UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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Channahon Water Supply Summary

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Channahon, like many Illinois communities, is examining whether its water supply is equipped to meet 21st century demands. In that effort, Channahon joined a group of local communities and industries that contracted the Illinois State Water Survey to evaluate the sustainability and viability of their future water supplies. This is a condensed nontechnical summary of Channahon's water supply risk under the developed scenario of future groundwater usage.

Channahon utilizes two distinct aquifer systems to meet water supply demands, the deep sandstone and the shallow. Both systems, especially the sandstone, are at risk of not meeting future water demands, especially if urbanization and water use increase more than modeled projections.

Deep Sandstone Aquifer. 'Sandstone aquifer' refers to a series of rock layers hundreds of feet below the surface that contain water. Overlain by hundreds of feet of rock and soil, rainwater does not replace water removed from the sandstone on timescales relevant for community planning. The lack of water replenishing in the aquifer makes pumping unsustainable. Declining water levels in this aquifer forced communities in Cook and DuPage Counties to cease usage by the 1990s, and Joliet will vacate this aquifer by 2030.

The table below depicts the risk of Channahon public supply wells being unable to meet community needs in 2021, 2050, and 2070. 'Low' categorized wells are unlikely to encounter trouble meeting community demands. Wells with 'Moderate' risk could experience declining well performance. While not an immediate risk to water supply, such wells could see faster rates of declining water levels and require more frequent maintenance. 'High' risk wells are at greater risk of being unable to meet demands, particularly under peak pumping conditions (such as during summer irrigation). Wells with 'Excessive' risk will almost certainly struggle to provide water. This assessment is based on observations at existing wells in Will County that have already reached this level. **All risk compounds if local demands increase beyond what is currently simulated.** The Table below presents model results for a *single scenario* of community growth. This scenario was vetted by Channahon water operators, environmental consultants, and planning agencies.

Sandstone Well	Risk in 2021	Risk in 2050	Risk in 2070	Vulnerability to New User
Well 4	Moderate	Excessive	Excessive	Excessive
Well 6	Low	High	Excessive	Excessive
New Well 1	-	Excessive	Excessive	Excessive
New Well 2	-	High	Excessive	Excessive
New Well 3	-	Excessive	Excessive	Excessive

In 2021, one Channahon well is experiencing moderate risk. By 2050, all of the wells, including hypothetical future ones, are at high or excessive risk. When new demands (such as new industries) are added to the model, water levels in all wells decrease dangerously. The modeled scenario indicates that this aquifer will no longer be a reliable water supply source for Channahon.

Sandstone Summary: **Sandstone aquifer withdrawals in Channahon are unsustainable. Models indicate risk will increase over time, even if Joliet leaves the sandstone by 2030 as planned. Risk is amplified by any new major sandstone water user, such as a data center or major industry.**

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Shallow Aquifer. Unlike the very deep sandstone aquifer, the **shallow aquifer** is at or near land surface and can interact with rivers and be replenished by rainwater. This allows for sustainable withdrawals from many shallow aquifers, but at the cost of **susceptibility to contamination**. Consequently, both water quality and quantity must be included in a risk assessment of the shallow aquifer.

Water Quality Risk Table

Shallow Well	Chloride Severity 2021	Chloride Severity 2050
Well 2	High	High
Well 5	High	High

Chloride, which originates from deicers applied to paved surfaces, accumulates in the groundwater and has become a growing problem in the shallow aquifer. The table to the left shows current and projected (based on land use not changing) risk of chloride contamination at each shallow public supply well. 'Low' means chloride is at natural concentrations in groundwater, 'Moderate' is slightly elevated, 'High' encompasses a range harmful to aquatic species, and 'Excessive' is above the EPA secondary standard, where water will begin to taste salty. Now and in 2050, chloride levels at all shallow Channahon wells are high, though below the EPA secondary standard. Future chloride severity could be worsened or improved by land use or deicing practices.

The geology of the shallow aquifer is highly variable and complicated. To render a more complete picture of water level risk, four different factors are assessed: 1) well productivity capacity compared to the region, 2) whether well productivity has decreased at a well, 3) aquifer dewatering at the site of the well. A well's risk, shown in the table below, is defined by the number of risk factors present, with one being 'Moderate', two being 'High' risk, and a well with all three risk factors having 'Excessive' risk.

Shallow Pumping Risk Table

Shallow Well	Does the well have **poor** capacity to increase demands?	Has well productivity **decreased**?	Is the shallow aquifer dewatering?	Risk
Well 2	✓	-	-	Moderate
Well 5	✓	-	-	Moderate

The shallow aquifer at Channahon is generally less productive than the shallow aquifers to the north and east, largely due to a major change in aquifer material. Although lower well productivity potential here is a natural feature of the landscape, it still affects the efficacy of the shallow aquifer to provide water to Channahon. Both wells 2 and 5 are at moderate risk due to this lower well productivity and resulting poor capacity to meet increased demands. While the aquifer is not currently dewatered, it is very close, particularly at well 5; dewatering this aquifer would exacerbate risk.

Shallow Summary: **Chloride concentrations in the shallow aquifer of Channahon are increasing, although it would likely take a major land use change to approach the EPA secondary standard. Naturally low well productivity of the aquifer greatly restricts how demands may increase in the shallow aquifer. Further declines in water levels would dewater the shallow aquifer and elevate risk to "High".**