

Water Supply Planning Report

Village Board Presentation

March 19, 2015



Overview of Presentation

- Purpose for Study
- Selection of Engineering Firm
- Process/Scope of the Study
- Findings
- Preliminary Conclusions
- Next Steps – Public Forums

Glencoe Water Treatment Plant



Purpose

- Existing plant infrastructure approaching the end of useful life
- Maintenance costs increasing
- Major system failures could result in long term water outages
- Regulations/requirements are coming that do not easily retrofit the Village's 87 year old facility
- Northwest Water Commission – Potential Partnership

Selection of Engineering Firm

- Village short-list RFP – January 2013
- Strand Associates selected thru QBS – March 2013
 - Prior experience with Village
 - Broad water system expertise
 - Familiarity with Lake Michigan water producers
- Project Manager – Chris Ulm
- Lead Engineer – Brian Hackman



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Water Supply

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Water supply is a major focus of our environmental division. We provide a complete range of supply, storage, pumping, distribution, treatment, security, and supervisory system control services, from planning phase, through design, and into construction. In addition, we offer comprehensive water system study and distribution system analyses, vulnerability assessments, water loss, distribution and water quality modeling, field investigations, loan and financing issues, plus other specialty studies.

Key Benefits

- Extensive experience with both large and small capacity systems.
- Expertise and experience in developing surface water and groundwater drinking water supplies.
- Extensive experience with rural and urban water systems.
- In addition, we specialize in many non-technical elements, such as public relations, permits, project financing, and easement acquisitions.

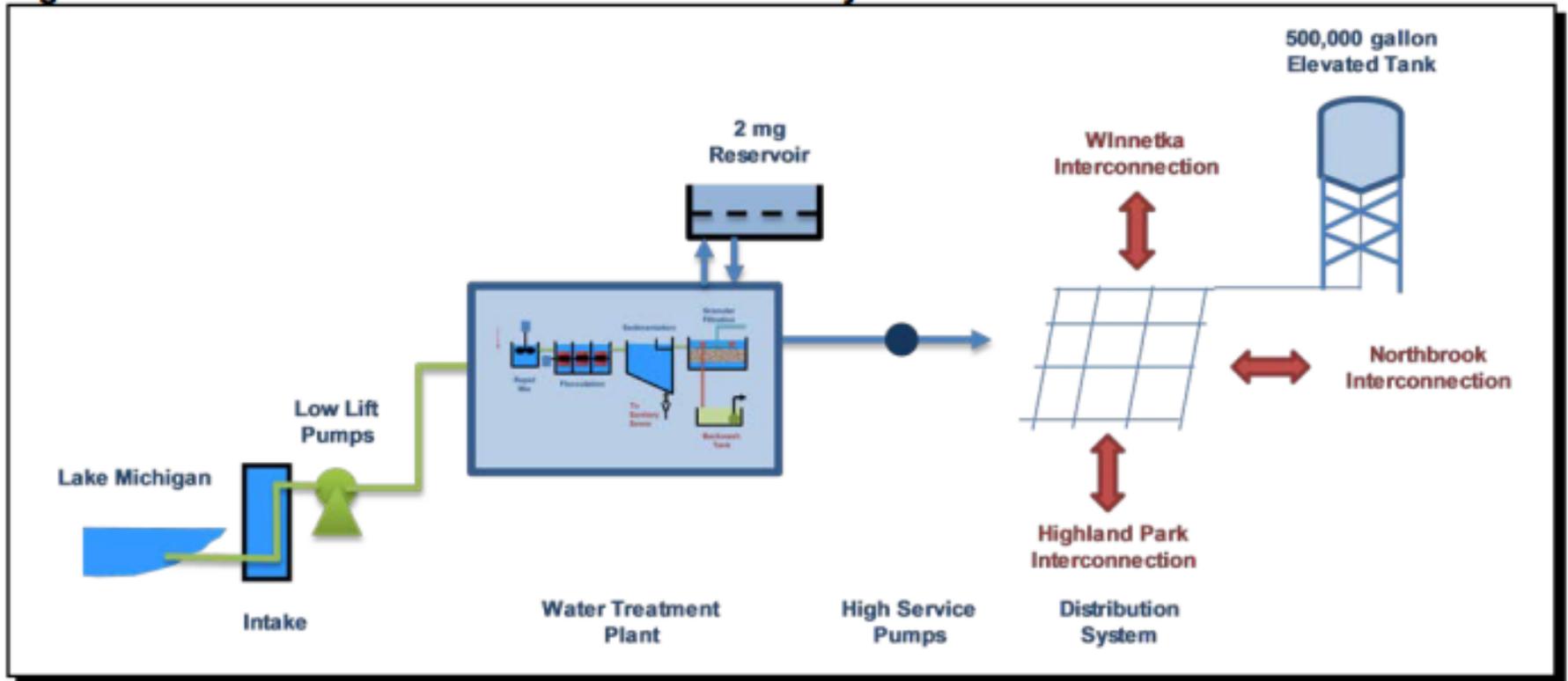


Scope of the Water Supply Planning Report

- Step 1
 - General Water System Inventory
 - Water Demand Characteristics
 - Storage Capacity Analysis
- Step 2
 - Water System Model Creation and Analysis
 - Future Water Supply Analysis
- Step 3
 - Study Findings and Recommendations

Step 1: Existing System Inventory

Figure ES-1 Basic Schematic of Glencoe Water Utility



Step 1:

Water Demand Characteristics and Water Storage Capacity Analysis

Table ES-1 Water Demand Characteristics

Description	Historical Demands	40-Year Projection
Average Day Demand	1.97 mgd	1.97 mgd
Average to Max Ratio	2.75	2.75
Maximum Day Demand	5.42 mgd	5.59 to 6.84 mgd
Population	8,730	9,000 to 11,000

- With existing 2 MG reservoir and 0.5 MG elevated water storage tank, adequate storage volume exists to meet current Maximum Day Demands and a 1500 gpm/2 hour fire demand.

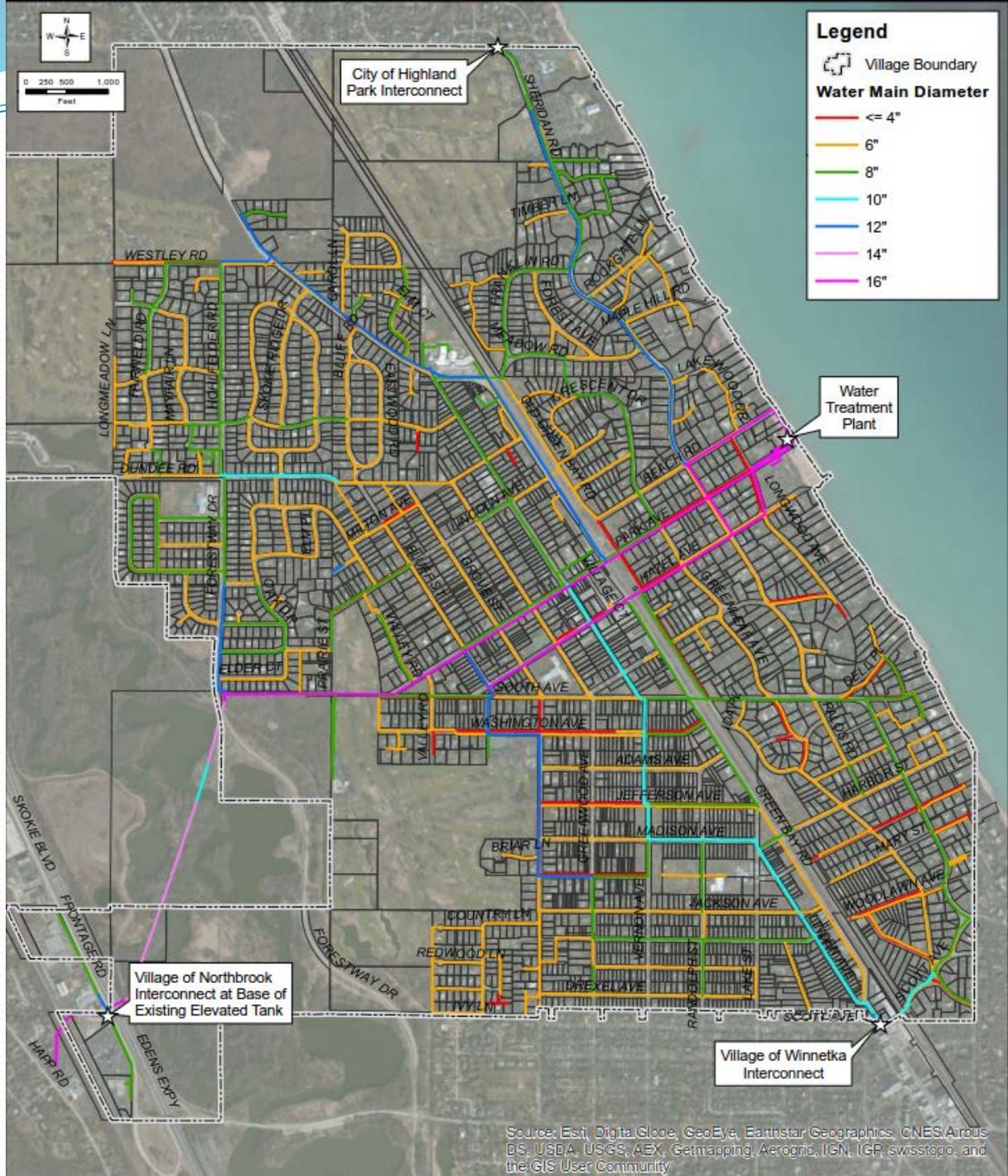
Step 2: Water System Model Creation and Analysis

- Water Model necessary to:
 - Determine current system performance
 - Forecast impacts of water supply point changes
- Created from Village GIS Data
- Calibrated to match “real world” through field testing



Water Model Findings

- The current system provides adequate flow and pressure meeting desired fire flows.
- The current system has a backbone transmission line along the Park Avenue and Hazel Avenue Corridors



Legend

-  Village Boundary
- Water Main Diameter**
-  <= 4"
-  6"
-  8"
-  10"
-  12"
-  14"
-  16"

City of Highland Park Interconnect

Water Treatment Plant

Village of Northbrook Interconnect at Base of Existing Elevated Tank

Village of Winnetka Interconnect

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Step 3:

Consideration of Community Impacts

- Cost
- Community Needs
- Control & Oversight
- Available Land
- Minimize Disruption

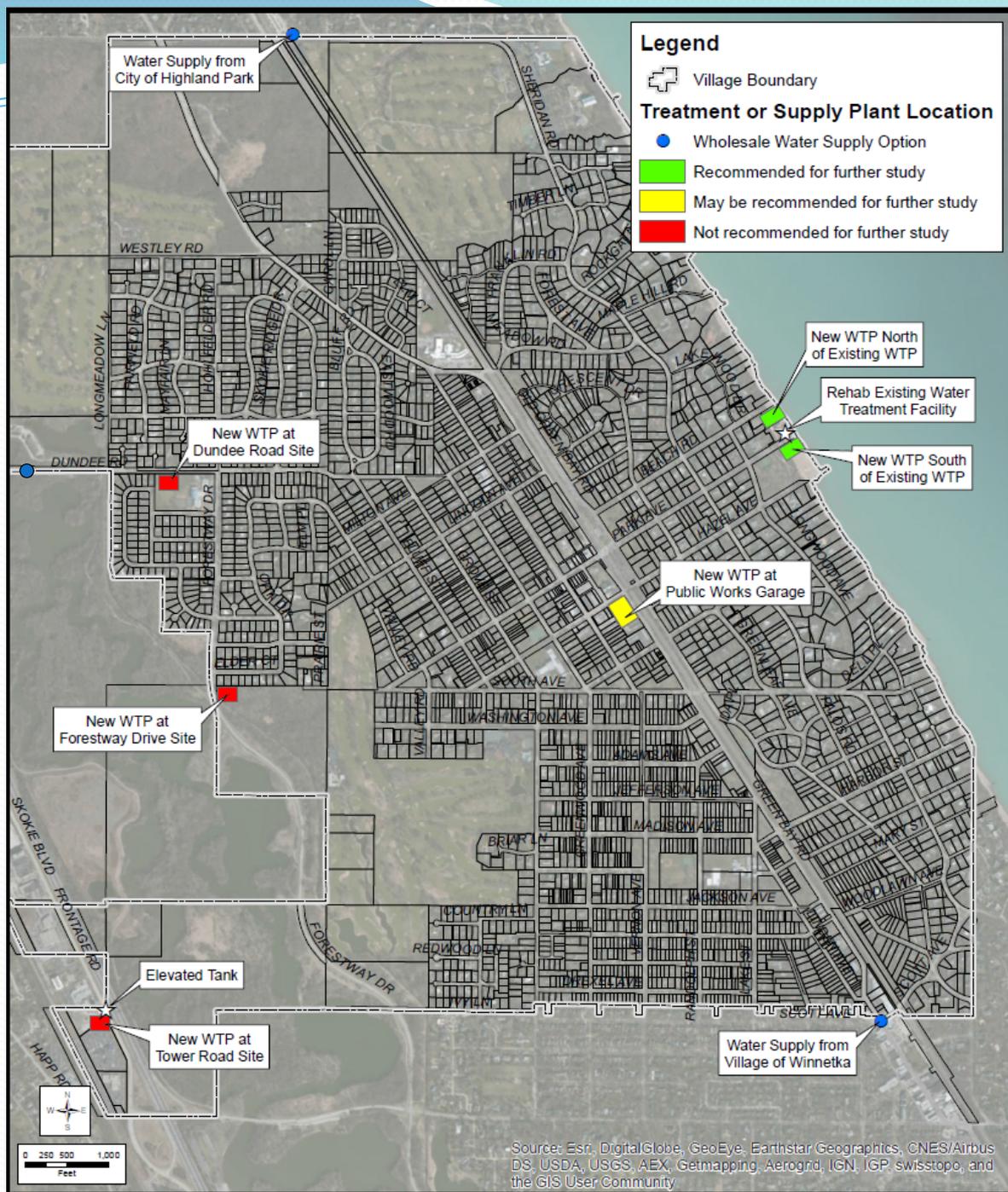
Consideration of Engineering Feasibility

- Engineering Best Practices
- Regulatory Requirements

A Thorough Water System Understanding Lays Foundation for Future Water Supply Analysis

Three options were investigated for the future water supply:

1. Purchase Water from Neighboring Community
2. Rehabilitate Existing Water Treatment Plant
3. Build New Water Treatment Plant
 - At Inland Location
 - At Lakefront Location



OPCC - Opinion of Probable Construction Costs

- Total Opinion of Probable Construction Cost (OPCC)
 - Probable Cost 2015 Pricing – Equipment, Materials, Facility Construction
 - General Conditions
 - Technical Services

Purchase of Water from Neighboring Communities

Each neighbor controls their own water system:

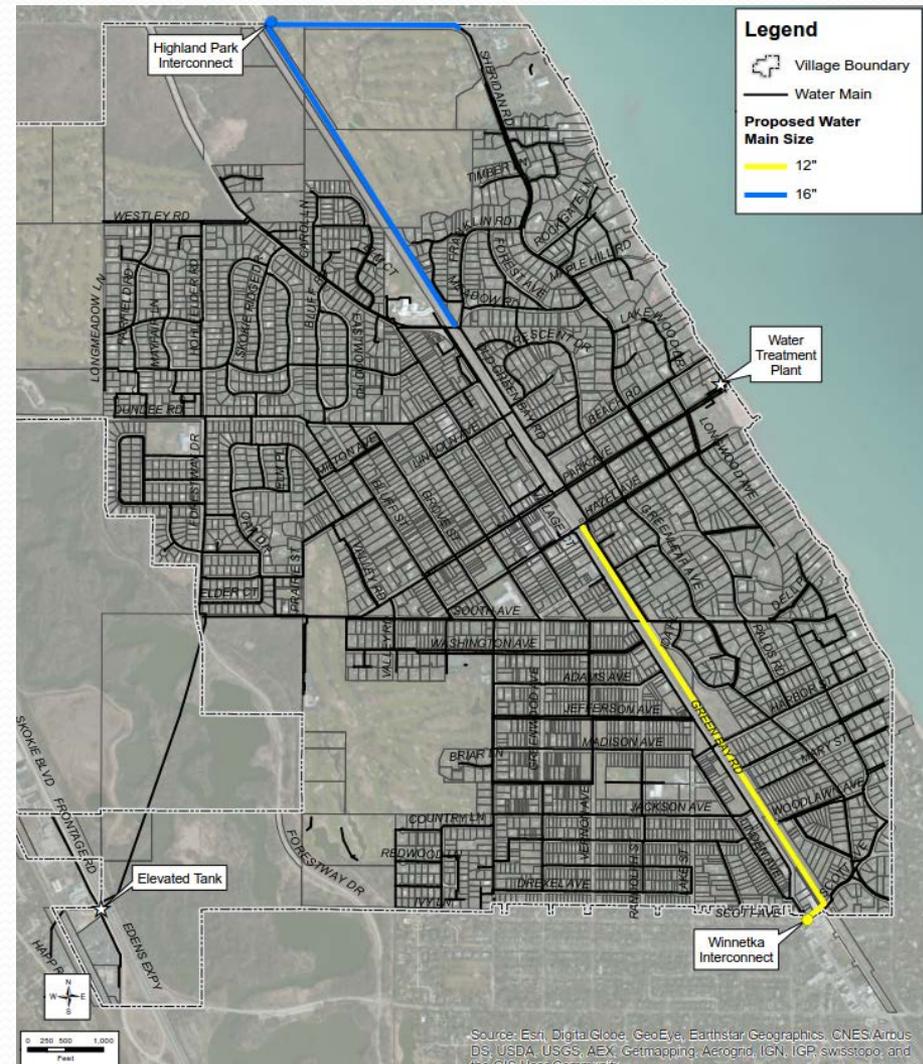
- Northbrook
- Winnetka
- Highland Park

Purchase Water From Neighboring Community

- Northbrook – Not Viable
 - Do not have capacity
 - Significant Transmission Main Challenges
- Winnetka
 - Not viable on their own due to lack of capacity

Purchase Water From Neighboring Community

- Highland Park
 - Not capable of meeting max demand days without pumping; upgrades needed
- Highland Park/Winnetka
 - Meets demands
 - Purchasing from two wholesale suppliers is not recommended



Purchase Water From Neighboring Community – Pumping from Highland Park

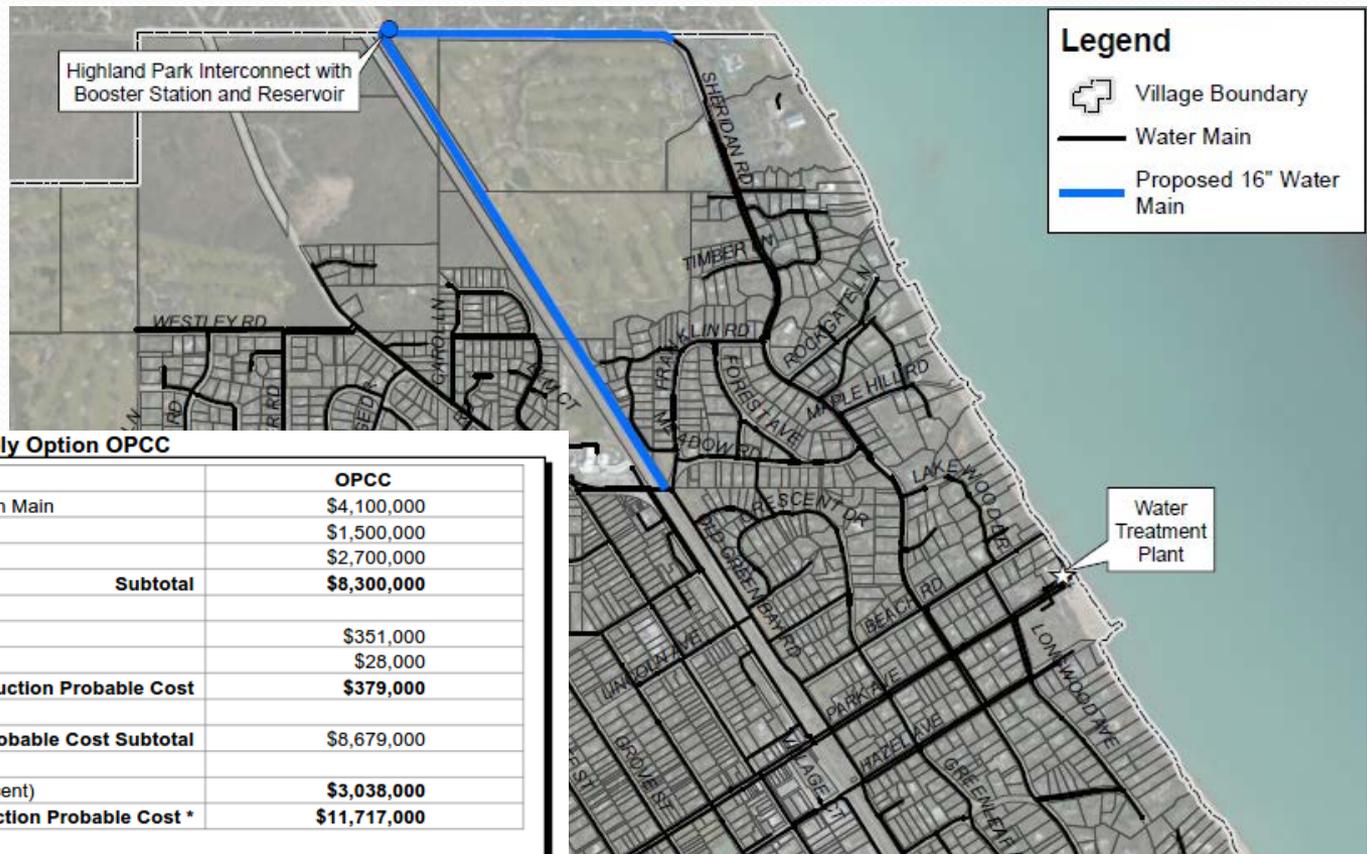


Table 5.02-1 Highland Park Pumped Supply Option OPCC

Description	OPCC
6 mgd Booster Station and 16-inch Transmission Main	\$4,100,000
2 mgd Booster Station at Existing Reservoir	\$1,500,000
2 MG Reservoir and 2 mgd Booster Station	\$2,700,000
Subtotal	\$8,300,000
WTP Demolition	\$351,000
General Conditions (8 percent)	\$28,000
Construction Probable Cost	\$379,000
Construction Probable Cost Subtotal	\$8,679,000
Professional Services and Contingency (35 percent)	\$3,038,000
Total Construction Probable Cost *	\$11,717,000

* Does not include land acquisition costs

“All estimates are Preliminary and in 2015 dollars”

Purchasing water from a neighboring community: Possible Advantages and Challenges

- Advantages

- Gets the Village out of the water business
- Could reduce or repurpose water production staff and associated costs

- Challenges

- Perpetual loss of control of water supply and rates
- Still responsible for water quality
- Water rates for Glencoe residents include water purchase and system maintenance
- Additional water storage facility strongly recommended



If the Village determines it appropriate to continue to produce water, two options exist

- Rehabilitate the existing water treatment plant to replace deteriorated infrastructure/equipment
- Build a new fully modernized plant

Rehabilitate Existing Water Treatment Plant

Figure 5.03-3 Membrane Facility Expansion Locations

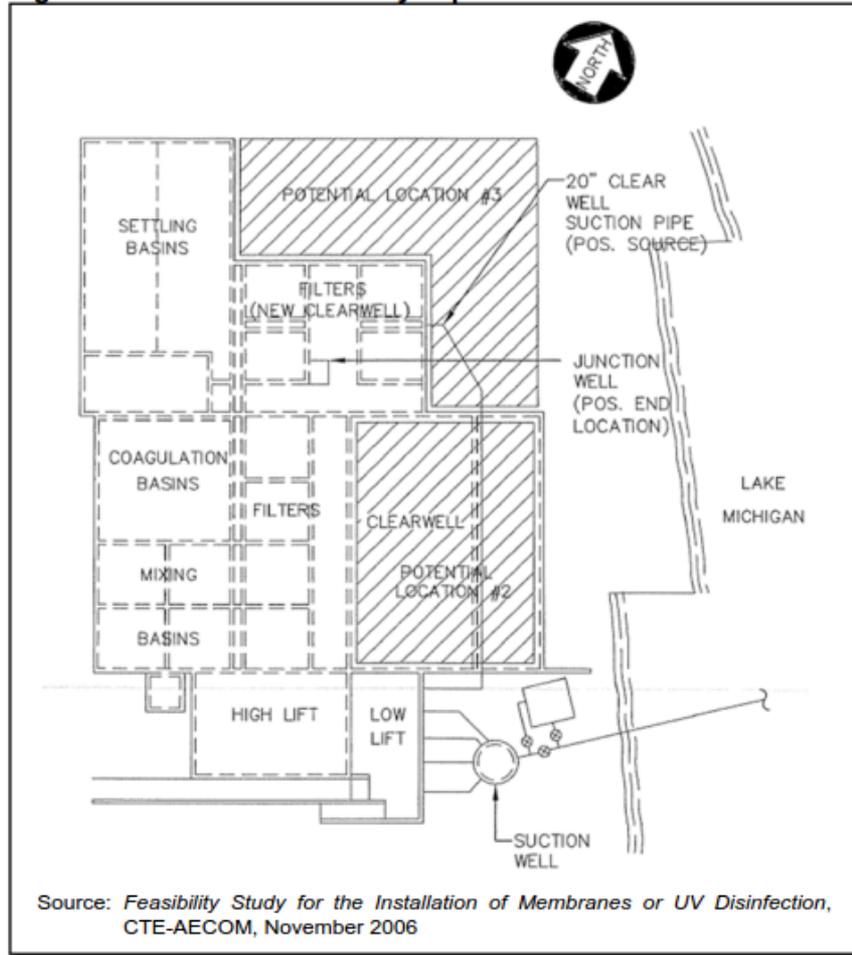


Table 5.03-8 Rehabilitated WTP OPCC

Description	OPCC
6 mgd Intake Facility	
Repair Existing Intake	\$30,000
Intake Piping (24-inch)	\$3,326,000
Subtotal	\$3,356,000
General Conditions (8 percent)	\$269,000
Construction Probable Cost	\$3,625,000
Rehabilitate WTP	
Rapid Mix	\$110,000
Flocculation	\$185,000
Sedimentation-Clarification	\$245,000
Granular Media Filtration	\$1,235,000
Finished Water Basins	\$45,000
Membrane Filtration	\$8,060,000
Pumping Equipment	\$184,000
Chemical Feed Systems	\$265,000
Building Infrastructure	\$930,000
Ancillary Facilities	\$1,383,000
Security Upgrades	\$250,000
Subtotal	\$12,892,000
General Conditions (8 percent)	\$1,032,000
Construction Probable Cost	\$13,924,000
Highland Park Water Supply and Booster Stations	
6 mgd Booster Station and 16-inch Transmission Main	\$3,797,000
2 mgd Booster Station	\$1,389,000
Subtotal	\$5,186,000
General Conditions (8 percent)	\$414,000
Construction Probable Cost	\$5,600,000
Construction Probable Cost Subtotal	\$23,150,000
Professional Services and Contingency (35 percent)	\$8,103,000
Total Construction Probable Cost	\$31,253,000

Note: Does not include cost to purchase water during construction, as this amount will vary based on plant location.

“All estimates are Preliminary and in 2015 dollars”

Rehabilitation of Existing Plant: Possible Advantages and Challenges

- Advantages
 - Lower initial construction costs compared to new WTP
 - Construction impacts are minimized
 - Village Owned Property
 - Minimal change to exterior of existing building
 - Village retains control of water production
- Disadvantages
 - Higher long term maintenance costs
 - Shorter lifespan than new WTP
 - Most remaining site space (beach) will be filled with plant expansion
 - Requires temporary connection with Highland Park
 - Adds new technology into 87 year old infrastructure

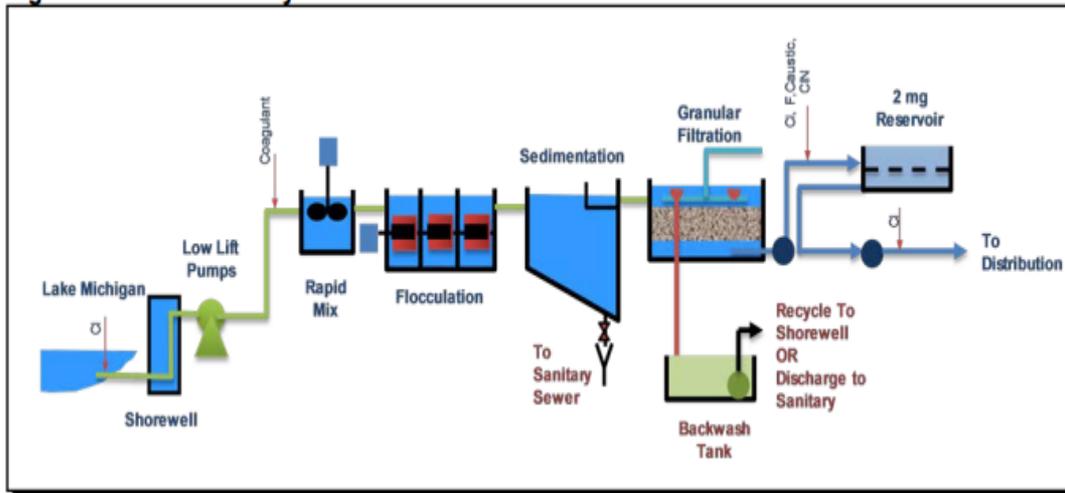
Building a New Water Treatment Plant

- Consideration of Treatment Process (regardless of location)
 - Conventional Water Treatment Process
 - Direct Membrane Filtration Process
- Analysis of Inland WTP Options
- Analysis of Lakefront WTP Options

Treatment Process Option 1 - New Conventional Filtration Plant

- Similar to current treatment process
- May need additional processes in the future to meet new regulations

Figure 5.04-1 Preliminary New WTP Process Schematic—Conventional Filtration



“All estimates are Preliminary and in 2015 dollars”

Table 5.04-1 New Conventional WTP OPCC

Description	OPCC
6 mgd Intake Facility	
Intake Piping (24-inch)	\$3,326,000
Shoreline Stabilization	\$320,000
Intake Equipment and Structure	\$3,220,000
Subtotal	\$6,866,000
General Conditions (8 percent)	\$550,000
Construction Probable Cost	\$7,416,000
6 mgd Conventional Treatment Facility	
Administration and Offices	\$438,000
Chemical Storage and Feed	\$742,000
Rapid Mix/Flocculation/Sedimentation	\$1,650,000
Tube Settlers	\$1,367,000
Granular Filtration	\$2,465,000
HVAC	\$1,956,000
Electrical and Generators	\$2,446,000
Intermediate and Backwash Pumps	\$500,000
Piping	\$1,367,000
Coatings	\$474,000
Reservoir and High Lift Yard Piping (24-inch)	\$266,000
2-Million-Gallon Reservoir Rehabilitation	\$531,000
Residuals Handling	\$880,000
Civil and Site Work	\$965,000
WTP Access Improvements	\$500,000
Site Security	\$250,000
Distribution Garage	\$393,000
Subtotal	\$17,190,000
General Conditions (8 percent)	\$1,376,000
Construction Probable Cost	\$18,566,000
Existing WTP Demolition	
	\$351,000
General Conditions (8 percent)	\$28,000
Construction Probable Cost	\$379,000
Professional Services and Contingency (35 Percent)	\$9,227,000
Total Construction Probable Cost	\$35,588,000

Note: Does not include land acquisition costs.

Treatment Option 2 - New Direct Membrane Filtration Plant

- Uses latest treatment technology
- May meet future regulations without the need for additional treatment
- Higher annual operational cost than conventional process

Figure 5.04-2 Preliminary New WTP Process Schematic Direct Membrane Filtration

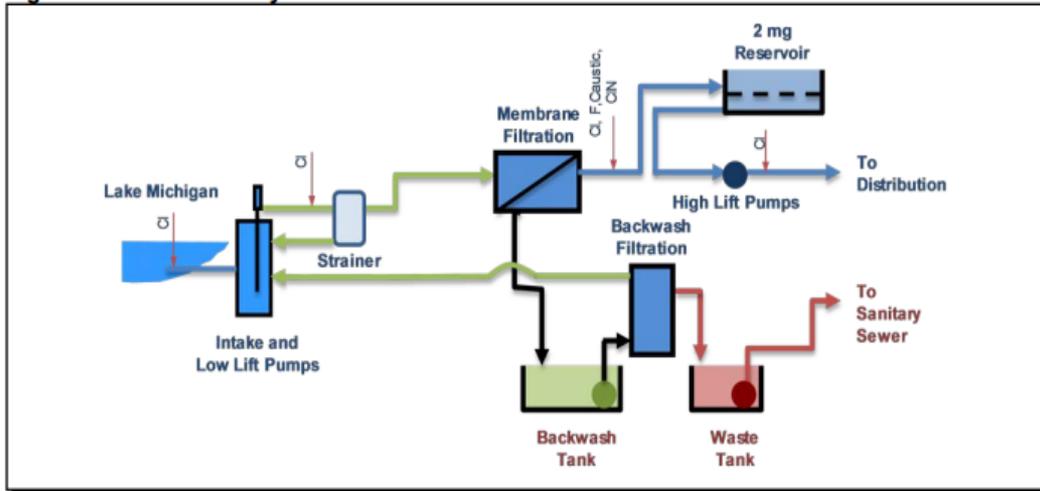


Table 5.04-2 New Direct Membrane Filtration WTP OPCC

Description	OPCC
6 mgd Intake Facility	
Intake Piping (24-inch)	\$3,326,000
Shoreline Stabilization	\$320,000
Intake Equipment and Structure	\$3,220,000
Subtotal	\$6,866,000
General Conditions (8 percent)	\$550,000
Construction Probable Cost	\$7,416,000
6 mgd Direct Membrane Filtration	
Administration and Offices	\$438,000
Chemical Storage and Feed	\$778,000
Membrane Treatment	\$5,541,000
Backwash Treatment	\$1,475,000
HVAC	\$2,065,000
Electrical and Generators	\$3,789,000
Piping	\$2,401,000
Coatings	\$753,000
Reservoir and High Lift Yard Piping (24-inch)	\$266,000
2-MG Reservoir Rehabilitation	\$531,000
Civil and Site Work	\$1,201,000
Distribution Garage	\$393,000
WTP Access Improvements	\$500,000
Site Security	\$250,000
Subtotal	\$20,381,000
General Conditions (8 percent)	\$1,631,000
Construction Probable Cost	\$22,012,000
WTP Demolition	
General Conditions (8 percent)	\$28,000
Construction Probable Cost	\$379,000
Construction Probable Cost Subtotal	\$29,807,000
Professional Services and Contingency (35 percent)	\$10,433,000
Total Construction Probable Cost	\$40,240,000

"All estimates are Preliminary and in 2015 dollars"

Direct Membrane Filtration selected for plant location analysis

- Slightly smaller footprint
- Requires less chemicals
- Higher potential to meet more stringent future regulations
- Latest treatment technology

Direct Membrane Filtration offers Advantages

Option	Capacity (mgd)	Redundancy	Process Flexibility	Regulatory Compliant Technology	Consistent Water Quality Regardless of Lake Conditions	Taste and Odor Control	Future Regulations	Improvement to Existing Water Quality
Membrane Filtration	>6	✓	+	✓	✓	✓	✓	✓
Conventional Filtration	6	✓	○	✓	✗	○	○	○

 =Yes
  =Improvement to Existing
  =Maybe
  =No

Inland Options for New WTP

- Dundee Road / West School
- Forestway Drive / CCFPD
- Public Works Garage Facility Site
- Village Water Tower Site



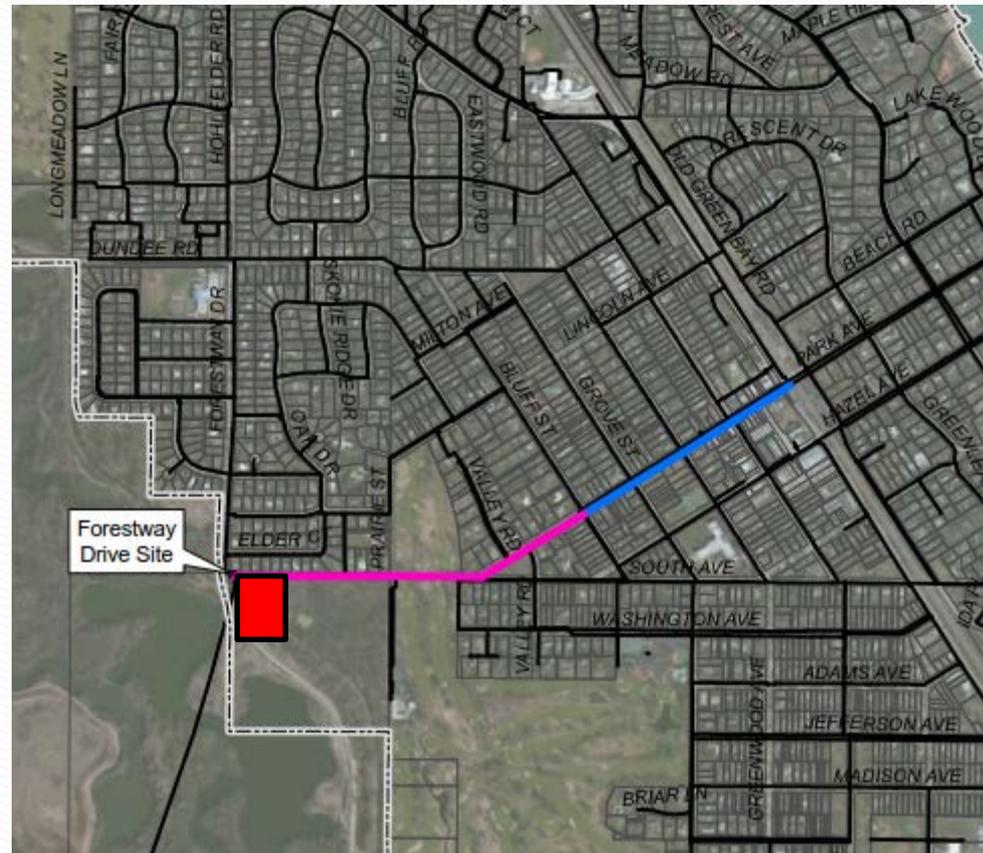
Dundee Road Site - West of West School

- Significant loss of Park and School Property
- Extension of Raw and Treated Water Transmission Mains
- Major Impacts to Residential Area



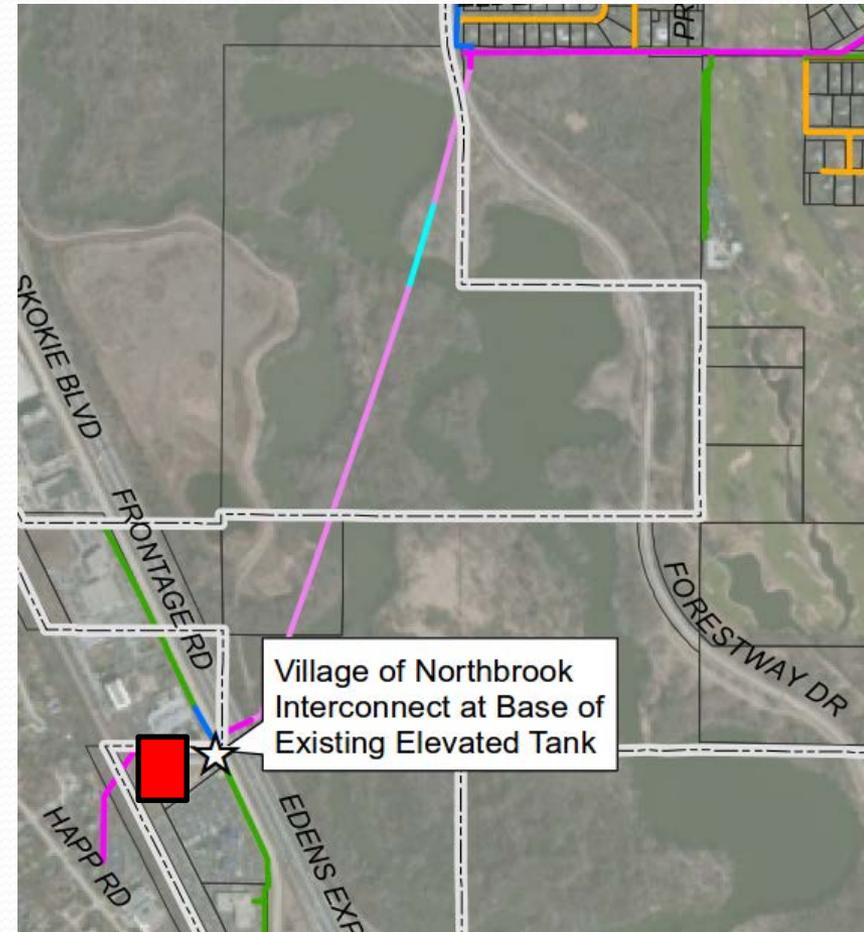
Forestway Drive Site - CCFPD

- Cook County Forest Preserve District Property Generally not Available for this Use
- Raw and Treated Water Transmission Mains
- Major Impacts to Residential Area



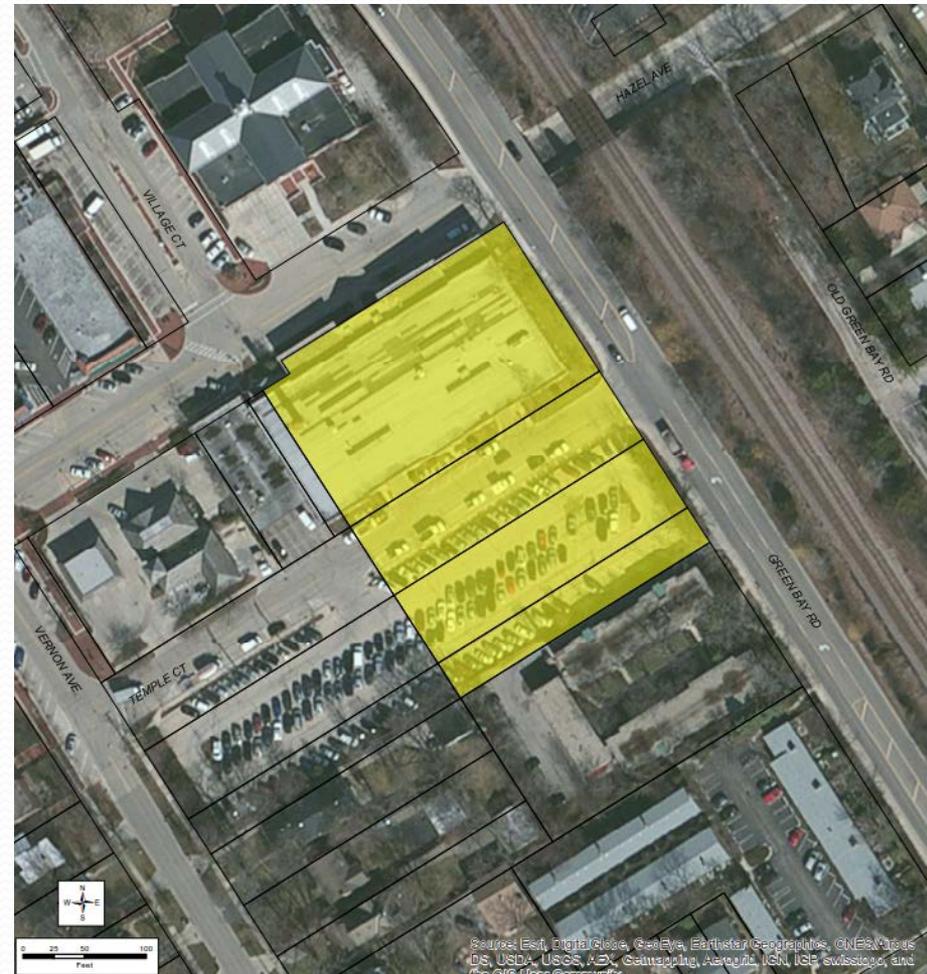
Village Water Tower Site

- IEPA regulated Landfill Site
- Crossing Skokie Lagoons/Edens with raw/treated transmission water mains
- Hydraulic deficiencies



Public Works Garage Facility Site

- Require new Public Works Facility
- Likely require Parking Structure to replace lost parking
- Raw Water Transmission Main Extension



Public Works Garage Site: Possible Advantages and Challenges

- Advantages
 - Only viable inland option
 - Village Owned Property
 - Close to “backbone”

- Challenges
 - Costly relocation of existing garage and parking lot
 - Difficult site security
 - Loss of Public Roadway
 - Access/Delivery Issues
 - Not in character of downtown

Table 5.04-11 New Inland Membrane Filtration WTP on the Existing Public Works Property
OPCC (2nd Quarter 2015)

Description	OPCC
6 mgd Intake Facility	\$7,416,000
6 mgd Direct Membrane Filtration Treatment Facility	\$22,012,000
WTP Demolition	\$569,000
Raw Water Transmission Main	\$1,472,000
6 mgd Booster Station and 16-inch Transmission Main	\$4,100,000
2 mgd Booster Station at Existing Reservoir	\$1,500,000
Construction Probable Cost Subtotal	\$37,069,000
Professional Services and Contingency (35 percent)	\$12,975,000
New Parking Deck	\$5,000,000
New Public Works Garage Facility	\$10,000,000
Total Construction Probable Cost	\$65,044,000

“All estimates are Preliminary and in 2015 dollars”



Potential Lakefront Locations: Three Possible

- On the existing Water Treatment Plant site
- South of the existing Water Treatment Plant site
- North of the existing Water Treatment Plant site

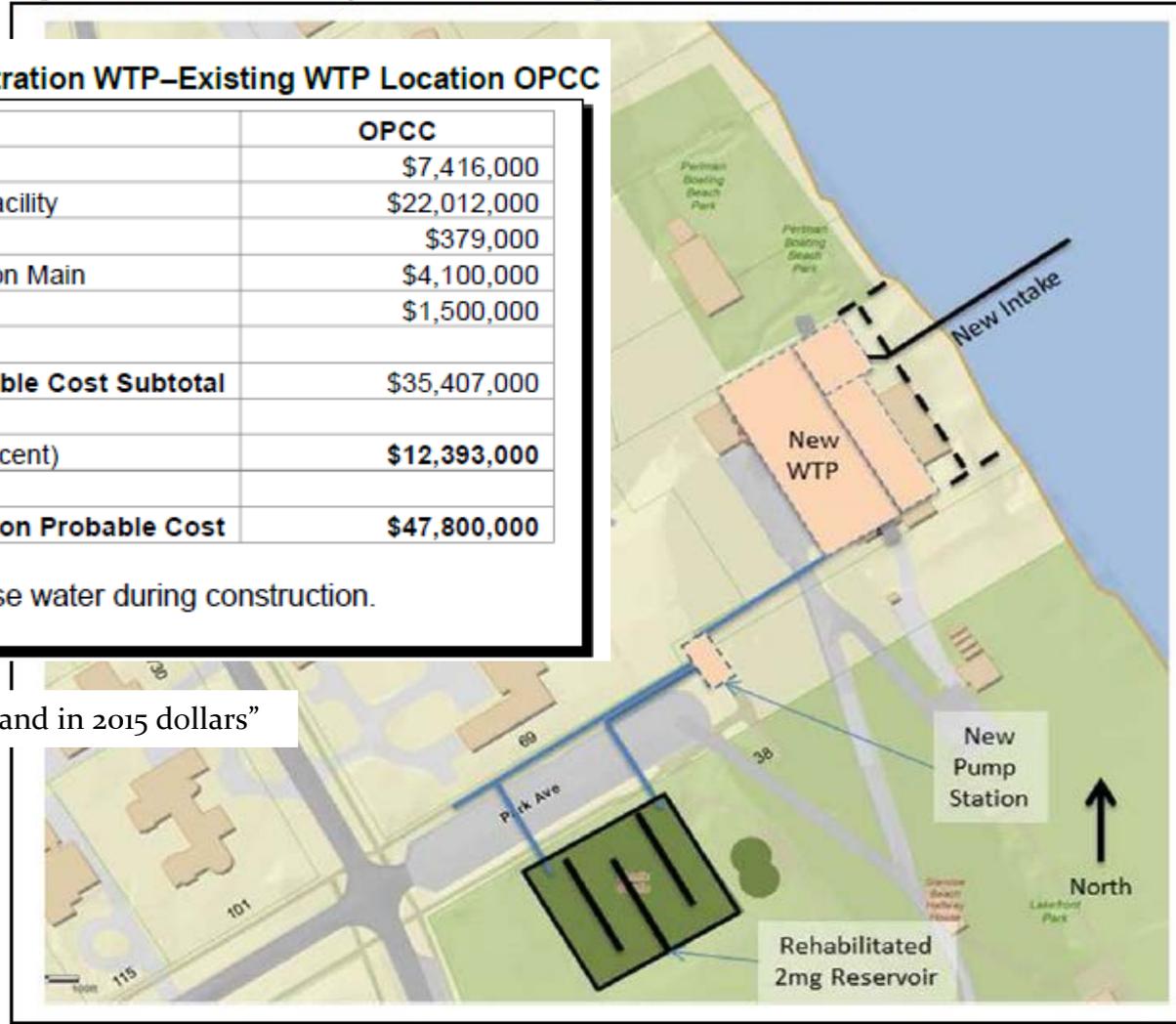
Lakefront Location on existing WTP Site

Figure 5.04-5 Preliminary Site Plan–Existing WTP Lakefront Location

Table 5.04-7 New Lakefront Membrane Filtration WTP–Existing WTP Location OPCC

Description	OPCC
6 mgd Intake Facility	\$7,416,000
6 mgd Direct Membrane Filtration Treatment Facility	\$22,012,000
WTP Demolition	\$379,000
6 mgd Booster Station and 16-inch Transmission Main	\$4,100,000
2 mgd Booster Station at Existing Reservoir	\$1,500,000
Construction Probable Cost Subtotal	\$35,407,000
Professional Services and Contingency (35 percent)	\$12,393,000
Total Construction Probable Cost	\$47,800,000

Note: Does not include the costs to purchase water during construction.



“All estimates are Preliminary and in 2015 dollars”

Existing Lakefront Site: Possible Advantages and Challenges

- Advantages
 - Village Owned Property
 - Freedom of Architectural Design
 - Completely renewed WTP with the latest technology
- Challenges
 - Connection with Highland Park for water supply during construction
 - Restricted access to Boater Beach
 - Higher cost than other lakefront options

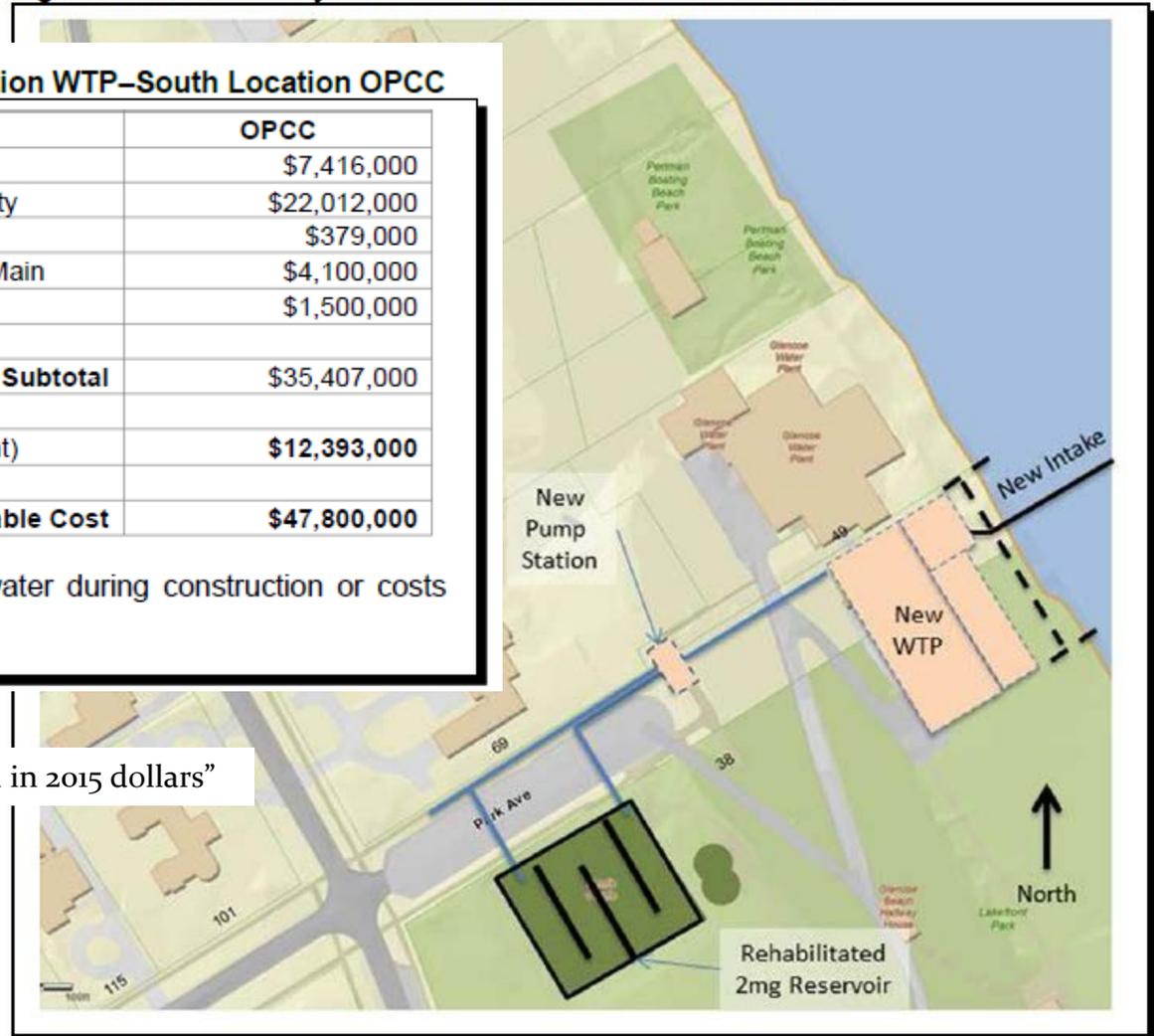
Lakefront Location – South of Existing WTP

Figure 5.04-4 Preliminary Site Plan–South Lakefront WTP Location

Table 5.04-5 New Lakefront Membrane Filtration WTP–South Location OPCC

Description	OPCC
6 mgd Intake Facility	\$7,416,000
6 mgd Direct Membrane Filtration Treatment Facility	\$22,012,000
WTP Demolition	\$379,000
6 mgd Booster Station and 16-inch Transmission Main	\$4,100,000
2 mgd Booster Station at Existing Reservoir	\$1,500,000
Construction Probable Cost Subtotal	\$35,407,000
Professional Services and Contingency (35 percent)	\$12,393,000
Total Construction Probable Cost	\$47,800,000

Note: Does not include cost to purchase water during construction or costs associated with land acquisition.



“All estimates are Preliminary and in 2015 dollars”

South of the Existing WTP: Possible Advantages and Challenges

- Advantages
 - Existing WTP stays in service throughout most of the construction
 - Mainly Village Owned Property
 - Freedom of Architectural Design
 - Completely renewed WTP with the latest technology
 - Lower cost than over existing WTP
- Challenges
 - Some property must be acquired
 - Connection with Highland Park for water supply during construction (recommended)
 - Restricted access to Boater Beach

Lakefront Location – North of Existing WTP

Table 5.04-3 New Lakefront Membrane Filtration WTP–North Location OPCC

Description	OPCC
6 mgd Intake Facility	\$7,416,000
6 mgd Direct Membrane Filtration Treatment Facility	\$22,012,000
WTP Demolition	\$379,000
6 mgd Booster Station and 16-inch Transmission Main	\$4,100,000
2 mgd Booster Station at Existing Reservoir	\$1,500,000
Construction Probable Cost Subtotal	\$35,407,000
Professional Services and Contingency (35 percent)	\$12,393,000
Total Construction Probable Cost	\$47,800,000

Note: Does not include the cost to purchase water during construction or the costs associated with land acquisition.

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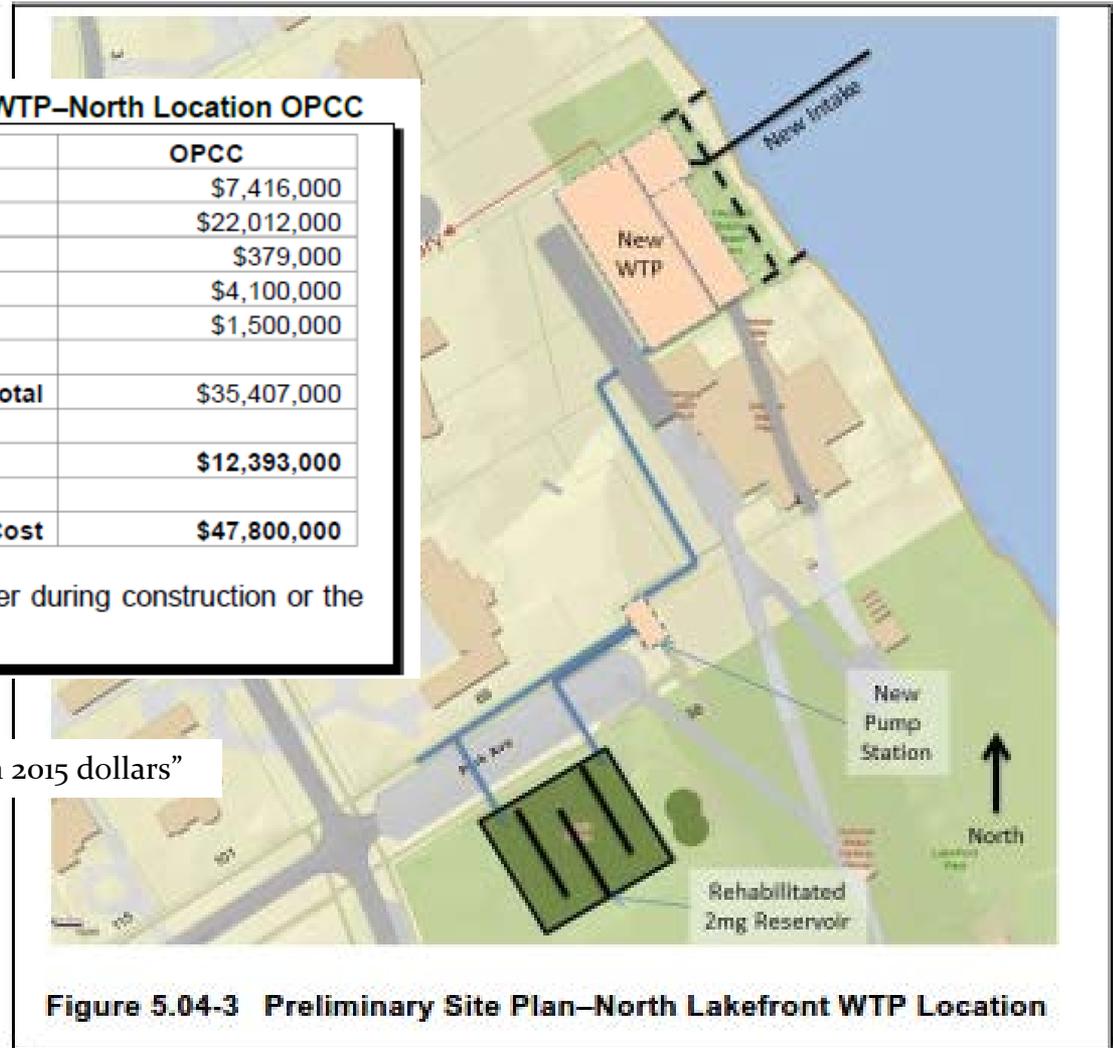


Figure 5.04-3 Preliminary Site Plan–North Lakefront WTP Location

North of the Existing WTP:

Possible Advantages and Challenges

- Advantages
 - Existing WTP stays in service throughout most of the construction
 - Portion of Village Owned Property
 - Freedom of Architectural Design
 - Completely renewed WTP with the latest technology
 - Contiguous beach operations
 - Lower cost than over existing WTP
- Challenges
 - Construction and permeant access will be difficult
 - Property must be acquired
 - Connection with Highland Park for water supply during construction (recommended)
 - Loss of separate and distinct Boater Beach
 - Neighbor Impacts

Summary of OPCC and Addition of Cost to Purchase Water During Construction

Table 5.05-1 Water Supply OPCC Summary

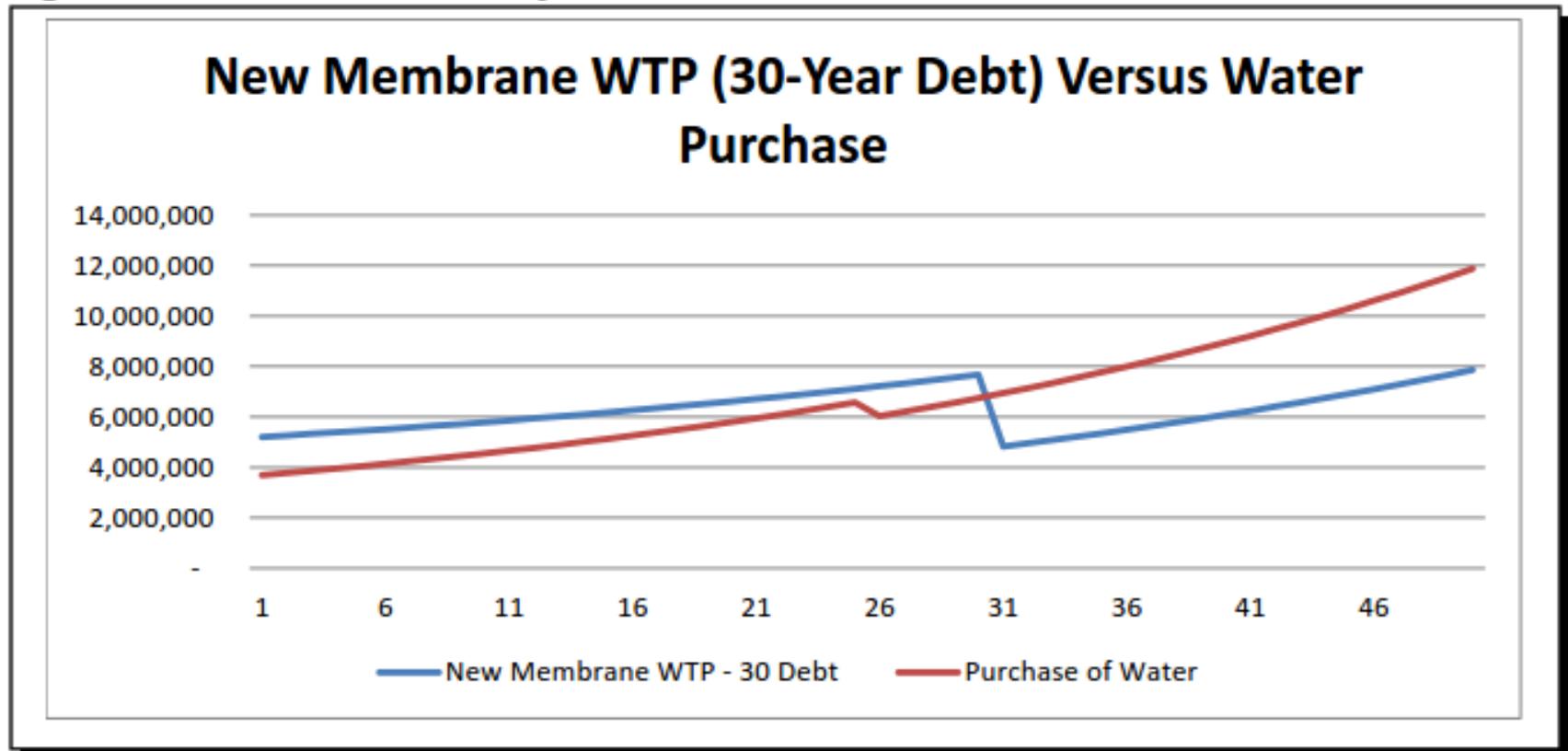
Water Supply Alternative	OPCC	Purchased Water Cost During Construction	Total OPCC
Rehabilitate Existing WTP	\$31,253,000	\$621,000	\$31,874,000
New WTP-Existing Site	\$47,800,000	\$3,777,000	\$51,577,000
New WTP-South of Existing Site	\$47,800,000	\$621,000	\$48,421,000
New WTP-North of Existing Site	\$47,800,000	\$621,000	\$48,421,000
New WTP-Existing Public Works Garage Site	\$65,044,000	\$621,000	\$65,665,000
Purchase Water from Highland Park	\$11,717,000		\$11,717,000

NOTE: Cost may increase depending on complexity of construction

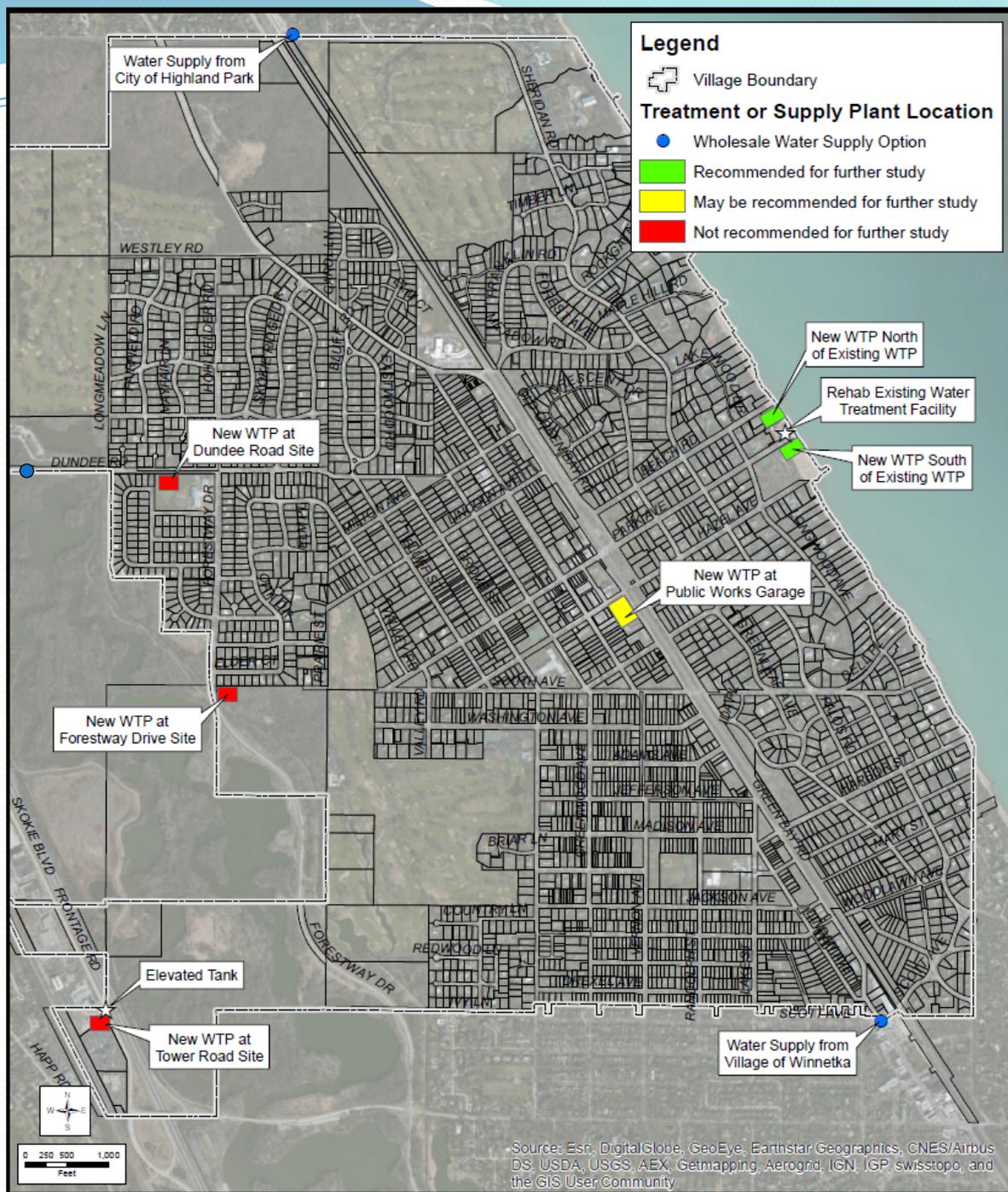
“All estimates are Preliminary and in 2015 dollars”

Long-term Cost Comparison to Produce vs. Purchase Water

Figure 6.03-1 50-Year Annual Payment Trends For Purchased Water Versus New WTP



“All estimates are Preliminary and in 2015 dollars”



Recommendations

- If the Village determines it appropriate to become a wholesale purchaser of water, consider purchasing from Highland Park as the sole source.
- If the Village determines it appropriate to continue to produce water, consider construction at the Lakefront to minimize the costs and impacts to the majority of the Village residents and reduce the amount of additional infrastructure.



Village Board
questions with
respect to the report

Next Steps

- What is our next step?
 - Inform & Educate
- How does the public engage?
 - Continued presentations and discussions at future Village Board Meetings
 - Online:
 - Email waterplant@villageofglencoe.org
 - Website <http://www.villageofglencoe.org/news/wtpinitiative.aspx>
 - An Open House, with Village staff and representatives of Strand Associates in attendance to gather input and answer questions of residents
 - A series of smaller-scale presentations and dialogue hosted by the Glencoe Community Relations Forum
 - Village to meet with Park District and other stakeholders