

## TECHNICAL MEMORANDUM

To: Greg Johnson, PE, MCES  
From: Uma Vempati, PE, Kimley-Horn  
Petros Paulos, PE, Kimley-Horn  
George Sendry, PE, Kimley-Horn

Date: October 14, 2025

Subject: White Bear Lake Comprehensive Plan: Study No. 11 - Update  
Non-/Less-Potable or Potable Water Reuse for Irrigation & Process Water (Vadnais Heights & White Bear Lake)

### 1.0 EXECUTIVE SUMMARY

Study 11 includes the evaluation of the feasibility of supplying non- or less-potable water and potable water (treated surface water) to selected commercial and industrial users for irrigation and process uses, with the goal of reducing groundwater pumping in Vadnais Heights and White Bear Lake areas. Since the kickoff, business surveys were issued in Vadnais Heights and White Bear Lake, initial demand indicators were compiled, preliminary watermain alignments were established for a dedicated reuse system with pressure management (tower/booster) options, and regulatory considerations were documented. Early survey results show seasonally peaking demands, mixed willingness to adopt reuse water, and the need for additional outreach and code clarification. A more complete feasibility snapshot will follow as survey responses increase and as Lake Vadnais source-water quality results become available in the spring of 2026.

### 2.0 PURPOSE AND SCOPE

#### **Purpose.**

- Identify whether a non-/less-potable or potable reuse system can serve target corridors (Willow Lake Blvd., Highway 61, and adjacent areas) reliably and cost-effectively, thereby lowering groundwater withdrawals in Vadnais Heights and White Bear Lake area.

#### **Scope.**

- Analyze the feasibility of non-/less-potable water use and (where applicable) potable reuse for specific user classes.
- Screen potential effects on the overall surface-water/groundwater balance and White Bear Lake management strategies.
- Evaluate concept-level costs, O&M needs, regulatory path, and ownership/management structures.
- Further evaluation of the inclusion of the water reuse study and the White Bear Lake Augmentation Study by others shall be conducted. As these studies have separate purposes, during portions of the year when lake augmentation is not needed, the system may be able to supply the industrial water supply to provide continuous use of the lake augmentation system.

## 3.0 WORK PERFORMED TO DATE

### 3.1 Stakeholder Survey

- Distribution. ~110 businesses in Vadnais Heights (sent Sept 25, 2025) and ~100 in White Bear Lake (sent Oct 2, 2025).
- Responses to date. 9 completed (as of Oct 9).
- Content:
  - Current water uses/volumes, quality needs, on-site treatment, pressure/flow/fire-protection, and willingness to accept a separate non-potable service.

**Table 1. Summary Table of Survey Response**

Question	Summary of Responses
Usage Type	Irrigation (4), Cooling Towers (1), Boilers/Steam (2), Rinsing (4), Sanitation (4), Machinery (1)
Estimated Monthly Usage	No Estimate Known (3), Provided Estimate (5)
Estimated Peak Hour Demand	No Estimate Known (8)
Minimum Flow Rate	No Requirement (7), Provided Minimum (1)
Water Pressure Requirements	No Requirement (7), Provided Minimum (1)
Current Treatment	None (4), Yes (4)
Impact of Changes to Water Chemistry	None (5), Unsure (2), Provided Required Chemistry (1)
Desired Changes to Water Chemistry	Currently Satisfied (4), Desired Changes to Odor (1) and Hardness (3)
Existing Separate Fire Suppression	Yes (2), No (4), Unsure (2)
Desire for Non-Potable Service	Yes, with Additional Information (2), No (4), Unsure (2)
Current Wastewater Pre-Treatment	No (7), Yes (1)
Interest in Water Reuse/Treated Surface Water Use	Yes (1), Yes with Additional Information (3), Potentially in the Future (1), No (3)

### 3.2 Demand Indicators

- Compiled initial annual and peak-season demand snapshots for target areas using recent utility data (WBL 2024; VH 2022–2024) and a simple demand calculator to translate reported uses into preliminary sizing ranges.
- The City of Gem Lake was included in the study as they are along the proposed water main route and has been in discussion with White Bear Lake and Vadnais Heights to potentially provide potable water to the community, which would make logistical sense to evaluate its inclusion in the study. Gem Lake also potentially has more suitable locations for a proposed water tower that are being assessed.

**Table 2: Average Yearly Water Users**

	Avg. Domestic per User, Gallons per year	Avg. Irrigation Use per User, Gallons per year
<b>Vadnais Heights</b>	<b>558,206</b>	<b>191,874</b>
<b>White Bear Lake*</b>	<b>891,819</b>	<b>500,139</b>
<b>Gem Lake**</b>	<b>239,113</b>	

**Table 3: Average and Projected Yearly Water Demand**

	Avg. Total Domestic Use, Gallons per Year	Average Total Irrigation Use, Gallons per Year
<b>Vadnais Heights</b>	<b>57,495,285</b>	<b>19,596,578</b>
<b>White Bear Lake*</b>	<b>86,506,500</b>	<b>13,503,750</b>
<b>Gem Lake</b>	<b>87,249,600</b>	

*\*White Bear Lake usage is calculated using data from 2024 only. Vadnais Heights calculations use data from 2022-2024.*

*\*\*Gem Lake demand is based upon total community demands with fire flow demands and represented as average per day usage.*

### 3.3 Network & Siting (GIS)

- Built a working basemap with candidate customers, potential irrigation water users (Attachment A), potential commercial water users (Attachment B) Potential watermain route with businesses (Attachment C) and site elevation map (Attachment D). Mapping of areas suitable for reuse is in progress as survey data arrives.

### 3.4 Regulatory Scan

- Minnesota's Universal Plumbing Code Chapter (reuse standards) is not yet adopted statewide; a Plumbing Board is reviewing its potential inclusion.
- Special Discharge: Twelve permit holders in White Bear Lake and Vadnais Heights with three that are located within the current reused footprint. These users will have to be investigated further if included in any wastewater interception and reuse technologies, as their discharge may be outside the standard discharge concentration.
- Core principle: maintain complete separation between existing potable and proposed non-potable or potable systems.

## 4.0 PRELIMINARY FINDINGS & IMPLICATIONS

1. Seasonal peaks matter. Reuse demand is strongly seasonal (irrigation and wash water), which affects sizing of mains, tower/booster needs, and storage turnover. A tower can buffer peaks but must be balanced against winter operations.
2. Adoption will require more engagement. Early survey returns suggest mixed willingness to switch to reuse water. Targeted follow-ups with high-volume users (dealerships, R&D/manufacturing) are needed to define quality/pressure thresholds and conversion hurdles.
3. Regulatory pathway is pivotal. The plumbing-code adoption of reuse standards and local enforcement details (backflow, dual-plumbing) will drive schedule and cost. Early coordination with MDH/Plumbing Board is in progress.
4. Integration with augmentation study. Treatment requirements and conveyance options may tie to lake-augmentation study work by others; reuse could share facilities or benefit from the same source-water treatment. Additional data is expected in the spring of 2026.
5. Irrigation runoff constraints. MPCA requires irrigation practices that prevent off-site runoff when using recycled water; this affects site-level design standards and outreach messaging.

## 5.0 IN PROGRESS/NEXT STEPS *(through October 21 meeting)*

- Survey push: Second reminder; targeted calls to high-users to capture flow/pressure and fire-suppression needs (for main and tower/booster sizing).
- Refine demand calculator: Normalize to common units; bracket average day / max day/peak hour by user type.
- Network options: Compare a booster-only concept versus booster + elevated storage (two sitting options) for reliability, fire-flow support (as applicable), and winter operation.
- Regulatory coordination: Document the current status of reuse standards and summarize separation/cross-connection requirements for a corridor system.
- Draft exhibits: Update maps (customers, routing, storage sites) and create simple cost elements to frame order-of-magnitude economics.

## 6.0 RISKS & DATA NEEDS

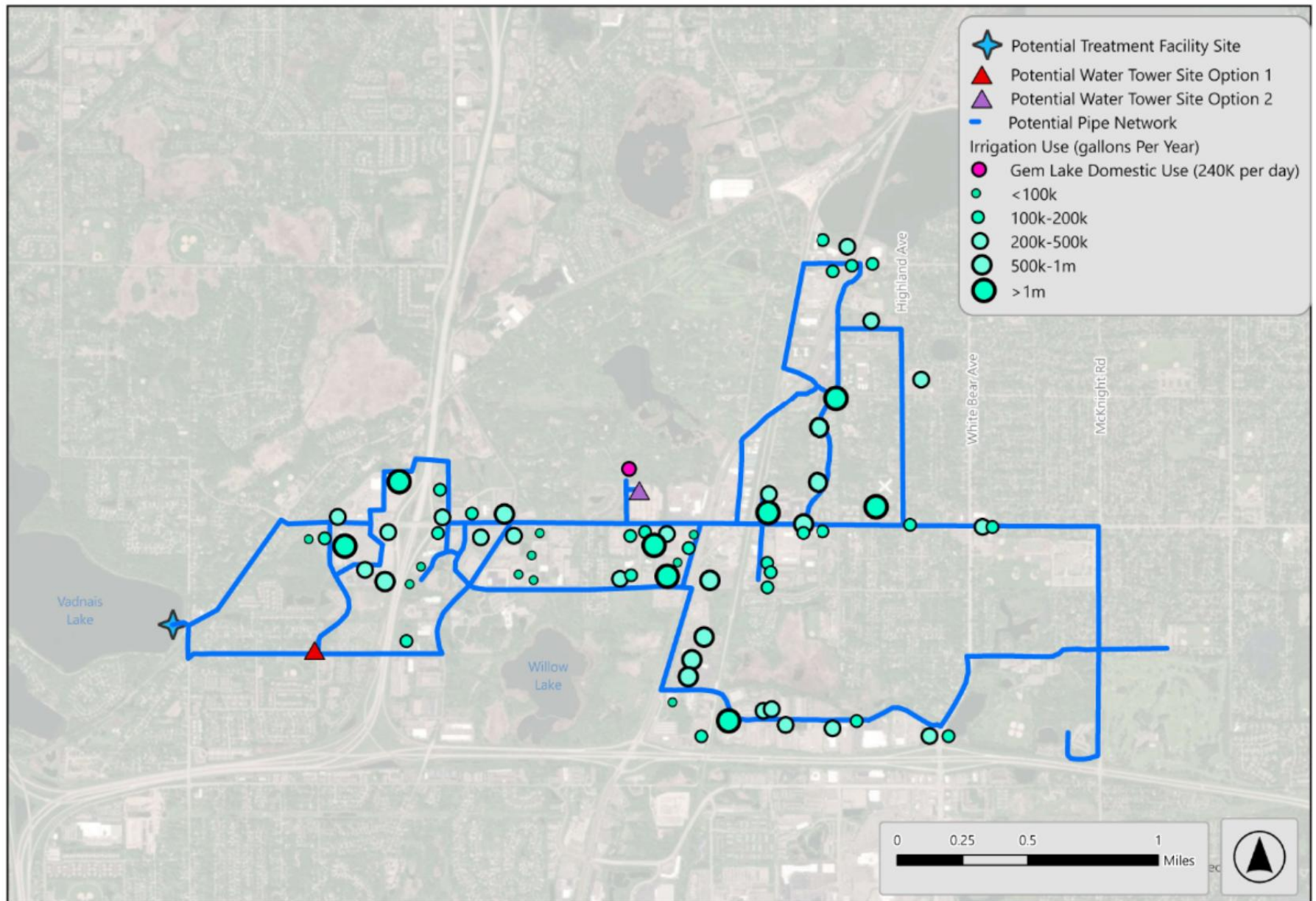
- Low survey response rate could bias sizing; mitigation is direct outreach to top water users identified by billing data.
- Code adoption timing is uncertain; team will present a compliance path and contingencies.
- Source-water treatment: until Lake Vadnais sampling/model results are published by others, treatment levels for reuse will be presented as scenarios (e.g., clarity/solids control only vs. higher treatment).

## 7.0 DRAFT CONCLUSIONS *(for Mid Point)*

- A reuse water distribution system serving targeted corridors remains feasible in concept, but seasonality, regulatory confirmation, and customer readiness are the controlling factors.
- Additional survey returns and preliminary treatment guidance (from the ongoing lake studies) are needed to finalize sizing, costs, and adoption strategy.
- We anticipate returning in late October with an updated demand summary, a preferred pressure-management concept (tower vs. booster), and clearer regulatory guidance for Work Group discussion.

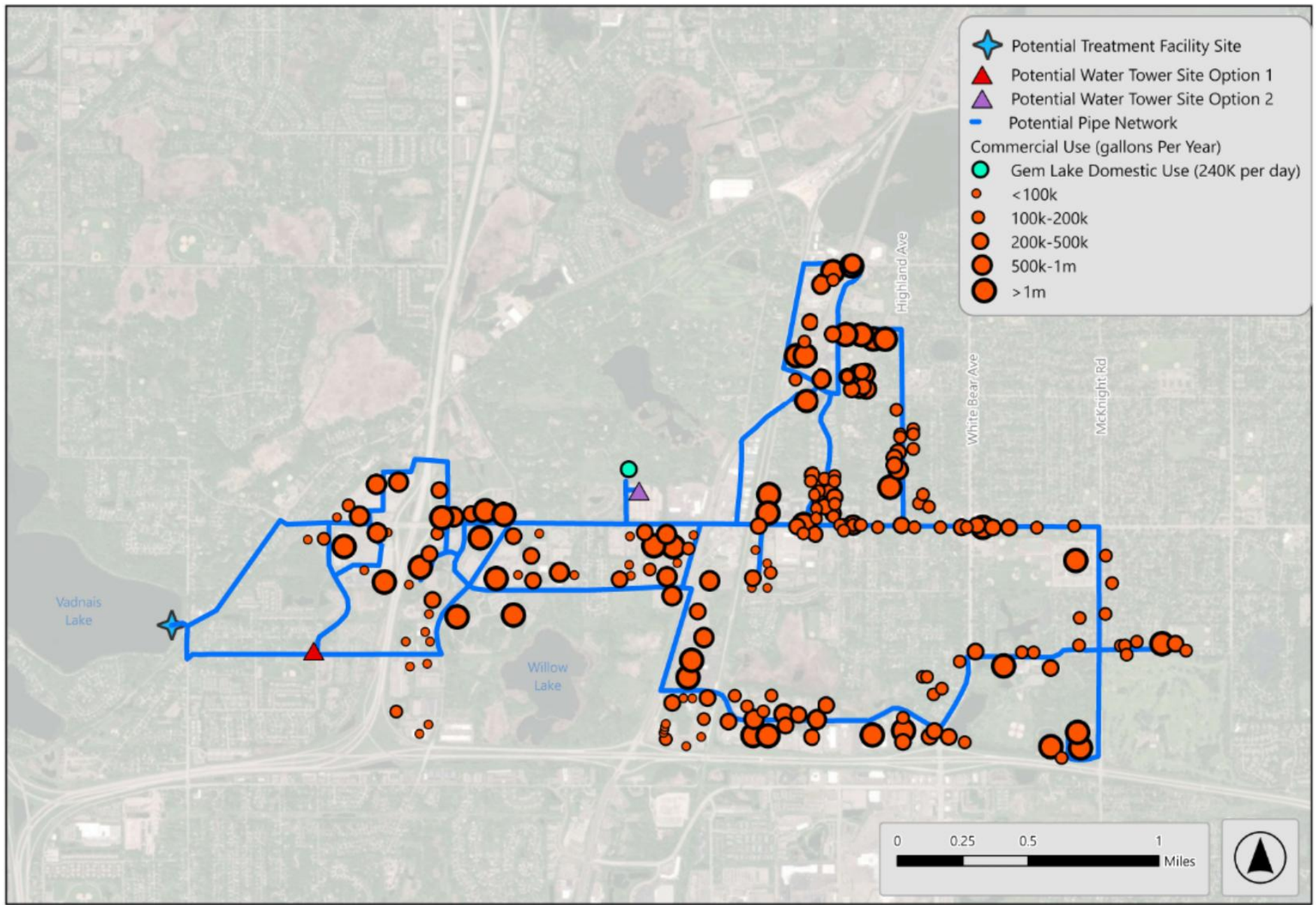
## ATTACHMENTS *(from presentation)*

- Maps showing potential businesses.
- Basemap with candidate pipe routing, elevation, potential watermain and potential storage sites

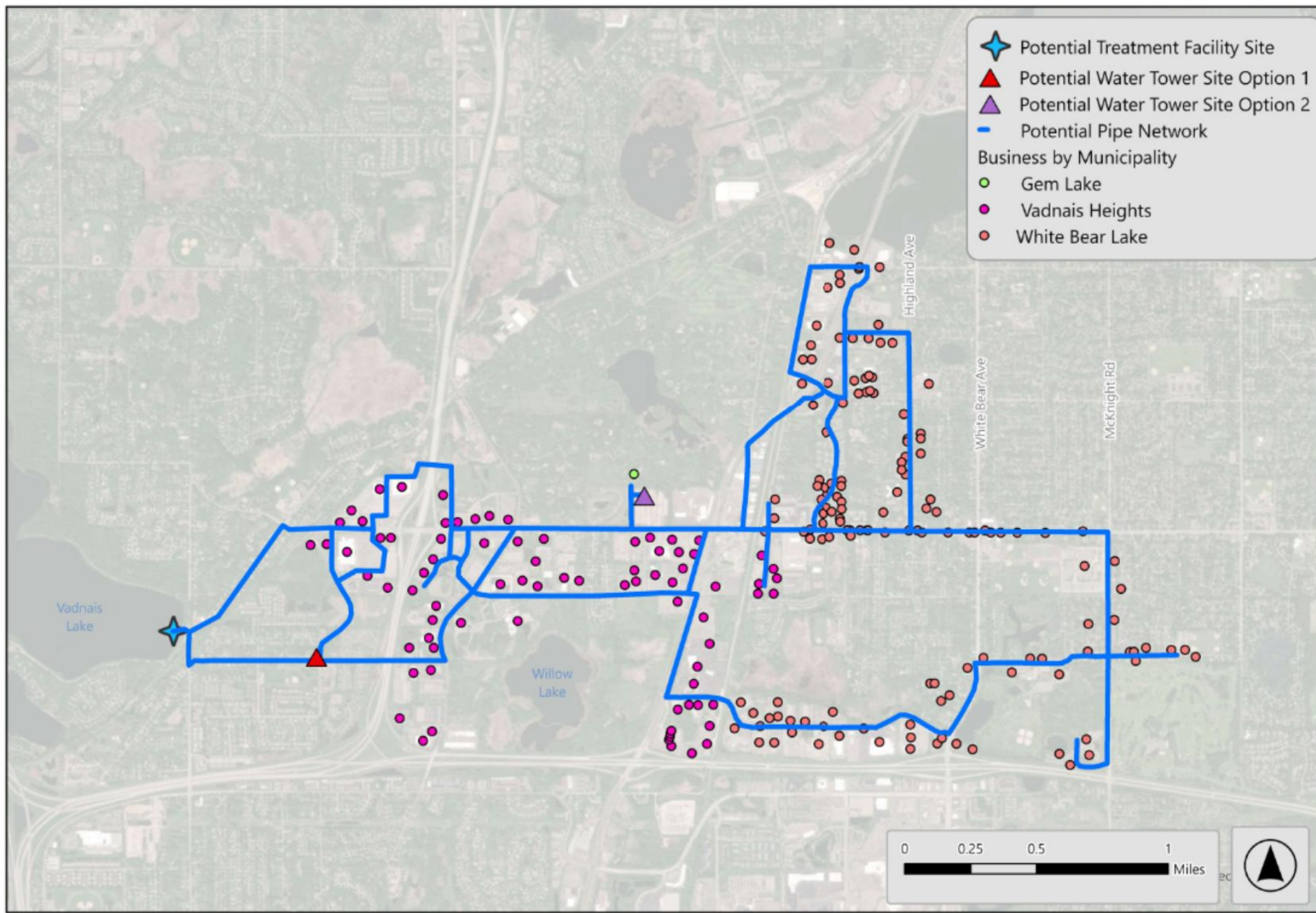


**Attachment A: Irrigation Water Users Map**



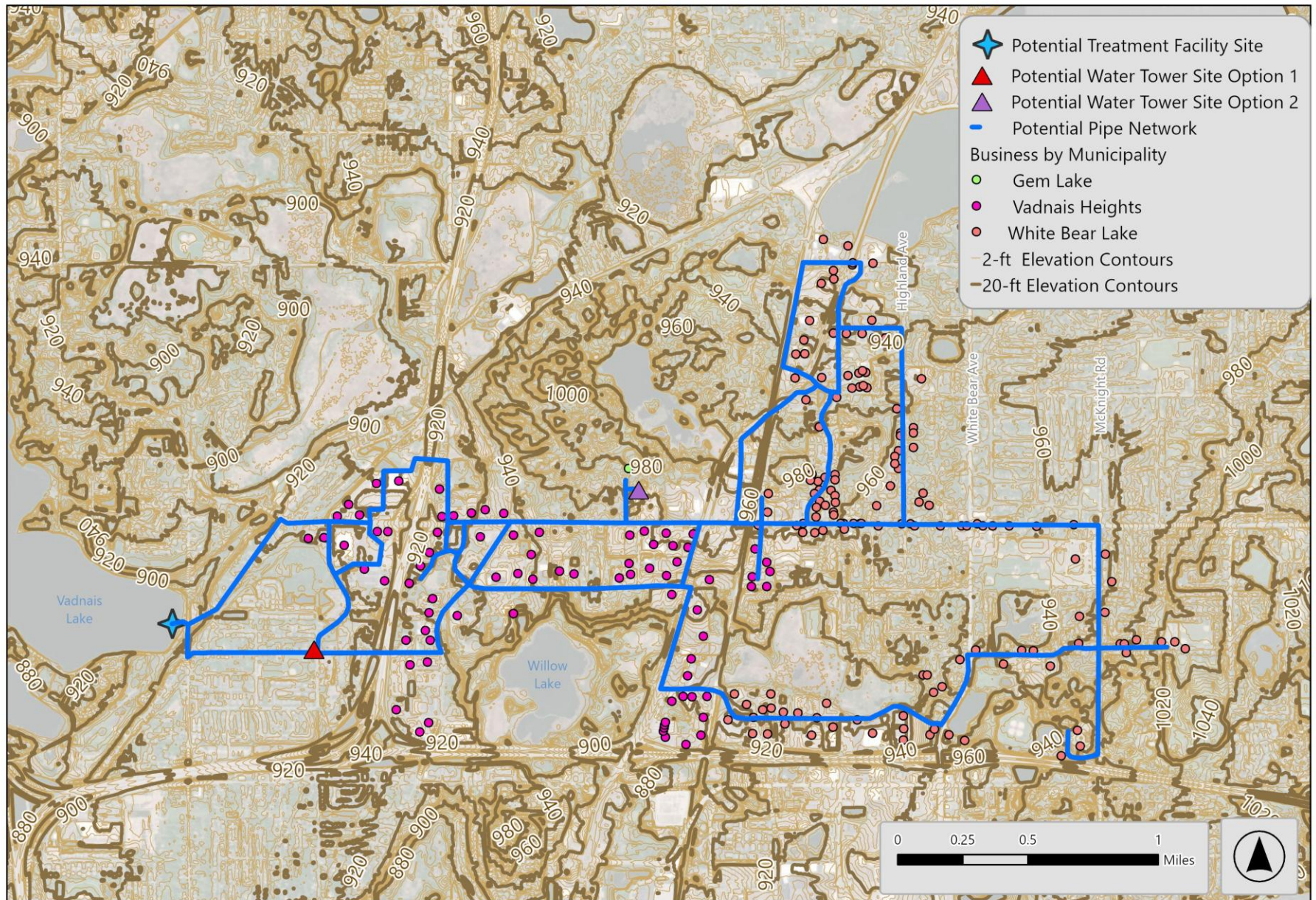


**Attachment B: Domestic Water Users Map**



**Attachment C: Watermain Routing Map**





**Attachment D: Site Elevation Map**