

White Bear Lake Area Comprehensive Plan Study 11

Implement/Require/Encourage Non- or
Less-Potable Water Reuse or Potable
Reuse for Irrigation and Process Water

Presenter: Petros Paulos, P.E.



July 16, 2026

Overview of Scope

- Analyze the feasibility of non- and less-potable water use and potable water reuse in White Bear Lake and Vadnais Heights for Commercial/Industrial Businesses
- Coordinate with the DNR to analyze the potential for improvement or maintenance of White Bear Lake surface water elevation using the estimated savings from less groundwater pumping
- Evaluate potential costs, operation and maintenance requirements, regulatory concerns, and ownership and management structures of proposed scenarios

Progress Update

Task	Status
Summarize historical water usage for targeted businesses along impacted corridors	Complete
Collect and summarize available datasets regarding current water supply systems, water quality data, treatment methods, and potential water reuse applications	Complete
Conduct outreach to stakeholders to determine current water chemistry & pressure requirements and the impacts of switching water sources	Complete
Prepare a detailed map establishing watermain route and major distribution infrastructure.	Complete
Evaluate infrastructure requirements and preliminary route alignments based on gathered data and develop potential trunk distribution system layouts.	Complete
Identify regulatory constraints and opportunities with non-potable water	Completed
Obtain the capital, O&M costs for proposed infrastructure and establish treatment requirements for source water	Completed

Model Evaluation

- Two models are currently being evaluated: the Infrastructure-Based Model vs the User-Based Model
- Infrastructure-Based Model
 - Aim to service as many commercial, industrial, irrigation and HOA water usage with service corridor between Vadnais Heights and WBL as practical
 - Redundant backup service lines are installed
 - Due to the robust network, multiple pressure zones are required.
- User-Based Model
 - The distribution network is directed at the highest quantity users with limited watermain and associated infrastructure.
 - Single pressure zone distribution network.

	8-Inch Water Main	12-Inch Water Main	16-Inch Water Main	Water Tower Height	Water Tower Capacity	Pressure Zones	Pressure Zone 1 Range	Pressure Zone 2 Range
	(Linear ft)	(Linear ft)	(Linear ft)	ft	Gallons	#	PSI	PSI
Infrastructure-Based Model	53,423	24,446	7,721	170	1,500,000	2	46-84	68-78
User-Based Model	2,653	33,209	573	170	1,250,000	1	48-83	--

Annual Water Usage Overview

		WBL and VH Commercial/Industrial **	Gem Lake Commercial/Industrial**	Irrigation*	WBL Residential	VH Residential	Gem Lake Residential	Estimated Total Annual Demand
Infrastructure- Based Model	Total Annual Water Demand*** (GPY)	216,890,893	25,206,900	70,075,404	35,616,750	2,738,216	18,269,345	368,797,508
	Water Demand (GPM)	413	48	665	68	5	35	1,234
	Daily Demand (GPD)	594,222	69,060	359,361	97,580	7,502	50,053	1,177,778
User-Based Model	Total Annual Water Demand*** (GPY)	157,769,210	25,206,900	47,691,948	18,559,500	554,162	18,269,345	268,051,065
	Water Demand (GPM)	300	48	453	35	1	35	872
	Daily Demand (GPD)	432,244	69,060	244,574	50,848	1,518	50,053	848,298

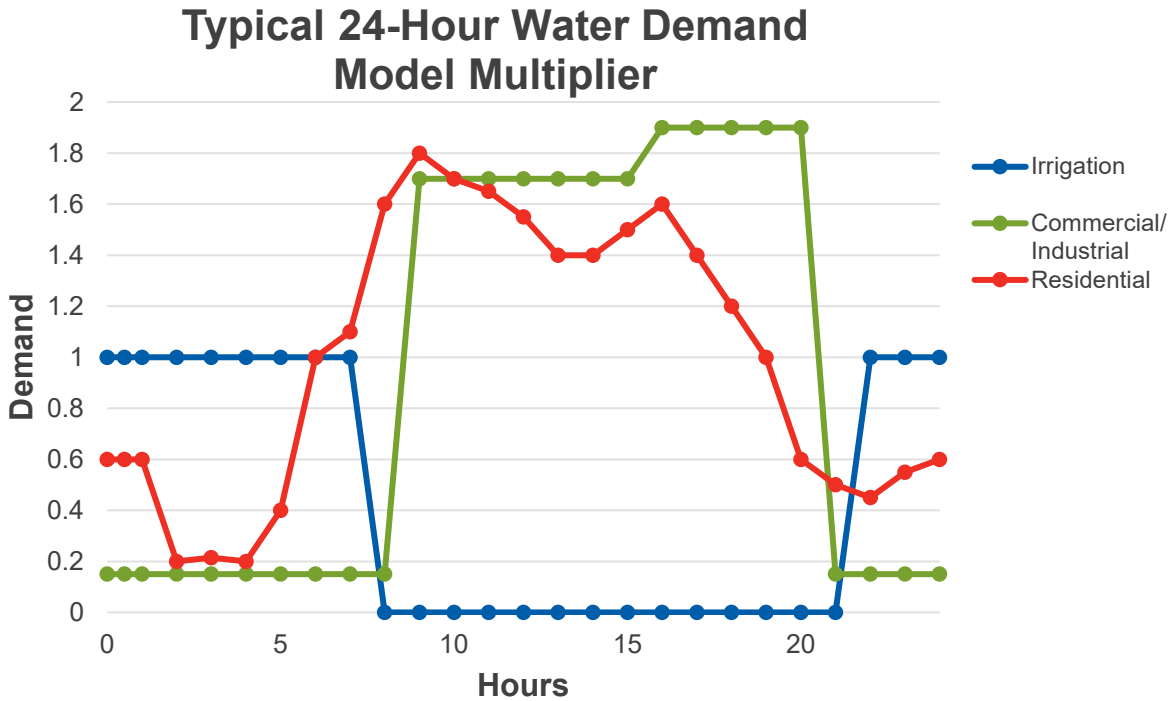
*Based on 9 hours of usage and 6.5 months of irrigation

**Based on 24 hours of usage for Commercial

***Diurnal Pattern will account for max flows

Demand Projections

Communities Included	Season	Daily Water Usage, Gallons	Fire Flow, GPM	Tank Size, MG
Infrastructure-Based Model	Irrigation	1,177,778	1,500 2 hours	1.5
Infrastructure-Based Model	Non-irrigation	818,417	1,500 2 hours	1.5
User-Based Model	Irrigation	848,298	1,500 2 hours	1.25
User-Based Model	Non-irrigation	603,724	1,500 2 hours	1.25

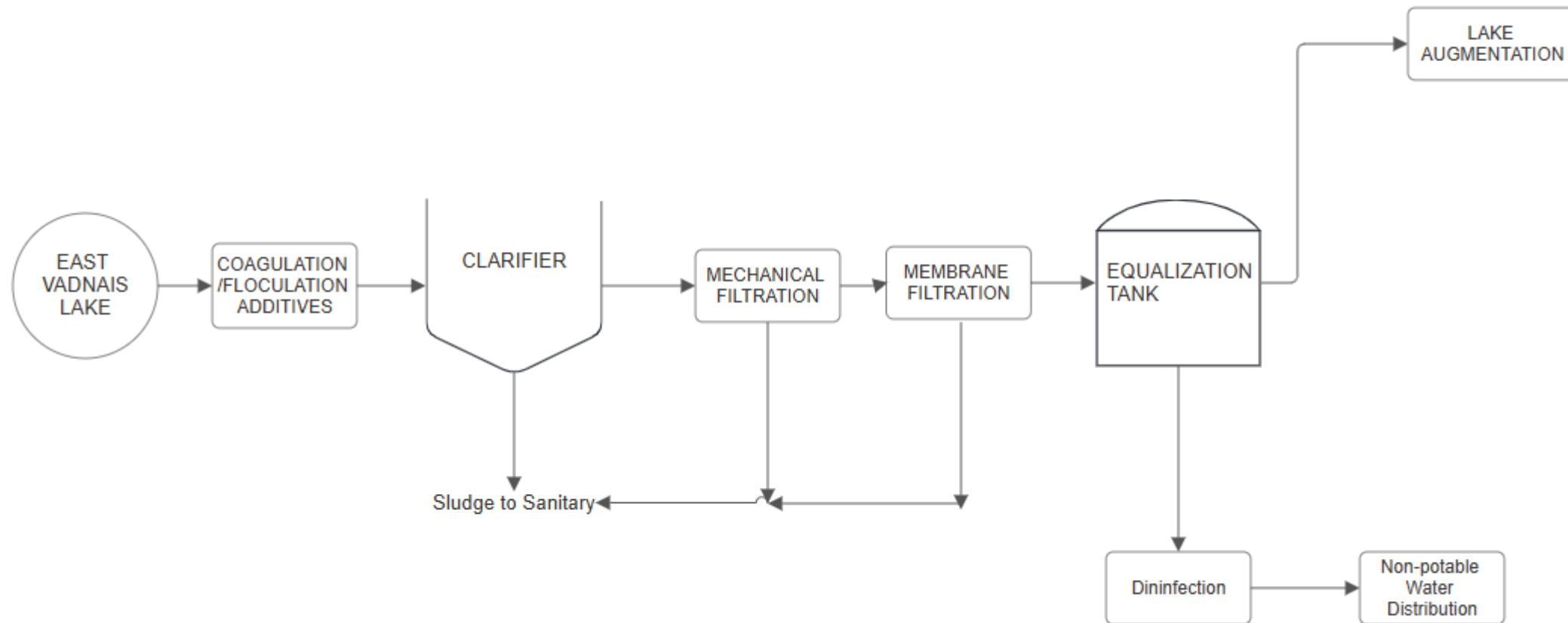


Source: AWWA

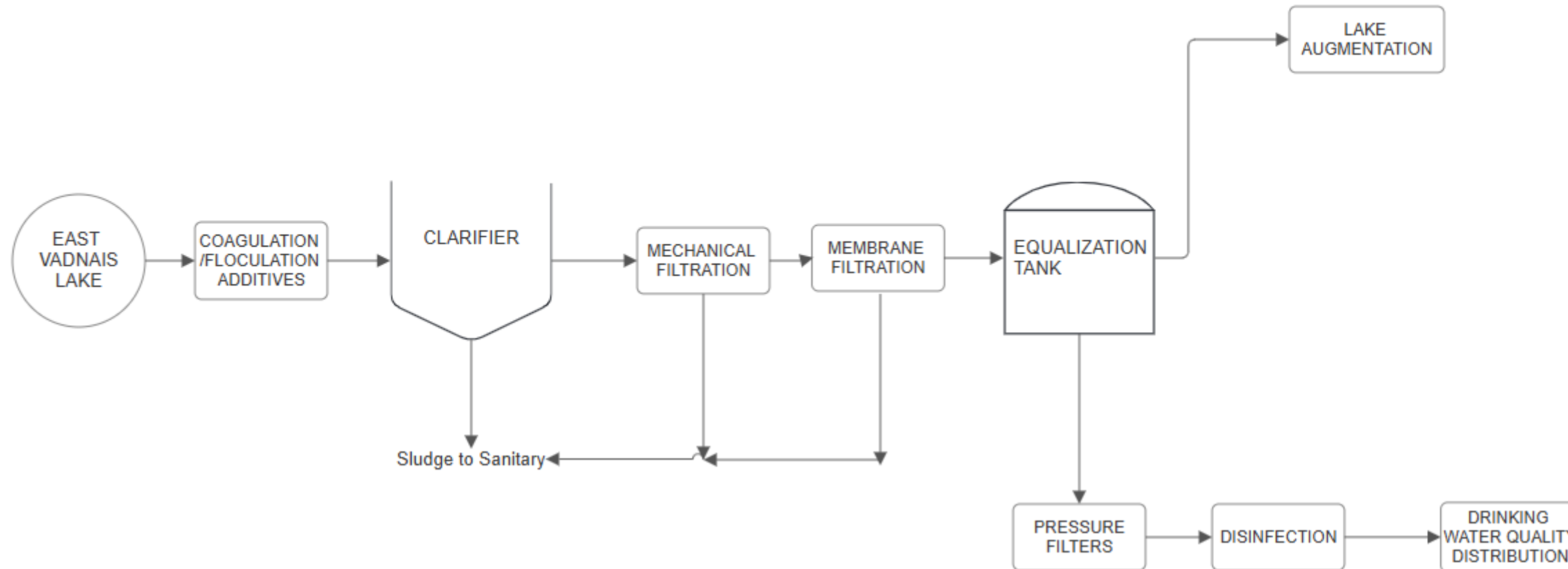
Treatment Options

- Study 7B outlines the Lake Augmentation treatment cycle:
 - Enhanced coagulation, mechanical filtration followed by membrane filtration (Front-End Treatment)
- STUDY 11 anticipated implementing a modular system for 3 options
 - Front-end Treatment to Lake Augmentation (Purely Lake Augmentation)
 - Front-end Treatment followed by Non/less-Potable Water Treatment
 - Front-end Treatment followed by Potable Water Treatment

Lake Augmentation & Non-Potable Water Treatment PFD



Lake Augmentation/Drinking Water Treatment PFD



Preliminary Costs and O&M

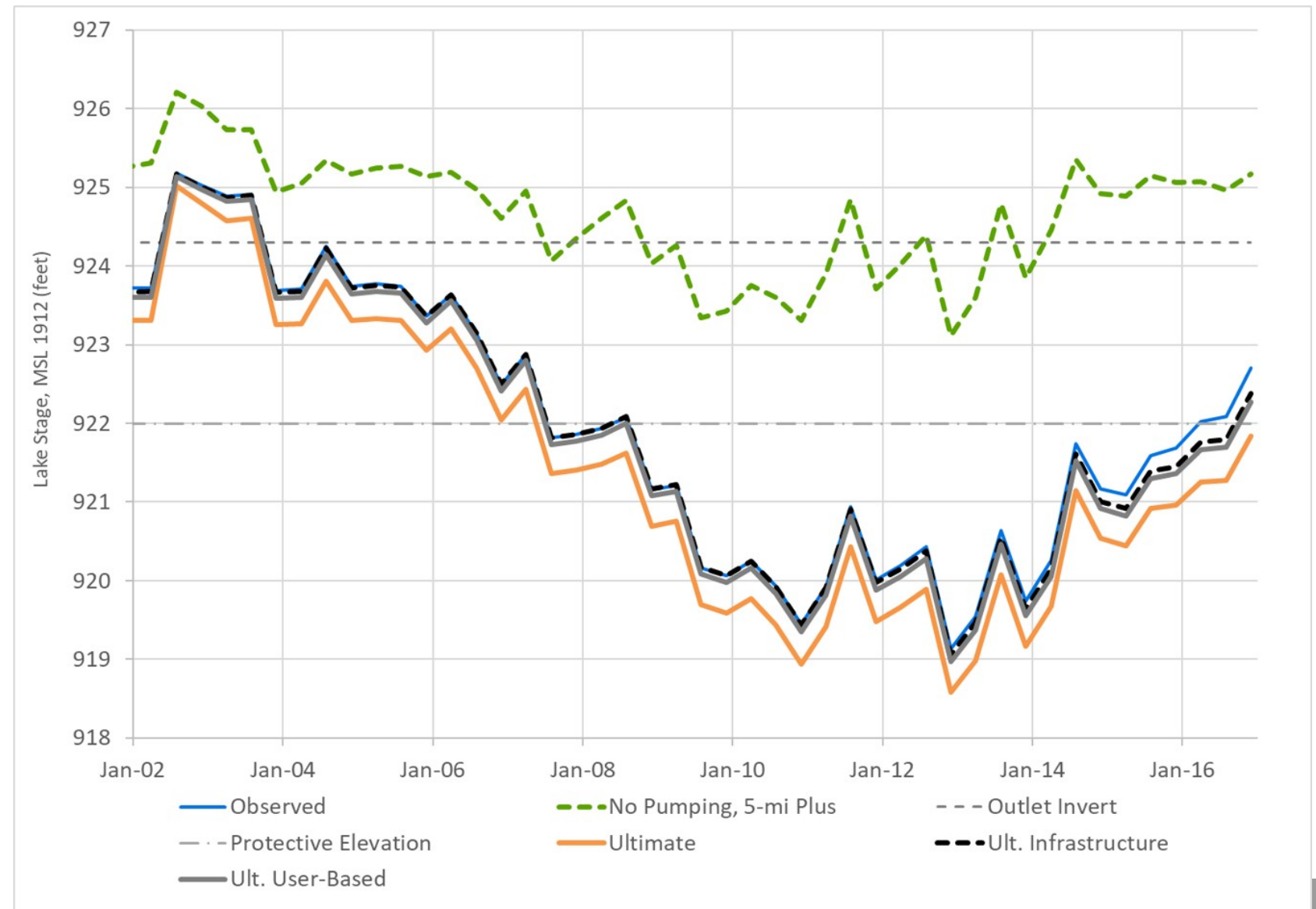
- Current discussions related to potential operations and management duties are currently being evaluated
- Vadnais Heights, White Bear Lake and Gem Lake have been included in the early study phase watermain routing discussions
- Sole ownership and partnerships between the neighboring cities are both being evaluated.

	Infrastructure-Based Model	User-Based Model	Potable Water Treatment System	Non-Potable Water Treatment System	Non-Potable Water Polishing Treatment System
Capital Costs	\$ 48,000,000-\$ 50,000,000	\$ 27,000,000-\$ 30,000,000	\$53,000,000-55,000,000	\$22,000,000-24,000,000	\$26,000,000-\$30,000,000
Annual O&M Costs	\$ 364,000	\$ 260,000	\$600,000	\$500,000	\$520,000

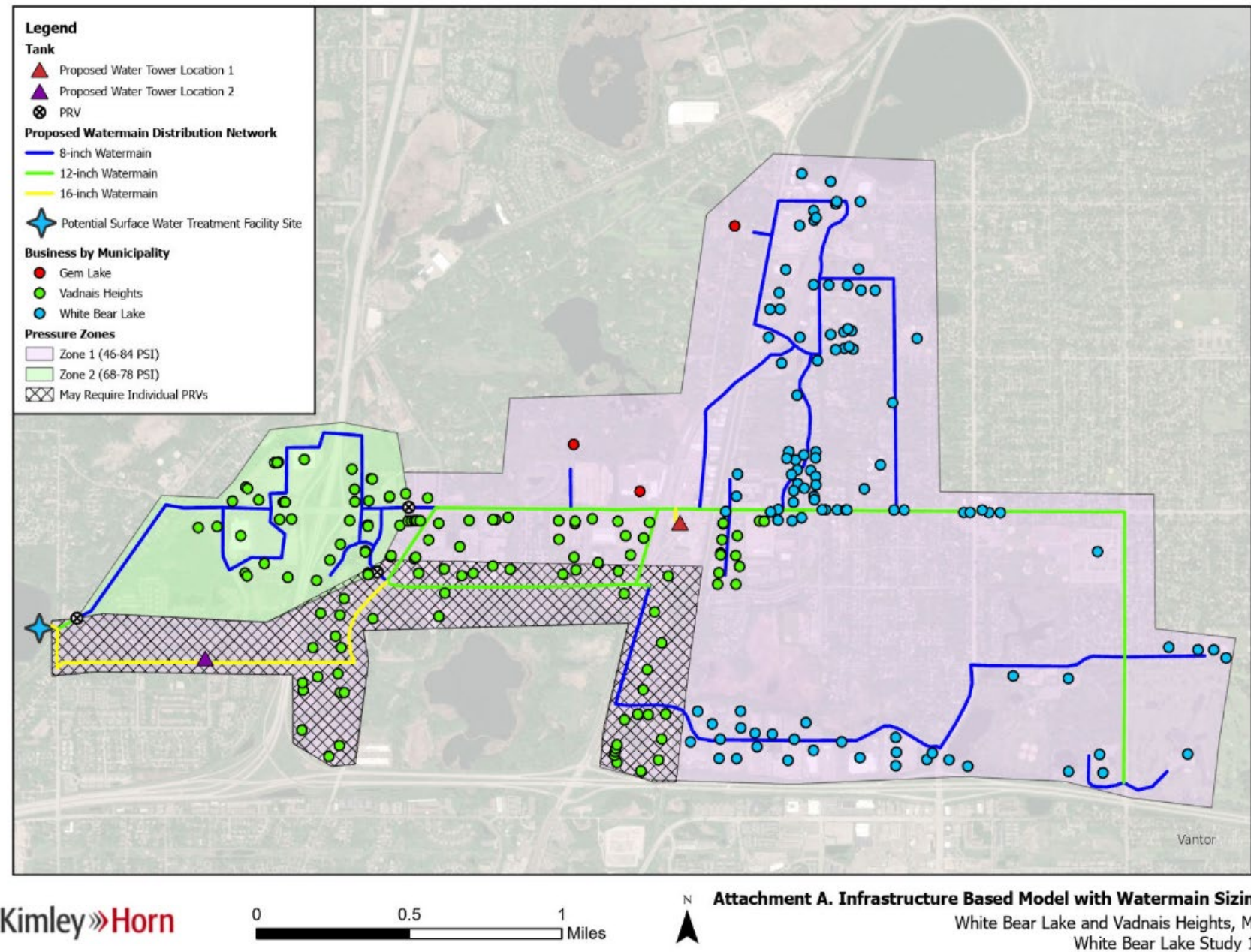
Effect on WBL Water Elevation

DNR Water Modeling Projections

- Based on an evaluation of the two scenarios over the period of 2008-2015 (Hugo 1 Development):
 - Infrastructure-Based vs. Ultimate (Hugo 1): 0.46 to 0.50 feet increase in White Bear Lake water elevations
 - User-Based vs. Ultimate (Hugo 1): 0.37 to 0.41 feet increase in White Bear Lake water elevations

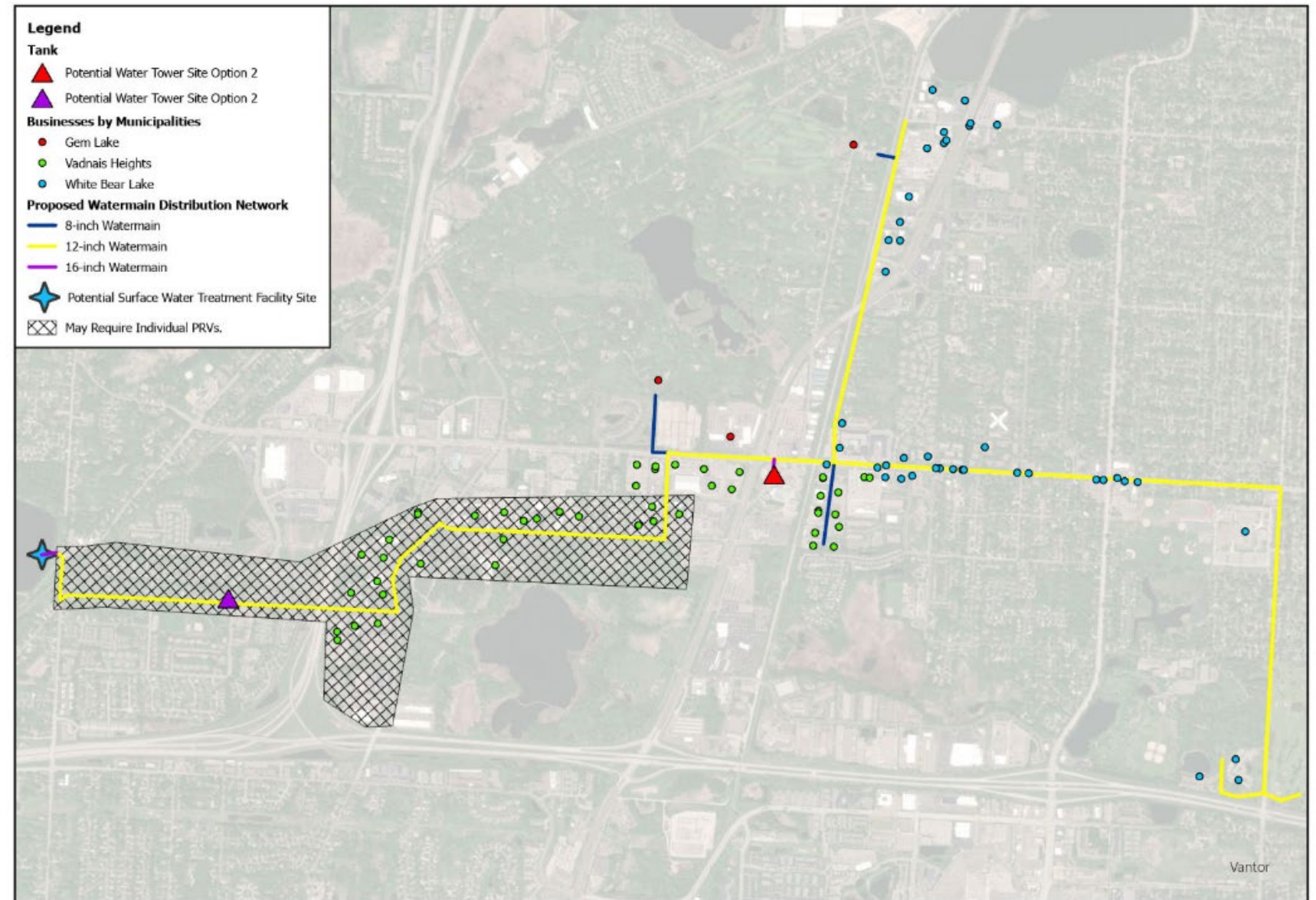


Infrastructure Based Model

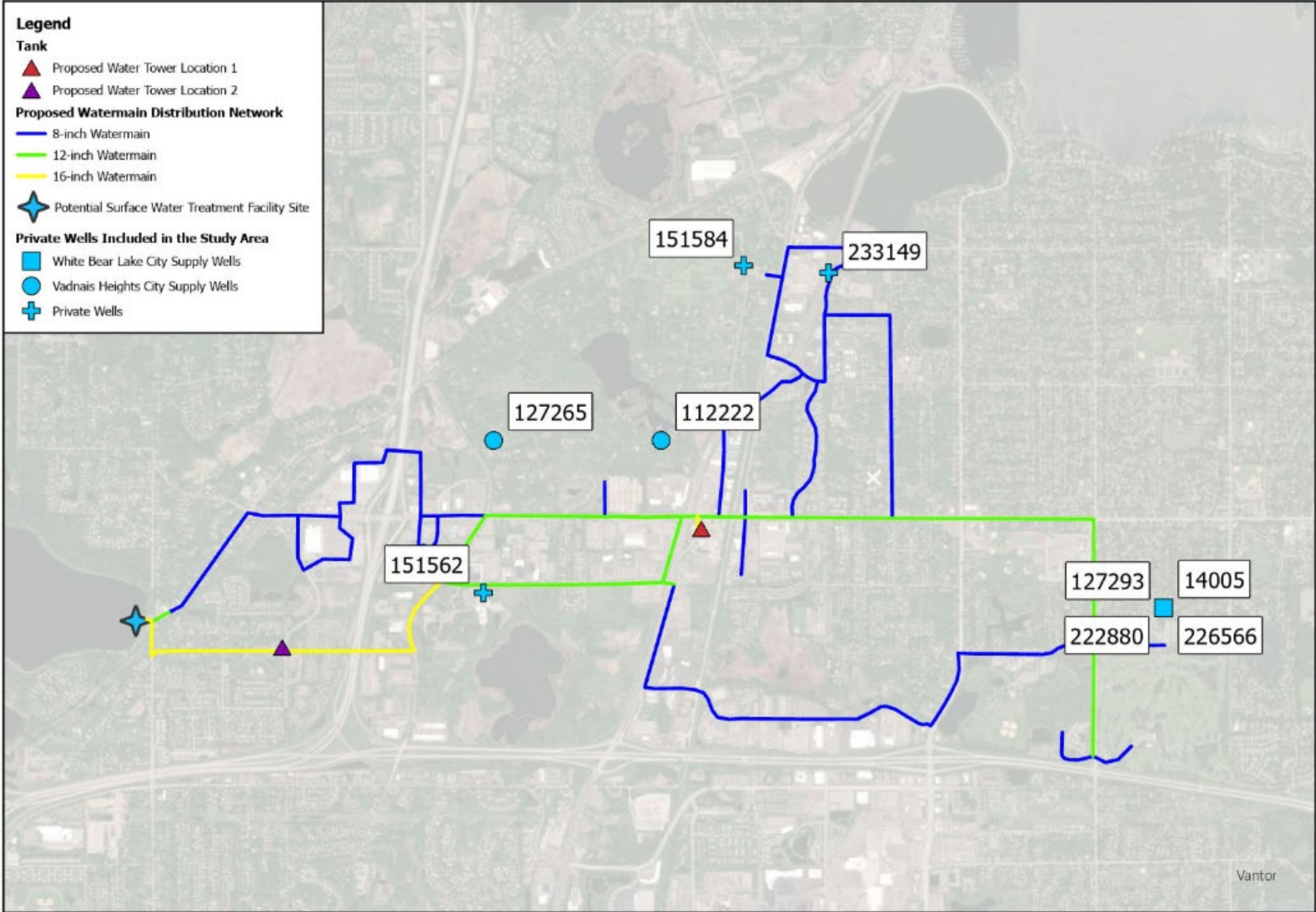


* Map Represents Commercial Water users in both WBL and Vadnais Heights

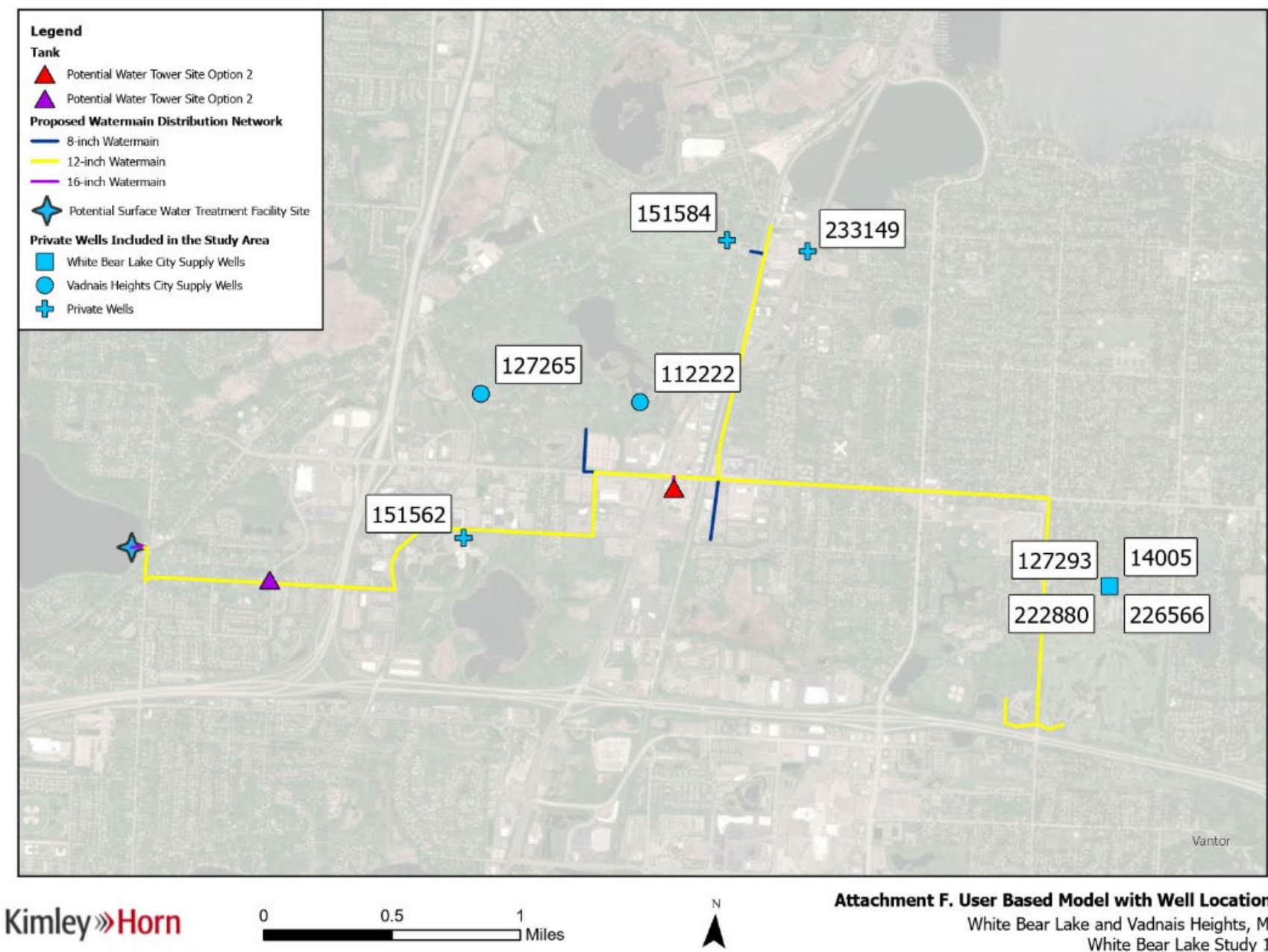
User-Based Model



Infrastructure-Based Model Well Information



User-Based Model Well Information



Regulatory Considerations

- MN State Law
 - Universal Plumbing Code (UPC) includes standards for non-potable water
 - MN Plumbing Board is reviewing these standards for potential inclusion into revisions with input from relevant state agencies

Study 11 - Evaluation

- Additional outreach to various users and community members to educate on less-potable non-potable water may be required if the State chooses to proceed with the non-potable water treatment option.
- Further discussion regarding operations and maintenance duties and system ownership/responsibilities.
- The user-based model will potentially provide 73% of the volume use reduction with 56% of the initial capital cost and 71% of the annual O&M costs.
- The non-potable treatment option is approximately 50% of the cost of the potable treatment option.
 - It should be noted that further evaluation on commercial water quality requirements should be conducted as a portion of the commercial may likely require potable water quality standards.

Questions

