Alternative Water Source Evaluation

Part 2 – Water Source Options and Key Considerations

Village of Oswego, Illinois

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BAXTER & WOODMAN Consulting Engineers

Village of Oswego, IL
Part 2

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LIST OF ABBREVIATIONS

avg	-	average
CDWM	-	Chicago Department of Water Management
CMAP	-	Chicago Metropolitan Agency for Planning
DWC	-	DuPage Water Commission
EPA	-	Environmental Protection Agency
ft	-	feet
ft2	-	square feet
ft3	-	cubic feet
gpd	-	gallons per day
gpm	-	gallons per minute
gpcpd	-	gallons per capita per day
IAWC	-	Illinois American Water Company
IDNR	-	Illinois Department of Natural Resources
IEPA	-	Illinois Environmental Protection Agency
ISWS	-	Illinois State Water Survey
max	-	maximum
MG	-	million gallons (or mil gal)
MGD	-	million gallons per day
mg/L	-	milligrams per liter (parts per million in dilute solutions)
min	-	minimum
PRV	-	pressure reducing valve
psi	-	pounds per square inch
WRT	-	Water Remediation Technology LLC

7. PART 2 INTRODUCTION

7.1 Part 2 Overview

Part 2 of the Alternative Water Source Evaluation (Study) includes detail on the water supply alternatives and is a companion document to the Part 1 report. The purpose of the Study is to update and align the previous source water analyses completed for the Fox River Option (Engineering Enterprise, Inc., 2017) and Lake Michigan Water via DuPage Water Commission Option (AECOM, 2018) with two new Lake Michigan Water alternatives: the proposed Joliet Water Commission Option and the Illinois American Water Option. The specific design recommendations from the previous Fox River and DWC studies have not been altered as part of this study.

The Village is partnering with the Village of Montgomery and United City of Yorkville to evaluate several alternative water supply sources. The alternatives evaluated in the Study are sized to meet the 2050 demands of Montgomery, Oswego, and Yorkville, with consideration given to the ultimate demand when the three communities are fully developed.

Part 1 of the Study provided the following:

- A summary of the existing water source in Montgomery, Oswego, and Yorkville
- An analysis of population and water demand projections and water conservation efforts
- A summary of Oswego's existing water system
- The results of the Illinois State Water Survey analysis
- An overview of the Fox River and Lake Michigan alternative water sources
- A description of the comprehensive Study approach and next steps

Part 2 of the Study (this report) provides the following:

- An overview of the key considerations used for evaluation
- A detailed discussion of the identified water source options
- The internal system improvements necessary when changing water sources

Future parts of the Study will address the following:

- Cost estimates
- Funding alternatives
- Conservation measures
- Public information meeting

7.2 Study Approach

The Alternative Water Source Evaluation Study will update and align the previous analyses completed for the Fox River Option and Lake Michigan Water via DuPage Water Commission Option with two new Lake Michigan Water alternatives: the Joliet Water Commission Option and the Illinois American Water Option. Exhibit A displays the current water sources for communities in the region, including the four alternatives being evaluated in the Study.

The specific design recommendations from the previous Fox River and DWC studies have not been altered as part of this study but some elements have been updated or added to provide a uniform comparison between the alternatives. The alternatives evaluated in the Study are sized to meet the 2050 demands of Montgomery, Oswego, and Yorkville, with consideration given to the ultimate demand when the three communities are fully developed. The alternatives are inclusive of the improvements and facilities required to meet 2050 demands.

The Part 1 report provided a detailed analysis of the current and projected water demands for Montgomery, Oswego, and Yorkville. A summary of the 2020 and 2050 water demand projections in million gallons per day (MGD) is included as Table 1.

TABLE 1

Water Demand Projection Summary

Parameter		Montgomery	Oswego	Yorkville	Total
2020	Average Day (MGD)	2.36	2.38	1.62	**6.36**
	Maximum Day (MGD)	4.03	5.04	3.88	**12.95**
2050	Average Day (MGD)	3.4	3.77	4.06	**11.23**
	Maximum Day (Current Trends) (MGD)	5.53	7.99	7.62	**21.14**
	Maximum Day (Contractual Limit/LRI) (MGD)	5.53	6.41	6.91	**18.85**

As shown above, two demand scenarios were developed to project water demands to 2050. The Current Trends (CT) scenario assumes that per capita water demand trends remain constant through 2050. The Contractual Limit/Less Resource Intensive (CL/LRI) scenario reflects the general downward trend in per capita water consumption in the region and contractual limitations on the MDD:ADD ratio, a common requirement of Lake Michigan water suppliers and described in more detail in Section 4. The Fox River Option was evaluated using the Current Trends demand scenario and is discussed in more detail in Section 3. The three Lake Michigan alternatives were evaluated using the Contractual Limit/Less Resource Intensive demand scenario.

8. KEY CONSIDERATIONS

The selection of a new, sustainable water source is vital to the future of Montgomery, Oswego, and Yorkville. The three communities will be unable to meet their continued population growth and water demands without choosing a new water source.

8.1 Cost

While the cost of a new water source is a significant factor, cost is not the only consideration when selecting a new water source. It is critical that the chosen water source is able to provide a sufficient amount of reliable, safe drinking water to the three communities through 2050 and beyond. Five key considerations, beyond cost, were identified to evaluate the four water source alternatives and are discussed below. The key considerations are put forth without prioritization or weighting. Doing so will be a community decision spearheaded by the Village Board.

Establishing a new water source, regardless of the chosen source, will be the most expensive endeavor undertaken by the Village. The costs of the system will be high, but the cost of doing nothing is the viability of the Village itself.

Estimated costs for each alternative, including capital, operating, and financing, will be provided in a later part of the comprehensive Study.

8.2 Sustainability of Water

The key consideration "Sustainability of Water" reflects the requirement of the water source alternative to have sufficient water quantity to supply Montgomery, Oswego, and Yorkville to 2050 and beyond to navigate service disruptions and outages.

TABLE 2

Sustainability of Water

Criteria	Description
Water Quantity	Capacity of the source to meet projected average and maximum day demands
Flow Restrictions	Limitations on the availability of water
Supply Rate	Ability to increase/decrease supply rate to meet peak demands
Backup Wells	Availability of backup source for service disruptions or withdrawal limitations
Supply Redundancy	Ability to maintain supply during planned or unplanned outages

As discussed in the Part 1 report, Montgomery, Oswego, and Yorkville currently rely on the Ironton-Galesville aquifer for their primary source of water. According to the Illinois State Water Survey (ISWS), the deep sandstone aquifer is being pumped beyond its sustainable yield and water levels

in the aquifer are dropping, putting many supply wells in the area at risk. The aquifer is projected to be at severe risk of depletion and may no longer be able to meet the regional maximum day water demands in the near future.

8.3 Water Quality and Permitting

The key consideration of "Water Quality and Permitting" relates to water treatment requirements, water quality parameters, operator licensing and agency permitting requirements, and seasonal variability of the water source.

TABLE 3

Water Quality

Criteria	Description
Water Quality Parameters	Hardness of the raw water source and finished water
Treatment Type	Treatment process required to meet drinking water standards
Operator License Requirements	IEPA Drinking Water Operator Certification level required
Water Intake Location	Location of the water source intake in relation to potential contaminant sources
Seasonal Quality Concerns	Seasonal changes in source water may alter taste and odor of treated water
Permitting Requirements	Requirements IDNR and IEPA

Naturally occurring Radium-226 and Radium-228 are found in the Ironton-Galesville aquifer and are being treated and removed by the three communities. Water from the deep sandstone aquifer is seasonally consistent.

The Village of Montgomery's potable water supply system consists of nine wells from the deep sandstone and shallow sand and gravel aquifers. Montgomery has two cation exchange water treatment plants for softening and radium removal, and a lime softening treatment plant for softening and radium removal. Montgomery's water system currently requires a Class A Drinking Water Operator license.

The Village of Oswego's potable water supply system consists of eight deep sandstone wells with Water Remediation Technology (WRT) treatment at each well for radium removal. Oswego's water system currently requires a Class B Drinking Water Operator license.

The United City of Yorkville's potable water supply system consists of four deep sandstone wells with three cation exchange water treatment plants for softening and radium removal. Yorkville's water system currently requires a Class A Drinking Water Operator license.

A summary of the water operator license classes and their requirements is shown below in Table 4.

TABLE 4

Water Operator Class Description

Water Operator Class	Water Facilities Description
A	Water treatment facilities that include coagulation/sedimentation, lime softening, UV disinfection, pathogen removal/inactivation, and/or membrane filtration
B	Water treatment facilities that include aeration and filtration, filtration (other than membrane filtration), and/or ion exchange
C	Water treatment facilities that utilize chemical feed only
D	Water treatment facilities limited to pumpage, storage, or distribution

Under all alternatives, a corrosion control study would be required by IEPA and USEPA to prove there will be no impact to lead services when switching water sources. The Corrosion Control study will likely include a desk top study and a demonstration study. The exact requirements of the corrosion control study are dependent on the water supply source and will need to be discussed further with IEPA once a source is selected.

8.4 Governance and Operational Responsibility

The key consideration "Governance and Operational Responsibility" encompasses the ability of Montgomery, Oswego, and Yorkville to maintain control of elements of the water source, including involvement in decision-making, and operations and maintenance.

TABLE 5

Governance and Operations Responsibility

Criteria	Description
Agreement Type	Role that Montgomery, Oswego, and Yorkville would have in decision-making as members or customers
Control of Water Source and Infrastructure	Level of control and responsibility over the raw water source, water treatment processes, and infrastructure

8.5 Timeline

The key consideration "Timeline" estimates the total project schedule, including design, permitting, easement acquisition, contract negotiations, and construction of each alternative.

TABLE 6

Timeline

Criteria	Description
Availability Timeline	Estimated schedule for when the alternative would be available
Decision Timeline	Constraints or deadlines for selection of the alternative
Oswego Intermediate Well Timeline	Based on demand projections exceeding Oswego's current well supply capacity relative to the Availability Timeline of the alternative

As detailed in the Part 1 report, Oswego's current wells will not be able to meet the maximum day demands by 2030. Oswego will likely need to drill a new well if the selected water source alternative is not available before that time.

8.6 Oswego Internal System Improvements

The key consideration "Oswego Internal System Improvements" includes the magnitude of distribution system improvements required within Oswego's water system in order to accommodate the source water alternative. For all alternatives, Oswego will require additional storage facilities by 2050.

A hydraulic model of Oswego's water distribution system was constructed and calibrated as part of HR Green's 2014 Water Study project. The hydraulic model was used as part of the 2018 AECOM study to perform a detailed analysis of Oswego's existing water distribution system in order to determine internal improvements required to distribute water for the Fox River Option and DuPage Water Commission Option. The Joliet and Illinois American sources are anticipated to have internal improvements similar to those under the DPWC option.

As part of this Study, the hydraulic model was updated to reflect the current field conditions of the system, including the addition of developments and capital improvements that have been constructed since the original model was developed. Water customer billing data from 2019-2020 was used to spatially distribute specific water demands within the model. This method of geographical demand assignment more accurately reflects how water demands vary throughout the system than other water model loading methods that have traditionally been utilized. Hydrant testing was performed and field data was used to re-calibrate the model. The Extended Period Simulation, which simulates water operations over 24 -72 hours, was updated to reflect the operations and setpoints used in 2020.

The updated water model was used to verify the internal system improvements identified in the 2018 AECOM report. These internal system improvement recommendations will be discussed in detail in later sections of this report.

9. FOX RIVER OPTION

9.1 Fox River Option Background

The Fox River is used as a source of potable water for public water supply for the City of Elgin and the City of Aurora. Both communities use a combination of water from the Fox River and wells.

In 2016, Engineering Enterprises Inc. (EEI) completed a Sub-Regional Water Supply and Treatment Planning Report that analyzed the Fox River as a potential water source for Montgomery, Oswego, and Yorkville. As detailed in the EEI report, the Fox River Option would include an intake pumping station on the Fox River, a network of backup wells and raw water transmission mains, a lime-softening water treatment plant, and a network of treated water transmission mains to distribute water to each community.

While the specific design recommendations from the EEI report have not been altered, as part of the Study two updates have been made: 1) updates to the demand projections and facility sizing, and 2) the addition of metering stations at connection points.

The EEI report outlined the population projections of the three communities through 2050 and evaluated two demand scenarios: Current Trends and Less Resource Intensive. The Current Trends utilized each community's historical water demand data through 2014 to project the additional water demand based on population growth, whereas the Less Resource Intensive scenario proposed a more conservative approach with a water use per capita of 75 gallons per capita per day (gpcpd) and a maximum to average day ratio of 1.75. The Less Resource Intensive approach was intended to account for increases in water efficiency and water conservation within each community.

The Current Trends scenario included a 32 MGD intake and treatment plant, with eight existing wells and five additional wells shared by all three communities, that would be used to supplement the Fox River. The Less Resource Intensive scenario included a 25 MGD intake and treatment plant, and eight existing wells and three additional wells for supplemental use.

As outlined in Section 1.2, the updated maximum day demand projections of all three communities is 21.14 MGD based on the updated Current Trends water demand scenario. As a result, the facilities and pipelines detailed in the EEI Less Resource Intensive improvements were used as the basis for this Study.

Metering stations at the connection points were not included in the 2016 report but were included in the cost estimates of the 2018 AECOM Report (DWC Option). A metering station is necessary to track the water treated at the regional water treatment plant and delivered to each of the three communities. This Study includes metering stations at each connection point for consistency.

9.2 Fox River Option Overview

For the purpose of the Study, locations for the intake pumping station, water treatment plant, connection points, and transmission main routes remain consistent with the EEI report. Siting of the proposed facilities will be evaluated and finalized during preliminary design after a water source is selected.

9.2.1 Intake Pumping Station and Water Treatment Plant

The sites for the proposed intake pumping station and water treatment plant would be located near the intersection of the Fox River and Orchard Road. This location was chosen for its central location between all three communities, to minimize transmission main costs, equitably distribute the backup well network, and ensure water age in the transmission main network is similar for all three communities. The proposed water source intake for a new Fox River Water Treatment Plant would be located approximately two miles downstream from the Fox Metro Water Reclamation District's outfall.

The intake pumping station and water treatment plant would be sized at 25 MGD to meet 2050 Maximum Day Demands for the three communities.

The proposed water treatment plant would have a combination of lime softening and membrane treatment. Lime softening treats surface water and groundwater to remove hardness, microorganisms, radium, and dissolved organic matter, and is a process used by both the City of Elgin and City of Aurora. Membrane treatment is used as a polishing step to treat any additional particles not removed in the lime softening process. The EEI report determined that a single stage upflow clarifier, such as a ClariCone®, would be a cost effective treatment option.

9.2.2 Backup Well Supply

In the event that withdrawals from the Fox River are restricted due to poor water quality or low river water levels that occur during a drought, a backup water supply will be needed by all three communities. The backup well supply network would be sized to meet the 2050 Average Day Demands with the largest well out of service. The proposed backup well network would consist of a combination of existing and new wells, as follows:

- Montgomery would connect two existing wells and add one additional well
- Oswego would connect four existing wells
- Yorkville would connect two existing wells and add one additional well
- One sub-regional well would be added, with usage split between Yorkville and Oswego

9.2.3 Transmission Mains

The proposed network of raw water transmission mains consists of installation of approximately 13 miles of 12-inch to 24-inch main to collect raw water from the wells and deliver it to the proposed

water treatment plant. Exhibit B shows the proposed routing of the raw water transmission network and a summary of the pipe lengths is included as Table 7.

TABLE 7

Summary of Fox River Options Raw Water Transmission Mains

Diameter	Length (ft)
12"	20,060
16"	18,760
20"	17,160
24"	13,180
Total	**69,160**

The Fox River Option includes installation of approximately nine miles of 16-inch to 36-inch treated water transmission main, summarized in Table 8. Due to differing hydraulic grade lines, or elevation between the three communities, treated water would be distributed to the three communities through two separate transmission main networks: High Transmission Main Network and Low Transmission Main Network. The High Transmission Main Network would provide water to Montgomery and Oswego's Middle Pressure Zone, with the possibility of a future connection to Yorkville. The Low Transmission Main Network would provide water to Oswego's Low Pressure Zone and Yorkville. Exhibit C shows the proposed layout of the treated water transmission mains.

TABLE 8

Summary of Fox River Option Treated Water Transmission Mains

Diameter	Length (ft)
16"	1,520
24"	17,830
30"	22,020
36"	5,450
Total	**47,520**

9.2.4 Receiving Stations

At each of the community connection point for this alternative, receiving components would include a metering station to establish the volume of water entering each community's distribution system.

Montgomery would have one connection point, Oswego would have three connection points, and Yorkville would have one immediate connection point and one future connection in the South Pressure Zone. For the purpose of this Study, Yorkville's proposed future connection will be included

in the alternative evaluation and cost estimates. Table 9 summarizes the locations of proposed connection points for the three communities.

TABLE 9

Summary of Fox River Option Receiving Station Locations

Community	Connection Location	Pressure Zone
Montgomery	Orchard Rd/Galena Rd	West
Oswego	Route 34/Arbor Ln	Low
	Route 71/Main St	Middle
	Minkler Rd/Hunt Club Dr	Middle
Yorkville	Route 34/Bristol Ridge Rd	North
	Minkler Rd/Hilltop Rd	South

Due to the proposed location of the water treatment plant, no cost-effective routes were identified for a second connection point for Montgomery. Instead, it was recommended that Montgomery construct interconnects with Oswego. It was also recommended that all three communities construct interconnects where feasible to provide redundancy for the treated water transmission network. Interconnect locations were not included in the EEI report and were not included in the Study.

As mentioned above, Yorkville's South Pressure Zone connection point is recommended for some time in the future. Due to the higher hydraulic grade line of Yorkville's South Pressure Zone, a booster pump station will be required in order to make the connection. Specific details of the proposed booster pump station were not included in the EEI report.

9.3 Sustainability of Water

As detailed in the 2016 EEI report, the ISWS has conducted water modeling for the Fox River and has determined the river is a sustainable water source, capable of meeting the Average and Maximum Day Demands of Montgomery, Oswego, and Yorkville during normal conditions.

However, there may be times that backup wells are required due to poor water quality or times of low river flow during drought. The IDNR requires a Public Water Supply Permit for any withdrawal from a public waterway such as the Fox River. For the times when the Fox River's flow is reduced, the IDNR uses the 7Q10, or "7 day 10 year low flow" to quantify how much water flows during periods of drought. Partial or full restrictions would be placed by IDNR on the withdrawal rates when the river falls below the 7Q10. During these times, the communities would need to rely on water produced from the network of backup wells.

Because the water treatment plant would be operated by the three communities, they would have direct control over water supply rate and could increase or decrease the water supply rate as needed to meet peak demands.

As detailed in Section 9.2, a network of backup wells would be required to supplement the withdrawals from the Fox River. The three communities would be able to abandon the remaining wells and associated treatment plants that are not connected to the raw water network.

Redundancy will be built into many facets of the water treatment plant and water transmission networks. Interconnects between the three communities, most importantly between Montgomery and Oswego, are recommended to provide redundancy in the event that treated water transmission mains are out of service.

9.4 Water Quality and Permitting

The raw water from the Fox River is considered to be very hard, with a hardness ranging from 260 to 400 mg/L as Calcium Carbonate ($CaCO_3$). The target hardness of the treated water is 100-130 mg/L as $CaCO_3$, similar to the finished water hardness within the existing Montgomery and Yorkville systems. The target hardness is significantly lower than the hardness in Oswego's existing system, which ranges from 200-260 mg/L as $CaCO_3$. This reduction in water hardness could allow Oswego residents to remove their water softeners.

As detailed in Section 3.2, the water treatment process would consist of lime softening and membrane treatment. This type of treatment requires a Class A Drinking Water Operator license. A Class A operator is required to demonstrate the necessary skills, knowledge, ability, and judgment of the chemical, biological, and physical sciences essential to the practical mechanics of coagulation, sedimentation, lime softening, ultraviolet disinfection, membrane filtration, chemical feed, calculation of dosage and distribution, in addition to the requirements of Class B, Class C, and Class D certification.

The proposed water source intake for a new Fox River Water Treatment Plant is located approximately two miles downstream from the Fox Metro Water Reclamation district's outfall. The IEPA noted that there are no rules that require a set distance from the Fox Metro outfall. It should be noted however, that there is some amount of risk in the event a surcharge or breach in Fox Metro's National Pollutant Discharge Elimination System Permit allows a higher level of contamination to occur into the proposed Surface Water Treatment Plant's intake that it may not be equipped to treat.

The Fox River experiences seasonal changes in water quality, such as taste and odor variations caused by algae or other organic matter. In the event of poor water quality, the backup wells would be used to supplement or replace the withdrawals from the river.

The IDNR requires a Public Water Supply Permit for any withdrawal from a public waterway such as the Fox River, and has a specific low flow withdrawal cut-off known as the 7Q10. The 7Q10 flow is the annual minimum 7-day average flow with a 10-year recurrence interval, and has been modeled and updated by the Illinois State Water Survey (ISWS).

Additional requirements include a Public Notice and an Incidental Take Authorization (ITA), which assesses whether the waterway contains threatened and endangered species that are impacted by

the reduced water levels. The ITA is permitted through the United States Army Corps of Engineers (USACE) and would come after the Public Water Supply Permit application through the IDNR.

In certain cases, if the surface water treatment plant intake is exposed under low flow conditions, a special condition may be placed on the permit that provides a safety plan to address any dangers to the public.

According to the IEPA, there has only been one new surface water treatment plant in the past 20 years, and there are currently no exact rules and/or procedures that govern the permitting process of a new surface water treatment plant. Any interest in new surface water plants must undergo a more detailed case review by the IEPA for water quality data and testing, and would be subject to continuous process and dialogue with the agency.

The IEPA estimates that one year of monitoring and sampling would be sufficient, and there are certain sampling requirements that extend beyond the construction of the source water intake that could cause a later failure or additional requirements. In addition, a list of parameters for regulated and unregulated items to be sampled on specific frequencies needs to established with the IEPA. Finally, certain emerging water quality criteria were noted:

- PFAS (per and polyfluoroalkyl substances), a requirement starting September 21, 2020
- Algae count
- Toxicity
- Personal Care and Pharmaceutical
- Cryptosporidium monitoring required for two years after the source water intake is installed

The permitting, sampling, and general requirements would be a costly and time consuming process that could potentially impact the timeline and cost of the surface water treatment plant.

9.5 Governance and Operational Responsibility

Several governance models are available for the three communities with the Fox River Option, including a joint action water agency (JAWA), water district, or water commission. If the Fox River Option is selected, it is recommended that the three communities evaluate the available governance models, select the most appropriate for the sub-region, and work through the development of the agency early in the implementation timeline. This study assumes that all three communities will own and operate the plant as a joint agency. However, there could be optional scenarios where one community owns the system and sells wholesale water to the other communities. These details will need to be negotiated if the Fox River Option is selected.

Regardless of the governance model selected, the three communities would maintain complete control over the water source, water treatment, and water distribution infrastructure. The three communities would be responsible for all decisions regarding the operations and maintenance of the water supply system.

9.6 Timeline

Overall, the estimated timeline for the Fox River Option is between 9 and 11 years. Aside from the threats to the aquifer detailed in Part 1, there are no constraints or deadlines on the selection of the Fox River Option.

Based on the demand projections detailed in the Study, it is projected that Oswego's demands will exceed its current well supply capacity before the Fox River Option is available. If the Fox River is selected, Oswego will likely require a new well prior to the Fox River Option coming online.

9.7 Oswego Internal Improvements

The 2018 AECOM report included a hydraulic analysis of Oswego's existing water distribution system in order to determine internal improvements required to distribute water for the Fox River Option and DuPage Water Commission Option. The AECOM report concluded that approximately 11,000 feet of water main improvements would be required to effectively move water and maintain adequate operating pressures within the distribution system. Of the 11,000 feet of required improvements, approximately 6,700 feet of upsized piping would be required immediately. The remaining 4,300 feet of upsized piping would be required sometime before 2050, depending on future Oswego demands. For the purpose of this Study, the proposed future water main upsizing will be included in the alternative evaluation and cost estimates.

Water storage facilities provide water to meet peak hourly demands, water for fire protection, and a reserve capacity for emergencies. Currently, the Village of Oswego has five elevated water tanks with a combined volume of 5.3 MG. While not contractually required for the Fox River Option, a common design criteria for water storage recommendations is to maintain a storage volume equal to two times the average day use. For Oswego's current demands, this equates to 4.8 MG. Using Oswego's projected 2050 demands, the recommended volume equates to 7.5 MG, meaning that Oswego should plan to construct additional storage before 2050. For the purpose of this Study, it is assumed that Oswego will construct an additional volume of 3.0 MG.

10. DUPAGE WATER COMMISSION OPTION

10.1 DuPage Water Commission Option Background

The DuPage Water Commission (DWC) is an existing commission that was established in 1992. The DWC receives treated Lake Michigan water from the City of Chicago and pumps water out to 23 charter customers and six subsequent wholesale customers. The DWC provides water to a service area of more than 300 square miles and a population of nearly one million people.

The water serving DWC travels from the Jardine Water Purification plant to the Central Park Pumping Station and then to the Lexington Pumping Station. After the Lexington Pumping Station, water travels through two transmission mains, 90-inches and 72-inches in diameter. The water is delivered to the DuPage County Pumping Station in Elmhurst before it is pumped through the DWC transmission system. The DuPage County Pumping Station has two 15 MG reservoirs and a pumping capacity of 185 MGD, with an average day demand of 71 MGD. The DWC system consists of 202 miles of 12-inch to 90-inch water mains, 82 remote metering stations, five standpipes totaling 32.5 MG, and one remote pumping station with an emergency interconnection to Schaumburg.

In 2017, AECOM Technical Services, Inc. (AECOM) completed a feasibility study to evaluate an alternative for Oswego and Yorkville to receive Lake Michigan water via DWC. An amendment to the study was issued in 2018 to update demand projects, add Montgomery to the alternative, and evaluate internal system improvements for Oswego.

As detailed in the AECOM report, the DWC Option would include a new transmission main and receiving stations at each of the three communities' connection points. The three communities would pay for the construction of required facilities and DWC would own, operate, and maintain the facilities outside of the receiving stations.

The specific design recommendations from the AECOM report have not been altered as part of the Study but updates have been made to include all internal pumping, storage, and water main improvements required to meet 2050 demands. It is important to note that DWC has indicated that improvements may be needed to their system to meet future demands of Montgomery, Oswego, and Yorkville including the future demands of their current customers. Details and costs for these potential future system improvements are not included in this analysis.

The demand projections detailed in the 2018 AECOM report are summarized in Table 9. As outlined in Section 1.2, the CL/LRI demand projections used in this Study are lower than those projected in the 2018 AECOM report. For the purpose of this Study, all internal improvements have been sized in accordance with the CL/LRI demand projections. The transmission main sizing in the 2018 AECOM report has not been updated. If the DWC Option is selected, it is recommended that the DWC's hydraulic model is updated and used to reevaluate transmission main sizing.

TABLE 10

AECOM (2018) Water Demand Projection

Parameter		Montgomery	Oswego	Yorkville	Total
2020	Average Day (MGD)	2.6	3.5	2.1	**8.2**
	Maximum Day (MGD)	3.6	6.0	3.6	**13.2**
2050	Average Day (MGD)	3.8	8.2	5.4	**17.4**
	Maximum Day (MGD)	6.8	13.9	9.2	**29.2**

10.2 DuPage Water Commission Option Overview

For the purpose of the Study, locations for the supply point, receiving station/connection points, and transmission main routes remain consistent with the 2018 AECOM report. Siting of the proposed facilities will be evaluated and finalized during preliminary design after a water source is selected.

10.2.1 Supply Point

The proposed supply point for Montgomery, Oswego, and Yorkville is at the current DWC transmission main system in Naperville, near the intersection of 75th Street and Book Road. The supply point would belong to DWC.

10.2.2 Transmission Mains

The DWC Option includes approximately 29 miles of new 16-inch to 48-inch water mains to deliver water from the existing DWC transmission system to Montgomery, Oswego, and Yorkville. A summary of pipe lengths is included as Table 11. Exhibit D shows the proposed layout of the water transmission mains.

TABLE 11

Summary of DWC Option Transmission Mains

Diameter	Length (ft)
16”	12,730
20”	4,540
24”	33,400
30”	13,180
36”	49,380
48”	40,310
Total	**153,540**

10.2.3 Receiving Stations

A total of seven receiving stations are proposed for the DWC Option. With the exception of Oswego's High Pressure Zone connection, it is assumed that each connection point would require a metering station. Due to the higher hydraulic grade line of Oswego's High Pressure Zone, booster pumps will be required within the receiving station; it is assumed that the receiving station would include storage and a pumping station.

TABLE 12

Summary of DWC Option Receiving Stations

Community	Connection Location	Pressure Zone
Montgomery	Hill Ave/Goodwin Dr	East
	Orchard Rd/Galena Rd	West
Oswego	Orchard Rd/Tuscany Tr	Low
	Sudbury Cir/Cole Ave	Middle
	Ogden Falls Blvd/Waterbury Cir	High
Yorkville	Lehman Crossing/Berrywood Ln	North
	Tremont Ave/Country Hills Dr	South

10.3 Sustainability of Water

As discussed in the Part 1 report, Lake Michigan is an important water source providing water to more than 6.6 million Illinois residents. As detailed in the Part 1 report, the three communities would be eligible for a Lake Michigan allocation under the IDNR Rules. Lake Michigan supplies are not subject to drought restrictions.

DWC requires the following for its customers to limit their Maximum Day to Average Day (MDD:ADD) ratio to 1.70. Currently, the MDD:ADD ratios for Montgomery, Oswego, and Yorkville are 1.71, 2.12, and 2.39, respectively. DWC also requires its customers to take at least 50% of their Lake Michigan allocation. DWC would also require the three communities to receive water at a constant supply rate. The three communities would not be able to increase or decrease the water supply rates to meet peak hour demands and would rely on water storage during times of peak demand. DWC requires a minimum of two average days of supply storage.

The three communities could maintain their wells to use as individual backup supplies, in the event of planned or unplanned outages in the DWC supply that exceed available water storage volumes. It is typically recommended that the backup wells have enough capacity to meet average day demands. The wells would require routine testing and inspections.

TABLE 13

Summary of DWC Requirements

Criteria	Requirements
Max Day/Avg Day Ratio	1.7
Flow Rate	Continuous Flow Rate
Storage	2 Average Days Volume
Backup Wells	Don't allow blending between water sources. Back up wells are encouraged for emergency operations

DWC provides redundancy through the existing looped transmission system with parallel supply tunnels from the City of Chicago. The DWC Option does not include a redundant feed from the existing DWC transmission system, meaning that a single transmission main would supply the three communities. DWC has established emergency response protocols, as outlined below:

- Maintains an inventory of repair materials for all pipe sizes and materials in the system
- Trained field crews on 24-hour call for emergency shutdowns
- Multiple on-call contracts with underground contractors for major pipeline repairs
- Three incoming electrical service lines and five standby generators for backup power supply

10.4 Water Quality and Permitting

Lake Michigan is considered a high quality surface water source. Lake Michigan water does not contain detectable levels of radium or other radioactive elements, and has lower hardness, typically 140 mg/L as $CaCO_3$, which means that softening of any kind may not be necessary with this source. Water from the City of Chicago has a similar hardness to the finished water hardness within the existing Montgomery and Yorkville systems. Lake Michigan hardness is lower than the hardness in Oswego's existing system, which ranges from 200-260 mg/L as $CaCO_3$. This reduction in water hardness could allow Oswego residents to remove their water softeners. The City of Chicago's water treatment system meets all USEPA and IEPA drinking water health standards.

With the DWC Option, the communities would purchase Lake Michigan water treated at the City of Chicago's Jardine Water Purification Plant. It is assumed that the three communities would need to boost chlorine at the receiving stations in order to maintain IEPA required minimum disinfection residual within their distribution systems. This type of treatment requires a Class C Drinking Water Operator license. A Class C operator is required to demonstrate the necessary skills, knowledge, ability, and judgment of the chemical, biological, and physical sciences essential to the practical mechanics of chemical feeding, calculation of dosage and distribution, in addition to the requirements of Class D certification.

The City of Chicago's raw water intakes are located approximately two miles off the shore of Lake Michigan. Due to the significant volume of Lake Michigan, the raw water quality is seasonally consistent and unlikely to be impacted by drought or extreme rain events.

As detailed in the Part 1 report, the IDNR administers the Lake Michigan allocation process in the state of Illinois. Allocation permit applications are submitted to IDNR, which then reviews the application and holds a public allocation hearing for each applicant. After review of the permit application, the IDNR determines anticipated water needs for each applicant based on the following criteria:

- Current and projected population; current and projected per capita consumption
- The nature and extent of industrial uses; municipal and hydrant uses
- Implementation of conservation practices and non-revenue water flows (required to be 10% or less of net annual pumpage)

IDNR also determines the duration of each allocation permit (typical permit duration is 20 years). Compliance with Lake Michigan allocation requirements is reviewed annually by IDNR. The conditions of an allocation permit can be modified if a permittee demonstrates a substantial change in circumstances resulting in a change in water needs.

The Chicago Department of Water Management is constantly monitoring and testing the quality of Chicago's drinking water. The City completed a two-year water quality study to monitor emerging contaminants, including Endocrine Disrupting Chemicals, Pharmaceuticals, and Personal Care Products. The City also monitors for chromium-6.

The IEPA would require permits for the construction and operation of new water supply facilities, including the transmission mains, receiving stations, and storage facilities. A corrosion control study will be required for any of the alternatives selected.

10.5 Governance and Operational Responsibility

A Board of Commissioners governs the DuPage Water Commission, which consists of 12 Commissioners and a Chairman. The DuPage County Board Chairman, with the approval of the DuPage County Board, appoints the Commission Chairman and six Commissioners, representing each County Board District. The remaining six Commissioners are elected by the mayors/presidents of the municipalities within their County Board District. The Commission is a separate, independent unit of government established through an intergovernmental agreement. In order for Montgomery, Oswego, and Yorkville to become members, DWC would likely need to change their governance structure to include representation for Kendall and Will counties, which requires state law to be modified.

DWC would own, operate, and maintain the infrastructure from their system up to the DWC meter. Once water travels 10 feet beyond the DWC meter, the water becomes the property and responsibility of the receiving utility.

DWC's water supply contract with the City of Chicago runs through 2024, after which it can be extended for a like term or additional 40 years. The contracts of all Commission customers run through 2024.

10.6 Timeline

The overall estimated timeline for implementing the DWC Option is anticipated to be four to five years after a source is selected. There are no known constraints on the selection timeline of the DWC Option. If the DWC Option is selected, it is unlikely that Oswego will need a new well prior to the switching to the DWC supply, provided the regional group agrees to proceed forward with DWC in a timely manner.

10.7 Oswego Internal Improvements

The 2018 AECOM report included a hydraulic analysis of Oswego's existing water distribution system in order to determine internal improvements required to distribute water for the Fox River Option and DuPage Water Commission Option. The AECOM report concluded that approximately 7,900 feet of water main improvements would be required to effectively move water and maintain adequate operating pressures within the distribution system. Of the 7,900 feet of required improvements, approximately 4,300 feet of upsized piping would be required immediately. The remaining 3,600 feet of upsized piping would be required sometime before 2050, depending on future Oswego demands. For the purpose of this Study, the proposed future water main upsizing will be included in the alternative evaluation and cost estimates.

Water storage facilities provide water to meet peak hourly demands, water for fire protection, and a reserve capacity for emergencies. Currently, the Village of Oswego has five elevated water tanks with a combined volume of 5.3 MG. DWC requires members to maintain a storage volume equal to two times the average day use. For Oswego's current demands, this equates to 4.8 MG. Using Oswego's projected 2050 demands, the recommended volume equates to 7.5 MG, meaning that Oswego should plan to construct additional storage before 2050. For the purpose of this Study, it is assumed that Oswego will construct 1.0 MG in storage at the High Pressure Zone receiving station, along with an additional volume of 2.0 MG at another location in the system.

11. JOLIET WATER COMMISSION OPTION

11.1 Joliet Water Commission Background

Like Montgomery, Oswego, and Yorkville, the City of Joliet uses the deep sandstone aquifer as its primary source of water. Groundwater modeling by ISWS has projected that the aquifer will not be able to meet Joliet's maximum day water demands by 2030.

The City of Joliet began its Alternative Water Source Study in 2018, evaluating 14 alternatives in Phase I and taking a deeper look at five of the alternatives in Phase II. In January 2021, Joliet selected Lake Michigan water via the City of Chicago. Preliminary engineering for the chosen source is underway, including sizing, siting, and routing for the improvements and evaluating funding strategies.

Joliet is currently working with other communities in the region to develop a proposed water commission. The regional group is working to define critical elements of the commission, including the governance structure, and is targeting to have regional governmental agreements approved by the end of 2021. A decision to join the Joliet Water Commission must be made by the end of 2021.

11.2 Joliet Water Commission Option Overview

For the purpose of the Study, locations for the receiving stations remain consistent with the other Lake Michigan alternatives (DWC Option and Illinois American Water Option) to standardize the alternatives. Siting of the proposed facilities will be evaluated and finalized during preliminary design after a water source is selected.

11.2.1 Supply Point

In order for the Joliet Water Commission to receive water from Chicago, a transmission main would be constructed from the Southwest Pumping Station to the Joliet Water Commission network. The proposed supply point for Montgomery, Oswego, and Yorkville has not yet been finalized. The supply point would belong to the Joliet Water Commission.

11.2.2 Transmission Mains

The route for the Joliet Water Commission Option has not yet been finalized.

11.2.3 Receiving Stations

A total of seven receiving stations are proposed for the Joliet Water Commission Option. Details on the facilities required at each receiving station will be updated once hydraulic modeling of the Joliet Water Commission network has been finalized by the Joliet engineering team. The locations of the receiving stations are summarized in Table 14.

TABLE 14

Summary of Joliet Water Commission Option Receiving Stations

Community	Connection Location	Pressure Zone
Montgomery	Hill Ave/Goodwin Dr	East
	Orchard Rd/Galena Rd	West
Oswego	Orchard Rd/Tuscany Tr	Low
	Sudbury Cir/Cole Ave	Middle
	Ogden Falls Blvd/Waterbury Cir	High
Yorkville	Lehman Crossing/Berrywood Ln	North
	Tremont Ave/Country Hills Dr	South

11.3 Sustainability of Water

As discussed in the Part 1 report, Lake Michigan is an important water source providing water to more than 6.6 million Illinois residents. As detailed in the Part 1 report, the three communities would be eligible for a Lake Michigan allocation under the IDNR Rules. Lake Michigan supplies are not subject to drought restrictions, but conservation ordinances are required to receive an allocation. Details on water conservation requirements will be discussed in future part of this comprehensive Study.

The Joliet Water Commission Option would have sufficient capacity to supply Montgomery, Oswego, and Yorkville's through 2050. While the commission is still being formed, assumptions have been made based on proposed commission guidelines made by the Technical Advisory Group (TAG). Twelve communities are currently being evaluated by the TAG, summarized in Table 15.

TABLE 15

Communities Participating in Technical Advisory Group

Channahon	Crest Hill	Homer Glen	Joliet
Lemont	Minooka	Montgomery	Oswego
Rockdale	Romeoville	Shorewood	Yorkville

As presented at the April 8, 2021, TAG meeting, a MDD:ADD ratio of 1.7 was proposed, with a surcharge assessed to communities that exceed 1.7. The surcharge would be calculated annually to reflect the difference in cost of service under the water supply agreement with Chicago attributable to excess peaking. Currently, the MDD:ADD ratios for Montgomery, Oswego, and Yorkville are 1.71, 2.12, and 2.39, respectively.

The TAG proposed that members would be required to receive water at a constant daily supply rate. The three communities would not be able to increase or decrease the water supply rates to meet

peak hour demands and would rely on water storage during times of peak demand. The TAG also proposed that members would be required to maintain a minimum of two average days of supply storage.

The three communities could maintain their wells to use as individual backup supplies, in the event of planned or unplanned outages in the Joliet Water Commission supply that exceed available water storage volumes. It is typically recommended that the backup wells have enough capacity to meet average day demands. The wells would require routine testing and inspections.

The Joliet Water Commission would be served by a single transmission main from the City of Chicago. The Joliet Water Commission Option does not include a redundant feed from the proposed Joliet Water Commission transmission system, meaning that a single transmission main would supply the three communities. Emergency repair protocols will be developed once the commission is formed.

TABLE 16

Summary of Joliet Water Commission Currently Proposed Requirements

Criteria	Proposed Requirements
Max Day/Avg Day Ratio	1.7 with a surcharge if exceeded
Flow Rates	Continuous Flow Rate
Storage	2 Average Days Volume
Backup Wells	Back up wells are encouraged for emergency operations

11.4 Water Quality and Permitting

Lake Michigan is considered a high quality surface water source. Lake Michigan water does not contain detectable levels of radium or other radioactive elements, and has lower hardness, typically 140 mg/L as $CaCO_3$, which means that softening of any kind may not be necessary with this source. Water from the City of Chicago has a similar hardness to the finished water hardness within the existing Montgomery and Yorkville systems. Lake Michigan hardness is lower than the hardness in Oswego's existing system, which ranges from 200-260 mg/L as $CaCO_3$. This reduction in water hardness could allow Oswego residents to remove their water softeners. The City of Chicago's water treatment system meets all USEPA and IEPA drinking water health standards.

With the Joliet Water Commission Option, the communities would purchase Lake Michigan water treated at the City of Chicago's Eugene Sawyer Water Purification Plant. It is assumed that the three communities would need to boost chlorine at the receiving stations in order to maintain IEPA required minimum disinfection residual within their distribution systems. This type of treatment requires a Class C Drinking Water Operator license. A Class C operator is required to demonstrate the necessary skills, knowledge, ability, and judgment of the chemical, biological, and physical sciences essential to the practical mechanics of chemical feeding, calculation of dosage and distribution, in addition to the requirements of Class D certification.

The City of Chicago's raw water intakes are located approximately two miles off the shore of Lake Michigan. Due to the significant volume of Lake Michigan, the raw water quality is seasonally consistent and unlikely to be impacted by drought or extreme rain events.

The Chicago Department of Water Management is constantly monitoring and testing the quality of Chicago's drinking water. The City completed a two-year water quality study to monitor emerging contaminants, including Endocrine Disrupting Chemicals, Pharmaceuticals, and Personal Care Products. The City also monitors for chromium-6.

As detailed in the Part 1 report, the IDNR administers the Lake Michigan allocation process in the state of Illinois. Allocation permit applications are submitted to IDNR, which then reviews the application and holds a public allocation hearing for each applicant. After review of the permit application, the IDNR determines anticipated water needs for each applicant based on the following criteria:

- Current and projected population; current and projected per capita consumption
- The nature and extent of industrial uses; municipal and hydrant uses
- Implementation of conservation practices and non-revenue water flows (required to be 10% or less of net annual pumpage)

IDNR also determines the duration of each allocation permit (typical permit duration is 20 years). Compliance with Lake Michigan allocation requirements is reviewed annually by IDNR. The conditions of an allocation permit can be modified if a permittee demonstrates a substantial change in circumstances resulting in a change in water needs.

The IEPA would require permits for the construction and operation of new water supply facilities, including the transmission mains, receiving stations, and storage facilities. A corrosion control study will be required for any of the alternatives selected.

11.5 Governance and Operational Responsibility

A regional governance structure is in formation over the course of 2021 to allow the Joliet Water Commission to be established in January 2022.

The Joliet Water Commission would own, operate, and maintain the infrastructure from their system up to the receiving stations.

11.6 Timeline

The Joliet Water Commission is being formed over the course of 2021 and is targeting to complete

construction and start using Lake Michigan water in 2030. This option requires a commitment from Montgomery, Oswego, and Yorkville by the end of 2021.

Based on the demand projections detailed in the Study, it is projected that Oswego's demands will exceed its current well supply capacity before the Joliet Water Commission Option is available. If the Joliet Water Commission is selected, Oswego will likely require a new well prior to the Joliet Water Commission Option coming online.

11.7 Oswego Internal Improvements

As detailed in Section 11.2, the receiving station locations have been kept consistent for the three Lake Michigan alternatives. Therefore, the internal improvements required for the Joliet Water Commission Option are consistent with the improvements recommended in the 2018 AECOM report for the DWC Option.

The AECOM report concluded that approximately 7,900 feet of water main improvements would be required to effectively move water and maintain adequate operating pressures within the distribution system. Of the 7,900 feet of required improvements, approximately 4,300 feet of upsized piping would be required immediately. The remaining 3,600 feet of upsized piping would be required sometime before 2050, depending on future Oswego demands. For the purpose of this Study, the proposed future water main upsizing will be included in the alternative evaluation and cost estimates.

Water storage facilities provide water to meet peak hourly demands, water for fire protection, and a reserve capacity for emergencies. Currently, the Village of Oswego has five elevated water tanks with a combined volume of 5.3 MG. For the purpose of this study, it is assumed that the Joliet Water Commission will require members to maintain a storage volume equal to two times the average day use. For Oswego's current demands, this equates to 4.8 MG. Using Oswego's projected 2050 demands, the recommended volume equates to 7.5 MG, meaning that Oswego should plan to construct additional storage before 2050. For the purpose of this Study, it is assumed that Oswego will construct 1.0 MG in storage at the High Pressure Zone receiving station, along with an additional volume of 2.0 MG at another location in the system. Note as the Joliet supply information is still being developed, the receiving stations and storage assumptions may need to be revised and updated.

12. ILLINOIS AMERICAN WATER OPTION

12.1 Illinois American Water Option Background

Illinois American Water is a private water company that delivers water and wastewater services to 1.3 million people in Illinois. A private water company is able to recover a profit. In the region, Illinois American Water receives Lake Michigan water from the City of Chicago via Bedford Park and provides water to Plainfield, Bolingbrook, and Homer Glen. Illinois American Water is currently evaluating the system capacity and determining the improvements required to meet the present and future demands of Montgomery, Oswego, and Yorkville.

12.2 Illinois American Water Option Overview

For the purpose of the Study, locations for the receiving stations remain consistent with the other Lake Michigan alternatives (DWC Option and Joliet Water Commission Option) to standardize the alternatives comparison. Siting of the proposed facilities will be evaluated and finalized during preliminary design after a water source is selected.

12.2.1 Supply Point

The proposed supply point for Montgomery, Oswego, and Yorkville has not yet been finalized, but is proposed at the end of an Illinois American Water transmission main in Plainfield near the intersection of 127th Street and Naperville Road. The ownership of the supply point is not yet defined.

12.2.2 Transmission Mains

The route for the Illinois American Water Option has not yet been defined.

12.2.3 Receiving Stations

A total of seven receiving stations are proposed for the Illinois American Water Option. Details on the facilities required at each receiving station will be updated once hydraulic modeling has been finalized by Illinois American Water's engineer. The locations of the receiving stations are summarized in Table 17.

TABLE 17

Summary of Illinois American Water Option Receiving Stations

Community	Connection Location	Pressure Zone
Montgomery	Hill Ave/Goodwin Dr	East
	Orchard Rd/Galena Rd	West
Oswego	Orchard Rd/Tuscany Tr	Low
	Sudbury Cir/Cole Ave	Middle
	Ogden Falls Blvd/Waterbury Cir	High
Yorkville	Lehman Crossing/Berrywood Ln	North
	Tremont Ave/Country Hills Dr	South

12.3 Sustainability of Water

As discussed in the Part 1 report, Lake Michigan is an important water source providing water to more than 6.6 million Illinois residents. As detailed in the Part 1 report, the three communities would be eligible for a Lake Michigan allocation under the IDNR Rules. Lake Michigan supplies are not subject to drought restrictions but conservation ordinances are required to receive an allocation. Details on water conservation requirements will be discussed in future part of this comprehensive Study.

Illinois American Water is still evaluating the capacity of their existing system and the improvements that would be required to meet the current and future demands of Montgomery, Oswego, and Yorkville.

The three communities could maintain their wells to use as individual backup supplies, in the event of planned or unplanned outages in the Illinois American Water supply that exceed available water storage volumes. It is typically recommended that the backup wells have enough capacity to meet average day demands. The wells would require routine testing and inspections.

The Illinois American Water Option does not include a redundant feed. Illinois American Water's emergency response protocols have not yet been defined.

TABLE 18

Summary of Illinois American Water Possible Requirements

Criteria	Proposed Requirements
Max Day/Avg Day Ratio	1.7
Flow Rates	Continuous Flow Rate
Storage	2 Average Days Volume
Backup Wells	Back up wells are encouraged for emergency operations

12.4 Water Quality and Permitting

Lake Michigan is considered a high quality surface water source. Lake Michigan water does not contain detectable levels of radium or other radioactive elements, and has lower hardness, typically 140 mg/L as $CaCO_3$, which means that softening of any kind may not be necessary with this source. Water from the City of Chicago has a similar hardness to the finished water hardness within the existing Montgomery and Yorkville systems. Lake Michigan hardness is lower than the hardness in Oswego's existing system, which ranges from 200-260 mg/L as $CaCO_3$. This reduction in water hardness could allow Oswego residents to remove their water softeners. The City of Chicago's water treatment system meets all USEPA and IEPA drinking water health standards.

With the Illinois American Water Option, the communities would purchase Lake Michigan water treated at the City of Chicago's Eugene Sawyer Water Purification Plant. It is assumed that the three communities would need to boost chlorine at the receiving stations in order to maintain IEPA required minimum disinfection residual within their distribution systems. This type of treatment requires a Class C Drinking Water Operator license. A Class C operator is required to demonstrate the necessary skills, knowledge, ability, and judgment of the chemical, biological, and physical sciences essential to the practical mechanics of chemical feeding, calculation of dosage and distribution, in addition to the requirements of Class D certification.

The City of Chicago's raw water intakes are located approximately two miles off the shore of Lake Michigan. Due to the significant volume of Lake Michigan, the raw water quality is seasonally consistent and unlikely to be impacted by drought or extreme rain events.

As detailed in the Part 1 report, the IDNR administers the Lake Michigan allocation process in the state of Illinois. Allocation permit applications are submitted to IDNR, which then reviews the application and holds a public allocation hearing for each applicant. After review of the permit application, the IDNR determines anticipated water needs for each applicant based on the following criteria:

- Current and projected population; current and projected per capita consumption
- The nature and extent of industrial uses; municipal and hydrant uses
- Implementation of conservation practices and non-revenue water flows (required to be 10% or less of net annual pumpage)

IDNR also determines the duration of each allocation permit (typical permit duration is 20 years). Compliance with Lake Michigan allocation requirements is reviewed annually by IDNR. The conditions of an allocation permit can be modified if a permittee demonstrates a substantial change in circumstances resulting in a change in water needs.

The Chicago Department of Water Management is constantly monitoring and testing the quality of Chicago's drinking water. The City completed a two-year water quality study to monitor emerging contaminants, including Endocrine Disrupting Chemicals, Pharmaceuticals, and Personal Care Products. The City also monitors for chromium-6.

The IEPA would require permits for the construction and operation of new water supply facilities, including the transmission mains, receiving stations, and storage facilities. A corrosion control study will be required for any of the alternatives selected.

12.5 Governance and Operational Responsibility

The governance structure for this Option is not yet defined. The three communities would be wholesale customers of Illinois American Water. Maintenance of the supply system infrastructure is open for negotiation with Illinois American Water. Some communities maintain and operate their own system while other communities, like Bolingbrook, are provided maintenance and operation services by Illinois American Water. The Illinois Commerce Commission (ICC) oversees private utility companies and would regulate the water rates charged by Illinois American Water.

12.6 Timeline

The overall estimated timeline for implementing the Illinois American Water Option is anticipated to be four to five years after a source is selected. There are no known constraints on the selection timeline of the Illinois American Water Option. If the Illinois American Water Option is selected, it is unlikely that Oswego will need a new well prior to the switching to the Illinois American Water supply.

12.7 Oswego Internal Improvements

As detailed in Section 11.2, the receiving station locations have been kept consistent for the three Lake Michigan alternatives. Therefore, the internal improvements required for the Illinois American Water Option are consistent with the improvements recommended in the 2018 AECOM report for the DWC Option.

The AECOM report concluded that approximately 7,900 feet of water main improvements would be required to effectively move water and maintain adequate operating pressures within the distribution system. Of the 7,900 feet of required improvements, approximately 4,300 feet of upsized piping would be required immediately. The remaining 3,600 feet of upsized piping would be required sometime before 2050, depending on future Oswego demands. For the purpose of this Study, the proposed future water main upsizing will be included in the alternative evaluation and cost estimates.

Water storage facilities provide water to meet peak hourly demands, water for fire protection, and a reserve capacity for emergencies. Currently, the Village of Oswego has five elevated water tanks with a combined volume of 5.3 MG. For the purpose of this study, it is assumed that the Joliet Water Commission will require members to maintain a storage volume equal to two times the average day use. For Oswego's current demands, this equates to 4.8 MG. Using Oswego's projected 2050 demands, the recommended volume equates to 7.5 MG, meaning that Oswego should plan to construct additional storage before 2050. For the purpose of this Study, it is assumed that Oswego will construct 1.0 MG in storage at the High Pressure Zone receiving station, along with an additional

volume of 2.0 MG at another location in the system. Note as the Illinois American supply information is still being developed, the receiving stations and storage assumptions may need to be revised and updated.

13. CONCLUSION

13.1 Regional Collaboration Considerations

Montgomery, Oswego, and Yorkville are partnering to develop a regional solution for long term water supply. In addition to this Study, Montgomery and Yorkville have individually contracted with EEI to evaluate the internal improvements required within their respective systems. The three communities are planning to hold a joint public information meeting.

13.2 Next Steps

Future parts of this Study will include cost estimates for each option to compare the expected construction costs, as well as operations and maintenance costs of each option. In addition to cost estimates, the Study will identify sources of funding including the Water Infrastructure Finance Investment Act (WIFIA), IEPA State Revolving Fund (SRF), and revenue bonds. Conservation ordinances, schedules for permits, and state legislative initiatives are under review.

A public information meeting will be held this summer, and feedback from the Board and public will be incorporated before finalizing the Study.

13.3 Part 2 Conclusion

Part 1 of the Study established the existing regional water source limitations and risk of well depletion. Part 2 of the Study described the four water source alternatives available to Montgomery, Oswego, and Yorkville. The alternatives evaluated in the Study are sized to meet 2050 demands, with consideration given to the ultimate demand when the three communities are fully developed. The alternatives are inclusive of the internal improvements and facilities required to meet 2050 demands.

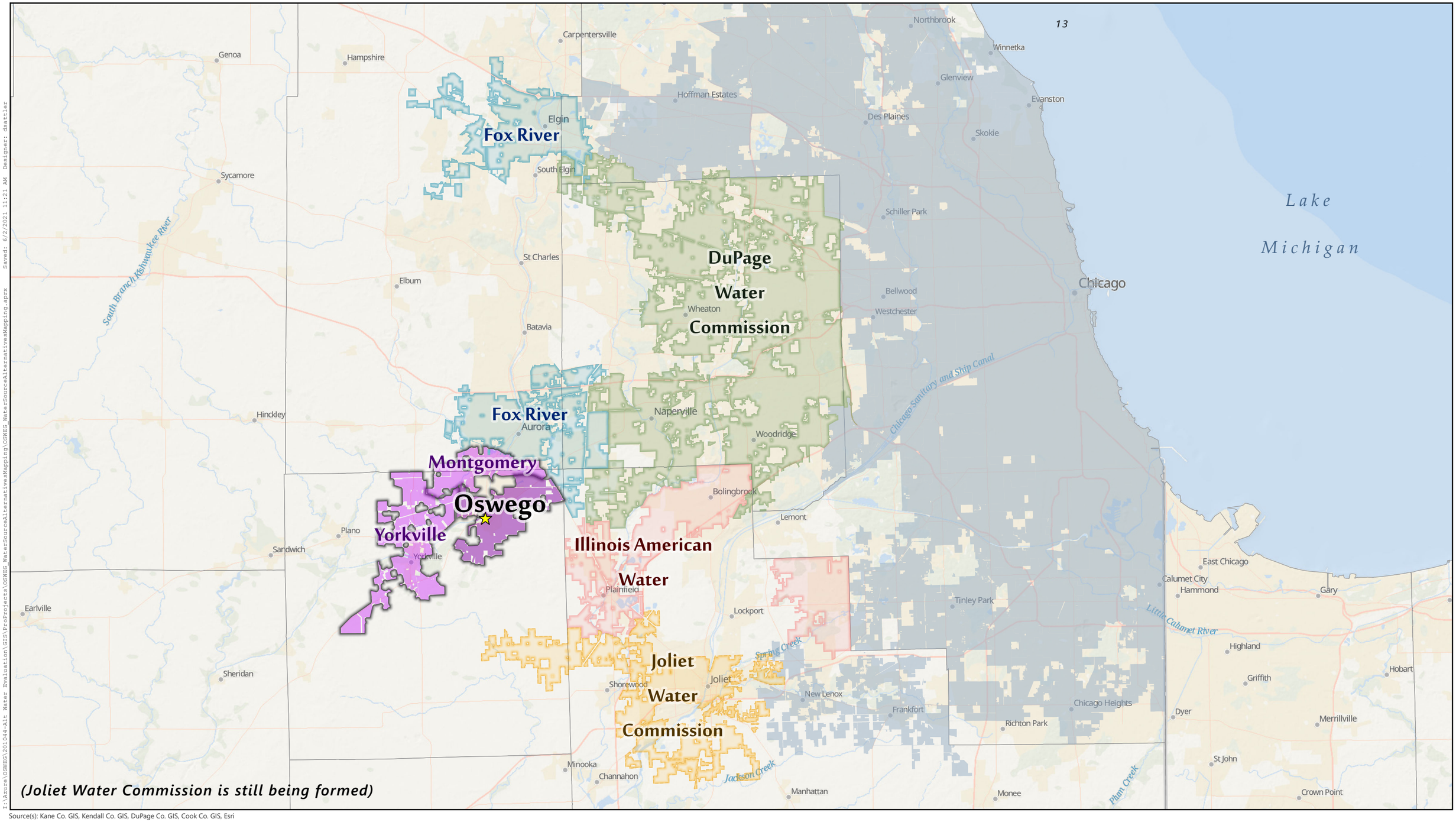
It is critical that the chosen water source is able to provide a sufficient amount of reliable, safe drinking water to the three communities through 2050 and beyond. Beyond cost, five key considerations were used to evaluate and compare the four water source alternatives.

EXHIBITS

BAXTER & WOODMAN
Consulting Engineers

EXHIBIT A

BAXTER & WOODMAN
Consulting Engineers



(Joliet Water Commission is still being formed)

Source(s): Kane Co. GIS, Kendall Co. GIS, DuPage Co. GIS, Cook Co. GIS, Esri

N

June 4, 2021

Not to Scale

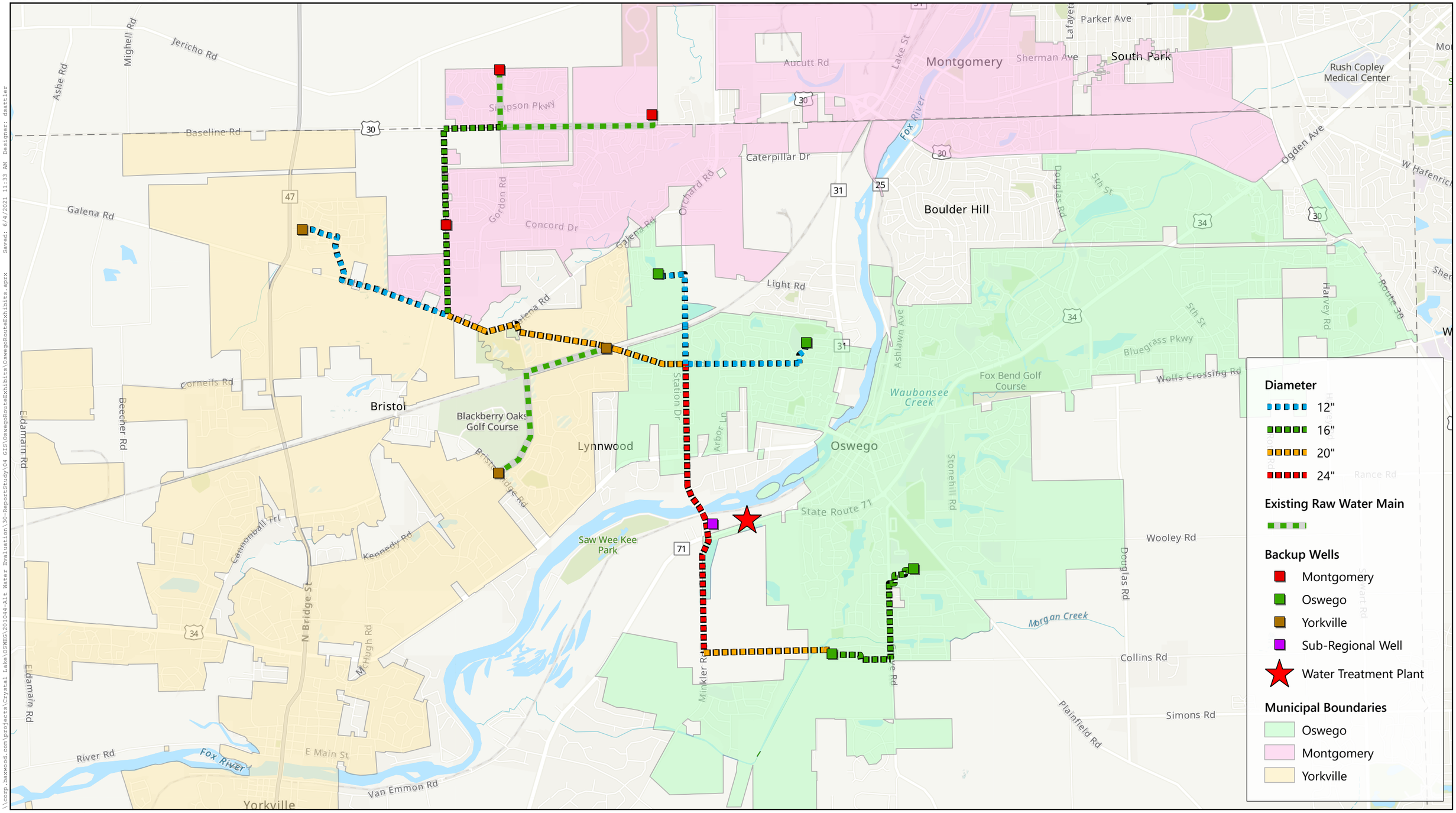
BAXTER & WOODMAN Consulting Engineers

EXHIBIT B

BAXTER & WOODMAN
Consulting Engineers

FOX RIVER OPTION

RAW WATER NETWORK



Source(s): Kane Co. GIS, Kendall Co. GIS, Esri

N

June 4, 2021

Not to Scale

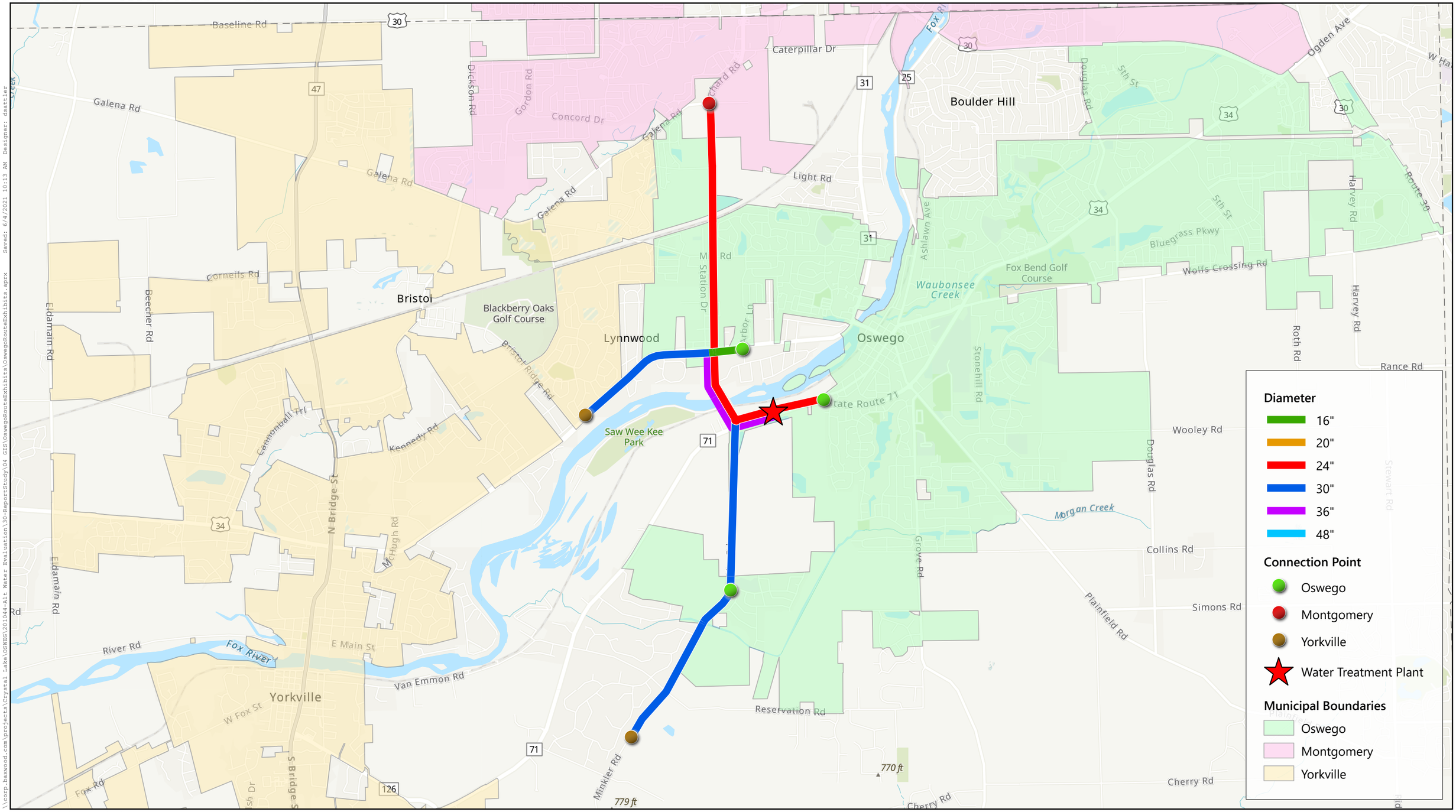
BAXTER & WOODMAN Consulting Engineers

EXHIBIT C

BAXTER & WOODMAN
Consulting Engineers

FOX RIVER OPTION

TREATED WATER NETWORK



Source(s): Kane Co. GIS, Kendall Co. GIS, Esri

N

June 4, 2021

Not to Scale

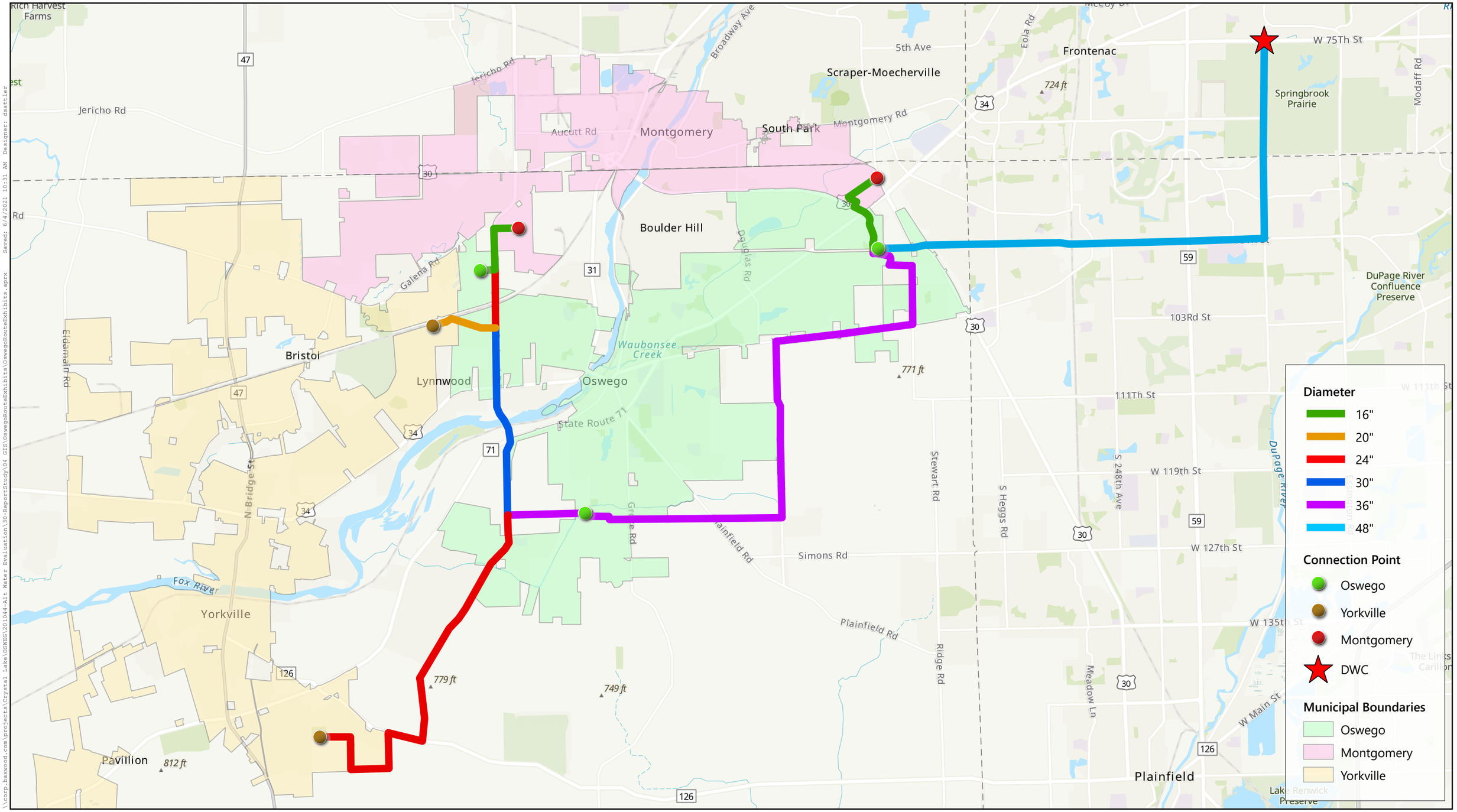
BAXTER & WOODMAN Consulting Engineers

EXHIBIT D

BAXTER & WOODMAN
Consulting Engineers

DUPAGE WATER COMMISSION OPTION

TREATED WATER NETWORK



Source(s): Kane Co. GIS, Kendall Co. GIS, Esri

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June 4, 2021

Not to Scale

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