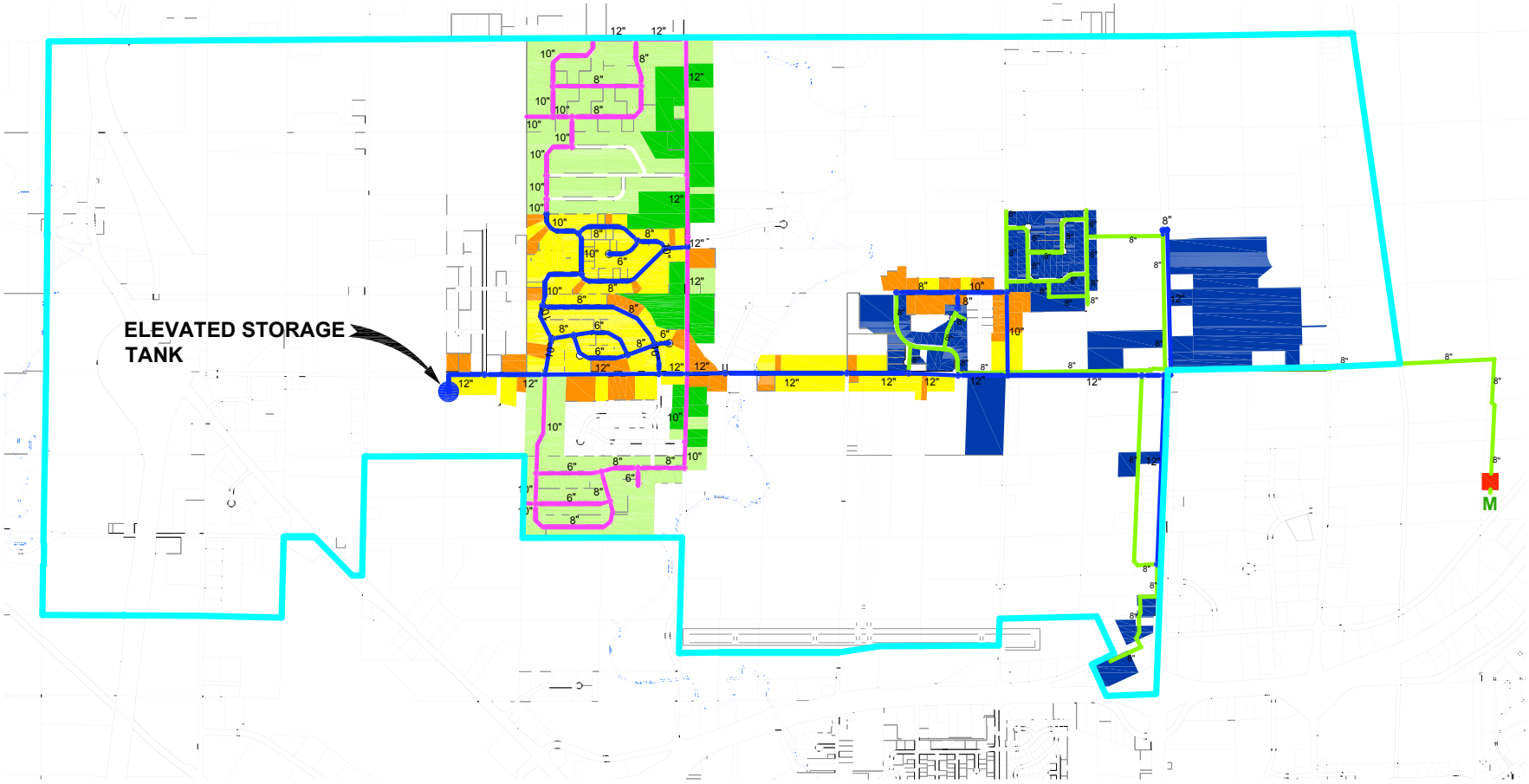
Proposed Water System Improvements
Static Pressure Contours



LEGEND

- PROPOSED WATER SERVICE PLANNING AREA
- STATIC PRESSURE CONTOUR AT OVERFLOW ELEVATION OF 965.00
- MARGINAL PRESSURE 35 - 45 PSI
- INADEQUATE PRESSURE < 35 PSI

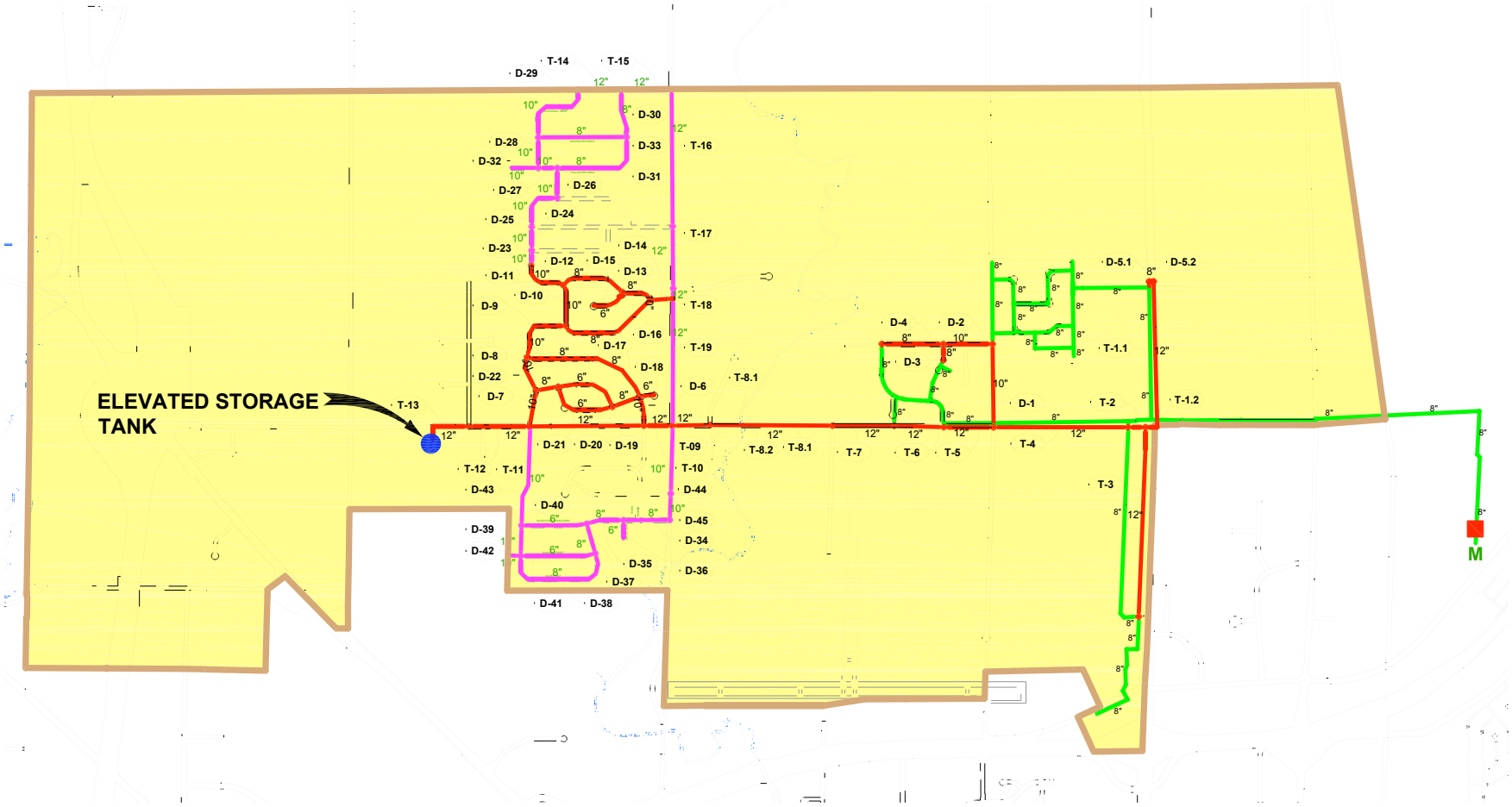
Proposed Water System Improvements
Possible Staging Plan



LEGEND

- PROPOSED WATER SERVICE PLANNING AREA
- TOWN OF FOND DU LAC PROPOSED WATER MAIN PHASE 2
- VACANT PROPERTY TO BE SERVED IN PHASE 2
- TOWN OF FOND DU LAC EXISTING WATER MAIN
- VACANT PROPERTY TO BE SERVED IN PHASE 1
- OCCUPIED PROPERTY TO BE SERVED IN PHASE 2
- TOWN OF FOND DU LAC PROPOSED WATER MAIN PHASE 1
- OCCUPIED PROPERTY TO BE SERVED IN PHASE 1
- OCCUPIED PROPERTY SERVED BY PUBLIC WATER SYSTEM

Recommended Water Supply System Plan



LEGEND

- PROPOSED WATER SERVICE PLANNING AREA
- TOWN OF FOND DU LAC EXISTING WATER MAIN
- TOWN OF FOND DU LAC PROPOSED WATER MAIN PHASE 1
- TOWN OF FOND DU LAC PROPOSED WATER MAIN PHASE 2
- PROPOSED ELEVATED STORAGE TANK
- BOOSTER PUMP STATION
- M METERING STATION

Recommended Plan Cost Summary

	Description	Total Cost
Phase 1	Transmission Main	$1,524,600
	Distribution System	
	North Distribution System Pipeline	$245,500
	South Distribution System Pipeline	$743,300
	Water Services	$552,000
	Elevated Storage Tank	$929,250
Phase 2	Transmission Main	$570,500
	Distribution System	
	West Distribution System	$474,200
	East Distribution System	$552,600
	Water Services	$394,000
	Subtotal, Phase 1	$3,994,650
	Subtotal, Phase 2	$1,991,300
	Total Cost	$5,985,950

Proposed Connection Requirement

- **Vacant property adjacent to water main - connection required when property is developed.**
- **Occupied property adjacent to water main – connection is not required. Property owner has the option of obtaining municipal water service.**

Recommended Plan Cost Summary

Description	Assessable	Non-Assessable	Total Cost
Phase 1			
Transmission Main	$425,630	$1,098,970	$1,524,600
Distribution System			
North Distrib. System Pipeline	$245,500	--	$245,500
South Distrib. System Pipeline	$743,300	--	$743,300
Water Services	$552,000	--	$552,000
Elevated Storage Tank		$929,250	$929,250
Subtotal, Phase 1	$1,966,430	$2,028,220	$3,994,650
Phase 2			
Transmission Main	$337,758	$232,742	$570,500
Distribution System			
West Distribution System	$474,200	--	$474,200
East Distribution System	$552,600	--	$552,600
Water Services	$394,000	--	$394,000
Subtotal, Phase 2	$1,758,558	$232,742	$1,991,300
Total Cost	$3,724,988	$2,260,962	$5,985,950

Proposed Water Service Planning Area Variation in Benefits

- **Vacant property on water system**
  - **Water service**
  - **Directly improved fire protection – fire hydrant**
- **Occupied property on water system**
  - **Immediate ability to obtain water service**
  - **Directly improved fire protection – fire hydrant**
- **Vacant or occupied property not on water system**
  - **Future ability to obtain water service**
  - **Indirectly improved fire protection – closer more reliable water supply**

Benefits of Proposed Project

- **Protects existing private wells and eliminates need for shared wells.**
- **Improves fire protection and reduces home insurance costs.**
- **Improves water quality.**
- **Makes public water service available to existing residents using private wells if needed in the future.**
- **Makes public water service with adequate fire protection available to support commercial and industrial development.**