Joliet Alternative Water Source Study

Topic #10: Total Cost of Water
July 1, 2019

As the City of Joliet proceeds with its evaluation of multiple options for a new source of water supply, it is important to establish a clear understanding of the way in which the costs of alternatives will be considered. In particular, it is critical to understand the component costs that will eventually make up the total cost associated with each of the water supply options being considered and eventually contribute to changes in the cost of water to Joliet customers.

The attached table provides a summary of various possible cost components that will contribute to the total cost Joliet would incur to develop and operate a new water supply. Individual cost components are described further in the balance of this memo.

Costs associated with new water supply options for Joliet can be broken down into three primary categories:

- Water Supply Costs
- Capital Improvement Costs
- Operation and Maintenance Costs

For the purpose of this discussion, water supply costs include costs charged to Joliet by another entity responsible for the supply of water to the community. Capital improvement costs include the costs for design and construction of new Joliet-owned infrastructure required to bring water from a new source to the City, and operation and maintenance (O&M) costs include cost associated with the ongoing and sustainable operation of the new supply system.

Water Supply Costs

Water supply costs may vary depending on the structure and organization of the entity that is assumed to supply water to Joliet. These costs do not apply to supply alternatives that are fully owned, operated, and controlled by Joliet. Specific water supply costs to be considered in the analysis of Joliet's supply alternatives are described below.

1.1 Sign-on/Membership/Capacity Recovery Charge. Established regional suppliers of water may charge Joliet a fee to become a member of their organization. Such a fee typically serves to offset the past costs incurred by the existing entity and its members to create the system and provide a certain level of capacity. In some cases, the cost is specifically identified as a capacity recovery charge. This is typically a one-time cost that would be incurred when Joliet acts to become a formal member or customer of the established water supply entity.

1.2 Supplier Capital Improvement Cost. In the event that an existing water supply entity needs to make improvements to its water delivery infrastructure specifically to meet Joliet's needs, the supply entity may charge Joliet for the engineering and/or construction costs associated with the improvements. An example of this cost component might be a charge for the installation of a new pump required to increase the capacity of a supplier facility to get water to Joliet.

1.3 Annual Charge for Access to Water. In a situation where Joliet or its water supply entity has to work through another community to get water from its proposed source, a cost may be imposed by the other community for accessing the water supply. For example, the Southland Water Agency has indicated that it would have to pay this type of annual fee to the City of Hammond for

the right to operate its water supply infrastructure within Hammond. Depending on the structure of a given supply scenario, this cost may be a direct cost to Joliet, or it could be rolled into the purchased water rate charged by a supply entity.

1.4 Costs for Purchase of Water from Supplier. If Joliet decides to purchase water from a separate water supply entity, it will incur ongoing costs for the purchase of that water. The cost for purchased water will almost certainly include a volumetric charge based on the amount of water that Joliet purchases in a given month or billing period. However, depending on the structure of the rates charged by the respective water supply entity, the rate for purchased water may also include a fixed cost component or a separate component that serves to specifically offset the supply entity's operating and maintenance needs.

Capital Improvement Costs

Capital Improvement Costs, that will have to be paid by Joliet to establish its new source of water supply, include the costs associated with planning, design, permitting, construction and financing new water supply facilities to connect to a new source of supply and efficiently distribute water from the new source throughout its service area. For the purpose of this discussion, these costs only include the costs associated with facilities to be constructed and owned by Joliet.

2.1 Capital Improvement Costs – Water Supply/Production Infrastructure. Under alternatives where Joliet would secure its own supply of water directly from a source and provide for the treatment of that water, the City will incur capital costs (including engineering and easement/land acquisition costs) to construct the necessary water supply and production infrastructure. Specific capital improvements required will include a new intake (river or lake), a raw water pumping station, some length of raw water transmission main, and a water treatment plant. While these costs are incurred during the design and construction of the improvements, their impact on customers is typically spread out using bonding arrangements or loans paid back over an extended period of time. No capital improvement expenditures for water supply and production infrastructure are required under alternatives where Joliet would purchase treated water from another water supply entity.

2.2 Capital Improvement Costs - Water Transmission/Delivery Infrastructure. All of the alternative water source options being considered by Joliet will require the construction of new finished water pumping and transmission main infrastructure. These costs will include planning, design, permitting, land and easement acquisition, and construction costs for the new infrastructure. Given the distances between Joliet and the potential new water sources, the cost for new transmission and delivery infrastructure, including potential costs associated with acquiring easements or right-of-way through a large number of other communities will be significant.

2.3 Capital Improvement Costs – Joliet Backup Supply Improvements. Redundancy is critical to maintaining a reliable supply of water for any community. Regardless of the new supply alternative selected, Joliet will need to make sure that its new supply system is capable of meeting the community's needs under all anticipated conditions including periods of extended low flow in area rivers, or periods when components must be shut down for emergency maintenance or repair. For example, Joliet will need to have a reliable backup source of supply for periods when withdrawals from a river supply are limited due to low flows in the waterway. Initial analyses suggest that the City will need to maintain and operate wells during these periods. Similarly, Joliet may need to invest in capital improvements for additional storage capacity to support the system during a planned or emergency outage of a lake water transmission system. Costs for such improvements make up this component of the overall cost of water for the City.

2.4 Joliet Distribution System Improvements. The current Joliet water system relies on a network of wells and water treatment facilities located across the service area. In contrast, all of the proposed supply alternatives will likely result in the delivery of treated water to a single point in Joliet. As a result, the City will need to implement capital improvements to efficiently distribute water from the new delivery point throughout its service area. These improvements are likely to include new water distribution main, one or more new pumping stations, and potentially new water storage facilities.

2.5 Financing Costs. By their nature, capital improvements require significant investment over a relatively short period of time between the start of planning for an improvement and completion of its construction. Municipalities and water utilities typically mitigate the impact of these costs on their budgets and rates through long-term financing of the construction costs using bonds or loans. Regardless of the method used, costs associated with long-term financing (typically for a period of 20 years or more) can be significant. Typical financing scenarios will be considered during the analysis of costs associated with Joliet's supply alternatives to confirm that financing costs are reasonably reflected in the total cost of water.

Operating and Maintenance Costs

Once new water system infrastructure is constructed, it must be properly operated and maintained to achieve Joliet's objectives for reliable, quality water service. Operation and maintenance (O&M) costs include all costs associated with the ongoing operation and upkeep of a water system. As Joliet moves to implement a new water supply system, it will incur new O&M costs and likely see changes in the level of O&M costs associated with operation of its existing water infrastructure.

3.1 Reduction in O&M Costs for Existing Wells and Treatment Systems. The implementation of a new source of water supply for Joliet will result in a reduction in the City's reliance on its existing network of wells and water treatment facilities. While some of these facilities will need to be maintained as part of the City's backup supply system, total costs associated with operation and maintenance of the existing facilities will change. These changes may include changes in costs associated with labor, energy, chemicals and supplies, or major maintenance/rehabilitation efforts. The magnitude of the change will be estimated for each option based on reductions in the number of facilities to be maintained and the amount of time that the remaining facilities are expected to be operated.

3.2 O&M Costs for New Production/Transmission Facilities. New water supply, treatment, and conveyance infrastructure required to supply water to Joliet from any of the proposed alternative sources will likely represent a major increase in the physical assets that the City will have to operate and maintain. Additional operating costs will include costs for energy to operate treatment and/or pumping facilities, chemicals and supplies required for management of water quality, and potentially additional staff to operate and maintain the facilities. The City will also have to budget for new costs associated with the ongoing maintenance of the new water facilities. While maintenance costs should be relatively low in the early years after the new infrastructure is constructed, the real cost of maintenance over an extended planning period must be calculated and included in the cost analysis to accurately reflect the long-term impact of the improvements on Joliet's water system finances.

3.3 Increased Distribution System O&M Costs. As noted previously, Joliet will need to make capital improvements within its existing water distribution system to make the transition from a distributed supply system to a centralized supply system. The new distribution system main, pumping equipment, and storage facilities required to implement this change will also require ongoing investment for operation and maintenance that must be considered in the calculation of the total cost of water for Joliet customers. *In addition, careful consideration must be given to the cost of*

corrosion control modifications that the City may have to make as it changes its source of water. Under current conditions, an equilibrium exists within the Joliet distribution system as a result of a combination of Joliet's existing water chemistry, its current corrosion control practices, and the characteristics of its water distribution mains. A new source of supply will change the chemistry of Joliet's water and require adjustments in its approach to corrosion control to minimize disruption of the current equilibrium within the pipe network.

3.4 Joliet Non-Revenue Water Reduction Improvements. Recent analyses have indicated that approximately 25% of the water pumped into the existing Joliet water system does not generate revenue for the City as a result of a combination of physical leakage and administrative losses. The City is committed to ongoing efforts to cost-effectively reduce this level of non-revenue water over time. However, if Joliet decides to pursue a Lake Michigan water allocation for its new water supply, it will have to commit to an aggressive program to work toward the Illinois Department of Natural Resources 10% limit on non-revenue water for Lake Michigan Allocation permittees. Such a commitment would likely require expanded leak detection and repair, meter testing and replacement, and increased replacement of aging water main. Work is currently in progress to determine the magnitude and overall cost of non-revenue water reduction efforts associated with both the river and lake supply options for the City.

Total Cost of Water Analysis

Once all of the various cost components associated with Joliet's alternative water source options are developed, an analysis will be performed to provide for a consistent comparison of total costs in terms of impacts on the cost of water for an average customer in the City. One-time costs associated with establishment of a water supply agreement with a water supply entity and early capital costs will be amortized over a planning period based on typical borrowing rates to generate equivalent annual costs. Annual costs for the purchase of water, access to water, or operating and maintenance requirements will also be scheduled over the planning period so as to establish an overall forecast of expenditures. The resulting combination of amortized costs (including financing costs) and annual expenditures can then be used to estimate the impact of the project on an average customer in Joliet.

As the City moves forward with selection of a specific supply alternative and implementation plan, more detailed funding and financial analyses will need to be performed to define a preferred financing strategy and integrate the costs of the new system into the City's specific water rate structure.

JOLIET ALTERNATIVE WATER SOURCE STUDY
SUMMARY OF COST COMPONENTS

	Cost Component	Description	Controlling Entity	Example	Illinois River	Kankakee River	Lake Michigan - CDWM	Lake Michigan - DWC	Lake Michigan - SWA (Treated Water)
Water Supply Costs									
1.1	Sign-on/Membership/Capacity Recovery Charge	One time charge upon execution of water supply agreement or rolled into water rate	Water Supply Entity	Cost to become a member of the DuPage Water Commission				X	
1.2	Supplier Capital Improvement Cost	One time charge upon construction of supplier capital improvements or rolled into water rate	Water Supply Entity	Cost for installation of new pump at Chicago's Southwest Pumping Station			X	X	X
1.3	Annual Charge for Access to Water	Annual charge for duration specified in water supply agreement	Raw Water Supply Entity	Hammond raw water access charge to Southland Water Agency					X
1.4	Costs for Purchase of Water from Supplier Fixed Water Purchase Cost Volumetric Water Purchase Cost Other Water Purchase Cost	Water rate charged to Joliet by supplier for the purchase of water during a period of time (month, quarter, etc.)	Water Supply Entity	Monthly water rate charged to Joliet by Southland Water Agency for the purchase of water			X	X	X
Capital Improvement Costs									
2.1	Water Supply/Production Infrastructure Engineering Design/Construction Services Easements/Land Acquisition Infrastructure Construction	Costs to design and construct infrastructure required to obtain and treat water from a new source of supply	Joliet	Cost for construction for Joliet-owned facilities required to obtain and treat Illinois River water	X	X			X
2.2	Water Transmission/Delivery Infrastructure Engineering Design/Construction Services Easements/Land Acquisition Infrastructure Construction	Costs to design and construct infrastructure required to convey water from supply point to Joliet receiving point	Joliet	Cost for construction of Joliet-owned facilities required to convey water from the Chicago supply point to Joliet	X	X	X	X	X
2.3	Joliet Backup Supply Improvements Engineering Design/Construction Services Easements/Land Acquisition Infrastructure Construction	Costs to design and construct infrastructure required to provide backup supply to Joliet during periods of shortage in primary supply	Joliet	Cost for modification or improvement of Joliet wells to provide backup supply during extended low flow periods on the Kankakee River	X	X	?	?	?
2.4	Joliet Distribution System Improvements Engineering Design/Construction Services Easements/Land Acquisition Infrastructure Construction	Costs to design and construct infrastructure required to distribute water from Joliet receiving point throughout service area.	Joliet	Costs for design and construction of a new distribution main piping to convey water from receiving point to other parts of Joliet	X	X	X	X	X
2.5	Financing Costs Administrative Costs (Bonds, Grants, Loans) Interest/Bond Repayment Costs	Costs to secure financing and repay loans or bonds	Financial Markets	Interest on State Revolving Fund Loans obtained from the Illinois Environmental Protection Agency	X	X	X	X	X
Operating and Maintenance Costs									
3.1	Reduction in O&M Costs for Existing Wells, Treatment Reduction in Labor Costs Reduction in Energy Costs Reduction in Chemical, Supply Costs Reduction in Maintenance Costs	Reduction in costs resulting from decreased use of existing wells and treatment facilities	Joliet	Reduced cost for purchase of HMO treatment chemicals required at existing water treatment facilities	X	X	X	X	X
3.2	O&M Costs for New Production/Transmission Facilities Labor Costs Energy Costs Chemical, Supply Costs Maintenance Costs	Costs for operation and maintenance of new Joliet-owned water supply, treatment, pumping, storage and conveyance facilities	Joliet	Cost for energy required to operate new pumping facilities to convey water from Chicago to Joliet	X	X	X	X	X
3.3	Increased Distribution System O&M Costs Modified Corrosion Control Energy Costs Maintenance Costs	Costs for operation and maintenance of new distribution pumping, storage and conveyance infrastructure within the Joliet system	Joliet	Costs for energy required to operate a new pumping station at the Fairmont and Garvin water receiving point	X	X	X	X	X
3.4	Joliet Non-Revenue Water Reduction Improvements Increased Leak Detection/Meter Testing Increased Leak Repair/Meter Replacement Increased Water Main Replacement	Costs for annual inspection, testing, repair, and replacement projects required to reduce non-revenue water levels	Joliet/IDNR	Costs for increased annual water main replacement needed to progress toward IDNR requirement for 10% level of non-revenue water	?	?	X	X	X