



## Identifying and Quantifying Risk

Some decisions that we make each day are relatively straight-forward. Unfortunately, decisions related to selection and implementation of a long-term water supply for an entire community don't fall into that category. While significant work is being done to define many features of the water source alternatives being considered by Joliet, it is not possible to know everything about what it will take to implement each option in advance. This uncertainty can be understood as risk.

For example, how much water will be needed to meet the demands of Joliet and potential regional partners in the year 2050 and beyond? The answer to this question has a significant impact on the infrastructure required to get water to Joliet and the way in which project costs are recovered in the future. While projections of future demands can be developed using standardized methodologies and the available data, there is a risk that future water needs could be more or less than estimated.

Similarly, we all want to know how much the water provided to Joliet through the new system will cost. Estimates have been developed and will continue to be refined through engineering and financial analysis, but many factors that could significantly impact project costs cannot be accurately defined at this point in the project. Uncertainty related to material costs, subsurface conditions, costs to City of Joliet to obtain easements or right-of-way outside Joliet, and future escalation in prices all represent significant risk for the City as it develops plans to finance the program.

Joliet's Strategic Plan for Alternative Water Source Implementation recognizes the importance of identifying and quantifying these risks. A component of the work being performed for the City this year involves the development and maintenance of a risk register. A risk register is a dynamic inventory of risks to the feasibility, performance, schedule, or cost of the overall program. The graphic below shows the structure of a preliminary risk register for the Joliet Alternative Water Source Program.

Joliet AWSP Preliminary Risk Matrix								
Probability Percentage	Likelihood Indices		Risk Matrix					
	>25%	Likely	1	4	5	4	3	2
15 to 25%	Occasional	2	7	6	5	4	3	2
10 to 15%	Seldom	3	8	7	6	5	4	3
5 to 10%	Unlikely	4	9	8	7	6	5	4
<5%	Remote	5	10	9	8	7	6	5
<1%	Rare	6	10	10	9	8	7	6
Impact Indices			6	5	4	3	2	1
			Incidental	Minor	Moderate	Major	Severe	Catastrophic
Impact Description (schedule/financial)			Day Lost (\$1,000's)	Days Lost (\$100k)	Week Lost (\$250k)	Couple of Weeks Lost (\$500k)	Significant Schedule Impact (\$1M)	Risk to Project Viability

### JOLIET AWSP PRELIMINARY RISK REGISTER

Risk Identification	Description	Potential Risk Control/Mitigation Measures (To Be Determined at Subsequent Project Stages)			Healthhead	Impact	Risk
		No Mitigation	With Mitigation				
Land/Easement/ROW Acquisition Delays	Delays in acquisition of critical parcels or easements requires change in alignment and re-design	2	4	5			
Construction/permitting seasonal delays related to transmission main construction	Seasonal delays due to weather and environmental permitting restrictions on construction windows.	4	5	8			
Underqualified contractor/subcontractors or inexperienced Contractors/subcontractors	The Contractor could have difficulty completing the project on time and within budget.	3	3	5			



As risks to the program are identified, they are entered into the risk register and assigned ratings for their likelihood and their impact. The likelihood rating reflects the probability that the risk will occur. The impact rating provides a measure of the severity of the impact that a risk would have on the project if it did occur. The product of the likelihood rating and the impact rating serves to define the overall magnitude of each risk. A risk that is not very likely to occur and that would have a small impact if it were to occur, may not warrant much attention. On the other hand, a risk that could have a serious impact on the project and has a moderate to high likelihood of occurrence is an item that needs to be carefully considered.

The Alternative Water Source Program Team is in the process of developing the initial risk register for the project. As the project progresses, the risk register will be reviewed and updated as part of monthly project progress meetings. When a risk is determined to be a high priority for the program, a mitigation strategy may be developed.



Risk mitigation measures can take a range of forms. Where practical, risk avoidance offers the greatest level of mitigation. For example, risks associated with the construction of a segment of transmission main through an industrial area, where the potential for encountering contaminated soils is high, can be mitigated by choosing an alternative route for the pipeline that simply avoids the area of concern.

Risk transfer is another option. As options for construction, financing, and future operation of the new water source are defined, the City will want to examine the degree to which it must absorb risks versus its ability to potentially transfer risks to other partners. In the case of a purchased water option, the risk that future changes in regulatory requirements may require costly water treatment plant upgrades is transferred to the entity responsible for water treatment (e.g., Chicago). However, that entity may choose to mitigate its risk through negotiation of an agreement that allows it to recover a portion of upgrade costs.

Lastly, when risks cannot be avoided or transferred, it will be necessary for Joliet to consider options for mitigation that involve reducing the potential impact of risks through contingency planning. As both of the alternative water source options being considered by Joliet include long sections of water transmission main, the City will need to carefully consider provisions for mitigating the potential impact of a main break or pumping station outage that interrupts its supply. Provision of emergency power to critical facilities, strategic placement of water storage facilities, and maintenance of select wells as a backup source of supply are examples of measures that can be used to mitigate this type of risk.

The identification, quantification, and mitigation of risks will be critical to the success of Joliet's Alternative Water Source Program. Major risks identified during the evaluation of the City's two Lake Michigan options in 2020 will be defined and incorporated into the materials presented to the community and City Council later this year so that they can be accurately considered in the final selection of an alternative water source.