

DRAFT Technical Memorandum 3: Screening Criteria and Methodology

Wholesale Water Management and Reliability Study

PREPARED FOR
SAN JUAN WATER DISTRICT



PREPARED BY



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BUILDING A BETTER WORLD

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List of Abbreviations and Acronyms

District	San Juan Water District
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Study	Wholesale Water Management and Reliability Study
SSWD	Sacramento Suburban Water District
TM	technical memorandum
option	water management option

1.0 Introduction and Background

This Technical Memorandum (TM) is the third of a series of memoranda that will look to improve management of surface water and groundwater resources within the San Juan Water District's (District) wholesale service area, and potentially outside the District's current service area. It presents the criteria, methods, and approach developed to help complete the District's Wholesale Water Management and Reliability Study (Study). This TM contains the following:

- Description of the evaluation criteria and metrics developed to support evaluation, comparison, and prioritization of identified water management options (option).
- Overview of the approach for screening the initial options using the developed evaluation criteria and metrics to identify which options should be retained for further evaluation.
- Overview of the approach for prioritizing the retained options using the results of a more detailed evaluation of each retained option and applying the same evaluation criteria and metrics to provide a consistent framework for evaluation, comparison, and prioritization of the options.


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2.0 Evaluation Criteria and Metrics

To support evaluation, comparison, and prioritization of identified options, the following four evaluation criteria and associated metrics will be used:

1. Cost-effectiveness
2. Contribution to objectives
3. Implementation complexity
4. Uncertainty

These criteria were vetted with the District's Water Supply and Reliability Committee during the Study kickoff meeting. This section describes each of the evaluation criteria and associated metrics. For each metric within a criterion, a score between 1 and 3 will be assigned for each evaluated option. The water drop symbol, , represents the score each option will receive, based on the initial evaluation to be conducted:

-  represents a score of 1
-  represents a score of 2
-  represents a score of 3

The higher the score, the more likely an option will be prioritized higher.

2.1 Cost-Effectiveness




This criterion quantitatively measures the cost-effectiveness of an option's water supply benefits (yield) relative to its costs at a conceptual or pre-appraisal level. Cost-effectiveness is summarized by one metric:

- \$ per acre-foot: Annualized total cost of the option divided by yield.

To develop the scores for the quantitative metrics, the values will be normalized to a standard range (1 to 3). The option with the highest value (i.e., lowest cost per acre-foot) will receive a score of 3, while the option with the lowest value (i.e., highest cost per acre-foot) will receive a score of 1. All other options will be assigned scores based on a linear relationship between 1 and 3.




2.2 Contribution to Objectives

This criterion quantitatively and qualitatively assesses an option's contribution to each of the Study objectives. Each objective corresponds to a separate metric and will be scored as follows:
















- Increase water supply reliability to the District's retail customers and Wholesale Customer Agencies during dry years by integrating surface water and groundwater storage (acre-foot/year): Average annual acre-foot increase in dry year supply from implementing the option. To develop the scores for this quantitative metric, the values will be normalized to a standard range (1 to 3).
- Perfect the beneficial use of the District's water rights, contractual entitlements, and facilities (percent): Percent increase in average annual use of the District's water supply and treatment capacity as compared to the District's current average annual use. To develop the scores for this quantitative metric, the values will be normalized to a standard range (1 to 3).
- Provide long-term financial benefits to District ratepayers, and provide regional and statewide benefits (qualitative):
 - High  – Likely to able to implement new water transfers.
 - Moderate  – Likely to only have a limited ability to perform new water transfers.
 - Low  – Not likely to include new water transfers.

2.3 Implementation Complexity




This criterion qualitatively assesses how likely an option will be implemented within a reasonable timeframe to achieve its potential benefits relative to the following seven implementation factors or metrics (rated high, moderate, or low):

- Environmental compliance requirements
 - Low  – Categorical Exclusion/Exemption will likely be needed
 - Moderate  – Environmental Assessment, Mitigated Negative Declaration, or Negative Declaration will likely be needed
 - High  – Environmental Impact Statement or Environmental Impact Report will likely be needed

2.0 Evaluation Criteria and Metrics







- Permitting requirements and approvals
 - Low  –Jurisdictional Waters/Wetlands not likely to be affected
 - Moderate  – Nationwide/general permits and information Section 7 consultation will likely be needed
 - High  – Individual permit(s) and formal Section 7 consultation will likely be needed
- Water rights and contracts requirements
 - Low  – Likely no changes will be needed
 - Moderate  – Change to point of diversion or place of use will likely be needed
 - High  – New water right or contract will likely be needed
- Institutional arrangements and coordination
 - Low  – No partnerships will be needed
 - Moderate  – Partnerships will be needed, but will likely be similar to existing arrangements
 - High  – Partnerships will be needed, and will likely require new agreements
- Land acquisitions
 - Low  – Option will be within the existing right-of-way
 - Moderate  – Willing seller has been identified
 - High  – No willing seller has been identified
- Public acceptance and support
 - High  – Public acceptance and wide support
 - Moderate  – Some public acceptance and moderate support
 - Low  – Low public acceptance and support

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- Schedule
 - Short  – Option will likely take less than a year to implement
 - Moderate  – Option will likely take more than one, but less than three years to implement
 - Long  – Option will likely take more than three years to implement

2.4 Uncertainty

This criterion qualitatively assesses level of confidence in the definition of the option with respect to the following two areas or metrics (rated high, moderate, or low):

- Costs
 - High  – Plans/studies available to support costs
 - Moderate  – Cost information available, but no engineering details to support costs
 - Low  – No plans/studies available; best engineering judgment applied
- Yield and reliability
 - High  – Confirmed yield and high reliability
 - Moderate  – Confirmed yield and moderate reliability
 - Low  – Unconfirmed yield and low/moderate reliability

2.5 Option Evaluation Summary

These evaluation criteria and associated metrics will be used to evaluate each identified option. Figure 2-1 shows a template for the evaluation summaries.

2.0 Evaluation Criteria and Metrics


SAN JUAN WATER DISTRICT WATER SUPPLY & RELIABILITY STUDY			
Project Evaluation Summary			
ID:		Type:	
Project Name:			
			
CRITERIA / METRICS	ASSESSMENT/ VALUE	SCORE	NOTES
Cost-Effectiveness			
Yield - Long-term Average (TAF/year)	1.0	N/A	
Water Supply Source	Pre-1914 and appropriative water right	APPR	
Total Cost (\$)	\$ 6,000,000,000	N/A	6 to 10 billion dollar estimate (Reclamation, 2013)
Overall Cost-effectiveness (\$/AF) (Total Cost / Yield)	\$ 326,228	N/A	Annualized, 3.5% discount rate over 30 year project life
Contribution to Objectives			
Perfect Beneficial Use	Moderate Potential	🟡🟡	
Improve Dry Year Reliability	High Potential	🟢🟢🟢	
Provide Financial Benefit	Low Potential	🔴	
Implementation Complexity			
Environmental Compliance Requirements	Complex: Likely EIS/EIR	🔴	
Permitting Requirements	Complex: Likely Individual Permit, Formal Section 7 Consultation	🔴	
Water Rights / Contracts	Moderate: Likely Change to Point of Diversion/Place of Use	🟡🟡	
Institutional & Coordination	High: Partnerships Needed, Likely New Agreement	🔴	
Land Acquisition	High: No Willing Seller identified	🔴	
Public Acceptance & Support	Low: Low Public Acceptance and Support	🔴	
Schedule	Greater than 3 years to implement	🔴	
Uncertainty			
Costs	Moderate: Cost Information, No Engineering Details	🟡🟡	
Yield & Reliability	Moderate: Confirmed Yield, Moderate Reliability	🟡🟡	
Key: AF = acre-feet, CVP = Central Valley Project, EIS/EIR = Environmental Impact Statement/Environmental Impact Report, N/A = not applicable, PCWA = Placer County Water Agency, ROW = Right-of-Way, TAF = thousand acre-feet			
<div style="border: 1px solid black; padding: 5px; display: inline-block;">Relative Ranking</div>			
References:			

Figure 2-1. Template for Water Management Option Summary Evaluation

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3.0 Approach for Screening Initial Water Management Options

To support evaluation, comparison, and prioritization of the initial options, the four criteria and associated metrics described in Section 2 will be evaluated for each option using best available information. Scores for each metric will be developed and used for screening. TM2 will document the data collection and review conducted under Study Task 4. TM 4 will document the preliminary evaluation and screening of options to be conducted under Study Task 5.

3.1 Scoring

For qualitative metrics, scores will be developed based on each option's assigned assessment value (1 to 3).

For quantitative metrics, the scores will be normalized to a standard range (1 to 3) to be consistent with the qualitative scores. The option with the highest metric value will be assigned a value of 3, and the lowest value will be assigned a value of 1. The other options will be assigned a proportional value between 1 and 3.

The developed initial scores will be used to conduct a trade-off analysis to support screening of the options. This analysis will be documented in TM4.

3.2 Trade-off Analysis

The trade-off analysis will investigate how the options rank across two or more criteria. It will allow for identification of options that score best across multiple criteria and those that score well on one metric, but not on others. The following three trade-offs will be used to evaluate the options:

1. **Cost-Effectiveness and Contribution to Objectives Trade-off** – Options will be ranked according to their cost-effectiveness and overall contribution to objectives scores. Options with lower cost per acre-foot and higher overall contribution to objectives scores will rank higher.
2. **Cost-Effectiveness and Implementation Complexity Trade-off** – Options will be ranked according to their cost-effectiveness and implementation complexity scores. Options with lower cost per acre-foot and higher overall implementation factors (easier to implement) scores will rank higher.

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- Contribution to Objectives and Implementation Complexity Trade-off** – Options will be ranked according to their contribution to objectives and implementation complexity scores. Options with higher overall contribution to objectives and higher overall implementation factors (easier to implement) scores will rank higher.

Figures 3-1 through 3-3 present example charts for these three trade-offs scenarios. Each figure plots the two considered criteria on the y- and x-axes. For example, in Figure 3-1 (cost-effectiveness and contribution to objectives trade-off), the y-axis represents the cost-effectiveness and the x-axis the overall contribution to objectives score. An option plotting in the upper right corner of the figure would be more efficient and contribute better to the objectives; therefore, it would be more desirable than an option represented in the bottom left corner of the figure. Similarly for Figure 3-2 (cost-effectiveness and implementation complexity trade-off), and Figure 3-3 (contribution to objectives and implementation complexity trade-off) the upper right regions represent the more desirable ranges, the lower left regions represent the less desirable ranges.

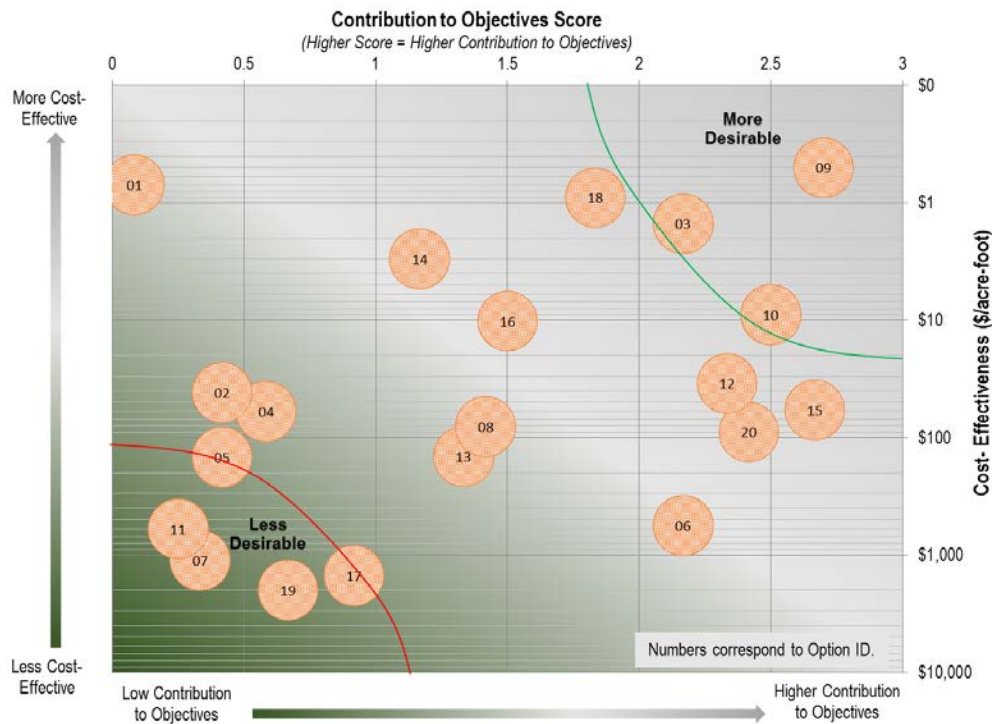


Figure 3-1. Example Cost-Effectiveness and Contribution to Objectives Trade-off Analysis

3.0 Approach for Screening Initial Water Management Options

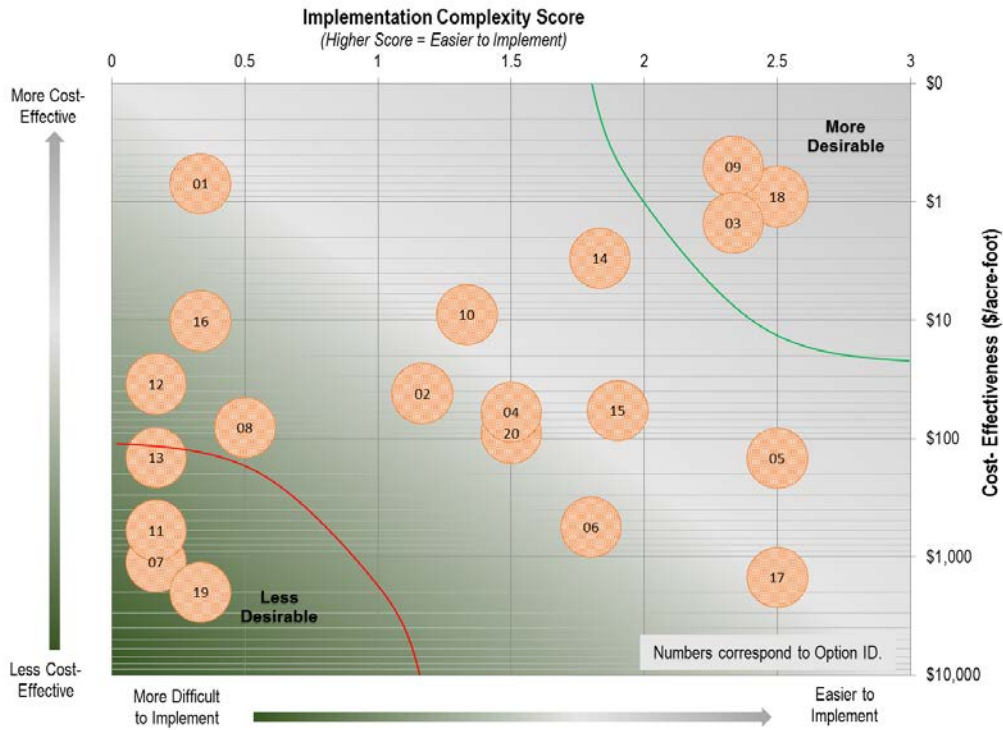


Figure 3-2. Example Cost-Effectiveness and Implementation Complexity Trade-off Analysis

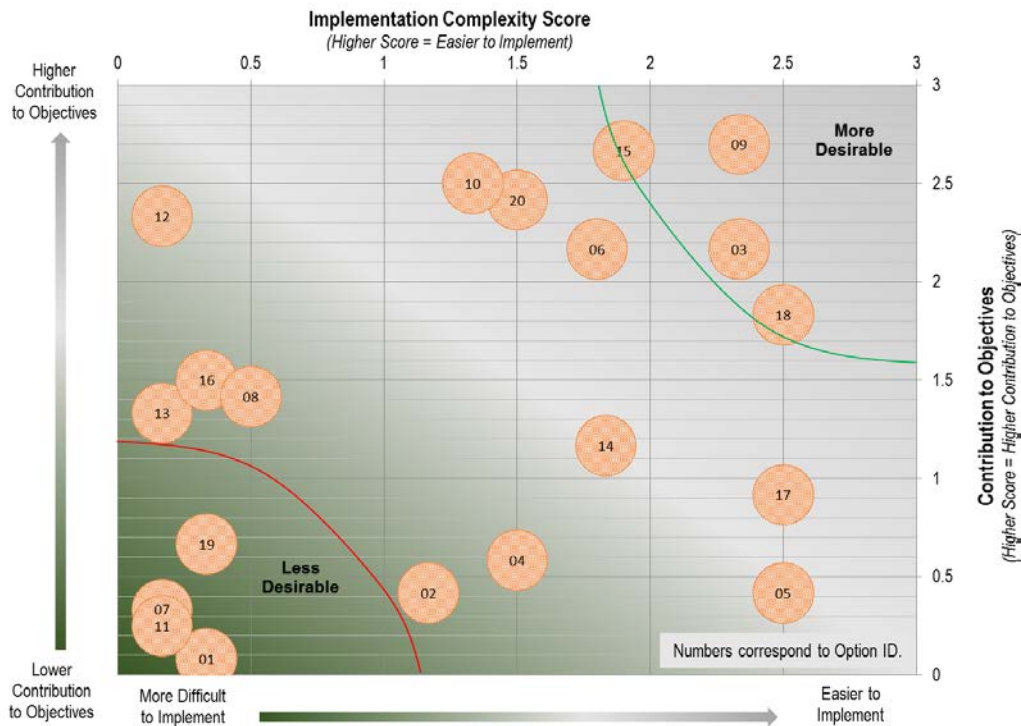


Figure 3-3. Example Contribution to Objectives and Implementation Complexity Trade-off Analysis

3.3 Screening

The findings of the trade-off analysis will be used to identify options that consistently rank in the desirable regions and those that consistently rank in the less desirable regions. This will allow for organizing options into three groups: (1) high potential, (2) moderate potential, and (3) low potential. This approach will provide a means for identifying those options with a greater chance of achieving the District's goals and objectives for this Study in a cost-efficient manner, within a reasonable timeframe, and with higher degree of confidence.

The results of this initial cluster analysis will be discussed with the District's Water Supply and Reliability Committee and Board to solicit feedback and direction. Input received will provide guidance to finalize the screening of initial options.

4.0 Approach for Prioritizing Retained Water Management Options

Based on the initial screening, options that score relatively high in all or most of the prioritization scenarios may then be evaluated in more detail as refined options. TM 5 will document the evaluation and prioritization of the refined options to be conducted under Study Task 5.

4.1 Evaluation of Retained Options

Evaluation of the refined options will likely include the following activities:

- Additional analysis to verify options and develop more detailed descriptions regarding operations, availability of water supplies, and infrastructure needs to allow for a more refined operations analysis to better estimate option yield and potential benefits
- Refinement of information on option location and site-specific details to allow for a more thorough assessment of implementation requirements (e.g., environmental and permitting requirements)
- Conceptual engineering designs and cost estimates for structural features

4.2 Scoring of Refined Options

The scoring of the refined options will use a similar approach to the screening of initial options. The four evaluation criteria and associated metrics described in Section 2 will remain applicable to provide a consistent framework for evaluation, comparison, and prioritization of the options.

4.3 Prioritization of Refined Options

In addition to the trade-offs described in Section 3, a composite weighted score of all four of the evaluation criteria will also be used to aid in the prioritization of the refined options relative to one another. The weights for each of the criteria and metrics will be determined using input from the District's Water Supply and Reliability Committee and Board on the relative importance of the four criteria. Table 4-1 is an example of the relative criteria weights that will need to be determined.

In addition, a sensitivity analysis of the assigned weights may be performed to identify any potential effects that varying weights may have on the prioritized list of refined options.

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The results from this analysis will be a prioritized list of refined options available to the District to implement to improve its water supply reliability and management as funds become available. A detailed scope of work for the subsequent feasibility study will be developed for these prioritized options under Study Task 6 and documented in TM 6.

**Table 4-1.
Example Relative Weights for the Evaluation Criteria**

Criteria	Criteria Relative Weight
Cost-Effectiveness	X ₁ %
Contribution to Objectives	X ₂ %
Implementation Complexity	X ₃ %
Uncertainty	X ₄ %
TOTAL	100%