



6.0 Recommendations

6.1 Cost Factors

Alternative 3 has the lowest capital cost and the lowest present worth as shown in the cost-effectiveness analysis. A distinct difference is shown for the present worth of the capital costs. The ranking of alternatives by present worth of capital costs is shown below.

Ranking by Present Worth of Capital Costs

<u>Ranking</u>	<u>Alternative Description</u>	<u>Present Worth</u>	<u>Difference from Alt. 3</u>
1	Alt. 3 – Wakarusa WWTP (Site B)	\$48,400,000	
2	Alt. 2 – Wakarusa WWTP (Site A)	\$52,000,000	7.4%
3	Alt. 1 – Kansas River WWTP	\$56,600,000	16.9%

From a cost standpoint, master planning alternatives may be considered similar if the difference in present worth is less than 10 percent. Based on capital costs only, Alternative 1 is not equivalent to the Wakarusa Alternatives 2 and 3. Alternative 3 has the lowest capital cost, however, Alternative 2 should be given consideration since the capital cost difference is less than 10 percent.

Alternative 3 has the lowest total present worth considering both capital and operation and maintenance costs. The ranking of alternatives by present worth cost of both capital and operation and maintenance costs is shown below:

Ranking by Present Worth of Capital and O&M Costs

<u>Ranking</u>	<u>Alternative Description</u>	<u>Present Worth</u>	<u>Difference from Alt. 3</u>
1	Alt. 3 – Wakarusa WWTP (Site B)	\$74,300,000	
2	Alt. 2 – Wakarusa WWTP (Site A)	\$78,200,000	5.3%
3	Alt. 1 – Kansas River WWTP	\$82,000,000	10.4%

The difference in total present worth cost between Alternatives 1 and 3 is larger than 10 percent, so Alternative 1 would still not be considered similar to Alternative 3. The difference in present worth between Alternatives 2 and 3, at 5.3 percent, is close enough that both plant locations should be given consideration, however, Alternative 3 is the best option from a cost standpoint.



6.2 Additional Issues

The present worth analysis indicates the cost of Alternatives 2 and 3 is similar. With this in mind, consideration of additional issues may aid in the ultimate selection of an alternative.

If Alternative 1 is screened out due to cost reasons, a review of Alternatives 2 and 3 may provide some differences that may influence the selected location of a Wakarusa WWTP. As shown in the issues matrix, the two Wakarusa River WWTP alternatives have similar requirements relating to the evaluation and study of environmental, cultural, protected species, and flood plain issues. Wakarusa River WWTP (Site B) would have the benefit of better plant access roadways than would Site A. Public perception and acceptance of a Wakarusa River WWTP location should be evaluated and studied in more detail to provide input for selecting a site for a Wakarusa River WWTP.

Based on this initial review, the overall impact of additional issues is similar for both Wakarusa plant locations. Further study of the additional issues for potential Wakarusa River WWTP locations will provide more insight into the most favorable plant site.

6.3 Recommended Alternative

Alternative 3 – Wakarusa WWTP (Site B) is the most cost-effective option for the City of Lawrence and, at present, does not appear to have any fatal flaws with respect to additional issues.

Consideration should also be given to the long-term expansion of the City wastewater system. After the year 2025, further expansion of the Kansas River WWTP beyond that shown for Alternative 1 would be extremely difficult. Additional space for expansion within the existing plant layout would not be available, therefore, any future expansion after 2025 would likely require a separate treatment plant located adjacent to the existing plant. The collection system would also need to be expanded with parallel pipelines in congested areas to route flow from west and south Lawrence to the existing plant.

In a similar fashion, consideration should also be given to the impact of implementing a Wakarusa River WWTP after 2025 if Alternative 1 – Kansas River WWTP is selected now. If a Wakarusa River WWTP is implemented after 2025, a significant amount of collection system infrastructure would be constructed for Alternative 1 that would not be needed after the year 2025. Alternative 1 collection system improvements that would be unused after 2025 include the 31st Street Relief Sewer, Wakarusa Pumping Station 5C and Force Main 5C, and most of the force main for Wakarusa South Pumping Station WRS-1. The capital cost for these collection system facilities which would not be used after 2025 is \$19,200,000.



Based on capital and present worth costs, review of additional issues, and long-term wastewater expansion issues beyond 2025, the recommended plan is Alternative 3 – Wakarusa River WWTP (Site B). It is recommended that collection system improvements proceed on the basis of routing flow for part of the collection system to a future Wakarusa River WWTP. The Four Seasons Holding Basins should be used as a wet-weather handling facility for all Wakarusa River WWTP service area flow originating north of the Wakarusa River. It is also recommended that studies be conducted of the additional issues including environmental, cultural resource, and flood plain impact assessments to determine the best and most favorable location for a Wakarusa River WWTP site.