

WATER RESOURCE PLAN DEVELOPMENT



WATER SUPPLY

- Is the existing water supply adequate for present and future demands?
- Do we have adequate infrastructure to treat and deliver water for future demand?
- What are the alternatives for increasing raw water supply including expanding the existing well field, using alternative groundwater sources and surface water supply?



WHAT CRITERIA SHOULD BE CONSIDERED WHEN EVALUATING ALTERNATIVES?

The current criteria includes:



Feasibility - what are the chances of a successful project?



Cost - the overall cost of the project



Phasing - ability for project to be split into phases to spread out costs

Is the existing water supply adequate for present and future demands?

Yes! The current supply is adequate for present needs. The City's primary water supply source is an aquifer located in the McBaine Bottoms near the Missouri River. Based on a test conducted in September 2015, all 15 wells in operation produced about 27 million gallons per day (MGD), which is in excess of the City's historical highest demand of 24 MGD. Three new wells to be build in the fall of 2016 will increase the raw water supply to the plant to 32 MGD.

No! Future demands will require in excess of 32 MGD, potentially up to 45 MGD. To meet future demands, we will need to increase the water supply.

Do we have adequate infrastructure to treat and deliver water for future demand?

No! There is not enough infrastructure to meet future demands. The wells and water treatment plant can reliably treat and deliver to the system about 24 MGD. Improvements are needed in the well field and at the plant to meet future demands as well as replace existing infrastructure to continue to provide reliable drinking water supply. The City's current Capital Improvement Plan includes a \$32M treatment plant upgrade.

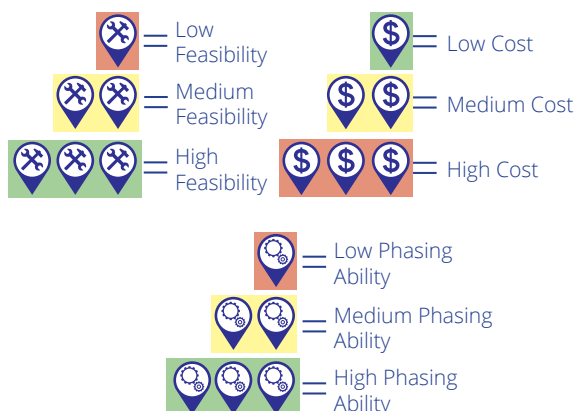
Alternatives for increasing raw water supply include expanding existing well fields using alternative groundwater sources and surface water from the Missouri River.

Improvements and expansion of the current water treatment plant will be needed to continue to provide reliable supply and to handle the future demand.

EXPANDING EXISTING WELL FIELD



Options were considered for expanding existing well fields. Existing and potential sites for future wells are highlighted in the figure above.



SUPPLY ALTERNATIVES

1 HORIZONTAL WELLS



Horizontal collector well located along the Missouri River bank can produce 5 to 10 times the volume of one vertical groundwater well. This supply system is expensive to install but has lower long-term operating and maintenance costs than vertical wells. Water from these wells are regulated differently than existing vertical wells and would require additional treatment at the plant. Horizontal collector wells could be used in addition to the current vertical groundwater system.

2 EXPANSION INTO OVERTON BOTTOMS



This alternative includes the addition of vertical wells in an aquifer west of the Missouri River. Locating wells on the west side would be more expensive since it requires a pipeline crossing the river and would be more difficult to access and maintain from the plant side.

3 EXPANSION OF MCBAINE BOTTOMS-CURRENT SYSTEM



Additional vertical wells would be installed in the same aquifer as the existing wells. Based on modeling the aquifer is capable of providing about 58 MGD with the addition of 15 more wells. The wells could be installed incrementally over time as demands increase to minimize one-time costs. Water quality would be the same as the existing supply to meet future demands.

4 REHABILITATION OF WELLS IN THE CITY LIMITS



Rehabilitation of the existing deep wells within the City limits and additional deep wells in the Ozark Aquifer has supply limitations and treatment challenges that make this not a good long term alternative for drinking water to meet all future demands. The wells could be utilized for non-drinking water uses to reduce impacts at the treatment plant.

SURFACE WATER



The Missouri River has enough water supply to meet the future water demands; however a different type of water treatment plant is needed to remove the sediment and pollutants/contaminants in the water and treat it to meet drinking water specifications and regulations. Consequently this option is significantly more expensive than the other supply alternatives.

The next part of the plan introduces water reclamation and reuse, managing demand, and conserving water. These topics will be addressed in fact sheet #3.