



Draft Report

# Prospectus for Lake Michigan Water – Chicago Department of Water Management (CDWM) Alternative

# Alternative Water Source Program

City of Joliet, Illinois  
November 19, 2020





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# 1 Executive Summary

With its January 7, 2020 decision, the City of Joliet took a major step forward in its effort to implement a new, reliable, long-term water supply for the City and possibly the region with the selection of Lake Michigan Water as its alternative water source. The City of Joliet is now facing another major decision – selecting between Lake Michigan Water purchased from the Chicago Department of Water Management or Lake Michigan Water from a new intake constructed in Indiana.

## 1.1 Prospectus Goals and Objectives

The goal of this Prospectus is to present the business case associated with the Lake Michigan Water – Chicago Department of Water Management (CDWM) Alternative. A separate Prospectus document has been prepared for the Lake Michigan Water – New Indiana Intake Alternative. With the two Prospectus documents, a side-by-side comparison can be made to aid in the City’s selection of a new water source alternative.

Each of the Prospectus documents have a similar structure with each meant to be able to stand on its own. To allow this, some sections are the same in both Prospectus documents. Section 1 contains the Executive Summary which is a unique summary of the alternative. Sections 2 through 5 are the same in both Prospectus documents and present background information related to the Alternative Water Source Program and the work completed as part of the 2020 evaluation of alternatives.

Sections 6 through 10 are unique in each Prospectus document and present the description of alternative improvements, associated risks, a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) and the business case for the alternative.

## 1.2 Business Case Summary

The detailed analysis of the overall features, costs, benefits and risks associated with the Lake Michigan Water - CDWM Alternative completed during the 2020 Evaluation confirms that it is a viable option for bringing high quality, treated Lake Michigan water to Joliet and the region by 2030. The City of Chicago has demonstrated over the past 6 months that it has a high level of interest in providing water service and is willing and prepared to serve Joliet and potential regional partners as wholesale water customers under a new framework that offers greater engagement and transparency related to system operations and pricing. The framework includes a different pricing model than Chicago has historically used for its wholesale water supply agreements. The proposed wholesale water rate methodology provides that Joliet would only pay for a capital cost share of the facilities used to supply water to Joliet and a share of the actual cost of service for operation and maintenance of those designated facilities. The proposal also includes a proposed advisory council that offers Joliet the opportunity to provide meaningful input and feedback regarding the management, operation, and financial aspects, including water rates and capital investments, of the Chicago water system. This new framework is a significant departure from CDWM’s prior methodology regarding rate setting which offered no ability for input and required the same rate for wholesale and retail customers.

The City of Chicago, through the Chicago Department of Water Management, operates a large scale water utility reliably serving more than 100 northeastern Illinois communities and a total population of more than 5 million people through an infrastructure network of intakes, water treatment plants, water tunnels, and large pumping stations. These facilities and CDWM's comprehensive water quality laboratories are managed, operated, and maintained by more than 1,300 staff, including more than 12 water professionals with advanced degrees.

Under the CDWM Alternative, the City of Joliet would purchase treated water from the City of Chicago near 84th and Kedvale on the southwest side of Chicago. Water supplied to this location is drawn from Lake Michigan at the 68th & Dunne Crib on Lake Michigan, treated at the Eugene Sawyer Water Purification Plant, and conveyed to 84th and Kedvale on the southwest side of Chicago through the existing South Tunnel System. Treated water would be supplied to Joliet through a new tunnel connection and pumping station owned and operated by Chicago. From the new Chicago pumping station, the water would flow through a meter vault to a new suction well owned and operated by Joliet. Joliet would pump water from the suction well via a new pump station through approximately 31 miles of new, large diameter water transmission main to Joliet. From that point, the treated water would be distributed to key points within Joliet through new water distribution piping, storage and pumping facilities. Joliet would retain its existing wells as an emergency source for water in the event that the supply from Chicago would be disrupted.

During the past 6 months, Joliet City staff and members of the consultant team have engaged in detailed technical analyses of the infrastructure elements of this system and conducted extensive outreach to external parties including the City Of Chicago, major regulatory and permitting entities, and municipal, utility, railway, and private entities with control of rights-of-way between Chicago and Joliet. This extensive coordination was required to verify the viability of this alternative. Through these efforts Joliet has negotiated a preliminary water supply agreement with the City of Chicago. Coordination with entities in control of land along the proposed transmission main route has also provided the team with critical information regarding the suitability and likely costs associated with transmission main construction between Chicago and Joliet.

It is estimated that the 2020 capital cost of the new infrastructure to bring up to 30 MGD of water from Chicago to Joliet would be approximately \$592 million dollars; upsizing of the system to meet a potential regional demand of 60 MGD would increase costs to be borne by Joliet and its regional partners to approximately \$810 million dollars. Considering the added cost for the purchase of treated water from Chicago and financing of the required capital improvements, it is estimated that the 50-year total cost for providing water to Joliet alone or Joliet plus several regional partners would be on the order of \$1.63 billion or \$2.64 billion, respectively, based on an assumed rate escalation of 2%. If a lower escalation rate of 1.3% or 1.39% is utilized, as suggested by CDWM, the 50-year total cost for providing water to Joliet alone or Joliet plus several regional partners would be on the order of \$1.43 billion or \$2.34 billion, respectively. Financial analysis suggests that a program of rate increases of 10.5% annually from 2020 to 2022, 12% annually from 2023 to 2029, 8% annually from 2030 to 2032, 6.5% annually from 2033 to 2036, 3% in 2037 and 1% annually from 2038 to 2040 would be needed to support development and operation of this new system and other necessary improvements to the City's existing water system including water main replacement of 1.6% annually.

For the CDWM alternative, Joliet would be able to leverage the knowledge and water supply expertise as well as the existing capacity of the City of Chicago system for providing treated Lake Michigan water to reduce the effort, time, cost, and risks associated with development and operation of a new lake intake and surface water treatment plant. Joliet would become a long-term, wholesale customer of Chicago, bound by the terms, and conditions established in a negotiated long-term Water Supply Agreement. However, this alternative is not without its risks. The City of Joliet would give up control over water supply and treatment and be subject to Chicago's wholesale water rates. While the City of Chicago and the City of Joliet have negotiated a water rate methodology which results in a true wholesale rate, the City of Chicago's infrastructure is aged and its treatment process does not treat for emerging contaminants which could result in significant replacement and water treatment costs in the future. While risks exist with relinquishing control of Joliet's water production and treatment, with this alternative, the City of Joliet has the opportunity to collaborate with the City of Chicago along with its existing wholesale customers to leverage the benefits of affiliation with a prominent and experienced large water utility that serves millions of customers.

### 1.3 Next Steps

If the Lake Michigan Water - CDWM Alternative is selected by the City of Joliet as its new water source alternative, the City of Joliet would approve and sign the preliminary water supply agreement that has already been negotiated with the City of Chicago, as well as begin preliminary engineering design. Once the preliminary water supply agreement is fully executed and in effect, the City of Chicago would work with the Chicago Park District to secure the necessary land at Durkin Park for the new Joliet water facilities at the Southwest Pumping Station/Durkin Park Site. Concurrently, the City of Joliet and City of Chicago would work together to develop the final Water Supply Agreement which is anticipated to be completed by Fall 2021. Preliminary design of the selected alternative would proceed through 2021 in order to reach 30% design completion and allow the City of Joliet to submit for federal loan funding by the required deadline of December 2021.

## 2 Problem Statement

The City of Joliet currently relies on deep wells for its primary water source. A 2015 study completed by the Illinois State Water Survey (ISWS) of the sandstone aquifers in northeastern Illinois identified decreased groundwater levels. Further refinement of this model in 2018 and in early 2020 concluded the City of Joliet’s existing water source, the deep sandstone aquifer, will be depleted to the point of not being able to meet the City’s Maximum Day Demands<sup>1</sup> by the year 2030.

### 2.1 Summary of Joliet’s Existing System

The City of Joliet’s existing water system consists of 21 deep wells and 5 shallow wells which are treated at 11 water treatment plants spread throughout the distribution system. The treated well water is then either discharged directly to the distribution system or discharged into a ground storage tank before being pumped into the distribution system. The distribution system consists of over 665 miles of watermains not including fire hydrant leads, services and private watermains, in four pressure zones. A map of the water system facilities (wells, treatment plants, pumping stations and storage tanks) as well as each of the four pressure zones is contained in **Exhibit 2-1**.

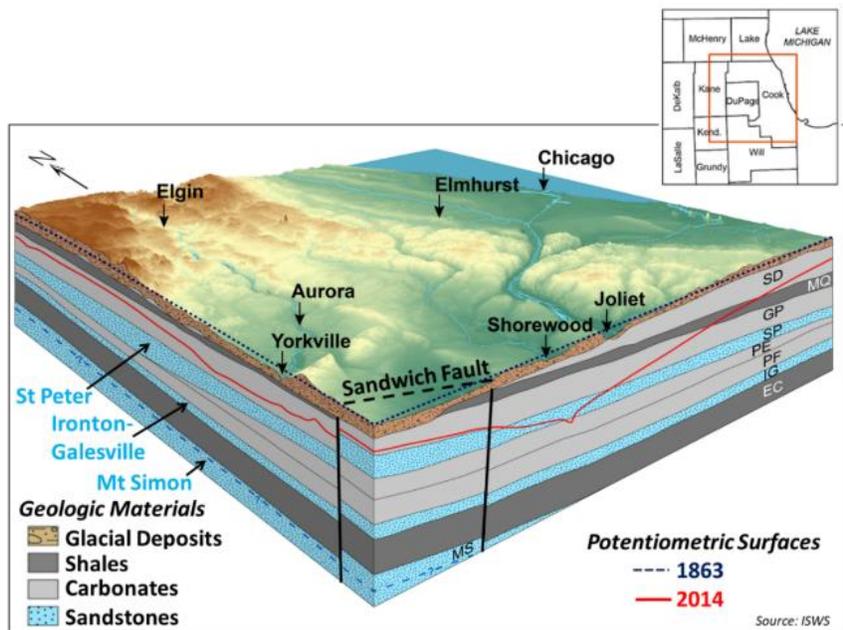
### 2.2 Historical Water Levels and Groundwater Modeling Projections

The City of Joliet, as well as several surrounding communities, currently utilizes the deep sandstone aquifers (St. Peter and Ironton-Galesville) as its primary source of supply. **Figure 2-1** shows the deep aquifer system in northeastern Illinois and the significant decrease in the potentiometric surface (level of water in the aquifer) over the past 150 years. Regional deep sandstone withdrawals have exceeded the sustainable yield of the aquifer. This means communities, industries and other users have pumped more water out of the ground than naturally flows back in.

In the Joliet area, the sandstone aquifers receive virtually no recharge through the ground from rainfall. As a result, water levels in the aquifer have dropped as much as 800 feet in some areas. Eventually water levels within the deep sandstone aquifer will reach a point where the City of Joliet’s wells will become inoperable.

**Figure 2-1**

Northeastern Illinois  
Bedrock Geology,  
From ISWS



<sup>1</sup> Maximum Day Demand is the 24-hour water usage during the highest day of water usage in a year.

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Figure No.

Title  
**EXISTING WATER WORKS SYSTEM:  
EXHIBIT 2-1**

Client/Project  
City of Joliet Department of Public Utilities  
Alternative Water Source Program

Project Location  
Will and Kendall County IL

Prepared on 09-18-2020



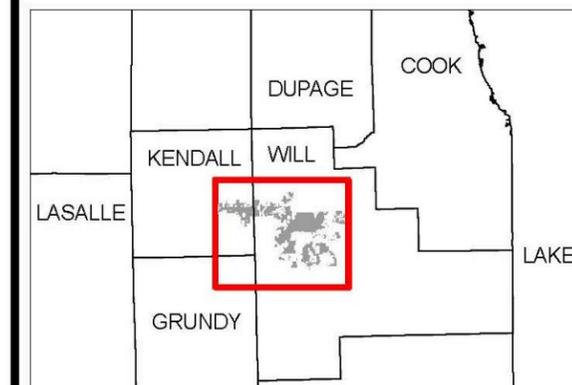
0 4,000 8,000 Feet  
(At original document size of 11x17)  
1:48,000

Legend

- Existing Water Wells
- Existing Treatment Plant
- Booster Station
- Elevated tank
- Stand pipe
- Reservoir
- Watermain

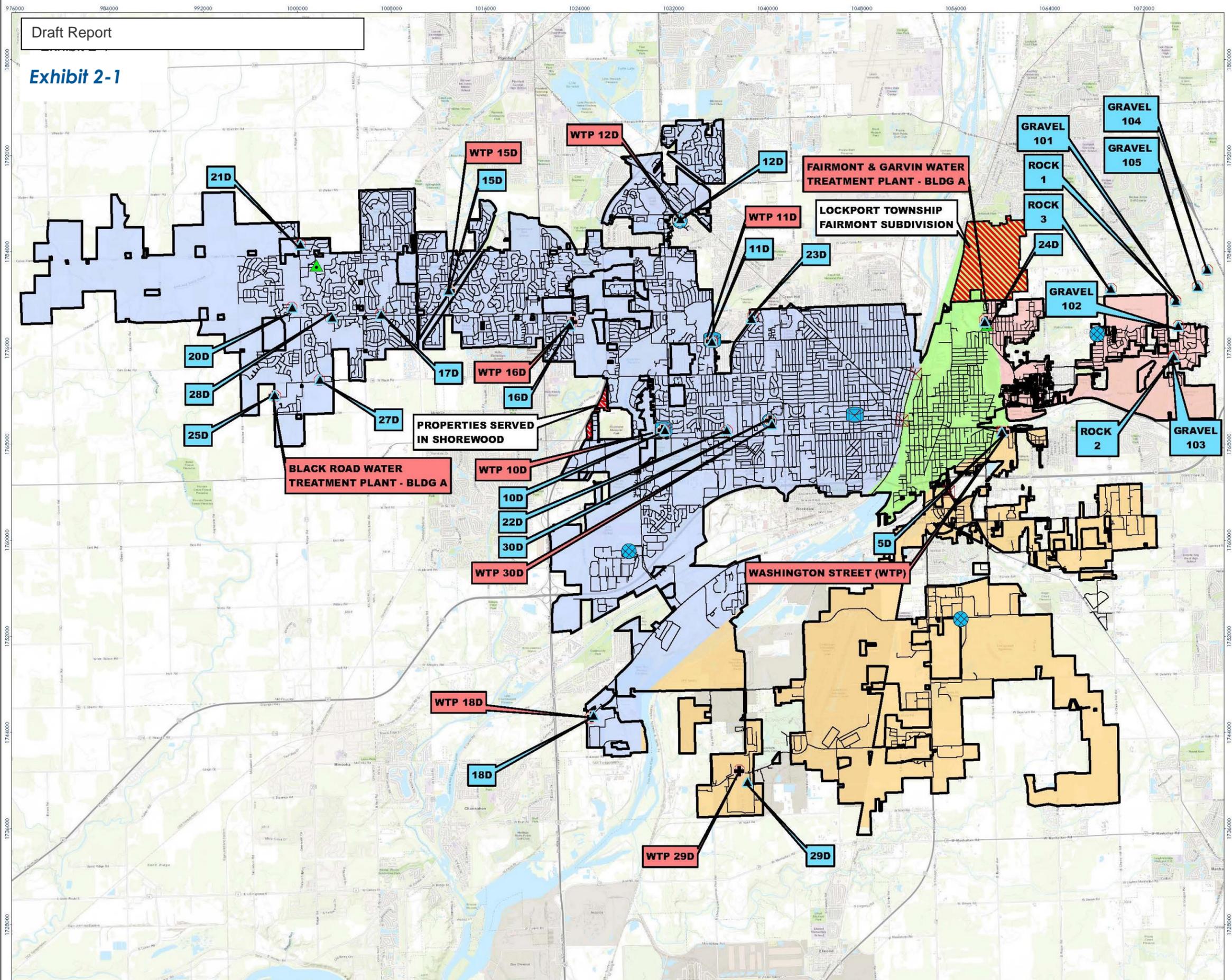
Pressure\_zones

- High
- Low
- Ridgewood
- Southeast



Location Map: Not to Scale

Notes  
1. Coordinate System: NAD 1983 StatePlane Illinois East FIPS 1201 Feet  
2. Data Sources: WILL CO., COOK CO., DUPAGE CO., IDOT, INDOT, INDIR and USFWS DATA DOWNLOADED FROM WEB 3/11/2019 to 9/20/2019  
3. Background Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China

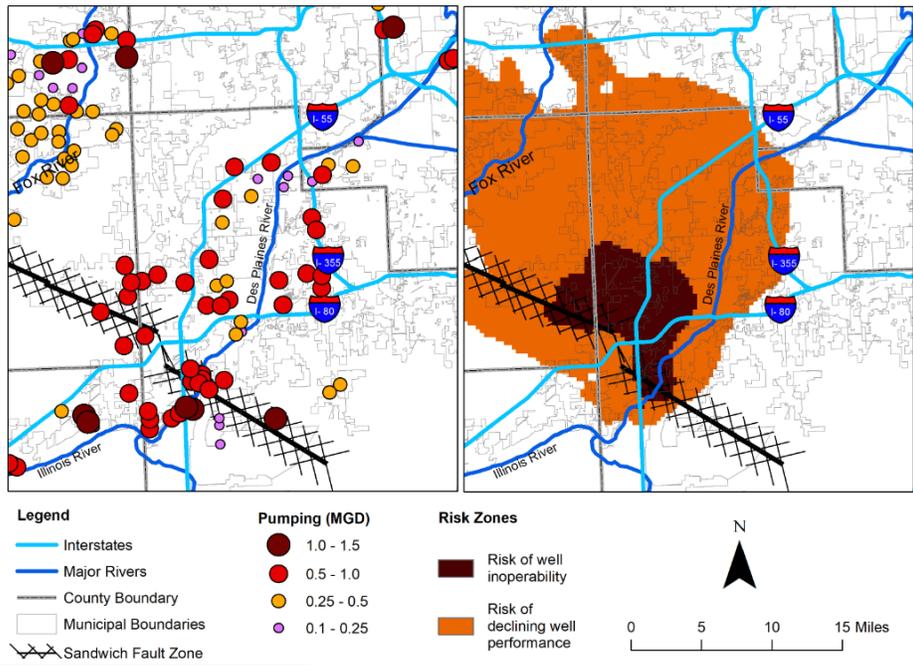


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The Illinois State Water Survey has a long history of investigating groundwater supply in northeastern Illinois, beginning as early as 1919. In 1959, ISWS published the *Preliminary Report of the Ground-Water Resources of the Chicago Region*<sup>2</sup> which concluded that future changes in the locations and rates of groundwater withdrawals, if left unmanaged, could jeopardize the long-term viability of the deep sandstone aquifers. In 2015, ISWS published *Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply*<sup>3</sup> which concluded that local desaturation of the deep sandstone aquifers would occur in the Joliet area by 2040.

In 2018, ISWS was tasked with updating the regional groundwater model and determining the timeframe remaining in the deep groundwater aquifers to reliably provide water to the City of Joliet as part of the *Joliet Alternative Water Source Study*<sup>4</sup>. Based on the results of this study, ISWS concluded that more than three of the City’s existing wells are at risk of desaturation by 2030, resulting in Joliet not being able to meet its Maximum Day Demands.

In 2019, ISWS began a three-year groundwater modeling study for the Southwest Water Planning Group, of which Joliet is a member, to update the deep sandstone aquifer model for the southwest suburban region. Based upon this study<sup>5</sup>, the overall conclusion for Joliet remains consistent with the 2018 modeling results and many of Joliet’s wells on the west side of the City fall into the highest risk category, “Risk of well inoperability”, by 2029, as shown in **Figure 2-2**.



**Figure 2-2**

2029 Risk in the Ironton-Galesville Sandstone Aquifer (before Joliet switches), From ISWS

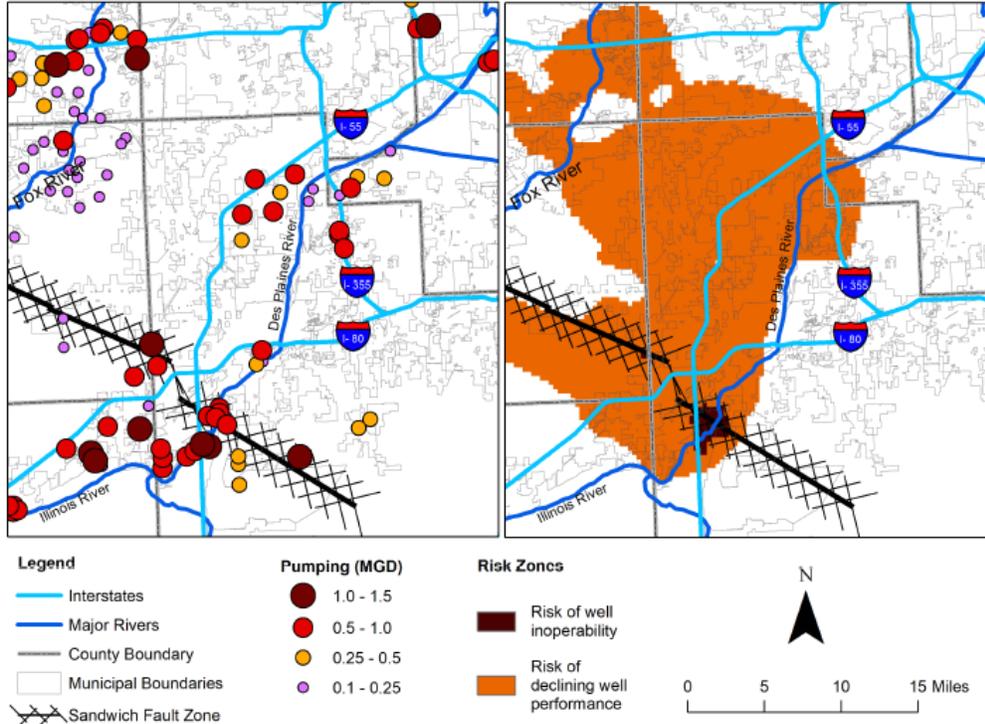
<sup>2</sup> Suter, Max et. al. *Preliminary Report on Ground-Water Resources of the Chicago Region, Illinois*. Illinois State Water Survey (1959) ([Hyperlink](#))

<sup>3</sup> Abrams, Daniel. *Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply*. (2015) ([Hyperlink](#))

<sup>4</sup> CMT, EEI, Stantec. *City of Joliet Alternative Water Source Study - Phase I FINAL Report, Appendix E – Groundwater Modeling*. ( January 2019). ([Hyperlink](#))

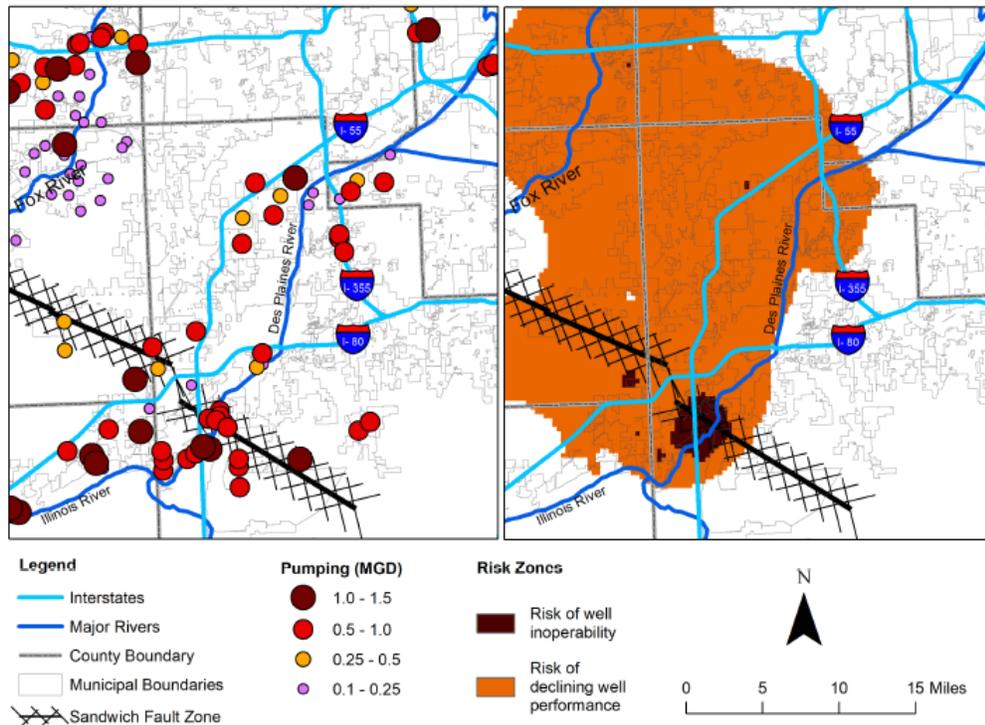
<sup>5</sup> Abrams, Daniel. B. and Cecilia Cullen. *Analysis of Risk to Sandstone Supply in Southwest Suburbs*. Illinois State Water Survey Contract Report 2020-4. (September 2020). ([Hyperlink](#))

The study also addressed whether neighboring communities would remain at risk after Joliet switches to a new water source in 2030. While there appears to be an initial recovery in aquifer levels, the risk of declining well performance remains prevalent in 2050 and 2070, as shown in **Figures 2-3** and **2-4**, respectively.



**Figure 2-3**

2050 Risk in the Ironton-Galesville Sandstone Aquifer (after Joliet switches), From ISWS



**Figure 2-4**

2070 Risk in the Ironton-Galesville Sandstone Aquifer (after Joliet switches), From ISWS

### 3 Water Sources Available in Northeastern Illinois

Northeastern Illinois is fortunate to have several possible sources of water that could be tapped to provide high quality water to its water users. There are three major sources of water available in northeastern Illinois: groundwater wells, river water and Lake Michigan water.

#### 3.1 Groundwater Wells

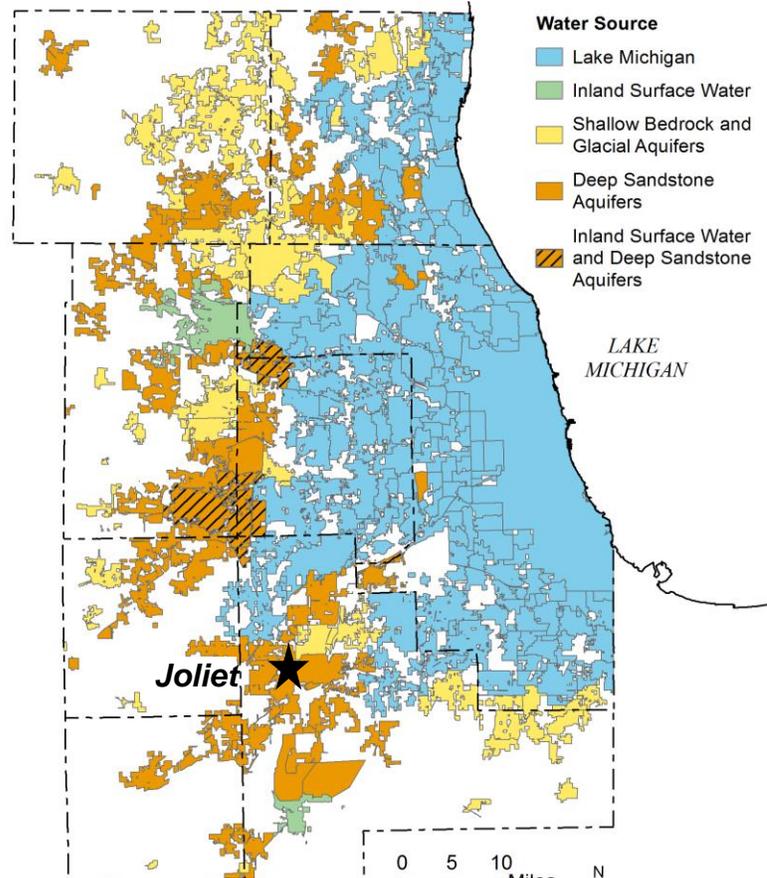
Many communities in the collar counties, which are not close to Lake Michigan, utilize groundwater wells for their water source. Groundwater in northeastern Illinois consists of shallow wells (sand & gravel or Silurian Dolomite) and/or deep wells (St. Peters Sandstone or Ironton – Galesville Sandstone). In **Figure 3-1**, communities which use shallow groundwater wells are shown in yellow and communities which use deep groundwater wells are shown in orange.

#### 3.2 River Water

There are a few communities which use river water as their primary source of drinking water in northeastern Illinois. The Cities of Elgin and Aurora utilize the Fox River and the Cities of Kankakee and Wilmington utilize the Kankakee River. In **Figure 3-1**, communities which utilize river water (inland surface water) are shown in green.

#### 3.3 Lake Michigan Water

The majority of communities in northeastern Illinois rely on Lake Michigan water as their drinking water source. In **Figure 3-1**, communities which utilize Lake Michigan water are shown in light blue.



**Figure 3-1**

Water Sources in Northeastern Illinois, From ISWS

## 4 Previous Studies

As noted in Section 2, the ISWS has predicted the decline of the deep sandstone aquifers since the late 1950s and determined that at current withdrawal rates it is unsustainable for the entire region. Therefore, Joliet and its neighboring communities that use the deep sandstone aquifers as their primary source of drinking water must find an alternative water source. The northeastern Illinois area is fortunate to have several possible drinking water sources, as discussed in Section 3. Over the past 60 years multiple studies of this issue have been completed which identified potential solutions. However, in each instance, the decision to move forward with the development of a new water source for the region was deferred due to cost, complexity, or a lack of consensus. Now, given the timeline documented in the recent modeling completed by the ISWS, action is required. Knowing this, in 2018 the City of Joliet initiated the Alternative Water Source Study to identify an alternative water source for the City of Joliet and potentially the region.

### 4.1 Phase I Alternative Water Source Study

The Alternative Water Source Study began in July 2018 and was completed in two phases. While previous studies have been conducted, the City decided to start with all possible water source alternatives on the table for evaluation. Fourteen water source alternatives were evaluated in the Phase I Study. These fourteen alternatives covered the full range of possible water sources from groundwater (Mt. Simon aquifer & aquifer recharge), rivers (Fox River, DesPlaines River, Illinois River and Kankakee River) and Lake Michigan. The focus of the Phase I Study was to narrow the alternatives down to those which could supply high quality water and sufficient water quantity to meet the demands for the City of Joliet, and possibly the region. The Phase I Study<sup>6</sup> was completed in January 2019 and recommended five alternatives for further evaluation as feasible alternative water sources.

### 4.2 Phase II Alternative Water Source Study

The Phase II Study<sup>7</sup> began in early 2019 and developed a deeper analysis of five alternatives in order to determine the improvements that would be required to implement each alternative. Variations of the alternatives were also included in the evaluation. The alternatives included: Illinois River, Kankakee River, Lake Michigan Water – Chicago Department of Water Management, Lake Michigan Water – DuPage Water Commission<sup>8</sup> and Lake Michigan Water – New Indiana Intake.

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<sup>6</sup> CMT, EEI, Stantec. *City of Joliet Alternative Water Source Study - Phase I FINAL Report*. (January 2019). ([Hyperlink](#))

<sup>7</sup> CMT, EEI, Stantec. *Final Report, Alternative Water Source Study - Phase II. City of Joliet*. (December 2019). ([Hyperlink](#))

<sup>8</sup> Per a letter dated December 4, 2019 from DuPage Water Commission, the Commission does not want to be considered as an alternative water source supplier for the City of Joliet. Therefore, the evaluation for this option was removed from the Phase II Study.

Conceptual water infrastructure improvements were identified for each alternative and preliminary opinions of probable construction cost were established. Recognizing that the resulting water cost includes more than just construction costs, the total cost of water for each alternative was determined by including purchased water costs and operation and maintenance costs along with the construction costs.

The Phase II Study results were presented to the City Council in November 2019. In January 2020, the City Council selected Lake Michigan Water as the City's new water source as it will be a long-term, sustainable and reliable water source for the City of Joliet and potentially the region. This decision is supported by the Phase I and II Studies. The City Council elected to move forward with further evaluation of two Lake Michigan alternatives: Chicago Department of Water Management and New Indiana Intake.

### 4.3 Strategic Plan

In order to establish the direction of the Alternative Water Source Program and identify the means to accomplish the program goals, a strategic plan<sup>9</sup> was prepared. The strategic plan was prepared by City Staff and approved by the City Council, under Resolution No. 7489, concurrently with the selection of Lake Michigan water as the City's new water source. The strategic plan established a mission, vision and core values for the Alternative Water Source Program. A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was completed to assist in long term planning objectives. Using this information, long term goals were established in order to successfully implement the program.

The vision statement for the City of Joliet Alternative Water Source Program is:

- ◆ *To be recognized by our customers, employees, elected officials, regulatory agencies, regional partners and the water industry as a leader in providing sustainable, reliable and high-quality water in an innovative and efficient manner for our community.*

The mission statement for the City of Joliet Alternative Water Source Program is:

- ◆ *To provide a sustainable, reliable and high-quality water supply for Joliet and potentially the region by 2030 in order to support the public health, safety and economic interests of the community.*

As Joliet moves forward over the next ten years with the implementation of the Alternative Water Source Program, it will be important for the City to reflect and remain centered on the Program's vision and mission in order to successfully achieve its goals.

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<sup>9</sup> Swisher, Allison. *City of Joliet. Alternative Water Source Program Implementation. Strategic Plan.* (January 2020). ([Hyperlink](#))

## 5 2020 Evaluation

The 2020 Evaluation is a critical first step of Joliet’s Alternative Water Source Program to bring Lake Michigan Water to the City of Joliet and potentially the region by 2030. At the completion of the Phase II Study, there remained a significant amount of uncertainty regarding the details of the alternative improvements, potential regional partners, future water demand, cost of improvements and funding sources that may be available. The goal of the 2020 Evaluation is to reduce this uncertainty by further defining each alternative and answering a number of critically important questions through more detailed conceptual engineering analysis, negotiation of preliminary agreement terms with potential water supply/access communities, identification of the funding required based on updated program costs, intensive outreach to potential regional partners, detailed analysis of risks and governmental advocacy. The sections below detail the significant work that was completed during 2020 in order to reduce uncertainty and further define the two remaining alternatives to aid the City Council in its decision on the final water source alternative.

Engineering for the Alternative Water Source Program, including the 2020 Evaluation, is being completed by a Consultant Team with technical expertise in large water supply and delivery projects as well as strong local knowledge required to support and advise the City on this program. The Consultant Team is being led by Stantec in partnership with Crawford, Murphy & Tilly (CMT) along with support from subconsultants including Engineering Enterprises Inc. (EEI), Strand Associates, Cornwell Engineering Group, V3, and Images Inc. Legal support was provided by Barbara Adams with Donahue & Rose. Water rate modeling was provided by Burns & McDonnell and financial advising was provided by Speer Financial. Government advocacy was provided by Barnes & Thornburg. Combined, this team of professionals has the expertise to successfully guide the City through this program.

### 5.1 Water Demand Scenarios

The foundation of all successful water improvement programs is accurate water use projections. The population and water usage projections for the City of Joliet and potential regional partners were originally established as part of the Phase I Study and have now been updated as part of the 2020 Evaluation. Water usage was projected to 2050 based on population projections published by the Chicago Metropolitan Agency for Planning (CMAP). Based on those projections, the population of the City of Joliet is expected to increase from 149,141 in 2019 to 202,559 in 2050. During this same timeframe, Average Day Demands<sup>10</sup> are anticipated to increase from 15.50 MGD to 23.61 MGD, and Maximum Day Demands will increase from 19.22 MGD to 29.27 MGD. Note that these water usage projections are for the City of Joliet only and do not include the water demands of potential regional partners.

Similar to the Phase II Study, the 2020 Evaluation considers two demand scenarios:

- ◆ 30 MGD Demand Scenario, Joliet only
- ◆ 60 MGD Demand Scenario, Regional Water Commission (including Joliet)

<sup>10</sup> Average Day Demand is the total water usage in a year divided by the number of days in that year.

For the purposes of this evaluation, a 60 MGD regional demand scenario was assumed. As regional outreach continues, it is envisioned that this demand scenario will be further refined to reflect the actual demands of the regional communities that decide to form and join the Regional Water Commission and could be more or less than 60 MGD.

Looking at CMAP projections, the City of Joliet, as well as several regional communities, are likely to be still growing beyond 2050. As part of the 2020 Evaluation, estimates for buildout population and water demands have been made based on Joliet's current boundary agreements and assumed land usage. This information will be further refined in 2021. The decision on final sizing of the new water system improvements is contingent upon many factors including regional participation and is planned for early 2022, prior to final design. The current conceptual design of the improvements has incorporated flexibility to allow for increased capacity, if required, to serve anticipated growth in Joliet beyond 2050.

## 5.2 Lake Michigan Allocation

The maximum quantity of Lake Michigan water that can be withdrawn for use in Illinois is governed by a consent decree established by the United States Supreme Court. Illinois is required to monitor and control the withdrawals, which is done pursuant to the Level of Lake Michigan Act [615 ILCS 40]. All Illinois communities that use Lake Michigan as their water source are required to have a Lake Michigan Water Allocation Permit from the Illinois Department of Natural Resources. Regardless of the alternative selected, the City of Joliet will need to obtain a Lake Michigan Allocation Permit. The City of Joliet submitted its Lake Michigan Allocation Permit Application to the Illinois Department of Natural Resources (IDNR) on September 22, 2020. The typical process takes 4 to 6 months and includes a pre-hearing and a formal hearing held soon thereafter. Conditions of obtaining a Lake Michigan Allocation include adoption of water conservation ordinances<sup>11</sup> and reduction of non-revenue water below 10%.

## 5.3 Engineering/Siting/Routing Studies

The engineering goal of the 2020 Evaluation is to refine the improvements required for each alternative, with a specific objective of reducing areas of critical uncertainty that relate to overall program costs and risks. To achieve this goal, there has been a robust program of engineering analysis completed as part of the 2020 Evaluation.

Results from the engineering analyses completed as part of the 2020 Evaluation have been compiled in a separate Basis of Design Report and related attachments. The *Alternative Water Source Program Basis of Design Report*<sup>12</sup> includes a description of basic design parameters and results from conceptual engineering analyses of the various infrastructure components associated with each alternative being considered by Joliet. The primary report includes a comprehensive description of each alternative and a

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<sup>11</sup> The City of Joliet adopted amendments to its Municipal Code to address IDNR water conservation requirements on August 18, 2020 per Ordinance #18106. ([Hyperlink](#))

<sup>12</sup> Stantec, CMT et. al. *Basis of Design. Alternative Water Source Program. City of Joliet.* (November 2020). ([Hyperlink](#))

comparison of alternative features and costs. Additional details from the 2020 engineering analyses are included in attachments to the Basis of Design Report that cover:

- ◆ Updated population and water usage projections,
- ◆ Conceptual siting and design analyses for a new Lake Michigan intake and raw water pumping station including an analysis of coastal conditions (New Indiana Intake alternative only),
- ◆ Evaluation of raw water quality conditions and regulations, water treatment process options, and conceptual siting and design analyses for a new surface water treatment plant (New Indiana Intake alternative only),
- ◆ Level 1 and Level 2 routing studies for proposed raw water and finished water transmission mains including an analysis of transmission main hydraulics and major transmission main crossings,
- ◆ Conceptual design analyses for required pumping stations and water storage facilities,
- ◆ Hydraulic modeling analysis and conceptual design of the local and regional pipe networks required to distribute water to Joliet and potential regional partners,
- ◆ Development of a water source transfer plan for each alternative to allow the City to safely switch from its existing water source to the new water source with no impact to existing customers, and
- ◆ Plans for the future disposition of the City’s existing wells and groundwater treatment plants.

## 5.4 Permitting Plans

Similar to the Phase II Study, regular meetings and communications with regulatory agencies such as Illinois Environmental Protection Agency, Illinois Department of Natural Resources, Indiana Department of Environmental Management, and Indiana Department of Natural Resources occurred during the 2020 Evaluation to confirm overall program permitting requirements. In addition, as part of the engineering studies completed during the 2020 Evaluation, individual permitting requirements were identified for each major water system improvement component including overall permitting (IDNR, IEPA), Lake Michigan crib/intake permitting (US Army Corps of Engineers, IDEM and Indiana DNR), site specific permitting (local jurisdiction), and route specific permitting (local, county, township right-of-way permits). The permitting information was then consolidated into a permitting plan for each of the two water source alternatives being considered.

## 5.5 Construction Sequencing/Contracting Plan

Both of the alternatives being considered by Joliet will require the completion of an intensive program of capital construction to establish a new water source for the City by 2030. During the 2020 evaluation, an initial construction sequencing/contracting plan has been developed for each option. The sequencing and contracting plan for each alternative is based on consideration of a number of factors as listed below.

- ◆ Type and location of work – logically group projects based on location and contractor capabilities
- ◆ Expected contract value and bonding requirements – package work so as to create opportunities for involvement of local, regional, and national contractors for program components with differing levels of complexity
- ◆ Interdependence of project elements – identify projects that must be completed to allow for subsequent delivery of other program elements
- ◆ Schedule risks related to permitting, land acquisition, or construction duration – identify program elements that present the greatest risk to overall program schedule

The sequencing and contracting plan for each alternative provides a roadmap and identifies program elements that are critical for meeting the City's water delivery target of 2030.

## 5.6 Water Source Transfer Plan

One significant component for implementation of both alternatives is the Water Source Transfer Plan. The water characteristics (hardness, alkalinity, pH, etc.) of Joliet's current groundwater source is different than treated Lake Michigan water. When switching water sources, there is the potential for the differing water characteristics to disturb the scale that has built up over years in the pipes in Joliet's distribution system, which may result in contaminants, such as lead and radium, being released into the water. In order to prevent this, a Water Source Transfer Plan will be developed and implemented as part of the source water switch. It is anticipated the Water Source Transfer Plan will include water quality monitoring in the distribution system after the switch to verify that no water quality impacts occur. As part of 2020 Evaluation, the characteristics of Joliet's existing water have been analyzed to gauge potential impact of the differing water characteristics anticipated for each alternative.

## 5.7 Operations & Staffing Evaluation

The two alternatives are very different in terms of staffing required for operations and maintenance (O&M) given that one involves purchasing treated water and the other requires water treatment. In order to better understand the impact to operations and staffing for the two alternatives, the 2020 Evaluation included an *Operations Planning and Staffing Strategy* memo<sup>13</sup> to identify required staffing levels to operate the new alternative

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<sup>13</sup> Johnson, Joe, Brian Kazyak, and Emily Saban, Stantec. *Operations Planning and Staffing Strategy. Alternative Water Source Program. Memo to Allison Swisher.* (November 2020). ([Hyperlink](#))

water source infrastructure and incorporate the staffing needs into the project costs.

## 5.8 Non-Revenue Water (NRW) Reduction

From 2016 to 2018, the City of Joliet has experienced Non-Revenue Water (NRW) percentages from 29.7% to 38.4% based on the American Water Works Association (AWWA) methodology (Manual M36 – Water Audits and Loss Control). The City of Joliet has committed to the reduction of NRW below 10% by 2040 as compliance with this is a water conservation standard expected to be a condition of receiving a Lake Michigan Allocation Permit. The City of Joliet has developed several strategies to reduce its NRW percentage. Strategies have been developed to reduce both apparent and real losses to achieve NRW below 10%. While the City already has a robust watermain replacement program that targets replacement of 1% of the watermain in the system each year, the City has committed to increasing its watermain replacement to 1.6% per year in order to reduce the real losses resulting from leakage through aging watermains. This commitment of replacement of 1.6% of the watermain in the system each year requires a yearly investment of \$16.4 million beginning in 2022, which is \$6.4 million per year more than its current watermain replacement program.

## 5.9 Water Purchase/Access Negotiations

Building on discussions with water supply and access providers from the Phase II Study, intensive negotiations with potential water suppliers (CDWM Alternative) and access providers (New Indiana Intake Alternative) have occurred in 2020. The goal of the 2020 Evaluation was to develop an initial agreement containing key concepts with the water supplier or access provider for each alternative that would be in place prior to City Council selection of the new water source. These preliminary agreements establish the major terms and conditions that would be included in, and provide the basis for negotiating, the final Water Supply or Access agreement including without limitation compensation, responsibilities of each party, real estate considerations, permitting and access to rights of way for routing of transmission mains.

## 5.10 Class 4 Opinions of Probable Construction Cost (OPCCs)

Cost estimating is a critical component of any major improvement program. It is important to not only identify the improvements required for an alternative, but also accurately estimate the cost to construct the improvements. For this project, cost estimates have been prepared in accordance with guidelines developed by the Association for the Advancement of Cost Engineering (AACE). These guidelines relate the accuracy range of an estimate class to the maturity of the project design.

Opinions of Probable Construction Costs (OPCC) developed for the alternatives evaluated during the 2019 Phase II Study were Class 5 OPCCs reflecting the very low maturity of project designs available (0% to 2% design completion). To account for the conceptual nature and unknown conditions associated with the Phase II analysis a moderately high contingency (30%) was added to all alternative OPCCs. For the 2020 Evaluation, additional information related to the size, characteristics and general location of program components has been used to reduce some of the uncertainty surrounding project requirements and support improvements in estimates of cost. The resulting OPCCs are considered to be Class 4 estimates that reflect a modest increase in design maturity (1% to 15% design completion) and include project specific contingencies in the range of 20%

to 25%. Further improvements in the accuracy of OPCCs will occur as an alternative is selected, field investigations and surveys are conducted, and design activities proceed.

### 5.11 Funding Strategy

The funding strategy utilized in the Phase II Study incorporated the use of a federal low interest loan program (WIFIA<sup>14</sup>) and the state’s low interest loan program (SRF<sup>15</sup>) as well as revenue bonds for the financing of the design and construction of the proposed improvements for each water source alternative. The focus of the 2020 Evaluation was to confirm the funding strategy and update it, as appropriate. The funding strategy developed for each alternative is similar, using low interest loans as much as possible and supplementing with revenue bonds for the remainder of the funding required. The updated recommended funding strategy was presented to the City of Joliet’s Finance Committee on October 20, 2020. The updated funding strategy is summarized in the *Joliet Alternative Water Source Program Funding Strategy* memo<sup>16</sup>. The funding strategy memo also includes an evaluation of key affordability indicators to increase understanding and awareness of the potential financial burden the Alternative Water Source Program may have on certain households within the community.

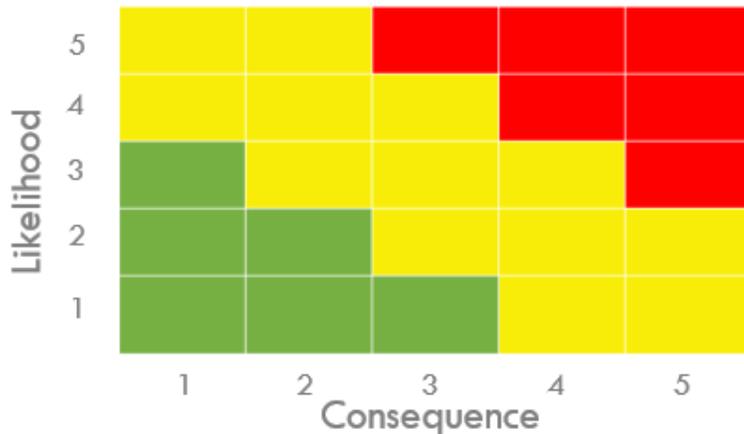
### 5.12 Impact on Water Rates and Total Cost of Water

Using the Class 4 Opinions of Probable Construction Cost developed and the confirmed funding strategy, the City’s water rate model was updated to determine the impact on monthly water rates and the total cost of water for each of the water source alternatives in order to determine the short-term and long-term cost impact to Joliet water customers.

### 5.13 Risk Analysis

Quite simply, risk is uncertainty that matters. Through the 2020 Evaluation, an active risk register has been developed, updated and maintained in order to track issues that could impact the feasibility, costs or schedule associated with each of the water source alternatives. This process began with a PESTLE

(Political, Economic, Social, Technical, Legislative, Environmental) Analysis Workshop



<sup>14</sup> The Water Infrastructure Finance and Innovation Act (WIFIA) Program provides low-cost supplemental loans for regionally and nationally significant projects. (<https://www.epa.gov/wifia>)

<sup>15</sup> The Illinois Environmental Protection Agency (IEPA) issues State Revolving Fund (SRF) low-interest loans for drinking water projects. (<https://www2.illinois.gov/epa/topics/grants-loans/state-revolving-fund/Pages/default.aspx>)

<sup>16</sup> Broughton, Amy, Stantec. *Joliet Alternative Water Source Program - Funding Strategy*. Memo to Allison Swisher. (November 2020). ([Hyperlink](#))

that was conducted in May 2020 with two (2) City Council Representatives, ten (10) City Staff and six (6) Consultant Team Members. The results of the PESTLE Analysis were summarized in the *PESTLE Analysis Results* memo<sup>17</sup>, provided to Joliet City Council in June 2020. By classifying the risks identified into the likelihood that the risk would occur and the consequence if the risk did occur, we are able to better mitigate the risks that are expected to have a higher likelihood of occurring that would result in more significant consequences for the project.

## 5.14 Regional Development

As presented at the August 25, 2020 City Council Workshop, regional development as part of the 2020 Evaluation consisted of two components: Regional Outreach and Regional Governance Evaluation.

### 5.14.1 Regional Outreach

As discussed in Section 2, the problem with the deep sandstone aquifer is not specific to the City of Joliet. Rather it is a regional problem. As such, it makes sense to engage neighboring communities in a regional solution. One component of the regional water system development during the 2020 Evaluation included the outreach to potential regional community and industrial participants. City staff and project team members met with 17 potential regional partner communities and two industries between June 2020 and August 2020. The regional outreach efforts have been highlighted in the *Joliet Alternative Water Source Program, 2020 Evaluation Regional Outreach Meeting Summary* memo<sup>18</sup>. Regional outreach included meetings between interested potential regional participants, Joliet staff and consultant team members. During these meetings, potential regional partners were asked to provide input on preferences related to governance and water source alternative.

### 5.14.2 Regional Governance Evaluation

The other component of the regional water system development during the 2020 Evaluation included a Regional Governance Evaluation. The Regional Governance Evaluation was summarized in the *Joliet Alternative Water Source Program, Alternative Forms of Governance and Operation – Lake Michigan Water System* memo<sup>19</sup> which highlighted five major governance structures currently available in state statutes for public sector/governmental water systems and their key advantages and disadvantages. The recommended governance structure, a Water Commission with some modification to state statutes to allow for proportional voting and other ancillary issues, was presented to the City Council at the August 25, 2020 City Council Workshop. Based upon the concurrence of the City Council to proceed with the modified Water Commission

<sup>17</sup> Johnson, Joe, Russ Snow, Gavin Gilchrist, and Lila Gillespie, Stantec. *PESTLE Analysis Results. Memo to Allison Swisher.* (June 2020). ([Hyperlink](#))

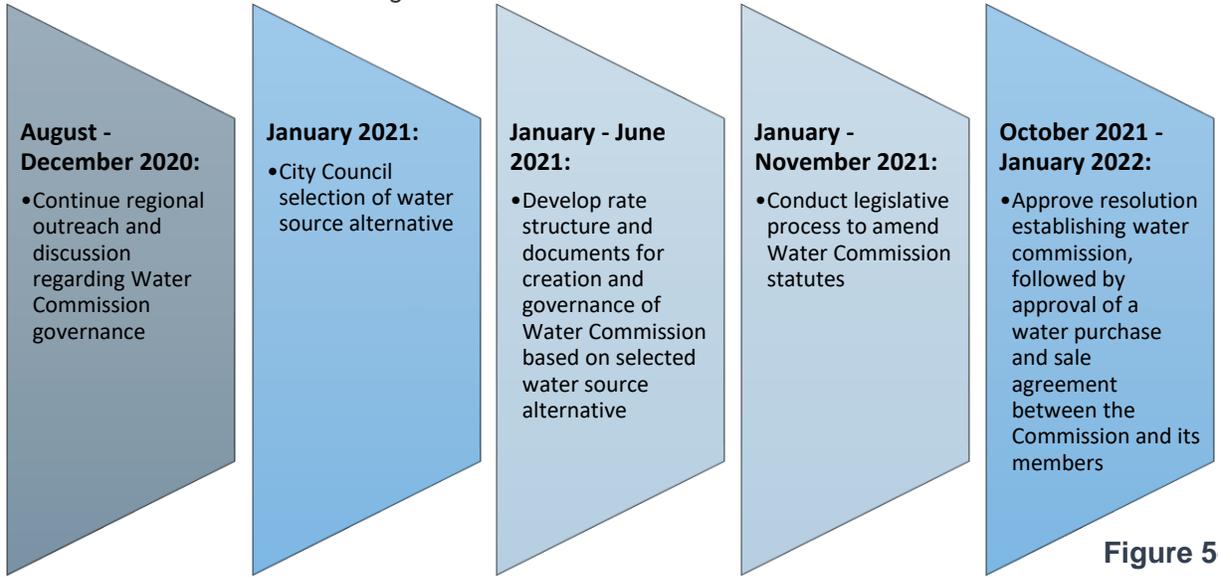
<sup>18</sup> Wallers, Pete, EEI. *Alternative Water Source Program, 2020 Evaluation, Regional Outreach Meeting Summary. Memo to Allison Swisher.* (November 2020). ([Hyperlink](#))

<sup>19</sup> Adams, Barbara, Donahue & Rose, PC. *Alternative Water Source Program. Alternative Forms of Governance and Operation - Lake Michigan Water System. Memo to Allison Swisher.* (August 2020). ([Hyperlink](#))

format for the proposed regional water system, Staff will proceed with preparing drafts of the documents necessary to establish and commence operation of a Commission. These documents include a resolution to create a Commission, an organizational ordinance/by-laws to be presented to potential regional partners in 2021, and the proposed legislation required to modify state statutes. The goal is to have the Regional Water Commission formed by the end of 2021, as shown in

**Figure 5-1**

Timeline for Formation of the Regional Water Commission



**Figure 5-1.**

### 5.15 Governmental Advocacy/Outreach

In a significant public improvement program like this one, it is important to have the support of state and federal legislators representing Joliet and the surrounding area. To that end, the City’s governmental advocacy team has been working hand-in-hand with the project consultant team on the advancement of Joliet’s Alternative Water Source Program in Illinois, Indiana and at the federal level.

#### 5.15.1 Illinois

The primary focus of the Illinois Governmental Outreach in 2020 has been to promote awareness of and garner support from state and local legislators for both water source alternatives by sharing information on the program and its benefits to the City of Joliet, the Will County region and the entire State of Illinois.

#### 5.15.2 Indiana

The primary focus of the Indiana Governmental Outreach in 2020 has been to understand the concerns of state and local legislators on the New Indiana Intake Alternative. By understanding the concerns, we can address and mitigate the potential risks associated with this alternative which crosses state lines.

### 5.15.3 Federal

The primary focus of the Federal Governmental Outreach has been to draw awareness to the needs of the program for consideration for future funding opportunities, as well as support for the program at a federal level.

## 5.16 Public Outreach & Stakeholder Engagement

The Public Outreach and Stakeholder Engagement that began in the Phase I and II Studies has continued into the 2020 Evaluation. In spite of the limitations on engagement activities due to the pandemic, significant outreach has been conducted. Public engagement activities included the following in 2020:

- ◆ Monthly Newsletters and Educational Topics emailed to the project stakeholder list (currently containing 1018 stakeholders) and posted to the project website
- ◆ Ongoing social media posts and use of the City’s electronic messaging boards
- ◆ Maintenance of the project website, [www.RethinkWaterJoliet.org](http://www.RethinkWaterJoliet.org), which has captured all of the program activities completed to date
- ◆ Three Stakeholder Meetings held virtually on the Zoom Webinar platform in May, July and September with recordings posted to the project website
- ◆ Three City Council Workshops broadcast live on Channel 6 and the City’s website in June, August and November with recordings posted to the project website
- ◆ Monthly meetings of the Water Conservation Subcommittee which continued to champion the City’s water conservation efforts including the low flow toilet rebate program and rain barrel subsidy program and supported the City’s decision to become a Water Sense Partner
- ◆ Public Forum to be held virtually in December to answer questions and obtain comments before the City Council selection of the alternative water source

## 6 Lake Michigan Water – Chicago Department of Water Management (CDWM) Alternative

The City of Chicago Department of Water Management (CDWM) serves as a regional supplier of treated Lake Michigan Water to Chicago and more than 125 other water utilities. For this alternative, the City of Joliet would purchase treated Lake Michigan Water from the City of Chicago and then pump the treated water approximately 31 miles to the City of Joliet.

### 6.1 Description of Alternative

This alternative involves the purchase and pumping of treated Lake Michigan Water from Chicago's existing Southwest Pumping Station site (located near 84th Street and Kedvale Avenue) approximately 31 miles to a delivery point near Joliet as conceptually shown in **Exhibit 6-1**.

#### 6.1.1 Water Source

For the supply to Joliet, water would be drawn from Lake Michigan at the 68<sup>th</sup> and Dunne Crib, treated at the Eugene Sawyer Water Purification Plant, and conveyed through the South Tunnel System towards the Southwest Pumping Station site.

#### 6.1.2 Water Treatment and Finished Water Quality

The Eugene Sawyer Water Purification Plant, constructed in 1947, is a conventional surface water treatment plant with coagulation, flocculation, sedimentation and filtration. The resulting water quality is excellent and meets all current state and federal water quality regulations. The City of Chicago tests for emerging contaminants such as PFAS, microplastics, pharmaceutical and personal care products in Lake Michigan and does not anticipate that additional treatment will be required to meet future regulations of these contaminants because the current contaminant levels are below the proposed regulated maximum contaminant levels.

#### 6.1.3 Water Delivery Infrastructure

As the existing Southwest Pumping Station, location as shown in **Figure 6-1**, does not have sufficient capacity to supply Joliet, a new connection to the City's water tunnel system, an extension of the tunnel to the southern end of the Southwest Pumping Station site, a reservoir and two new pumping stations will be required.

As the existing Southwest Pumping Station site does not have enough land to contain all of the new facilities required to serve Joliet, a portion of the adjacent Durkin Park Site, currently owned by the Chicago Park District, will be required to house some of the new improvements. Between the Southwest Pumping Station and Durkin Park sites, there is sufficient area to construct the new facilities, while allowing park activities to continue.

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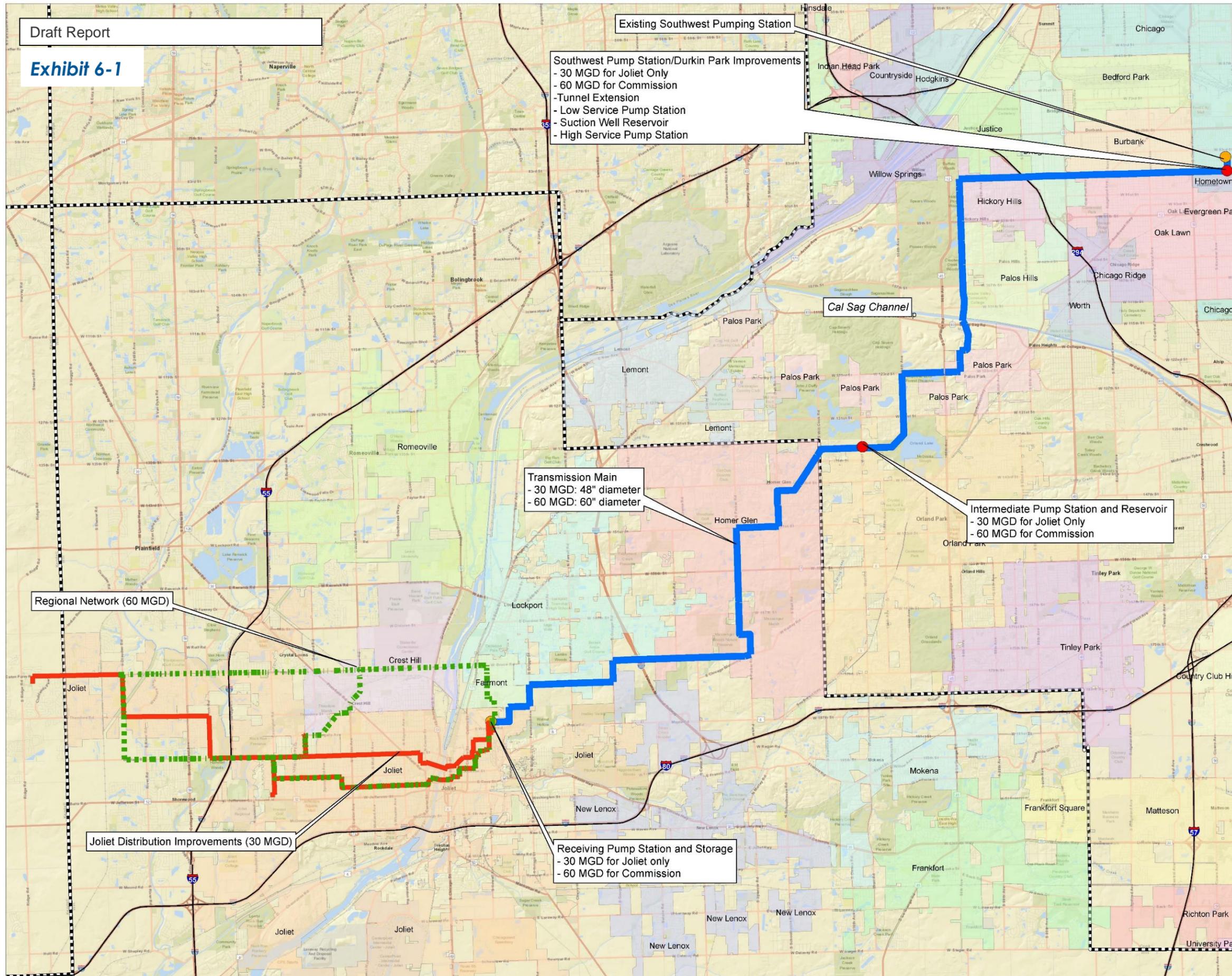


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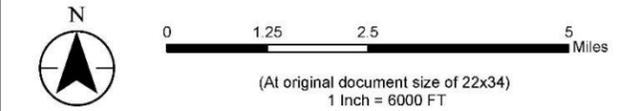
DRAFT

Title  
**Lake Michigan Water - Chicago Department of Water Management Overall System Plan**

Client/Project  
 City of Joliet Department of Public Utilities  
 Alternative Water Source Program

Project Location  
 Will, Cook, and Kendall, IL, Lake County, IN

Prepared by JV on 2020-10-29

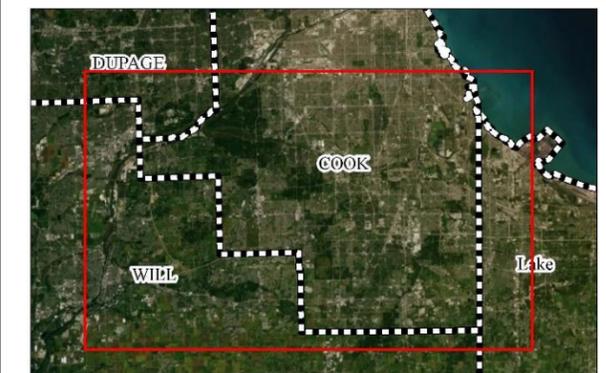


### Legend

- Finished Water Transmission Main
- - - Regional Network
- Water Distribution System Modifications

### Facilities

- Existing Fairmount & Garvin Facilities
- Existing Southwest Pumping Station
- Proposed Facility
- County Boundaries



Location Map: Not to Scale

Notes  
 1. Coordinate System: NAD 1983 StatePlane Illinois East FIPS 1201 Feet  
 2. Data Sources: WILL CO, COOK CO, IDOT, INDIAN and USFWS DATA DOWNLOADED FROM WEB 3/11/2019 to 8/26/2019  
 3. Background: Source: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community  
 Source: Esri, DigitalGlobe, GeoEye, Earthstar/Armas DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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**Figure 6-1**

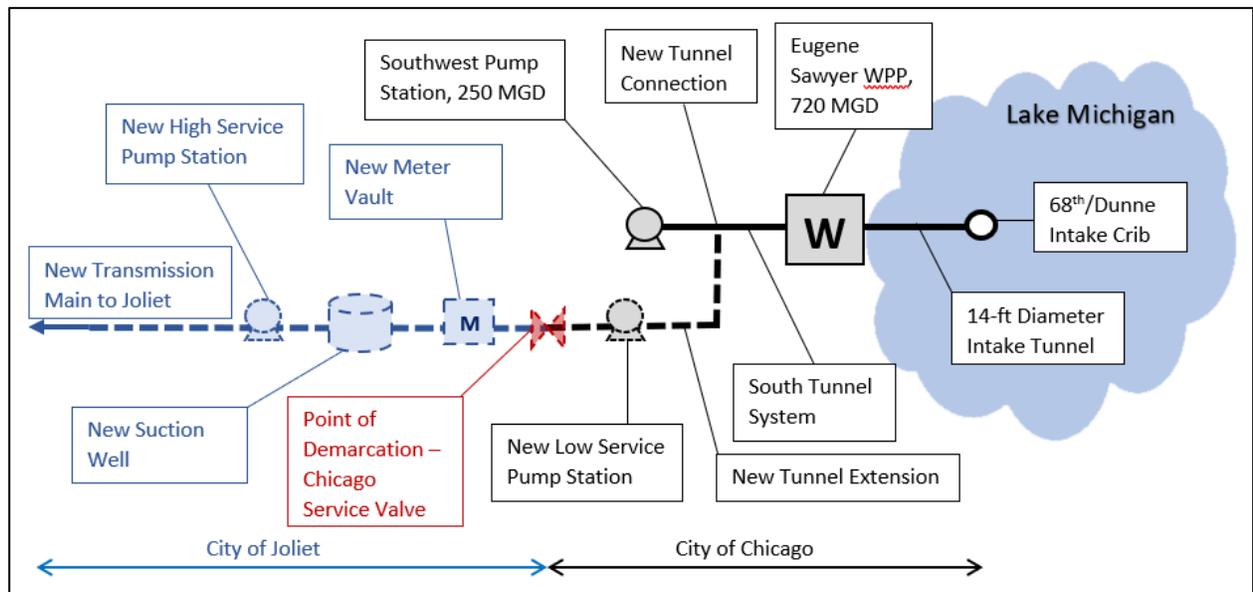
Southwest Pumping Station & Durkin Park, Chicago, Illinois



At the Southwest Pumping Station site, there would be a new low service pump station connected to the tunnel extension to pump water through a meter vault to a new underground suction well, located in the adjacent Durkin Park site. Prior to the suction well, there would be an air gap to separate the Chicago water system from the new Joliet facilities. This is a typical arrangement to prevent contamination between two water systems. From the new suction well, water would be pumped through a new high service pump station at the Southwest Pumping Station site to the transmission main to Joliet. A schematic of the proposed water delivery infrastructure is shown in **Figure 6-2**.

**Figure 6-2**

CDWM Alternative – New Water Infrastructure Schematic

**6.1.6.1** *City of Chicago New Infrastructure*

It is anticipated that the City of Joliet would design and construct all of the new infrastructure except for the tunnel connection at the northern end of the Southwest Pumping Station site. The tunnel connection, tunnel extension, low service pump station and Chicago service valve would be financed, owned, operated and maintained by the City of Chicago. The Chicago service valve will be outside of and after the low service pump station and will serve as the point of demarcation in ownership between the City of Chicago and City of Joliet.

**6.1.6.2** *City of Joliet New Infrastructure*

The City of Joliet would finance, own, operate and maintain the new infrastructure beyond the point of demarcation including the piping downstream of the Chicago Service Valve, the meter vault, air gap, suction well at the Durkin Park Site, high service pump station at the Southwest Pumping Station Site and transmission main to Joliet. The water being purchased by Joliet will be metered in the meter vault. While owned by Joliet, Chicago will have access to the meter readings from the meter vault.

**6.1.6.3** *Transmission System/Intermediate Pump Station*

From the Southwest Pumping Station/Durkin Park site, the City of Joliet will construct a new transmission main between Chicago and Joliet as shown in **Exhibit 6-1**. A 48" transmission main is required for the 30 MGD demand scenario (Joliet only) and a 60" transmission main is required for the 60 MGD demand scenario (Water Commission). Given the topography between Chicago and Joliet, there would be a new

intermediate pumping station and reservoir along the transmission main prior to reaching the water delivery point near Joliet.

#### 6.1.6.4 *Joliet Water Distribution System Modifications*

From the new transmission main, the new water source will enter the Joliet distribution system at a single entry point. Joliet's current groundwater source enters the water distribution system at multiple points throughout the system. Therefore, extensive improvements are required in Joliet's water distribution system to distribute water from the single entry point. Additional storage, approximately double the amount the City currently has, will need to be constructed given the City of Chicago water storage requirements of two times the average day demand.

#### 6.1.6.5 *Back-Up Well Supply*

Given that the new water source will travel through over 30 miles of transmission main, which does not have redundancy<sup>20</sup>, the City of Joliet will need to maintain its wells as a back-up water source. In the event of a transmission main break, loss of source or planned maintenance lasting greater than two days, the City of Joliet would place the wells back into service until the new water source is restored. As part of the Phase I Study<sup>21</sup>, ISWS evaluated the ability of the aquifer to supply groundwater for short-term durations (1 to 3 months) and determined that the aquifer would be able to supply the necessary back-up supply.

## 6.2 Key Terms for Water Purchase Agreement

Project team members and City Staff worked with City of Chicago representatives extensively during 2020 to establish the major terms and conditions for the long-term Water Supply Agreement and memorialize them in a preliminary water supply agreement. This preliminary water supply agreement is being introduced to the Chicago City Council on November 24<sup>th</sup> with approval anticipated on December 16<sup>th</sup>, prior to Joliet's decision on the new water source alternative. A copy of the preliminary agreement has been included in **Appendix A**.

### 6.2.1 Agreement Structure and Term

The preliminary water supply agreement has been established to identify key terms and conditions which would be incorporated into the Water Supply Agreement. If the CDWM Alternative is selected, Joliet would sign the preliminary water supply agreement, committing Joliet to move forward with negotiations with the City of Chicago for the long-term Water Supply Agreement. Upon execution of the preliminary water supply agreement, the City of Chicago would finalize the land transaction with the Chicago Park District for the property at the Durkin Park site required for the New Water Supply Infrastructure. Thereafter, the final Water Supply Agreement would be developed and approved

<sup>20</sup> It was determined that a parallel transmission main would not be cost effective as compared to maintaining the City's existing well supply as a back-up.

<sup>21</sup> CMT, EEI, Stantec. *City of Joliet Alternative Water Source Study - Phase I FINAL Report, Appendix E – Groundwater Modeling*. (January 2019). ([Hyperlink](#))

in Fall 2021. It is anticipated that the Water Supply Agreement would have a term of 50 years with 10-year automatic renewal terms with a right to terminate with at least 5 years advance notice.

## 6.2.2 Rights and Responsibilities of the Parties

The rights and responsibilities of the parties with respect to the water supply relationship have been defined in the Preliminary Water Supply Agreement as follows:

### 6.2.2.1 *Water Quality and Quantity*

Contingent upon Joliet obtaining a Lake Michigan Allocation Permit, Chicago will supply treated water, meeting all state and federal regulations, at the Southwest Pumping Station site. The average, maximum and minimum water quantity to be provided by Chicago will be determined based on the demands of the regional partners that form the Water Commission and stated in the Water Supply Agreement. It is anticipated that water supplied to Joliet will be at a constant rate over the course of a 24-hour day.

### 6.2.2.2 *Chicago New Water Supply Infrastructure*

Chicago New Water Supply Infrastructure includes the Tunnel Connection, Tunnel Extension, Low Service Pump Station and Chicago Service Valve to be located at the Southwest Pumping Station site. This infrastructure would be owned and operated by the City of Chicago. The current proposal is that the Tunnel Connection would be designed, constructed and financed by the City of Chicago, while the Tunnel Extension, Low Service Pump Station and Chicago Service Valve would be designed and constructed by Joliet but financed by the City of Chicago.

### 6.2.2.3 *Joliet New Water Supply Infrastructure*

Joliet New Water Supply Infrastructure includes the Meter Vault, Suction Well, High Lift Pump Station, and Transmission Main to the Joliet Water System. This infrastructure would be designed, constructed, financed, owned and operated by the City of Joliet. Joliet is also responsible for all new water supply infrastructure located outside of Chicago city limits.

### 6.2.2.4 *Water Storage Requirements*

The Preliminary Agreement includes provisions for Joliet and any subsequent partners or customers to maintain sufficient water storage capacity in their water distribution systems (not including transmission system storage) equivalent to twice the annual daily average IDNR Lake Michigan Allocation. This storage capacity will allow the City of Joliet and regional communities to maintain water service while the City of Chicago performs routine maintenance that requires short-term interruptions in water supply delivery.

### 6.2.3 Real Estate Matters

As noted in Section 6.1.3.2, Joliet's new infrastructure includes a reservoir to be located at the Durkin Park site and other facilities to be located at Chicago's existing Southwest Pumping Station site. As a condition of the preliminary agreement, the City of Chicago will acquire the portion of the Durkin Park site required for the reservoir (approximately 2 acres) from the Chicago Park District. The City of Joliet will then obtain an easement or other appropriate rights in the park property and a portion of the Southwest Pumping Station site from the City of Chicago.

### 6.2.4 Basis for Costs and Fees

Chicago will charge Joliet the current Uniform Water Rate, similar to all of its retail and wholesale customers. In addition, Chicago will provide a credit (or debit) equal to the difference between the previous year's Uniform Water Rate and the actual cost of service incurred by Chicago in the previous year in providing water service to Joliet based on an annual cost of service study completed per the AWWA M1 methodology. This will result in the City of Joliet receiving a wholesale rate from the City of Chicago based only on the costs associated with operation and maintenance of facilities attributable to the water supply service to Joliet. This means the water rate for the City of Joliet will not include the costs associated with the City of Chicago distribution/transmission system, such as major improvement programs for lead service line replacement, watermain replacement and water metering, or costs associated with maintenance and improvements at facilities that do not serve Joliet. The annual cost of service study will be completed by Chicago and provisions for an open book review by Joliet will be included in the Water Supply Agreement.

### 6.2.5 Provisions for Assignment/Transfer

Knowing that Joliet has decided to pursue the formation of a Water Commission, the Preliminary Agreement includes provisions to allow the final Water Supply Agreement to be transferrable to the Water Commission upon its formation. In addition, the Water Supply Agreement will include provisions stating that the Water Supply Agreement is not transferrable to another party without Joliet's approval and that the Chicago water system cannot be sold during the term of the agreement without Joliet's approval.

### 6.2.6 Commitment to Transparency and Collaboration

The City of Chicago has stated a commitment to have a more transparent and collaborative relationship with its suburban water customers. To memorialize that goal, the Preliminary Agreement includes provisions for the formation of an Advisory Council composed of representatives from Chicago, Joliet and other wholesale water purchasers of Chicago Water. The primary goals of the Advisory Council will be to (1) obtain meaningful input and feedback from Chicago and the Members regarding the operations and capital investments of the Chicago Water System, (2) establish standing mechanisms for regular and enhanced communication between Chicago and the Members, and (3) provide a process for the Members to make recommendations for Chicago's consideration as it relates to the reliable and cost-effective delivery of water.

### 6.3 Land Acquisition

Joliet will need to acquire land rights to support the construction and long-term operation of the new facilities required for the CDWM alternative. As the acquisition of land can be a time-consuming activity, it is important that specific land acquisition requirements are identified and acted on early in the overall alternative schedule. **Table 6-1** provides a summary of preliminary land acquisition needs for the CDWM Alternative. Additional details are documented in the *Joliet Alternative Water Source Program Basis of Design Report*<sup>22</sup>.

**Table 6-1**

Preliminary Land Acquisition Needs for the CDWM Alternative

<i>Alternative Component</i>	<i>Location</i>	<i>Land Acquisition Requirement</i>
<b>Suction Well</b>	Durkin Park Site, 84th St and Kedvale Ave, Chicago	Chicago to acquire land for Suction Well from Chicago Park District and grant easements and other rights to Joliet
<b>Tunnel Connection/ Extension, Low Service Pump Station, Meter Vault, High Service Pump Station</b>	Southwest Pump Station Site, 84th and Kedvale, Chicago	Chicago to grant permanent easements and other rights to Joliet for Meter Vault, High Service Pump Station & necessary appurtenances, Chicago to grant temporary construction easements for all new infrastructure (Tunnel Connection/Extension, Low Service Pump Station & Chicago Service Valve to be owned by Chicago)
<b>Finished Water Transmission Main</b>	Various alignments between Chicago and Joliet (31 miles)	ROW rights and easements required for construction and operation of transmission main
<b>Intermediate Pump Station</b>	Southwestern Cook County	2-3 acre site required for intermediate pump station and standpipe
<b>Receiving Station (Joliet only)</b>	Fairmount and Garvin Facilities Site	None – area available for facilities at existing site
<b>Commission Receiving Facilities (Regional Option Only)</b>	Vicinity of existing Fairmount and Garvin Facilities Site, Joliet	2-3 acre site required for commission pumping station and storage facility
<b>Regional Water Commission Network (Regional Option only)</b>	Various alignments through Joliet and adjacent communities	ROW rights and easements required for construction and operation of Regional Water Commission Network
<b>Regional Water Commission Network Storage (Regional Option only)</b>	To be determined	Site for 1 MG Standpipe to provide storage capacity for the Regional Water Commission Network

<sup>22</sup> Stantec, CMT et. al. *Basis of Design. Alternative Water Source Program. City of Joliet.* (November 2020). ([Hyperlink](#))

<i>Alternative Component</i>	Location	Land Acquisition Requirement
<b><i>Distribution System Improvements</i></b>	Various alignments through Joliet	ROW rights and easements required for construction and operation of Distribution System Improvements in Joliet
<b><i>Distribution System Pumping and Storage</i></b>	Various sites for new storage and pumping facilities within Joliet	Approximately 15.5 acres of expanded or new sites required for storage and pumping facilities within the Joliet distribution system

Extensive discussions with the City of Chicago have already been conducted and actions required to secure the use of land at the Southwest Pumping Station and Durkin Park sites have been defined. Formal land acquisition efforts related to the other sites and easements required will proceed during preliminary engineering once final routing/siting studies have been completed.

## 6.4 Permitting Plan

As part of the 2020 Evaluation, a permitting plan has been developed for this alternative. The permitting plan is contained in the *Joliet Alternative Water Source Program Basis of Design Report*<sup>23</sup> and highlights permitting efforts that have the potential to significantly impact the feasibility, cost, and/or schedule for implementation of this alternative. Permitting for this alternative can be classified into three categories: Overall Permitting, Site Specific Permitting and Transmission Main Route Permitting.

### 6.4.1 Overall Permitting

Two primary permits are required for this alternative: a Lake Michigan Allocation Permit from IDNR (as described in Section 5.2) and a construction permit from IEPA. Prior to construction of the new water infrastructure components, Joliet will apply for a water supply construction permit from the Illinois Environmental Protection Agency (IEPA). An application for an overall operating permit will be submitted in conjunction with final testing and commissioning of the completed system.

### 6.4.2 Site Specific Permitting

Site specific permitting efforts will be required for the new pumping and storage components to be constructed as part of the CDWM Alternative. In particular, extensive coordination and permitting will be required with the City of Chicago, the Chicago Department of Water Management, and the Chicago Park District for construction of the new facilities at the Southwest Pumping Station/Durkin Park Site in Chicago.

### 6.4.3 Route Specific Permitting

A variety of approvals and agreements will also be required for the construction of the more than 30 miles of transmission main from Chicago to Joliet. The transmission main routing, conceptually shown in **Exhibit 6-1**, utilizes right-of-way or land controlled by twelve (12) municipalities/townships, six (6) county and

<sup>23</sup> Stantec, CMT et. al. *Basis of Design. Alternative Water Source Program. City of Joliet.* (November 2020). ([Hyperlink to Permitting Plans](#))

state governmental agencies, one (1) railroad, two (2) utility agency corridors and three (3) private property owners. While routing investigations have included efforts to identify and avoid sensitive environmental areas (wetlands, threatened/endangered species habitat, floodplain, etc.), detailed field assessments, efforts to obtain approvals, and mitigation planning will be required at locations where impacts cannot be avoided. Major permitting activities for the transmission main portion of the project will include the WIFIA Programmatic Environmental Assessment (PEA) for the overall route and permits for major crossings at the Cal-Sag Channel, I-294, and I-355.

## 6.5 Implementation Plan and Schedule

For this alternative, there are considerable improvements that need to be implemented to bring the treated water supply to Joliet. As part of the 2020 Evaluation, a detailed contracting/construction sequencing plan has been developed for each alternative and is contained in the *Joliet Alternative Water Source Program Basis of Design Report*<sup>24</sup>. The detailed contracting/sequencing plan shows that the design, permitting and construction of the improvements for this alternative can be implemented to allow for water delivery to Joliet by 2030.



### 6.5.1 Design & Construction

Design of the infrastructure required to implement the CDWM Alternative is anticipated to begin in the first quarter of 2021 with construction beginning in the third quarter of 2024 and first water delivery for testing occurring in the first quarter of 2030. Preliminary design efforts and supporting field investigations will be completed in 2021 to support submittal of Joliet’s WIFIA loan application in December 2021. Detailed design will occur throughout 2022, 2023 and 2024, with specific program components (tunnel connection and new infrastructure at the Southwest Pumping Station/Durkin Park Site, Cal-Sag Channel Crossing) being expedited to allow adequate time for permitting and staged construction. Other major construction contracts linked to the construction of transmission main (3-6 contracts), the intermediate pumping station, water receiving/pumping facilities at Joliet, and distribution/commission conveyance, pumping, and storage projects in Joliet (multiple contracts) are anticipated to be awarded and move into construction beginning in early 2025. **Exhibit 6-2** provides an overall schedule of major program activities to be completed to allow for delivery of Lake Michigan water to Joliet by 2030.

<sup>24</sup> Stantec, CMT et. al. *Basis of Design. Alternative Water Source Program*. City of Joliet. (November 2020). ([Hyperlink to Contracting Plans](#))

Exhibit 6-2

# CONCEPTUAL IMPLEMENTATION SCHEDULE LAKE MICHIGAN WATER - CDWM REGIONAL 60 MGD ALTERNATIVE

	2021				2022				2023				2024				2025				2026				2027				2028				2029				2030							
	Q1	Q2	Q3	Q4																																								
Southwest Pump Station Tunnel Extension																																												
CDWM Tunnel Connection*																																												
Durkin Park Suction Well Reservoir																																												
Low and High Service Pump Stations																																												
Water Transmission Main - A																																												
Water Transmission Main - Mega Crossing																																												
Intermediate Pump Station																																												
Water Transmission Main - B																																												
Water Transmission Main - C																																												
Water Transmission Main - D																																												
Receiving Facilities																																												
Regional SCADA System																																												
Regional Network - R1																																												
Regional Network - R2																																												
Regional Network/Joliet Distribution System - Mega Crossings																																												
Joliet Distribution System Improvements																																												
Systemwide Commissioning/Startup																																												

\*Construction Completed by CDWM



Figure No.  
 Title  
**Conceptual Implementation Schedule  
 Lake Michigan Water - CDWM Alternative**  
 Client/Project  
 City of Joliet Department of Public Utilities  
 Alternative Water Source Program  
 Project Location  
 Cook County, IL and Lake County, IN  
 Prepared by LG on 2020-06-23

### Legend

- Preliminary Design
- Final Design
- Bidding/Contract Award
- Permitting
- Land Acquisition
- Construction
- Commissioning
- Systemwide Commissioning



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### 6.5.3 Start-up, Commissioning, Monitoring

Once the improvements have been constructed, start-up and commissioning will occur through the second quarter of 2030 to allow for water delivery to Joliet's customers mid-2030.

One significant component of the start-up process is implementation of the Water Source Transfer Plan as discussed in Section 5.6. As part of the 2020 Evaluation, an evaluation of the corrosion control implications of switching water sources was performed and is described in *Joliet Alternative Water Source Program Basis of Design Report*<sup>25</sup>. The testing performed in the 2020 Evaluation indicates that treated Lake Michigan water from Chicago, without orthophosphate, has similar propensity for corrosivity as Joliet's existing groundwater source. This suggests that the new water source switch will not adversely impact water quality, assuming a Water Source Transfer Plan is developed and implemented in conjunction with the switch. After further testing is performed in 2021, this will be verified. However, Chicago is evaluating a treatment change that will involve going from a blended phosphate to orthophosphate. Since Joliet does not have control over the water treatment process, Joliet may have to provide additional water conditioning to ensure compatibility.

## 6.6 Operations & Staffing

As noted in Section 5.6, the 2020 Evaluation included an *Operations Planning and Staffing Strategy* memo<sup>26</sup> to identify required staffing levels for operation of the new water source infrastructure and incorporate the staffing needs into the project costs. The following summarizes the operations and staffing levels for the CDWM Alternative.

### 6.6.1 Operations

From an operational standpoint, the new infrastructure associated with the CDWM Alternative will result in the eventual shift from the operation and maintenance of Joliet's existing wells and water treatment plants to the operation and maintenance of the new infrastructure both inside the City limits and outside the City limits. City staff will take responsibility for the operation of high capacity pumping facilities in Chicago, and the intermediate pumping station/reservoir facility along the transmission main between Chicago and Joliet. Since repair of large diameter (36" and larger diameter) watermain requires special tools and equipment, it is assumed that the City of Joliet would have Contractors on-call for repairs and maintenance to the large diameter transmission main outside City limits.

<sup>25</sup> Stantec, CMT et. al. *Basis of Design. Alternative Water Source Program. Attachment C.* City of Joliet. (November 2020). ([Hyperlink](#))

<sup>26</sup> Johnson, Joe, Brian Kazyak, and Emily Saban, Stantec. *Operations Planning and Staffing Strategy. Alternative Water Source Program. Memo to Allison Swisher.* (November 2020). ([Hyperlink](#))

It is anticipated that the primary control center would be located in Joliet. Automated instrumentation and controls will be installed to avoid the need for full time staffing of these remote facilities, but daily visits will still be needed. Also, while the City's existing 11 water treatment plants will be abandoned once the new system is operational, Joliet will need to continue to operate and sample its 26 existing wells monthly to maintain them as a reliable back-up water source and manage the operation of local pumping stations to cycle water through the expanded storage and conveyance system. Changes in operations will be required, but the general principles and methods used by City staff to reliably deliver water to customers will remain essentially the same.

#### 6.6.2 Staffing

Joliet currently uses a total of five (5) dedicated water plant operators and a shared pool of maintenance, utility, engineering, and administrative staff to support the operation of its existing water system. While the transition to a Lake Michigan supply from Chicago will require operational changes as described above, it is anticipated that the overall level of staffing and skill sets required for operation and maintenance of the new system will remain the same as current levels and can be provided through the gradual shifting of responsibilities and supportive training of existing Water Utility staff.

### 6.7 Cost of Water

Under this alternative, the cost of water to Joliet and its customers would include: CDWM water purchase costs (cost of water supply); capital costs and associated debt service; and operations, maintenance, and replacement costs (OM&R). It is important to note that the costs and values presented are estimates developed with the best available information, reflect assumptions, and may vary from the final costs for implementation.

Costs are presented for 30 MGD and 60 MGD options. The 30 MGD option assumes Joliet is the only participant in the program implementation and therefore assumes all the associated costs. The 60 MGD option serves a group of regional communities, including Joliet. For the 60 MGD option, Joliet is responsible for a proportionate share of capital and OM&R costs based on projected demand profiles. Distribution of costs related to the regional option are based on assumptions that will need to be further evaluated and discussed with potential regional partners.

Key cost sensitivities related to this alternative are water purchase cost escalation and financing cost terms. The impact of these key sensitivities on cost is described further in the *Joliet Alternative Water Source Program – Funding Strategy memo*<sup>27</sup>.

#### 6.7.1 Water Purchase Costs

Going forward, CDWM has agreed the water rate charged to Joliet will be based on capital facilities and investment attributable to service to Joliet and Joliet's proportionate share of Chicago's operation and maintenance expenses. CDWM has proposed an annual review of Joliet's rates and cost of service analysis. For

<sup>27</sup> Broughton, Amy, Stantec. *Joliet Alternative Water Source Program - Funding Strategy. Memo to Allison Swisher.* (November 2020). ([Hyperlink](#))

Joliet, the annual cost of service review would result in a credit or debit being applied for each year, based on a projected cost of service at the start of the year and an actual cost with a true-up at the end of each year, which will result in Joliet's total purchased water cost for that year. If a regional water commission is established, this rate would be part of the overall rate charged to all commission members.

In this analysis, a 2% annual escalation has been assumed. In principle, CDWM anticipates rates will escalate according to the true cost of service to Joliet and has suggested 1.30% and 1.39% annual increases for the 30 MGD and 60 MGD water purchase rates, respectively. If the increase in the true cost of water is greater or less than 2%, the resulting annual cost of purchased water would differ from current projections. Purchased water cost is the primary component of the monthly cost to Joliet customers for this alternative.

Based on the preliminary information provided by CDWM, the estimated 2031 cost of water supply to Joliet is approximately \$27.5 million for the 30 MGD system. For the 60 MGD system, the estimated 2031 cost of water supply to Joliet and regional partners would be approximately \$44.4 million. The cost of water supply to Joliet would be slightly less for the 60 MGD option than the 30 MGD option, approximately \$26.6 million in 2031.

Based on the cost of service study completed by Chicago, the 2018 cost was \$3.21 per 1,000 gallons (30 MGD Scenario) for existing water facilities (\$2.44 per 1,000 gallons) and new water facilities (\$0.94 per 1,000 gallons) attributable to Joliet.

### 6.7.2 Capital Costs

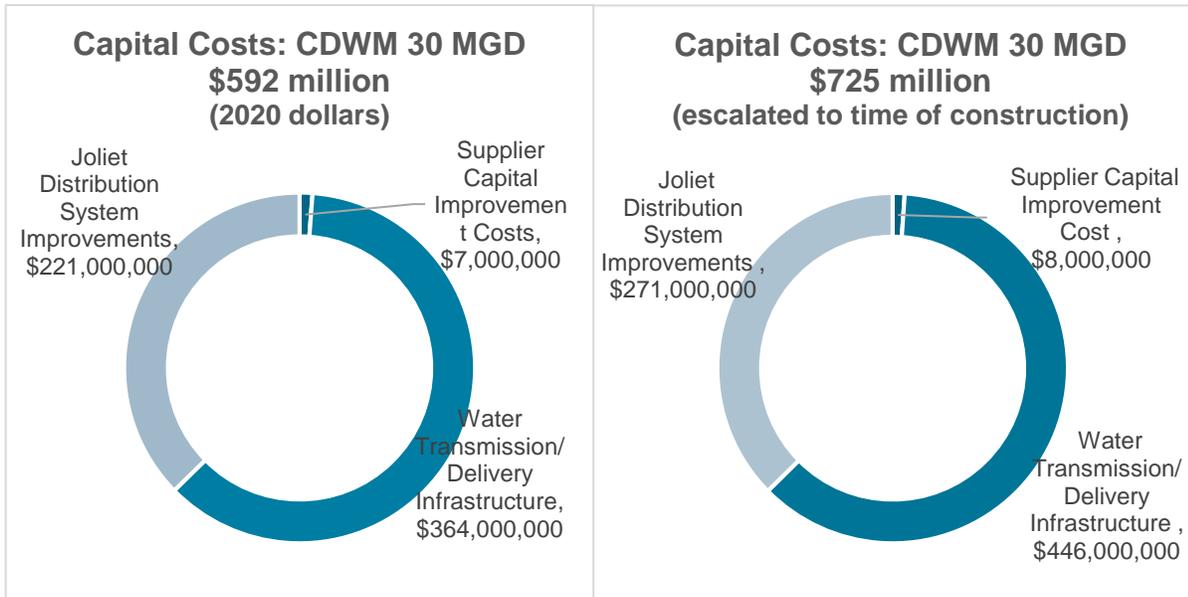
The City of Joliet will be responsible for the planning, design, and construction of new infrastructure to connect Joliet's existing infrastructure to CDWM infrastructure. New Infrastructure capital costs incurred by Joliet include water transmission/delivery infrastructure and distribution system improvements, as noted in Sections 6.1.3.2 to 6.1.3.4. Joliet will be responsible for the design of the new Tunnel Extension, Low Service Pumping Station and Chicago Service Valve but CDWM will pay for their construction. The 60 MGD option includes capital costs associated with the regional pipe network. Joliet will finance these elements with a combination of government program loans and revenue bonds (as described in 6.3.4 Funding Strategy). Capital costs are assumed to escalate 3% annually through the construction period. Capital costs for new infrastructure incurred by CDWM attributable to water service to Joliet will be recovered over time through water rates charged to Joliet and regional partners. **Figures 6-3, 6-4, and 6-5** illustrate the capital cost distribution for the 30 MGD and 60 MGD options. **Figure 6-5** shows Joliet's proportional share of the regional system costs. Joliet will be responsible for 100% of the costs associated with the Joliet distribution system improvements but will share proportionately in all other costs. Capital cost responsibility for the 60 MGD regional system has been distributed proportionally according to Maximum Day Demand.

The following describes the cost components referenced in the Figures:

- ◆ Supplier Capital Improvement costs include engineering, legal, and administrative fees to be paid by Joliet for the Tunnel Extension and Low Service Pump Station to be constructed at the Southwest Pump Station site. Joliet will contract for the design and construction of these facilities, but Chicago will reimburse Joliet for the final costs of construction. These facilities will be owned and operated by Chicago.
- ◆ Water Transmission/Delivery Infrastructure costs include all costs associated with the design and construction of facilities required to convey water from the Low Service Pump Station at the Southwest Pump Station site to receiving facilities in Joliet. These facilities include the Meter Vault, Durkin Park Suction Well, the High Service Pump Station at the Southwest Pump Station site, approximately 31 miles of finished water transmission main, an Intermediate Pump Station and Storage Facility, and a Receiving Pump Station in Joliet. For the 60 MGD regional option, Water Transmission/Delivery Infrastructure Costs also include costs for a new 4 MG Standpipe at the receiving facilities site.
- ◆ Joliet Distribution System Improvements costs include all costs associated with the design and construction of local conveyance, pumping, and storage improvements required to effectively distribute water from the transmission system throughout Joliet’s water supply service area and provide the two-times average day demand storage volume needed to meet Chicago’s requirement for local reserve capacity. Improvements included in this category only serve City of Joliet water customers.
- ◆ Regional Water Commission Network Improvements costs include the conveyance and storage infrastructure required under the 60 MGD Regional option to distribute water from the transmission system to the region as shown in **Exhibit 6-1**. This does not include operating costs such as pumping and transmission to Commission members beyond the Regional Water Commission Network; this would be determined based on which items are Commission-owned or member owned improvements. This will be further evaluated in the development of the Water Commission. No Regional Water Commission Network Improvements are required for the 30 MGD Joliet Only option.

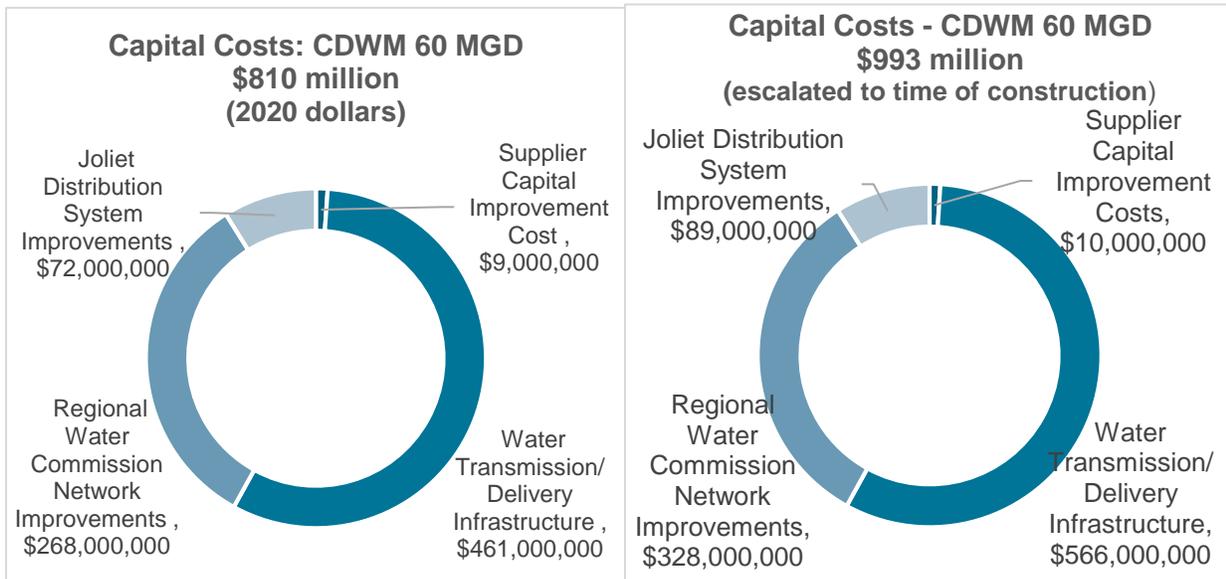
**Figure 6-3**

Capital Cost for 30 MGD CDWM Alternative



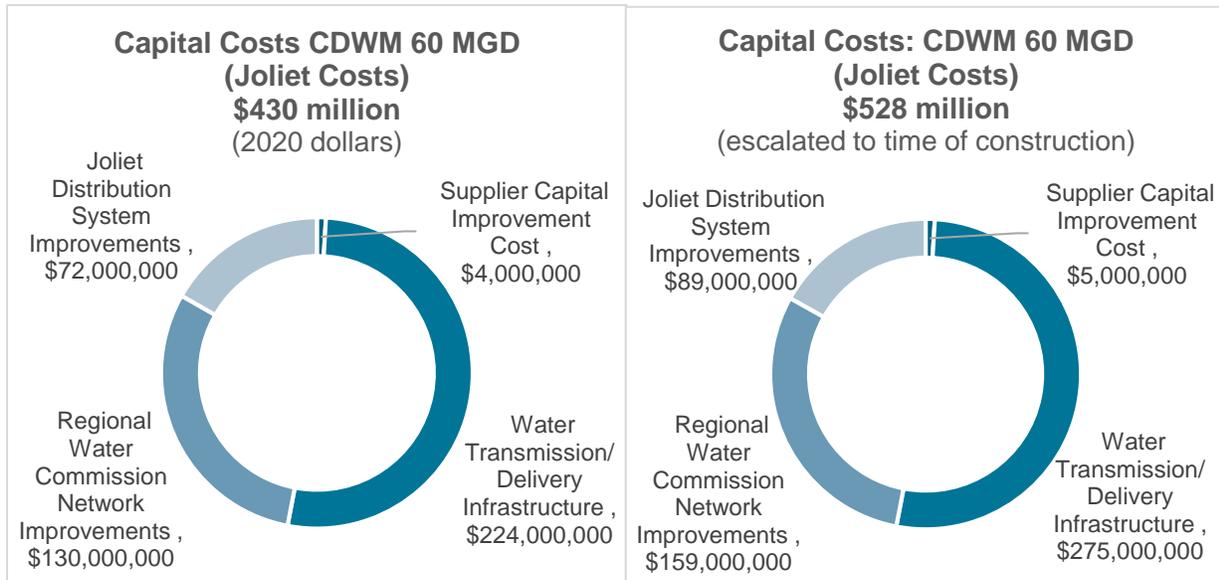
**Figure 6-4**

Capital Cost for 60 MGD CDWM Alternative



**Figure 6-5**

Capital Costs for 60 MGD CDWM Alternative: Joliet Capital Contribution Responsibility



6.7.3 Operation, Maintenance & Replacement (OM&R) Costs

The City of Joliet will have operation, maintenance & replacement (OM&R) responsibility for the new Joliet infrastructure as described in Sections 6.1.3.2 to 6.1.3.4. OM&R responsibility for regional infrastructure would be shared. Estimated City of Joliet or Regional (60 MGD) OM&R costs for the new infrastructure are shown in **Table 6-2**.

Also shown is an estimate of Joliet’s contribution to the regional OM&R costs, based on Joliet’s proportional share of total Average Day Demand. These costs are assumed to escalate at 2% through the life of the project. OM&R costs for the CDWM existing and new infrastructure (tunnel extension and low service pump station) providing water service to Joliet are included in the CDWM purchased water rate and therefore, not presented in **Table 6-2**.

**Table 6-2**

CDWM Alternative – OM&R Costs

Operations, Maintenance and Replacement Costs 2030

	CDWM 30 MGD	CDWM 60 MGD	CDWM 60 MGD (Joliet Share)
<b>Annual OM&amp;R Costs for New Infrastructure</b>	\$4,700,000	\$6,900,000	\$4,300,000
<b>Annual Credit for Reduced Well Use</b>	(\$4,000,000)		(\$4,000,000)
<b>Net Increase in Annual OM&amp;R</b>	<b>\$700,000</b>		<b>\$300,000</b>

#### 6.7.4 Funding Strategy (Overview)

The updated recommended funding strategy has been described in the *Joliet Alternative Water Source Program – Funding Strategy* memo<sup>28</sup>. The City of Joliet will secure capital from multiple sources to fund the Alternative Water Source Program. Currently, Joliet plans to pay debt service with water rate revenues. Water Infrastructure Finance and Innovation Act (WIFIA), Illinois Environmental Protection Agency (IEPA) state revolving funds (SRF), and municipal bonds are the assumed sources of funding, as shown in **Table 6-3**. As explained in Section 6.7.2, CDWM will pay for the construction of the new Tunnel Extension and the New Low Service Pumping Station. For the 60 MGD option, partner capital contributions, new funding options, and the availability of WIFIA and SRF loans may shift the funding strategy in the future.

**Table 6-3**

CDWM Alternative – Funding Strategy

<i>Funding Source</i>	Interest Rate <sup>29</sup>	Maturity	Financing 30 MGD	Financing 60 MGD
<b>WIFIA</b>	2.0% - 3.0%	35 years after substantial completion	\$355,000,000	\$487,000,000
<b>IEPA SRF</b>	1.5% - 2.5%	20 years	\$250,000,000	\$250,000,000
<b>Revenue Bonds</b>	3.0% - 4.0%	30 years	\$120,000,000	\$256,000,000
<b>TOTAL</b>			<b>\$725,000,000</b>	<b>\$993,000,000</b>

#### 6.7.5 Impact on Monthly Water Rates

Rate revenues will support water supply, capital repayment, and operations & maintenance costs associated with the new water source as well as Joliet's existing water system in general. Rate increases will be required to meet revenue requirements. Impacts on a typical, monthly water bill (not including sewer or trash) are reflected in **Figures 6-6 and 6-7**. In **Figure 6-6**, Joliet water revenues are increased gradually to meet water supply, operations & maintenance, and capital repayment costs. **Figure 6-7** shows the associated annual rate increases necessary to meet revenue requirements.

As shown in **Figures 6-6 and 6-7**, it is proposed that Joliet increase rates incrementally over time to build revenues to adequate levels to cover water

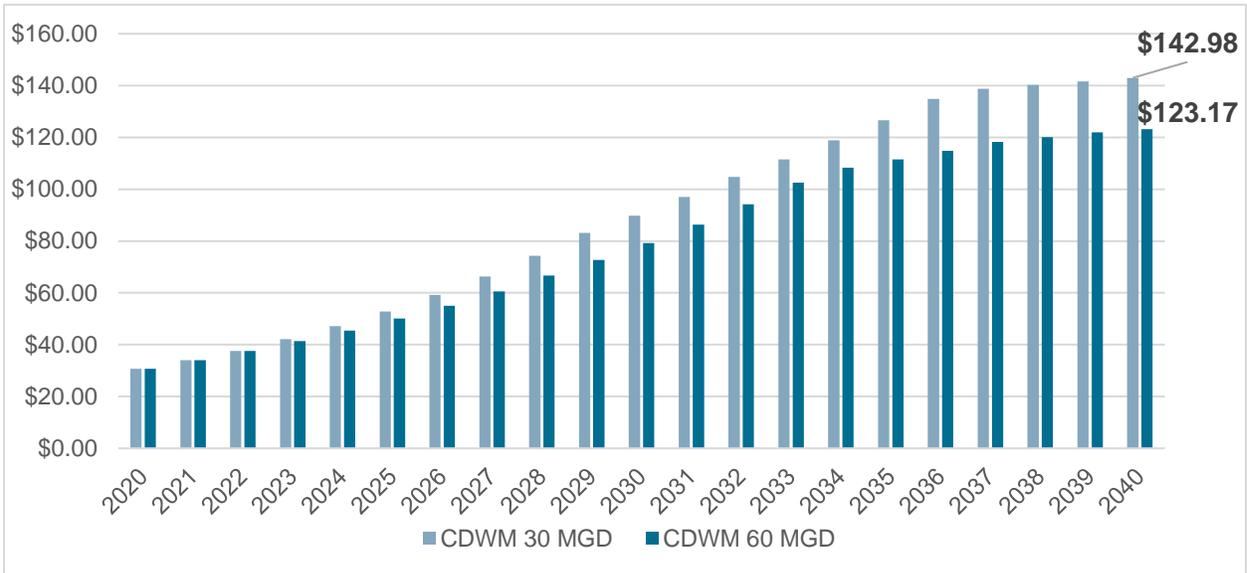
<sup>28</sup> Broughton, Amy, Stantec. *Joliet Alternative Water Source Program - Funding Strategy*. Memo to Allison Swisher. (November 2020). ([Hyperlink](#))

<sup>29</sup> Table 6-3 shows a range of interest rate for each funding source. To be conservative the higher range of interest rates was assumed for the highest funding sources (WIFIA and Revenue Bonds) and the lower range of interest rates was assumed for the lowest funding source (IEPA SRF).

supply, operations & maintenance, and capital repayment costs of the CDWM Alternative and Joliet’s existing water system in general.

**Figure 6-6**

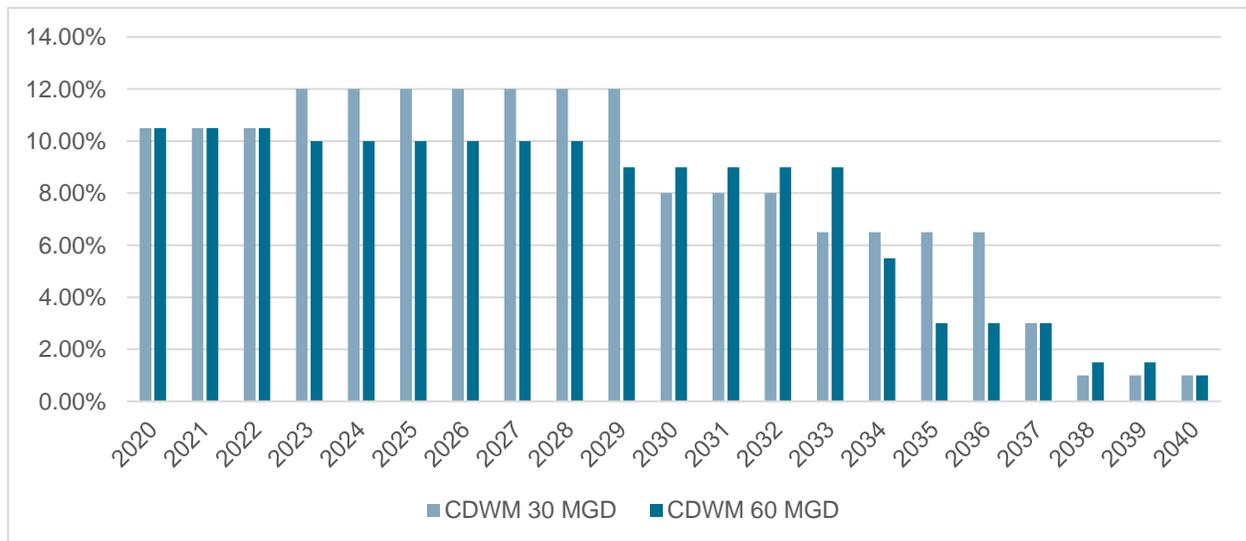
Monthly Water Cost Impact for CDWM Alternative, as well as Joliet’s existing water system in general



As shown in **Figure 6-7**, rate increases for the 30 MGD scenario would be 10.5% annually for 2020 to 2022, 12% annually for 2023 to 2029 and 8% annually for 2030 to 2032, 6.5% annually for 2033 to 2036, 3% for 2037 and 1% annually for 2038 to 2040<sup>30</sup>.

**Figure 6-7**

Annual Rate Increases for CDWM Alternative, as well as Joliet’s existing water system in general



<sup>30</sup> Long-term rate increases assume stable funding requirements after completion of the water supply project. Rate increases may vary based on operating and capital needs as they are better understood over time.

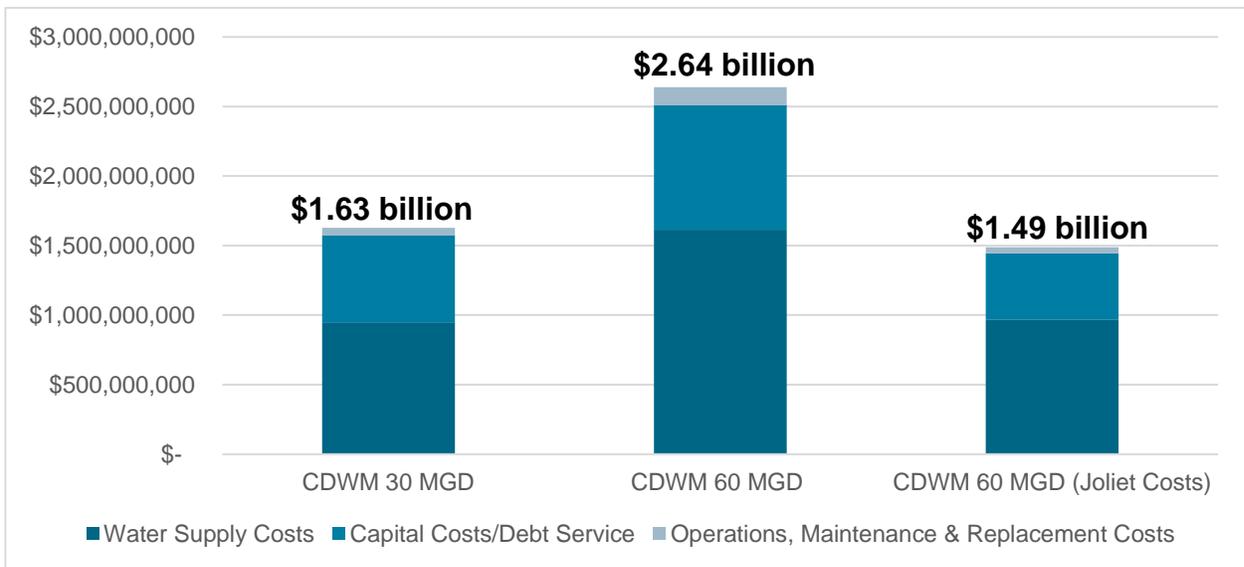
### 6.7.6 Total Cost of Water

For the analysis of costs over 50 years, capital costs associated with the construction of infrastructure and payment of up-front capital recovery are distributed over time based on an assumed debt service. Based on CPI for the last decade, purchased water rates are assumed to increase at an annual rate of 2% per year. Construction costs are forecast to increase at a rate of 3% per year, and water system operation, maintenance and replacement costs are projected to increase at a rate of 2% per year. By applying these assumptions, it is possible to calculate a “total” 50-year cost.

A discount rate of 3% was applied to the annual cost projections to calculate the present value of expected future costs. **Figure 6-8** shows the projected total 50-year cost associated with the 30 MGD and 60 MGD CDWM alternatives. The bars shown in the figure are color-coded to provide an indication of relative contribution of various cost components to the total long-term cost of the project.

**Figure 6-8**

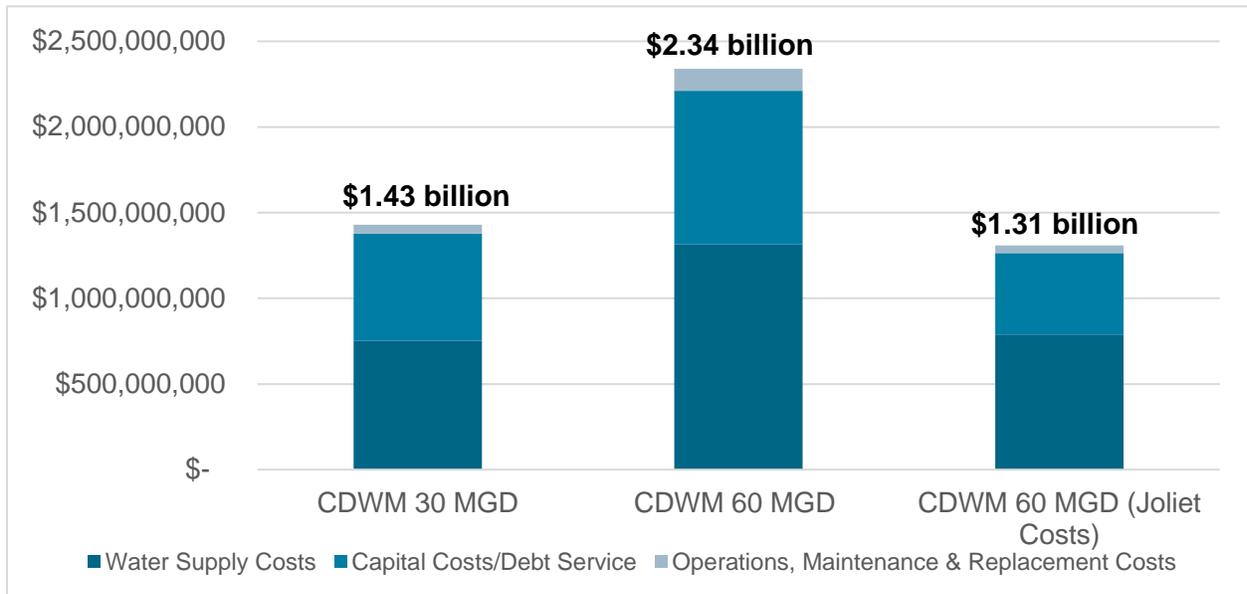
Total Cost of Water for CDWM Alternative



As described in Section 6.7.1, CDWM has suggested a lower annual purchased water rate increase than 2%. To reflect the impact of lower rate escalation, annual water purchase rate increases of 1.30% and 1.39% were assumed in the 50-year Total Cost of Water calculations shown in **Figure 6-9**.

**Figure 6-9**

Total Cost of Water for CDWM Alternative, 1.30% and 1.39% Water Purchase Rate



As you can see in **Figure 6-9**, the 50-year Total Cost of Water decreased by approximately 12.3% and 11.4% for the 30 MGD and 60 MGD options, respectively, when using the lower rate escalation.

**6.8 Regional Implications**

Based on the regional outreach performed as part of the 2020 Evaluation, there does not seem to be a preference amongst the regional communities between the two alternatives.

Given the location of the transmission main for this alternative, there may be more interest from potential regional partners located northeast of the City of Joliet as the transmission main will likely be routed close to these communities possibly making this alternative more cost effective.

**6.9 Intergovernmental Implications**

Communication and education with Illinois state legislators and other state government officials has focused on educating them about the urgent need for an alternative water source and the proposed alternatives. In general, these officials have been supportive of the City’s efforts to find a solution to its drinking water needs, and several have noted that a multi-jurisdictional, regional solution would be ideal. None have objected to the underlying concept of the CDWM alternative. Before formally weighing in on any particular option, state elected officials generally would like to hear additional specifics and the City’s concerns.

On the federal level, the team met with Joliet’s Member of Congress, Rep. Bill Foster, and held detailed briefings with his staff. The team has also briefed staff with Senators Dick Durbin and Tammy Duckworth. All have been interested and supportive of the City’s plans, while raising many of the same questions the City is considering about upfront capital investments and ongoing costs. For example, they recognize the lower construction cost of a CDWM alternative, while understanding that purchasing water could give Joliet less control over its rates. They have also shown strong interest in a regional approach to address declining deep aquifer levels and would like to participate in regional efforts. As the City’s Congressman, Rep. Foster has offered to facilitate these efforts. The delegation also expressed readiness to assist with efforts to find funding or financing assistance at the federal level.

## 7 Alternative Risk Analysis

As noted in Section 5, an active risk register has been developed, updated and maintained in order to track issues that could impact the feasibility, costs or schedule associated with each of the water source alternatives. At the beginning of the 2020 Evaluation, several potential risks were identified in conjunction with potential steps for mitigation. Throughout this process, some risks have been added and some of the risks have been mitigated to low likelihood. **Table 7-1** lists the risks associated with the CDWM Alternative in the order that they could occur as well as the Type of Risk (feasibility<sup>31</sup>, viability<sup>32</sup>, costs, schedule, purchased water cost, disruption of service and future cost), Likelihood of Risk (probability that the risk will occur), Potential for Impact (magnitude of impact if risk occurred) and steps that Project Team Members/City Staff have taken thus far to mitigate the risk.

Likelihood of Risk has been rated as Low, Moderate or High. Risks rated as Low are assumed to have a probability of less than 10%. Risks rated as Moderate are assumed to have a probability greater than 10% but less than 50%. Risks rated as High are assumed to have a probability of greater than 50%.

Potential for Impact (sometimes referred to as consequence) has been rated as Low, Moderate or High. Risks rated as Low are assumed to have a minimal impact to project cost or schedule. Risks rated as Moderate are assumed to have an impact to the cost or schedule within the contingencies or buffers included in the program. Risks rated as High are assumed to jeopardize the ability to implement the new water source either by 2030 or at all.

Risks that have a likelihood of moderate or high are highlighted in orange in the table to emphasize the probability for impact to the implementation of this alternative.

Note that some risks shown are common to both water source alternatives.

**Table 7-1**

Risks Associated with the CDWM Alternative

Risk	Type of Risk	Likelihood of Risk	Potential for Impact	Steps being Taken to Mitigate Risk
<b><i>Chicago’s Other Wholesale Water Users object to new rate calculation</i></b>	Feasibility, Purchased Water Cost	Low	High	New wholesale rate methodology included in Preliminary Agreement may benefit other wholesale customers as well. Chicago meeting with other customers to discuss proposed modifications.

<sup>31</sup> Feasibility refers to whether the alternative can even be attempted.

<sup>32</sup> Viability refers to whether the alternative has the ability to be sustainable over a long period of time.

Draft Report

Risk	Type of Risk	Likelihood of Risk	Potential for Impact	Steps being Taken to Mitigate Risk
<b><i>Joliet is unable to obtain a Lake Michigan Allocation Permit</i></b>	Feasibility	Low	High	Joliet has been coordinating with IDNR for the past two years on Joliet’s potential to obtain an allocation. Joliet submitted its Lake Michigan allocation permit application in September 2020.
<b><i>Chicago is unable to obtain property at Durkin Park Site</i></b>	Feasibility	Low	High	Chicago has had positive preliminary discussions with the Chicago Park District to lay the groundwork for land acquisition prior to final Water Supply Agreement. Preliminary Agreement indicates land will be under contract by 7/31/21.
<b><i>Enabling legislation for Regional Water Commission is not enacted</i></b>	Feasibility, Cost	Low	Moderate	Education of state and federal legislators about regional water need, urgency, and potential for regional collaboration to address the problem in order to garner support for Regional Water Commission has occurred in 2020. Legislators have been supportive of the concept.
<b><i>Chicago will not approve Water Supply Agreement</i></b>	Feasibility	Low	High	Preliminary Agreement to be approved by Chicago City Council indicates intent for Chicago to approve final Water Supply Agreement.
<b><i>Perception of Chicago as undesirable water supplier could limit regional participation, resulting in higher construction costs for Joliet</i></b>	Costs	Low	Low	Chicago has made significant strides in its commitment to transparency and collaboration with its wholesale customers as well as on rate methodology. Regional outreach conducted to date has not indicated this is an issue.
<b><i>Lack of regional participation results in the inability to form a Water Commission</i></b>	Feasibility, Cost	Moderate	Moderate	Significant regional outreach has been performed to promote a Regional Water Commission approach to allow for decreased cost due to economies of scale as well as right-of-way use outside City limits. If a Commission could not be formed, Joliet could pursue special land acquisition legislation.

Draft Report

Risk	Type of Risk	Likelihood of Risk	Potential for Impact	Steps being Taken to Mitigate Risk
<b><i>Change in Chicago Mayor/Administration jeopardizes terms &amp; conditions of Water Supply Agreement</i></b>	Feasibility, Viability, Purchased Water Cost	Low	High	Preliminary Agreement memorializes key terms and conditions for negotiation of final Water Supply Agreement, which is anticipated to be approved in Fall 2021, prior to Chicago's next Mayoral election in 2023.
<b><i>Unable to obtain right-of-way or acquire land for transmission main and intermediate pump station facility</i></b>	Feasibility, Cost	Moderate	High	The development of a Regional Water Commission is being pursued which will mitigate land acquisition and right-of-way use issues. In addition, early outreach to impacted communities was conducted as part of the 2020 Evaluation and did not identify any potential issues.
<b><i>Funding strategy cannot be achieved through lack of funding of low interest state and federal loan programs</i></b>	Feasibility, Costs	Low	Low	While the funding strategy may need to be adjusted, the program can still be financed through traditional revenue bonds at a slightly higher interest rate. Joliet has already secured WIFIA funding for 49% of the improvements.
<b><i>Tunnel connection at the Southwest Pumping Station is complex with potential risk to Chicago's existing customers</i></b>	Construction	Low	Moderate	This risk is low to Joliet because the City of Chicago will be responsible for the design and construction of the Tunnel Connection.
<b><i>The extent &amp; complexity of improvements, permitting &amp; land acquisition may result in Joliet not being able to construct the proposed improvements by 2030</i></b>	Feasibility	Low	High	In the Preliminary Agreement negotiation, Joliet has maintained control of the majority of the construction, thereby retaining the ability to mitigate potential schedule impacts. A planning, design, construction coordination plan will be developed with the City of Chicago to ensure completion by 2030.

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Risk	Type of Risk	Likelihood of Risk	Potential for Impact	Steps being Taken to Mitigate Risk
<b><i>Water Source Transfer is unsuccessful resulting in deterioration of existing protective coating in pipes in Joliet water distribution system</i></b>	Water Quality, Disruption of Service	Low	High	Even though it is more than 10 years before the switch, steps are being taken to verify that the switch will not result in any negative water quality impacts. Water Source Transfer Testing will be performed in 2021 to verify no impact.
<b><i>Debt burden due to capital improvements negatively impacts Joliet's credit rating</i></b>	Cost	Low	Low	Proposed water rate increases support repayment of debt. Formation of Water Commission would distribute debt burden and associated risk.
<b><i>Monthly water bills become unaffordable to some customers resulting in non-payment</i></b>	Water Rates	Low	Low	Project team has investigated affordability programs for Council consideration to minimize impact on affected customers.
<b><i>Chicago loses wholesale customers resulting in higher capital costs being attributed to Joliet, and therefore higher wholesale water rates</i></b>	Purchased Water Costs	High	Moderate	Impact to Joliet's wholesale water rate was estimated to be ~\$0.10/1,000 gallon for every 10 MGD lost. This calculation assumes lost customers utilize the same Chicago facilities as Joliet.
<b><i>Chicago significantly increases uniform water rate to pay for improvements such as lead service line replacement, individual customer meters, and water main replacement</i></b>	Purchased Water Costs	Low	Low	Under the negotiated wholesale rate, Joliet will not be responsible for improvements in Chicago's water distribution/transmission system that do not serve Joliet, such as lead service line replacement and metering. Joliet's ultimate rate will depend on the cost of serving Joliet, not other Chicago-wide or Chicago retail costs.

Risk	Type of Risk	Likelihood of Risk	Potential for Impact	Steps being Taken to Mitigate Risk
<b><i>Chicago has conventional water treatment that is not effective in treating emerging contaminants, advanced treatment may be required to treat emerging contaminants</i></b>	Future Costs	Moderate	High	Chicago has been monitoring emerging contaminants in Lake Michigan and levels are currently below limits currently being contemplated for water quality standards. Future limits of known and unknown contaminants are uncertain.
<b><i>Chicago has aged infrastructure that may require maintenance or replacement in the near future</i></b>	Future Costs, Disruption of Service	Moderate	High	Through the provisions of the Water Supply Agreement, Chicago will work with Joliet to minimize impacts due to planned outages for maintenance. To mitigate cost impacts, Joliet will be able to have a voice in future improvements through the proposed Advisory Council.
<b><i>Break occurs in the Transmission Main resulting in loss of water service to Joliet</i></b>	Disruption of Service	Low	Moderate	As part of the Alternative Water Source Program the City will increase its storage to two times average day demand allowing for time to repair break. The City will maintain its existing well water supply to be an emergency back-up in the event of transmission main breakage or loss of service from CDWM that cannot be repaired in two days.
<b><i>Maximum Agreement Term is 50 years, with automatic 10 year renewals with potential not to renew or for reopener of terms on both sides</i></b>	Viability, Purchased Water Cost	Low	High	Water Commission statutes set maximum term length. Possible amendment to law under consideration and discussion with Chicago. Joliet will continue to maintain relationship with Chicago to facilitate agreement renewal.
<b><i>Due to Chicago’s budget deficits, Chicago could decide to sell the water system to a private utility</i></b>	Viability	Low	High	Preliminary Agreement includes provisions that Chicago cannot transfer Water Supply Agreement or sell the water system without Joliet’s written consent.

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For a program of this magnitude, it is no surprise that there are several risks. Significant efforts have been made during 2020 to mitigate the risks that could have the greatest impact, especially related to the feasibility of the alternative. In some cases, the risks have been completely mitigated and have been shown with a likelihood of Low.

Of the 22 risks listed, 13 risks have identified related to the implementation of the alternative (prior to water delivery) with the remaining 9 risks related to ongoing operations after water delivery.

Based upon this risk analysis, there are a number of short term risks as well as long term risks associated with this alternative. The short term risks can impact the potential feasibility of the project due to issues related to formation of the water commission while the long-term risks primarily appear to impact the future viability of the alternative as well as future purchased water cost.

## 8 Alternative SWOT Analysis

Based on the alternative evaluation presented in Section 6 and the risk analysis discussed in Section 7, the alternative's strengths, weaknesses, opportunities and threats can be identified. Strengths and weaknesses are internal while opportunities and threats assess external activities that may impact this alternative. While steps have been taken to mitigate risks, some risks can still be identified as weaknesses or threats for this alternative.

### 8.1.1 Strengths

- ◆ Joliet does not have design, permitting, construction and operational responsibilities for surface water treatment facilities. Source water monitoring, source water testing, intake/raw water supply, water treatment and associated liability will be responsibility by CDWM.
- ◆ Chicago is an established, large water supplier with high quality source and proven track record supplying water to communities in northeastern Illinois.
- ◆ All construction activity is within the State of Illinois, easing the regulatory burdens on the project.
- ◆ Improvements can be completed in time to allow for new water source to be online by May 1, 2030; Joliet has control of design and construction schedule for all but one component of the interconnection with Chicago.
- ◆ Cost of service based water rate ensures that Joliet only pays for operations and improvements to capital assets associated with service to Joliet.
- ◆ Proposed advisory council offers Joliet the opportunity to provide meaningful input and feedback regarding the management, operation, and financial aspects, including water rates and capital investments, of the Chicago water system.
- ◆ Agreement transferrable to Regional Water Commission, if formed.

### 8.1.2 Weaknesses

- ◆ Ultimate decisions regarding the CDWM water system and issues impacting water production and thus purchased water costs are made by the City of Chicago City Council.
- ◆ Reliance on Chicago's existing aged infrastructure which may require replacement in the future, resulting in increased costs and service interruptions.
- ◆ Reduced flexibility for future expansion and operational opportunities.
- ◆ Complex construction at a constrained site in a densely developed, urban area in Chicago.

### 8.1.3 Opportunities

- ◆ Promotion of regionalization and use of existing infrastructure for economies of scale.
- ◆ Collaboration with City of Chicago (and its existing wholesale customers) leverages benefits of affiliation with prominent, and experienced large water utility.

### 8.1.4 Threats

- ◆ Factors beyond Joliet’s control, such as need for replacement of aging infrastructure, the need to construct advanced treatment and departure of existing wholesale customers result in purchased water rates increasing more than forecasted.
- ◆ Future changes to corrosion control and/or the water treatment process by Chicago negatively impacts the water source transition from groundwater to treated Lake Michigan water source.
- ◆ Challenges with connection to Chicago’s tunnel results in schedule delays.
- ◆ Inability to establish a Water Commission adds complexity to land acquisition outside Joliet limits.
- ◆ Higher interest rates than those assumed for program funding results in increased program costs and monthly water rate impact to customers.
- ◆ Increased monthly water bills result in customer non-payment thereby reducing revenues required to support program and water system in general.

## 9 Alternative Summary

When faced with a decision of this magnitude and importance that will affect the residents of Joliet for decades, even centuries to come, it is helpful to have a summary of the key alternative parameters, as shown in **Table 9-1**.

**Table 9-1**

Summary of Key Alternative Parameters

Parameter	Lake Michigan Water – CDWM Alternative
<b>Improvements Required</b>	Tunnel Extension, Low Service Pump Station, Chicago Service Valve, Meter Vault, Suction Well, High Service Pump Station, 31 miles of Transmission Main including intermediate Pump Station and Reservoir, Joliet Distribution System Modifications including additional Storage & Pump Stations
<b>Capital Costs (2020 dollars)</b>	\$592 million for 30 MGD system, \$810 million for 60 MGD system
<b>Type of Agreement</b>	Water Purchase for treated Lake Michigan water
<b>Length of Agreement</b>	50 years plus additional 10 year automatic renewals with 5-year advance notice of intent not to renew, also allows reopeners for discussion of issues on both sides
<b>Compensation</b>	Volumetric based on the water purchased, Annual cost of \$27.5 million for 30 MGD system, \$44.4 million for 60 MGD system (based on 2031 demand and 2031 rates)
<b>Basis for payment</b>	Uniform Water Rate plus credit/debit for difference between Uniform Water Rate and Wholesale Rate (as determined by annual cost of service)
<b>Operation, Maintenance &amp; Replacement (2020 dollars)</b>	Net increase of \$700,000 annually for 30 MGD, \$300,000 annually for 60 MGD (Joliet share)
<b>50-year Total Cost of Water</b>	\$1.63 billion for 30 MGD, \$2.64 billion for 60 MGD based on 2% rate escalation and \$1.43 billion for 30 MGD, \$2.34 billion for 60 MGD based on 1.3% and 1.39% rate escalation, respectively
<b>Rate Increases</b>	For 30 MGD system: 10.5% per year from 2020 to 2022, 12% per year from 2023 to 2029, 8% per year from 2030 to 2032, 6.5% per year from 2033 to 2036, 3% for 2037 and 1% per year for 2038 to 2040
<b>Estimated Monthly Water Bill</b>	For 30 MGD system: 2030 - \$89.83/month, 2040 - \$142.98/month based on estimated average monthly water usage of 700 cubic feet
<b>Control</b>	No Control over water treatment and rate setting for purchased water rates – only participation on Chicago’s new Advisory Council
<b>Operational Requirements</b>	Joliet responsible for water pumping, transmission and distribution. Staffing to remain unchanged from current levels.

## 10 Prospectus Summary – The Business Case

The detailed analysis of the overall features, costs, benefits and risks associated with the Lake Michigan Water - CDWM Alternative completed during the 2020 Evaluation confirms that it is a viable option for bringing high quality, treated Lake Michigan water to Joliet and the region by 2030. The City of Chicago has demonstrated over the past 6 months that it has a high level of interest in providing water service and is willing and prepared to serve Joliet and potential regional partners as wholesale water customers under a new framework that offers greater engagement and transparency related to system operations and pricing. The framework includes a different pricing model than Chicago has historically used for its wholesale water supply agreements. The proposed wholesale water rate methodology provides that Joliet would only pay for a capital cost share of the facilities used to supply water to Joliet and a share of the actual cost of service for operation and maintenance of those designated facilities. The proposal also includes a proposed advisory council that offers Joliet the opportunity to provide meaningful input and feedback regarding the management, operation, and financial aspects, including water rates and capital investments, of the Chicago water system. This new framework is a significant departure from CDWM's prior methodology regarding rate setting which offered no ability for input and required the same rate for wholesale and retail customers.

The City of Chicago, through the Chicago Department of Water Management, operates a large scale water utility reliably serving more than 100 northeastern Illinois communities and a total population of more than 5 million people through an infrastructure network of intakes, water treatment plants, water tunnels, and large pumping stations. These facilities and CDWM's comprehensive water quality laboratories are managed, operated, and maintained by more than 1,300 staff, including more than 12 water professionals with advanced degrees.

Under the CDWM Alternative, the City of Joliet would purchase treated water from the City of Chicago near 84th and Kedvale on the southwest side of Chicago. Water supplied to this location is drawn from Lake Michigan at the 68th & Dunne Crib on Lake Michigan, treated at the Eugene Sawyer Water Purification Plant, and conveyed to 84th and Kedvale on the southwest side of Chicago through the existing South Tunnel System. Treated water would be supplied to Joliet through a new tunnel connection and pumping station owned and operated by Chicago. From the new Chicago pumping station, the water would flow through a meter vault to a new suction well owned and operated by Joliet. Joliet would pump water from the suction well via a new pump station through approximately 31 miles of new, large diameter water transmission main to Joliet. From that point, the treated water would be distributed to key points within Joliet through new water distribution piping, storage and pumping facilities. Joliet would retain its existing wells as an emergency source for water in the event that the supply from Chicago would be disrupted.

During the past 6 months, Joliet City staff and members of the consultant team have engaged in detailed technical analyses of the infrastructure elements of this system and conducted extensive outreach to external parties including the City Of Chicago, major regulatory and permitting entities, and municipal, utility, railway, and private entities with control of rights-of-way between Chicago and Joliet. This extensive coordination was required to verify the viability of this alternative. Through these efforts Joliet has negotiated a preliminary water supply agreement with the City of Chicago. Coordination with entities in control of land along the proposed transmission main route has also provided the team with critical information regarding

the suitability and likely costs associated with transmission main construction between Chicago and Joliet.

It is estimated that the 2020 capital cost of the new infrastructure to bring up to 30 MGD of water from Chicago to Joliet would be approximately \$592 million dollars; upsizing of the system to meet a potential regional demand of 60 MGD would increase costs to be borne by Joliet and its regional partners to approximately \$810 million dollars. Considering the added cost for the purchase of treated water from Chicago and financing of the required capital improvements, it is estimated that the 50-year total cost for providing water to Joliet alone or Joliet plus several regional partners would be on the order of \$1.63 billion or \$2.64 billion, respectively, based on an assumed rate escalation of 2%. If a lower escalation rate of 1.3% or 1.39% is utilized, as suggested by CDWM, the 50-year total cost for providing water to Joliet alone or Joliet plus several regional partners would be on the order of \$1.43 billion or \$2.34 billion, respectively. Financial analysis suggests that a program of rate increases of 10.5% annually from 2020 to 2022, 12% annually from 2023 to 2029, 8% annually from 2030 to 2032, 6.5% annually from 2033 to 2036, 3% in 2037 and 1% annually from 2038 to 2040 would be needed to support development and operation of this new system and other necessary improvements to the City's existing water system including water main replacement of 1.6% annually.

For the CDWM alternative, Joliet would be able to leverage the knowledge and water supply expertise as well as the existing capacity of the City of Chicago system for providing treated Lake Michigan water to reduce the effort, time, cost, and risks associated with development and operation of a new lake intake and surface water treatment plant. Joliet would become a long-term, wholesale customer of Chicago, bound by the terms, and conditions established in a negotiated long-term Water Supply Agreement. However, this alternative is not without its risks. The City of Joliet would give up control over water supply and treatment and be subject to Chicago's wholesale water rates. While the City of Chicago and the City of Joliet have negotiated a water rate methodology which results in a true wholesale rate, the City of Chicago's infrastructure is aged and its treatment process does not treat for emerging contaminants which could result in significant replacement and water treatment costs in the future. While risks exist with relinquishing control of Joliet's water production and treatment, with this alternative, the City of Joliet has the opportunity to collaborate with the City of Chicago along with its existing wholesale customers to leverage the benefits of affiliation with a prominent and experienced large water utility that serves millions of customers.

## APPENDIX A – Preliminary Water Supply Agreement

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