Appendix B

Building Blocks of the Plan – Additional Information

2040 WSMP

Final April 2012

Appendix B: Building Blocks of the Plan – Additional Information

1. Objectives and Criteria

WSMP 2040 planning objectives were developed and organized into four objective categories:

- Operations, Engineering, Legal & Institutional;
- Economic;
- Public Health, Safety & Community; and
- Environmental.

They provided the basis for the screening and evaluation criteria used to assess the individual components and the portfolios (see Section 2.1, Table 2-2).

Evaluation criteria were used in the second stage of screening to assist in a more detailed assessment of the remaining components. The evaluation criteria were used to compare and array the components for their relative satisfaction of a criterion. A high score indicated high response to the criteria and a low score indicated a low response to the criteria (or High = Good, Low = Bad):

- High = H
- High/Medium = H/M
- Medium = M
- Medium/Low = M/L
- Low = L
- Hold from further consideration = L (boxed in tables)

1.1 Component Screening

1.1.1 Rationing Level Screening

In the second round of screening, the 10%, 15% and 20% rationing levels were tested in several of the Primary Portfolios to determine the associated impact on EBMUD customers. Assumptions that were made within the modeling regarding rationing implementation rules are summarized in Table 1-1.

Table 1-1: Drought Management Program Rationing Guidelines at 10%, 15% and 20% Rationing

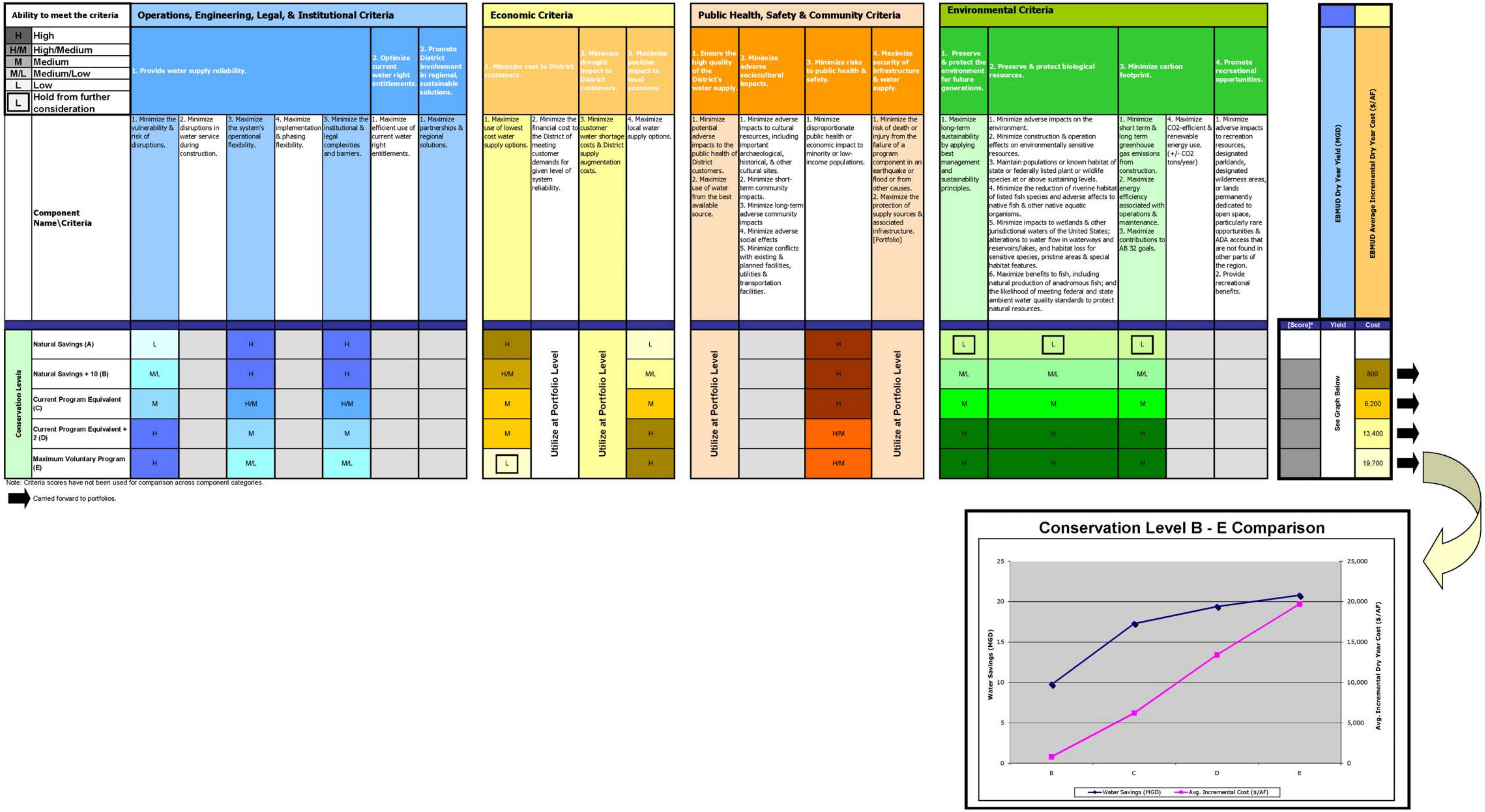
Stage	April Projection of Storage on September 30	Reduction Goal	Voluntary/Mandatory
10% Rationing Case			
	500 TAF or more	None	
Moderate	500-450 TAF	0 to 7.5%	Voluntary
Severe	450-300	7.5 to 10%	Mandatory
Critical	Less than 300 TAF	10%	Mandatory
15% Rationing Case			
	500 TAF or more	None	
Moderate	500-450 TAF	0 to 10%	Voluntary
Severe	450-300	10 to 15%	Mandatory
Critical	Less than 300 TAF	15%	Mandatory
20% Rationing Case			
	500 TAF or more	None	
Moderate	500-450 TAF	0 to 12.5%	Voluntary
Severe	450-300	12.5 to 20%	Mandatory
Critical	Less than 300 TAF	20%	Mandatory

TAF = thousand acre-feet

Under each rationing level, the amount of rationing for the different customer classes varies, as shown in Table 1-2 and Figure 1-1. The distribution of rationing across customer classes is based on the total demand of each customer class, the outdoor water use of each class, and the potential economic impact on the service area as a whole. The triggers to determine when rationing would be initiated would follow the existing Drought Management Plan (DMP). The only exception to the rationing rules as described above was for Portfolio D2 which involved the Enlarge Pardee Reservoir component. In this portfolio, the initial threshold for implementing rationing was increased from 500 TAF to 670 TAF to account for the amount of additional storage created by the enlargement of Pardee Reservoir. For additional detail on Portfolio D2, see Appendix D TM-6, Water Supply and Economic Modeling Report.

Table 1-2: Customer Class Percentage Cut-backs under the 20%, 15% and 10% System-Wide Average Rationing

Customer Class	20% Rationing (%)	15% Rationing (%)	10% Rationing (%)
Single-Family	24	19	12
Multi-Family	15	11	7
Commercial	16	12	8
Institutional	13	9	6
Industrial	7	5	3
Irrigation	39	30	19



Ability to meet the criteria	
H	High
H/M	High/Medium
M	Medium
M/L	Medium/Low
L	Low
☐L	Hold from further consideration

	Component Name\Criteria	Operations, Engineering, Legal, & Institutional Criteria						
		1. Provide water supply reliability.					2. Optimize current water right entitlements.	3. Promote District involvement in regional, sustainable solutions.
		1. Minimize the vulnerability & risk of disruptions.	2. Minimize disruptions in water service during construction.	3. Maximize the system's operational flexibility.	4. Maximize implementation & phasing flexibility.	5. Minimize the institutional & legal complexities and barriers.	1. Maximize efficient use of current water right entitlements.	1. Maximize partnerships & regional solutions.
Conservation Levels	Natural Savings (A)	L		H		H		
	Natural Savings + 10 (B)	M/L		H		H		
	Current Program Equivalent (C)	M		H/M		H/M		
	Current Program Equivalent + 2 (D)	H		M		M		
	Maximum Voluntary Program (E)	H		M/L		M/L		

	Component Name\Criteria	Economic Criteria			
		1. Minimize cost to District customers.		2. Minimize drought impact to District customers.	3. Maximize positive impact to local economy.
		1. Maximize use of lowest cost water supply options.	2. Minimize the financial cost to the District of meeting customer demands for given level of system reliability.	3. Minimize customer water shortage costs & District supply augmentation costs.	4. Maximize local water supply options.
Conservation Levels	Natural Savings (A)	H	Utilize at Portfolio Level	Utilize at Portfolio Level	L
	Natural Savings + 10 (B)	H/M			M/L
	Current Program Equivalent (C)	M			M
	Current Program Equivalent + 2 (D)	M			H
	Maximum Voluntary Program (E)	☐L			H

	Component Name\Criteria	Public Health, Safety & Community Criteria			
		1. Ensure the high quality of the District's water supply.	2. Minimize adverse sociocultural impacts.	3. Minimize risks to public health & safety.	4. Maximize security of infrastructure & water supply.
		1. Minimize potential adverse impacts to the public health of District customers. 2. Maximize use of water from the best available source.	1. Minimize adverse impacts to cultural resources, including important archaeological, historical, & other cultural sites. 2. Minimize short-term community impacts. 3. Minimize long-term adverse community impacts 4. Minimize adverse social effects 5. Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	1. Minimize disproportionate public health or economic impact to minority or low-income populations.	1. Minimize the risk of death or injury from the failure of a program component in an earthquake or flood or from other causes. 2. Maximize the protection of supply sources & associated infrastructure. [Portfolio]
Conservation Levels	Natural Savings (A)	Utilize at Portfolio Level		H	Utilize at Portfolio Level
	Natural Savings + 10 (B)			H	
	Current Program Equivalent (C)			H	
	Current Program Equivalent + 2 (D)			H/M	
	Maximum Voluntary Program (E)			H/M	

	Component Name\Criteria	Environmental Criteria				
		1. Preserve & protect the environment for future generations.	2. Preserve & protect biological resources.	3. Minimize carbon footprint.		4. Promote recreational opportunities.
		1. Maximize long-term sustainability by applying best management and sustainability principles.	1. Minimize adverse impacts on the environment. 2. Minimize construction & operation effects on environmentally sensitive resources. 3. Maintain populations or known habitat of state or federally listed plant or wildlife species at or above sustaining levels. 4. Minimize the reduction of riverine habitat of listed fish species and adverse affects to native fish & other native aquatic organisms. 5. Minimize impacts to wetlands & other jurisdictional waters of the United States; alterations to water flow in waterways and reservoirs/lakes, and habitat loss for sensitive species, pristine areas & special habitat features. 6. Maximize benefits to fish, including natural production of anadromous fish; and the likelihood of meeting federal and state ambient water quality standards to protect natural resources.	1. Minimize short term & long term greenhouse gas emissions from construction. 2. Maximize energy efficiency associated with operations & maintenance. 3. Maximize contributions to AB 32 goals.	4. Maximize CO2-efficient & renewable energy use. (+/- CO2 tons/year)	1. Minimize adverse impacts to recreation resources, designated parklands, designated wilderness areas, or lands permanently dedicated to open space, particularly rare opportunities & ADA access that are not found in other parts of the region. 2. Provide recreational benefits.
Conservation Levels	Natural Savings (A)	☐L	☐L	☐L		
	Natural Savings + 10 (B)	M/L	M/L	M/L		
	Current Program Equivalent (C)	M	M	M		
	Current Program Equivalent + 2 (D)	H	H	H		
	Maximum Voluntary Program (E)	H	H	H		

	Component Name\Criteria		EBMUD Dry Year Yield (MGD)	EBMUD Average Incremental Dry Year Cost ($/AF)	
		[Score]*	Yield	Cost	
Conservation Levels	Natural Savings (A)		See Graph Below		
	Natural Savings + 10 (B)			800	➡
	Current Program Equivalent (C)			6,200	➡
	Current Program Equivalent + 2 (D)			13,400	➡
	Maximum Voluntary Program (E)			19,700	➡

Note: Criteria scores have not been used for comparison across component categories.

➡ Carried forward to portfolios.

Figure 1-2: Conservation Level Component Evaluation

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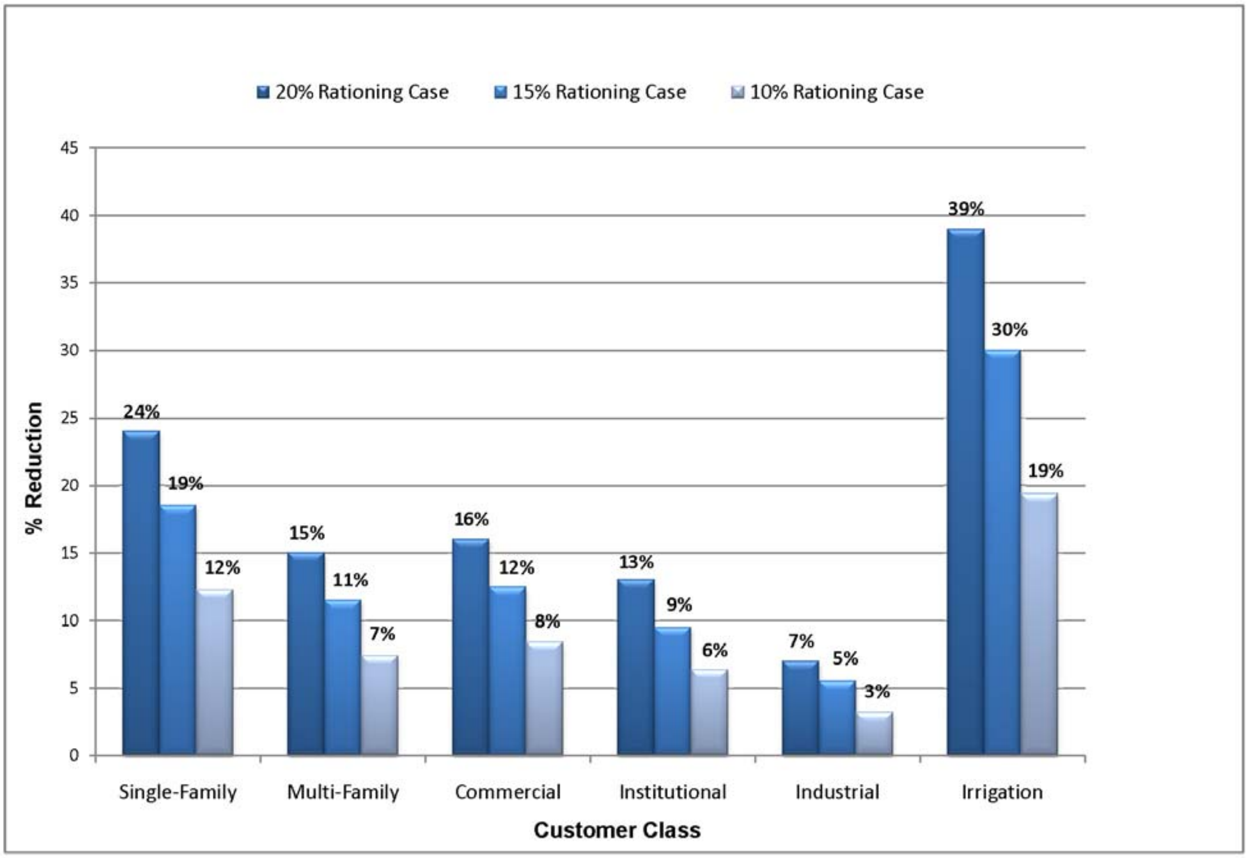

Figure 1-1: Customer Class Percentage Cut-backs under the 20%, 15% and 10% System-Wide Average Rationing

1.1.2 Conservation Level Screening

Although Conservation Level E received a very low score on the *maximize use of lowest cost water supply options* criterion due to its high cost, it was considered important to continue to evaluate and test this conservation level in the portfolio analysis and not eliminate it at this stage simply due to cost considerations. Therefore, the initial component screening evaluation only eliminated Conservation Level A from further consideration (Figure 1-2).

Conservation Levels B, C, D, and E were brought forward into the initial portfolio building and were each tested in at least one portfolio. Conservation Levels B and E were eliminated in this stage - Conservation Level B because it is less than the District's current level of investment in conservation and Conservation Level E because the small increment of conservation savings that is obtained from this level over Conservation Level D comes at an inordinately high cost.

Conservation Levels C and D were tested in the Primary Portfolio analysis. The differences between the two conservation levels are summarized in Table 1-3. Objections to Conservation Level D focused on the high cost of this component for the small increment (2 MGD) of extra yield as compared to Conservation Level C. Support for Conservation Level D, however, focused on the desire for EBMUD to be leaders in water supply planning for the future. A combination of selecting the 10% rationing level and Conservation Level D was seen as a reasonable approach because although District customers would be asked to conserve at a high level, the 10% rationing level would help to offset that impact, particularly on the single family residential customer.

Table 1-3: Conservation Levels C and D Comparison

Conservation Level	C (37 MGD)	D (39 MGD)
Additional Measures	• Surveys • Toilet rebates • Leak detection • Irrigation incentives	• Required plumbing for future graywater use in residential • Extensive incentives/rebates for irrigation upgrades
# Measures	51	53
Total Cost (NPV)*	$284 M	$404 M
Rate Increase from Level C to D (%)	2.8	

** Includes lost revenue.*

1.1.3 Recycled Water Screening

Initial Recycled Water Project Screening

A total of 22 recycled, satellite treatment and raw water projects, including Upcountry and Sacramento Partnership projects were identified for inclusion in the WSMP 2040. Following initial screening, recycled water projects were clustered together into recycled water levels, as described above.

As shown in Figure 1-3, many of the individual recycled and raw water projects scored similarly in the component evaluation. This is due to the fact that many of the projects are very preliminary and do not yet have an identified location or specific footprint. Therefore, scoring the Public Health, Safety, and Community Criteria as well as the Environmental Criteria were difficult, as the exact location of the components is unknown. The carbon footprint criterion had more wide-ranging scores, since the variable energy use of each component was more easily estimated.

The five upcountry partnership projects were the only recycled water components that were eliminated from further consideration during this round of screening. These projects scored very low on the *minimize the vulnerability and risk of disruptions* and *minimize the institutional and legal complexities and barriers* criteria. Upcountry partnership recycled water projects depend on Mokelumne Aqueducts for distribution and are therefore susceptible to Delta failure and risks of infrastructure failure. As these components are not very well defined, there is also unknown

Ability to meet the criteria	
H	High
H/M	High/Medium
M	Medium
M/L	Medium/Low
L	Low
$\boxed{L}$	Hold from further consideration

			Operations, Engineering, Legal, & Institutional Criteria							Economic Criteria				Public Health, Safety & Community Criteria				Environmental Criteria								
			1. Provide water supply reliability.					2. Optimize current water right entitlements.	3. Promote District involvement in regional, sustainable solutions.	1. Minimize cost to District customers.		2. Minimize drought impact to District customers.	3. Maximize positive impact to local economy.	1. Ensure the high quality of the District's water supply.	2. Minimize adverse sociocultural impacts.	3. Minimize risks to public health & safety.	4. Maximize security of infrastructure & water supply.	1. Preserve & protect the environment for future generations.	2. Preserve & protect biological resources.	3. Minimize carbon footprint.		4. Promote recreational opportunities.		EBMUD Dry Year Yield (MGD)	EBMUD Dry Year Unit Cost ($/AF)	
	Code	Component Name\Criteria	1. Minimize the vulnerability & risk of disruptions.	2. Minimize disruptions in water service during construction.	3. Maximize the system's operational flexibility.	4. Maximize implementation & phasing flexibility.	5. Minimize the institutional & legal complexities and barriers.	1. Maximize efficient use of current water right entitlements.	1. Maximize partnerships & regional solutions.	1. Maximize use of lowest cost water supply options.	2. Minimize the financial cost to the District of meeting customer demands for given level of system reliability.	3. Minimize customer water shortage costs & District supply augmentation costs.	4. Maximize local water supply options.	1. Minimize potential adverse impacts to the public health of District customers. 2. Maximize use of water from the best available source.	1. Minimize adverse impacts to cultural resources, including important archaeological, historical, & other cultural sites. 2. Minimize short-term community impacts. 3. Minimize long-term adverse community impacts 4. Minimize adverse social effects 5. Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	1. Minimize disproportionate public health or economic impact to minority or low-income populations.	1. Minimize the risk of death or injury from the failure of a program component in an earthquake or flood or from other causes. 2. Maximize the protection of supply sources & associated infrastructure. [Portfolio]	1. Maximize long-term sustainability by applying best management and sustainability principles.	1. Minimize adverse impacts on the environment. 2. Minimize construction & operation effects on environmentally sensitive resources. 3. Maintain populations or known habitat of state or federally listed plant or wildlife species at or above sustaining levels. 4. Minimize the reduction of riverine habitat of listed fish species and adverse affects to native fish & other native aquatic organisms. 5. Minimize impacts to wetlands & other jurisdictional waters of the United States; alterations to water flow in waterways and reservoirs/lakes, and habitat loss for sensitive species, pristine areas & special habitat features. 6. Maximize benefits to fish, including natural production of anadromous fish; and the likelihood of meeting federal and state ambient water quality standards to protect natural resources.	1. Minimize short term & long term greenhouse gas emissions from construction. 2. Maximize energy efficiency associated with operations & maintenance. 3. Maximize contributions to AB 32 goals.	4. Maximize CO2-efficient & renewable energy use. (+/- CO2 tons/year)	1. Minimize adverse impacts to recreation resources, designated parklands, designated wilderness areas, or lands permanently dedicated to open space, particularly rare opportunities & ADA access that are not found in other parts of the region. 2. Provide recreational benefits.				
																							[Score]*	Yield	Cost	
Recycled Water Projects	REC-01	**ConocoPhillips** Recycled Water Project Phase 1	H/M	H	M/L	H	M		H/M	See Dry Year Unit Cost ($/AF) Column	Utilize at Portfolio Level	Utilize at Portfolio Level	H	H	H/M	H/M	Utilize at Portfolio Level	H	H	M	M	NA		2.8	1,700	➡
	REC-01 A	**ConocoPhillips** Recycled Water Project Phase 2 (depends on Phase 1)	H/M	H	M/L	H	M		H/M				H	H	H/M	H/M		H	H	M	M	NA		0.9	400	➡
	REC-02	**East Bayshore** Recycled Water Project - **Phase 1B**	H/M	H	M/L	H/M	H/M		M				H/M	H	M	H		H	M	H/M	M	NA		1.2	3,400	➡
	REC-03	**East Bayshore** Recycled Water Project - **Phase 2**	H/M	H	M/L	H/M	H/M		M				M/L	H	M	H		H	H/M	H/M	M	NA		0.6	2,600	➡
	REC-04	**Franklin Canyon** Recycled Water Project	H/M	H	M/L	M/L	M/L		M				M	H	H/M	H/M		H	H/M	M/L	M	NA		0.3	2,100	➡
	REC-05	**North Richmond Water Reclamation Plant Expansion Project**	H/M	H	M/L	H/M	H/M		H/M				H/M	H	H/M	H/M		H	H	L	M	NA		1.7	2,200	➡
	REC-06	**Richmond Advanced Recycled Expansion (RARE) Water Project - Phase 2**	H/M	H	M/L	H/M	H		H/M				H/M	H	H/M	H/M		H	H	L	M	NA		0.5	1,400	➡
	REC-07	**Richmond Advanced Recycled Expansion (RARE) Water Project Future Expansion**	H/M	H	M/L	H/M	H		H/M				H/M	H	H/M	H/M		H	H	L	M	NA		1	1,300	➡
	REC-08	**Reliez Valley Recycled Water Project** (fromerly called : Diablo Valley Recycled Water Project (Portion of Former Lamorinda Project))	H/M	H	M/L	M/L	M		M				L	H	H/M	H/M		H	H/M	M/L	M	NA		0.2	4,700	➡
	REC-09	**San Leandro Water Reclamation Facility Expansion Project - Phase 3**	H/M	H	M/L	H/M	H/M		M				M	H	H/M	H/M		H	H/M	H/M	M	NA		0.6	5,300	➡
	REC-10	San Ramon Valley Recycled Water Program - **Phase 2**	H/M	H	M/L	H	H/M		H/M				M	H	H/M	H/M		H	H/M	M/L	M	NA		0.8	1,600	➡
	REC-11	San Ramon Valley Recycled Water Program - **Phase 3**	H/M	H	M/L	H	H/M		H/M				M	H	H/M	H/M		H	H/M	M/L	M	NA		0.6	1,900	➡
	REC-12	San Ramon Valley Recycled Water Program - **Phase 4**	H/M	H	M/L	H	H/M		H/M				M/L	H	H/M	H/M		H	H/M	M/L	M	NA		0.4	1,600	➡
	REC-13	San Ramon Valley Recycled Water Program - **Phase 5**	H/M	H	M/L	H	H/M		H/M				L	H	H/M	H/M		H	H/M	M/L	M	NA		0.3	2,700	➡
	REC-14	San Ramon Valley Recycled Water Program - **Phase 6**	H/M	H	M/L	H	H/M		H/M				L	H	H/M	H/M		H	H/M	M/L	M	NA		0.2	2,900	➡
Satellite Treatment Projects	REC-15	**Satellite Recycled Water Treatment Plant Project(s)**	H/M	H	M/L	H/M	M		M				M	H	H/M	H/M		H	H	H	M	NA		0.7	6,100	➡
Raw Water	REC-16	**Lake Chabot Raw Water Expansion Project**	H/M	M	M/L	M	H		M				H/M	H	H/M	H/M		H	H/M	H	M	NA		0.4	1,800	➡
Partnership with Upcountry/Sacramento Agencies	REC-17	**Amador Water Agency**	$\boxed{L}$	M	M/L	M	$\boxed{L}$		H				No Yield Info	NA	NA	NA		NA	NA	NA	NA	NA				
	REC-18	**Jackson Valley Irrigation Districts & Amador County Wastewater Agencies**	$\boxed{L}$	M	M/L	M	$\boxed{L}$		H				No Yield Info	NA	NA	NA		NA	NA	NA	NA	NA				
	REC-19	**Jackson Valley Irrigation Districts & Amador Water Agency/ future Joint Lake Camanche WWTP**	$\boxed{L}$	M	M/L	M	$\boxed{L}$		H				No Yield Info	NA	NA	NA		NA	NA	NA	NA	NA				
	REC-20	**Woodbridge Irrigation District**	$\boxed{L}$	M	M/L	M	$\boxed{L}$		H				No Yield Info	NA	NA	NA		NA	NA	NA	NA	NA				
	REC-21	**Sacramento Regional County Sanitation District & Sacramento County Water Agency**	Incorporated in SUP-07 (Groundwater Banking/Exchange - Sacramento Basin)																							

Note: Criteria scores have not been used for comparison across component categories.

➡ Carried forward to portfolios.

Figure 1-3: Recycled Component Evaluation

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potential for institutional and legal complexities. The Upcountry partnership projects were therefore held from further consideration and were not included in the three Recycling Levels. These projects will continue to be monitored and considered by the District in the future.

The Sacramento Regional Partnership project was incorporated into the Sacramento Basin Groundwater Banking / Exchange supplemental supply project and was further evaluated under that category. All other recycled and raw water projects were brought forward and combined into recycled water levels for inclusion in portfolio building.

Recycled Water levels 2 and 3 were assigned a grouping of recycled water projects that could possibly be implemented to meet the target production levels. Tables 1-4 and 1-5, below, summarize Recycled Water Level 2 and Level 3, respectively, and the projects that might comprise these levels. The recycled water levels are designed to be flexible and to respond to the opportunities that become available throughout the planning period, both in terms of funding opportunities as well as recycled water demand opportunities. The projects listed in Tables 1-4 and 1-5 are just examples of likely projects that could comprise these recycled water levels and are based on the individual project's likelihood success at implementation and lowest cost.

Table 1-4: Recycled Water Level 2 Projects

RW Project Name	Yield (MGD)
San Ramon Valley Recycled Water Program - Phase 2 Bishop Ranch	0.75
Richmond Advanced Recycled Expansion (RARE) Water Project - Phase 2 Additional 0.5 MGD	0.5
Richmond Advanced Recycled Expansion (RARE) Water Project - Future Expansion	1
ConocoPhillips Recycled Water Project, Phase 1	2.8
Level 2 Total	**5.05**

Table 1-5: Recycled Water Level 3 Projects

RW Project Name	Yield (MGD)
San Ramon Valley Recycled Water Program - Phase 2 Bishop Ranch	0.75
Richmond Advanced Recycled Expansion (RARE) Water Project - Phase 2 Additional 0.5 MGD	0.5
Richmond Advanced Recycled Expansion (RARE) Water Project - Future Expansion	1
ConocoPhillips Recycled Water Project, Phase 1	2.8

RW Project Name	Yield (MGD)
San Ramon Valley Recycled Water Program - Phase 3 Danville East	0.58
San Ramon Valley Recycled Water Program - Phase 4 Blackhawk East	0.37
East Bayshore Recycled Water Project - Phase 1B Alameda	1.2
East Bayshore Recycled Water Project - Phase 2 Future Expansion (Oakland Redevelopment)	0.6
ConocoPhillips Recycled Water Project, Phase 2	0.9
San Ramon Valley Recycled Water Program - Phase 5 Blackhawk West	0.3
San Ramon Valley Recycled Water Program - Phase 6 Danville West	0.2
San Leandro Water Reclamation Facility Expansion Project - Phase 3 Oakland/Alameda	0.56
Lake Chabot Raw Water Expansion Project	0.36
Reliez Valley Recycled Water Project	0.19
Satellite Recycled Water Treatment Plant Project (Retrofits)	0.45
Satellite Recycled Water Treatment Plant Project (Retrofits)	0.14
Satellite Recycled Water Treatment Plant Project (Retrofits)	0.11
Level 3 Total	11.01 MGD

1.1.4 Supplemental Supply Screening

Several components were eliminated in the first stage of consideration because they did not satisfy one of the exclusion criteria. This included statewide components Sites Reservoir, Temperance Flat Reservoir, and Expanded Los Vaqueros Reservoir because it remained unclear, whether they would meet the exclusion criteria to *meet projected water demands through 2040*. These components are currently at very early stages of discussion and development. As detailed information on the water supply benefit to EBMUD is not currently known, cost sharing has not yet been identified, and federal partners have not yet been identified. As such, all of the statewide components were held from further consideration in the WSMP 2040 planning process. However, the District will continue to track these projects for future consideration.

In the time period since the component screening process was undertaken for this WSMP, plans to expand Los Vaqueros Reservoir have moved forward and Contra Costa Water District has completed environmental documents for this project. Technological uncertainties continue to warrant exclusion of the remaining statewide components, but EBMUD has added the 160 TAF Expand Los Vaqueros Reservoir component (Current Expansion) to the WSMP 2040 Portfolio as a possible supplemental supply project option that could be implemented in the future to meet EBMUD's dry year water needs.

An additional four components were eliminated from consideration due to technical infeasibility: fog capture, Kellogg Reservoir, Off-shore Desalination, and water bags, as the technology for these components is not developed enough for consideration in the WSMP 2040 Planning Process.

Components Eliminated in the First Stage of Consideration

Sites Reservoir

The Sites Reservoir component is an off-stream storage project, located approximately 10 miles west of Maxwell in Antelope Valley. The reservoir would have a storage capacity of 1.9 million AF (possibly larger). The estimated total average annual yield of Sites Reservoir ranges from 470,000 to 640,000 AF per year. The Sites Reservoir component, as an off-stream project, would be filled primarily by pumped diversions from the Sacramento River. Water would be diverted into the reservoir during peak flow periods in winter months. To minimize potential impacts of existing diversions on Sacramento River fisheries, Sites would release water back into valley conveyance systems (such as the Glenn Colusa Irrigation District Canal and Tehama Colusa Canal) in exchange for water that would otherwise have been diverted from the Sacramento River. This undiverted summer water could become available for other downstream uses in the Bay-Delta. The Sites Reservoir component is currently in the feasibility and environmental documentation phase of planning and is a multi-agency partnership project. The Notice of Preparation (NOP) and Notice of Intent were issued in October 2001. The draft EIR/EIS for this component is expected in the Winter 2009/2010 with a final EIR/EIS expected by Summer 2010.

Temperance Flat Reservoir

The Upper San Joaquin River Basin Storage Investigation is a joint feasibility study by the U.S. Department of the Interior, Bureau of Reclamation and the California Department of Water Resources. The primary objectives are to contribute to San Joaquin River restoration, improve San Joaquin River water quality and facilitate additional conjunctive water management in the eastern San Joaquin Valley to reduce groundwater overdraft. Two potential locations are still being investigated for the Temperance Flat Reservoir, located in the Millerton Lake region. The Temperance Flat Reservoir component will be built on the San Joaquin River east of Fresno. In addition, Fine Gold Reservoir, an offstream alternative adjacent to Millerton Lake is being investigated. A new reservoir near Millerton Lake could hold up to 1.3 million AF in additional water storage and could supply up to 208,000 AF of water per year. The Temperance Flat Reservoir component is currently in the feasibility and environmental documentation phase of planning and is a multi-agency partnership project. The draft EIR/EIS for the Upper San Joaquin River Basin Storage Investigation, of which Temperance Flat Reservoir is one alternative, is expected by Fall 2009 with a final expected by Summer 2010.

Expand Los Vaqueros Reservoir

As described above, the 160 TAF Expand Los Vaqueros Reservoir component has been added into the WSMP 2040 Portfolio as part of the revision of the WSMP 2040 conducted in April 2012. A further description of this component is provided in Section 6.1.4, Supplemental Supply, in the main body of the WSMP 2040.

Kellogg Reservoir

Kellogg Reservoir would be a terminal reservoir in the Los Vaqueros watershed on Kellogg Creek, downstream of the existing Los Vaqueros Reservoir. Kellogg Reservoir could provide up to 135,000 AF of storage. Contra Costa Water District examined this component as an alternative to Los Vaqueros Reservoir. The challenges of this component that make it likely to be infeasible include:

- May not be available to EBMUD, as CCWD owns the land and has established wetland mitigation areas and recreation facilities in the proposed reservoir area.
- Would inundate the primary access to Los Vaqueros as well as other facilities (e.g., pipelines).
- Would result in significant biological impacts on wetlands and would inundate approximately nine miles of stream, destroying habitat for special-status plants and wildlife communities and species, including the Northern Claypan Vernal Pool community, kit fox, and California tiger salamander.
- There is also a potentially active fault line that crosses proposed dike alignments, which would create technical difficulties.
- A shallow reservoir depth may promote algae growth and degrade water quality.

Because the Kellogg Reservoir component failed to meet the exclusion criteria that components *must be technically feasible using proven technology*, it was eliminated from further consideration. The Kellogg Reservoir component is likely infeasible due to impacts on a wetland mitigation area as well as inundation of the primary access to Los Vaqueros as well as other facilities.

Off-shore Desalination

An off-shore Desalination component would involve producing freshwater from a floating off-shore desalination plant located in San Francisco Bay. One off-shore desalination plant can process up to 75 MGD of water a day; however, production will be tailored to the local demand. This component would possibly be an ocean-going ship that houses a self-contained seawater desalination plant. It includes:

- A multi-depth intake line and pump station to draw water from the sea,

- Microfiltration, reverse osmosis, and post treatment systems to convert the seawater to potable water,
- A mixing and dispersion system to properly dispose of the brine, and
- A variety of means by which the potable water can be transported to shore (e.g., pipeline (submerged or floating), barge system).

Because the off-shore desalination component failed to meet the exclusion criteria that components *must be technically feasible using proven technology*, it was eliminated from further consideration. Off-shore desalination is still in the conceptual stages of development, as it has not been implemented yet. At the present time, off-shore desalination has an unknown timeline for implementation as well as the unknown costs effectiveness.

Fog Capture

Fog capture technology utilizes collectors that are simple, flat, rectangular nets of nylon supported by a post at both ends and arranged perpendicular to the direction of the prevailing wind. The surface of fog collectors is usually made of fine-mesh nylon or polypropylene netting. As water collects on the net, the droplets join to form larger drops that fall under the influence of gravity into a trough or gutter at the bottom of the panel, from which it is conveyed to a storage tank or cistern. The collector itself is completely passive, and the water is conveyed to the storage system by gravity. The challenges of this component include:

- Best suited to areas where fog is constantly available and can be intercepted on land.
- Very sensitive to changes in climatic conditions which could affect the water content and frequency of occurrence of fogs.
- Meeting drinking water quality standards due to concentrations of chlorine, nitrate, and some minerals.
- Impacts on the landscape and the flora and fauna of the region during the construction of the fog harvesting equipment and the storage and distribution facilities.
- Visual concerns and the potential for vandalism.

Because the fog capture component failed to meet the exclusion criteria that components *must be technically feasible using proven technology*, it was eliminated from further consideration. The fog capture component is not developed or tested to a level that it is reasonably reliable to meet District demands through 2040.

Water Bags

Large water bags are used to move fresh water from source to demand. Currently, there are two operations using this technology; one in Greece and one between Turkey and Northern Cyprus. Bags available on the market currently include a 25-foot diameter, 230- foot long sausage-shaped bag (the “Spragg Bag”) and 800-foot by 200-foot by 35-foot deep bag. In both cases, bags are pulled by a tugboat from the source to the buyer and in one case (that of the "Spragg Bay"), the bags can reportedly be linked to form a bag 'train'.

Special facilities are required at both the supply and demand ends to handle bag docking, loading/emptying, etc., and additional facilities are required for treatment, pumping, etc. In the United States, two projects have been proposed using this technology. The first involved transporting water from the Mad River in Humboldt County and the second was moving water from the Gualala and Albion Rivers in Mendocino County. Neither project was implemented.

Because the water bag component failed to meet the exclusion criteria that components *must be technically feasible using proven technology*, it was eliminated from further consideration. Water bags have not been developed or tested to a level that it can be reasonably relied on as a component to help meet District demands through 2040.

Components Eliminated in the Second Stage of Consideration

Following the first stage of component consideration, each of the remaining components was scored using the evaluation criteria (see Figure 1-4). Although the criteria had not been weighted until this point, several of the criteria were determined to be capable of identifying "fatal flaws" in a component. These include:

- Provide water supply reliability [Minimize the institutional & legal complexities and barriers]
- Minimize adverse socio-cultural impacts;
- Minimize risks to public health & safety
- Preserve and protect biological resources.

H	High
H/M	High/Medium
M	Medium
M/L	Medium/Low
L	Low
[L]	Hold from further consideration

Ability to meet the criteria			Operations, Engineering, Legal, & Institutional Criteria							Economic Criteria				Public Health, Safety & Community Criteria				Environmental Criteria								
			1. Provide water supply reliability.					2. Optimize current water right entitlements.	3. Promote District involvement in regional, sustainable solutions.	1. Minimize cost to District customers.		2. Minimize drought impact to District customers.	3. Maximize positive impact to local economy.	1. Ensure the high quality of the District's water supply.	2. Minimize adverse sociocultural impacts.	3. Minimize risks to public health & safety.	4. Maximize security of infrastructure & water supply.	1. Preserve & protect the environment for future generations.	2. Preserve & protect biological resources.	3. Minimize carbon footprint.		4. Promote recreational opportunities.		EBMUD Dry Year Yield (MGD)	EBMUD Dry Year Unit Cost ($/AF)	
	Code	Component Name\Criteria	1. Minimize the vulnerability & risk of disruptions.	2. Minimize disruptions in water service during construction.	3. Maximize the system's operational flexibility.	4. Maximize implementation & phasing flexibility.	5. Minimize the institutional & legal complexities and barriers.	1. Maximize efficient use of current water right entitlements.	1. Maximize partnerships & regional solutions.	1. Maximize use of lowest cost water supply options.	2. Minimize the financial cost to the District of meeting customer demands for given level of system reliability.	3. Minimize customer water shortage costs & District supply augmentation costs.	4. Maximize local water supply options.	1. Minimize potential adverse impacts to the public health of District customers. 2. Maximize use of water from the best available source.	1. Minimize adverse impacts to cultural resources, including important archaeological, historical, & other cultural sites. 2. Minimize short-term community impacts. 3. Minimize long-term adverse community impacts 4. Minimize adverse social effects 5. Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	1. Minimize disproportionate public health or economic impact to minority or low-income populations.	1. Minimize the risk of death or injury from the failure of a program component in an earthquake or flood or from other causes. 2. Maximize the protection of supply sources & associated infrastructure. [Portfolio]	1. Maximize long-term sustainability by applying best management and sustainability principles.	1. Minimize adverse impacts on the environment. 2. Minimize construction & operation effects on environmentally sensitive resources. 3. Maintain populations or known habitat of state or federally listed plant or wildlife species at or above sustaining levels. 4. Minimize the reduction of riverine habitat of listed fish species and adverse affects to native fish & other native aquatic organisms. 5. Minimize impacts to wetlands & other jurisdictional waters of the United States; alterations to water flow in waterways and reservoirs/lakes, and habitat loss for sensitive species, pristine areas & special habitat features. 6. Maximize benefits to fish, including natural production of anadromous fish; and the likelihood of meeting federal and state ambient water quality standards to protect natural resources.	1. Minimize short term & long term greenhouse gas emissions from construction. 2. Maximize energy efficiency associated with operations & maintenance. 3. Maximize contributions to AB 32 goals.	4. Maximize CO2-efficient & renewable energy use. (+/- CO2 tons/year)	1. Minimize adverse impacts to recreation resources, designated parklands, designated wilderness areas, or lands permanently dedicated to open space, particularly rare opportunities & ADA access that are not found in other parts of the region. 2. Provide recreational benefits.	[Score]*	Yield	Cost	
State	SUP-04	Semitropic Groundwater Bank	M	H/M	H/M	M	[L]		M	See Dry Year Unit Cost ($/AF) Cost Column	Utilize at Portfolio Level	Utilize at Portfolio Level	L	M	H/M	H/M	Utilize at Portfolio Level	H	[L]	L	M	M/L				
Central Valley	SUP-05	Bixler/Delta Diversion	L	H/M	L	M	[L]		L				M/L	L	H/M	H		M/L	[L]	M	M	L				
	SUP-06	Duck Creek Reservoir	M/L	M	M	L	[L]		M				L	M/L	M	M		M/L	[L]	M	L	M/L				
	SUP-07	Groundwater Banking/Exchange (Sacramento Basin)	M	H/M	H	H	M		H				L	M	H/M	H		H	H/M	M/L	M	M/L		4.2	1,900	➡
	SUP-08	Groundwater Banking/Exchange (San Joaquin Basin)	M/L	M	H/M	H	M/L		H				L	H/M	H/M	H		H	H/M	M/L	M	M/L				
	SUP-25	Northern California Water Transfers	M/L	H	H	H	H		M				L	H/M	H/M	M		H	H/M	M	M	M/L		44.6	630	➡
Local - East Bay Service Area	SUP-09	Bayside Groundwater Project	H	H/M	H	H/M	H/M		L				H	M	H/M	M		H/M	H/M	M	M	M/L		9	890	➡
	SUP-10	Bollinger Canyon Reservoir	H	H/M	H	L	[L]		L				H	H/M	[L]	M		M	M/L	M	M	L				
	SUP-11	Buckhorn Canyon Reservoir	H	H/M	H	L	M/L		L				H	H/M	M/L	H/M		M	M/L	H/M	M	L		42	710	➡
	SUP-12	Cull Canyon Reservoir	H	H/M	H	L	[L]		L				H	H/M	[L]	M/L		M	M/L	H/M	M	L				
	SUP-13	Curry Canyon Reservoir	H	H/M	H	L	[L]		L				H	H/M	[L]	[L]		M	M/L	H/M	M	L				
	SUP-16	Low Energy Application for Desalination (LEAD) at C&H Sugar	M	H	L	L	H/M		M				H/M	H	H/M	H/M		M	M/L	H	M	L		1.5	2,600	➡
	SUP-18	Regional Desalination Project	H/M	H/M	H	M	M/L		H				H/M	H/M	M	M		M/L	M/L	L	M	L		20	1,900	➡
Upcountry	SUP-20	Enlarged Camanche Reservoir	M/L	M/L	M	L	M/L		M/L				L	H	M	[L]		H/M	[L]	H/M	H	H/M				
	SUP-21	Inter-Regional Conjunctive Use Project (IRCUP)	M/L	M	H/M	H/M	M/L		H				L	H/M	H/M	H/M		H	H/M	M/L	M	M/L		17.4	1,200	➡
	SUP-22	Enlarge Lower Bear Reservoir	M/L	H	M/L	L	M		H				L	H	M/L	M		H/M	M	H/M	H	H/M		2.2	840	➡
	SUP-23	Middle Bar Reservoir	M/L	M	M	L	[L]		M/L				L	H	M/L	M		M	[L]	H/M	H	L				
	SUP-24	Enlarged Pardee Reservoir	M/L	M	H/M	L	M		M/L				L	H	M	H/M		H/M	M	H/M	H	H/M		51.2	730	➡

Notes: Criteria scores have not been used for comparison across component categories. The scoring as presented was prepared prior to the CEQA revision effort.

➡ Carried forward to portfolios.

Figure 1-4: Supplemental Supply Component Evaluation

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Any component that received more than two low scores (a boxed "L") on select criteria was eliminated from further consideration. All of the components that were eliminated in this second round received at least two low "L" scores. The Curry Reservoir component received three "L" scores (see Table 1-6). All of the other supplemental supply components were carried forward into portfolio building.

Table 1-6: Summary of Components Eliminated in the Second Stage of Consideration

Component	Evaluation Criteria Used for Second Stage Consideration			
	Provide water supply reliability [Minimize the institutional & legal complexities and barriers]	Minimize adverse sociocultural impacts	Minimize risks to public health & safety	Preserve & protect biological resources
Semitropic Groundwater Bank	L			L
Bixler/Delta Diversion	L			L
Duck Creek Reservoir	L			L
Bollinger Canyon Reservoir	L	L		
Cull Canyon Reservoir	L	L		
Curry Canyon Reservoir	L	L	L	
Enlarged Camanche Reservoir			L	L
Middle Bar Reservoir	L			L

"L" = low score

Components Eliminated in the Second Stage of Consideration

Semitropic Groundwater Bank

This Semitropic Groundwater Bank component consists of a combination of water banking and water transfer activities, with the arrangement (water transfer or withdrawal) dependent upon the amount of runoff on the Mokelumne River system. The component could provide 45 TAF over a 3 year dry period assuming the same amount is injected over 7 years. The component consists of a groundwater banking facility south of the Delta such as the Semitropic-Rosamond Water Bank Authority (Semitropic), combined with a series of in-lieu water transfers or contract entitlements, to provide EBMUD with State Water Project (SWP) surface water during dry years. Semitropic provides water to the SWP when necessary, usually during dry years, either with banked water (i.e. by exchanging its entitlement) or by reversing the intake facility and pumping back to the California Aqueduct.

This component consists of a dry year recovery component and a recharge component when runoff is more abundant. EBMUD would use its existing water rights to divert Mokelumne water to store in the groundwater bank. The Mokelumne recharge water would be sent via the Mokelumne Aqueducts and a new pipeline from Bixler to the Clifton Court Forebay (the regulating reservoir at the head of the SWP's California Aqueduct). From there, the water will move through the SWP to a Southern California groundwater storage facility for banking in an existing dewatered aquifer space either by direct injection into the basin or in-lieu use. Several groundwater banking districts exist and can provide banking services without additional infrastructure, other than a new pipeline connecting the Mokelumne Aqueducts to Clifton Court Forebay.

During dry years, the groundwater district would use water banked by EBMUD to supply local irrigators (in place of SWP-contracted water) or to pump back directly into the California Aqueduct. The unused SWP water, normally supplied south of the Delta to Southern California users as part of their SWP entitlements would then be available for diversion by others since less surface water would be taken directly from the Delta into the SWP to serve Southern California. EBMUD would then divert the unused Delta water (legally theirs via the paper water transfer/entitlement exchange) north of the Delta at the Freeport facility.

Due to concerns about institution and legal complexities associated with this component in relation to water rights as well as the environmental impacts of construction of an 8.5 mile pipeline from Bixler to Clifton Court Forebay through the Delta, this component was held from further consideration.

Surface Water Reservoirs Eliminated in the Second Stage of Consideration

Bixler/Delta Diversion

The Bixler/Delta Diversion would provide EBMUD with additional means of withdrawing water transported via the Delta in addition to FRWP. EBMUD currently owns the Bixler High Head and Low Head Pumping Plants. These pump stations are located on the western side of the Delta, near Indian Slough. The low-head pump withdraws water from Indian Slough and supplies water to the suction-side of the high head pumps. As part of this component, these pump stations would be upgraded to provide Delta water to the raw water system; water may be 'transported' Mokelumne River water, Sacramento River water (exchanged/transferred) under a short- or long-term exchange, or water obtained under a new water right. However, neither station is operational at this time. Control cabinets in the high head station were destroyed in a fire, and the low head pumps and motors were recently rebuilt and installed. Due to concerns about institution and legal complexities associated with withdrawing water from the Delta as well as the environmental impacts of taking additional water from the fragile Delta ecosystem, this component was held from further consideration.

Duck Creek Reservoir

The Duck Creek Reservoir component would involve construction of an off-stream storage reservoir on Duck Creek, south of the Mokelumne Aqueducts in the Calaveras River watershed. A new pipeline would be constructed from Pardee Reservoir to convey floodflows to the new reservoir. Scenarios could include a contract for the purchase of water from the authority, or a partnership and would provide 150 TAF of new storage. Due to concerns about institution and legal complexities associated with the component as well as the environmental impacts of inundating habitat that the CDGW has a conservation easement over, this component was held from further consideration.

Bollinger Canyon Reservoir

The Bollinger Canyon Reservoir component would involve constructing a dam for a terminal reservoir on Bollinger Creek, 1.75 miles north of the Crow Canyon Road/Bollinger Canyon Road intersection. The site is approximately 2.5 miles southwest of the town of Danville. The reservoir would store 98,000 AF of water. Due to concerns about institution and legal complexities associated with inundating a portal of the Las Trampas Wilderness Area as well as the sociocultural impacts of inundating residences and known cultural resources within the pool of the reservoir, this component was held from further consideration.

Cull Canyon Reservoir

The Cull Canyon Reservoir component site is located northeast of Castro Valley, approximately 2 miles north of the Crow Canyon Road/Cull Canyon Road intersection. A dam would be constructed across Cull Creek to store 100,000 AF of water. Due to concerns about institution and legal complexities associated with the component as well as the sociocultural impacts of inundating the only access to residences and businesses, as well as inundating a portion of the Cull Canyon Regional Recreation Area and access to the Bay Area Ridge Trail within the pool of the reservoir, this component was held from further consideration.

Curry Canyon Reservoir

Located southeast of Clayton and north of the Black Hills on Marsh Creek, the Curry Canyon Reservoir component would store 200,000 AF of water. The proposed dam site is approximately 1.5 miles south of the Marsh Creek turn-off on Morgan Territory Road. Due to concerns about institution and legal complexities associated with the component; the sociocultural impacts of inundating residential development along Morgan Territory Road, a well-established mobile home community, and portions of Mount Diablo State Park within the pool of the reservoir; as well as disproportionate public health or economic impact to minority or low-income populations, this component was held from further consideration.

Enlarged Camanche Reservoir

Camanche Reservoir is operated by EBMUD and is located immediately downstream of Pardee Reservoir. Enlarging Camanche Resevoir would involve increasing the surface elevation of the existing Camanche Reservoir by approximately 25 feet (to approximately 260 feet above mean sea level) to provide an additional approximately 200,000 AF of storage. The increased storage would be used to meet downstream needs so that an equivalent amount of additional water could remain in storage in Pardee Reservoir for use by EBMUD rather than be released to meet downstream needs. The existing facilities could likely not be sufficiently improved to provide for this increased storage. Therefore, it is assumed that a new main dam, saddle dams, and dikes would need to be constructed. Due to the disproportionate public health or economic impact to minority or low-income populations caused by inundating a mobile home community and the environmental impacts of increased temperature on aquatic resources in the lower Mokelume River, this component was held from further consideration. An enlarged Camanche Reservoir would be relatively shallow, and would result in substantially reduced inflows from the cooler Pardee Reservoir. This component would therefore likely result in substantial temperature impacts on aquatic resources in the lower Mokelumne River. In addition, fish releases may not be able to be made during construction of this component.

Middle Bar Reservoir

The Middle Bar Reservoir site is located approximately 3 miles west of Mokelumne Hill on the Mokelumne River, immediately upstream of Pardee Reservoir. Its capacity would be 100,000 AF or more. Scenarios could include a contract for the purchase of water from the authority, or a partnership. Water for EBMUD likely would be released from the reservoir into Pardee Reservoir, where it would be available for diversion by EBMUD. Due to concerns about institution and legal complexities associated with the component in terms of obtaining permits and inundation of the popular Electra Whitewater Run, as well as the environmental impacts of on-river storage such as inundating 8 miles of the Mokelumne River and approximately 100 acres of wetland, this component was held from further consideration.

1.2 Portfolio Screening

1.2.1 Screening Criteria Used in the Portfolio Evaluation

Development of the Planning Objectives and screening criteria can be found in Section 2.1, WSMP 2040 Planning Objectives. As described in Section 6.2.1, the full list of criteria was viewed as a menu of possible criteria and individual criteria were only used if they were able to help distinguish between the portfolios. Table 1-7 provides an explanation of which criteria were included in the 2009 portfolio evaluation.

Table 1-7: Evaluation Criteria Included in the 2009 Portfolio Evaluation

	Criteria	Included in Portfolio Evaluation	Rational for Inclusion or Exclusion
Operations, Engineering, Legal & Institutional	Minimize the vulnerability & risk of disruptions.	Yes	This criterion continues to be a distinguishing factor when considering a portfolio's reliability. This criterion takes into account the reliability of a portfolio during an aqueduct/Delta failure.
	Minimize disruptions in water service during construction.	No	Disruptions in service during construction are assumed to be mitigable. None of components received a low score for this criterion, thus it was not carried forward as a distinguishing factor in the portfolio screening.
	Maximize the system’s operational flexibility.	Yes	This criterion continues to be a distinguishing factor when considering operational flexibility within a portfolio to respond to changing conditions such as drought or global climate change.
	Maximize implementation flexibility to respond to change.	No	This criterion did not prove to be a distinguishing factor for portfolios.
	Minimize the institutional & legal complexities & barriers.	Yes	This criterion continues to be a distinguishing factor when considering a portfolio’s likelihood of being successfully implemented.
	Optimize use of existing water right entitlements.	No	This criterion was excluded from the evaluation process, as it is not possible to estimate at this time.
	Maximize partnerships & regional solutions.	Yes	This criterion continues to be a distinguishing factor when considering a portfolio’s partnership opportunities.
Economic	Maximize use of lowest cost water supply options.	No	The two subsequent criteria specifically evaluate the lowest District and customer costs of the portfolios and therefore, this criterion is not utilized at the portfolio level.
	Minimize the financial cost to the District of meeting customer demands for given level of system reliability.	Yes	This criterion was not utilized to evaluate the components, but is utilized at the portfolio level.
	Minimize customer water shortage costs.	Yes	This criterion was not utilized to evaluate the components, but is utilized at the portfolio level.
	Maximize local water supply options.	No	This criterion was already reviewed at the component level. Preference for local water supply options continues to be reflected in the scoring of the first operations criterion. Therefore, this criterion was not utilized in portfolio screening.

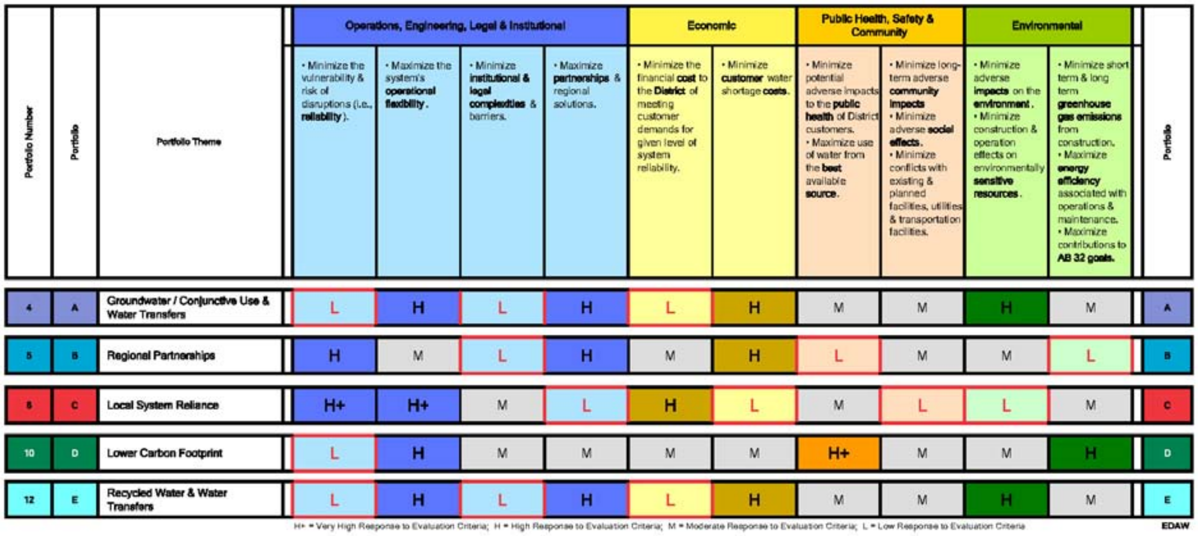
Public Health, Safety & Community	▪ Minimize potential adverse impacts to the public health of District customers. ▪ Maximize use of water from the best available source.	Yes	Source water quality and public health continue to be a distinguishing factor at the portfolio level.
	▪ Minimize adverse impacts to cultural resources, including important archaeological, historical, & other cultural sites. ▪ Minimize short-term community impacts.	No	The footprints of the portfolio components are generally unknown at this time and therefore, the cultural resources criterion does not help to distinguish the portfolios. Short-term community impacts were also difficult to assess for some portfolios where exact component locations are unknown and are unlikely to be a distinguishing factor between the portfolios. A more detailed analysis of cultural resources and short-term community impacts is provided in the Program EIR.
	▪ Minimize long-term adverse community impacts (e.g., aesthetics, noise, air quality). ▪ Minimize adverse social effects [e.g., impacts to community character, social cohesion, community features]. ▪ Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	Yes	These criteria are evaluated at the portfolio level to capture community impacts related to operations and existence of new facilities, as these criteria are distinguishing factors at the portfolio level.
	Minimize disproportionate public health or economic impact to minority or low-income populations.	No	All components that received low (L) or medium/low (M/L) scores for the criterion have not been carried forward into portfolios. The components that have been included in portfolios all scored between medium (M) and high (H). This criterion has become less of a distinguishing factor in the portfolio evaluation. Overall community impacts are considered in the previous criteria. Therefore, this criterion was not utilized in portfolio screening.
	▪ Minimize the risk of death or injury from the failure of a program component in an earthquake or flood or from other causes. ▪ Maximize the protection of supply sources & associated infrastructure.	No	This criterion was reexamined at the portfolio level and was not included, as the overarching objectives are incorporated under other operations and environmental criteria. In addition, security and safety standards will be applied to all components and portfolios.
Environmental	Maximize long-term sustainability by applying best management & sustainability principles.	No	This criterion does not serve as a distinguishing factor in the portfolio evaluation. Overall sustainability is a goal of the WSMP 2040 and environmental sustainability will be evaluated using the below environmental criteria. Long-term reliability is also evaluated in the operations criteria. Therefore, this criterion was not utilized in portfolio screening.

	▪ Minimize adverse impacts on the environment. ▪ Minimize construction & operation effects on environmentally sensitive resources.	Yes	These two criteria are included in the portfolio screening, as they are overarching criteria for this objective that capture the intent of the below environmental criteria. These two criteria assist in distinguishing the portfolios and measure environmental performance.
	▪ Maintain populations or known habitat of state or federally listed plant or wildlife species at or above sustaining levels. ▪ Minimize the reduction of riverine habitat of state or federally listed fish species & must not cause a net loss of spawning or rearing habitat of native anadromous fish species. ▪ Minimize impacts to wetlands, their values, & other jurisdictional waters of the United States. ▪ Minimize habitat loss for sensitive & native plant & wildlife species, pristine areas & special habitat features. ▪ Minimize adverse affects to native fish & other native aquatic organisms. ▪ Maximize benefits to fish, including natural production of anadromous fish. ▪ Maximize the likelihood of meeting federal & state ambient water quality standards to protect natural resources. Minimize alterations to water flow in waterways & reservoirs/lakes that would have an adverse impact on biological resources.	No	These criteria are more generally evaluated at the portfolio level using the above environmental criteria.
	▪ Minimize short term & long term greenhouse gas emissions from construction. ▪ Maximize energy efficiency associated with operations & maintenance. ▪ Maximize contributions to AB 32 goals.	Yes	Operational carbon emissions as well as energy generation (hydroelectricity) were considered.
	Maximize CO2-efficient & renewable energy use.	No	The positive contributions of hydroelectric generation were considered in the above combined criteria, so this criterion was not used in the portfolio screening.

	▪ Minimize adverse impacts to recreation resources, designated parklands, designated wilderness areas, or lands permanently dedicated to open space, particularly rare opportunities & ADA access that are not found in other parts of the region. ▪ Provide recreational benefits.	No	These two criteria do not serve as a distinguishing factor in the portfolio evaluation. The criteria are not applicable for rationing, conservation, and recycling components and were only utilized in the evaluation of the supplemental supply components. Most of the supplemental supply components that received a low score for these criteria have already been screened out (i.e., those that flooded wilderness, parks, etc.) Therefore, the two criteria are not utilized in portfolio screening.

Note: The portfolio evaluation was prepared prior to the CEQA revision effort.

Primary Portfolio Screening



Portfolio Number	Portfolio	Portfolio Theme	Operations, Engineering, Legal & Institutional				Economic		Public Health, Safety & Community		Environmental		Portfolio
			• Minimize the vulnerability & risk of disruptions (i.e., **reliability**).	• Maximize the system's **operational flexibility**.	• Minimize **institutional & legal complexities** & barriers.	• Maximize **partnerships** & regional solutions.	• Minimize the financial **cost** to the **District** of meeting customer demands for given level of system reliability.	• Minimize **customer** water shortage **costs**.	• Minimize potential adverse impacts to the **public health** of District customers. • Maximize use of water from the **best** available **source**.	• Minimize long-term adverse **community impacts** • Minimize adverse **social effects**. • Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	• Minimize adverse **impacts** on the **environment**. • Minimize construction & operation effects on environmentally **sensitive resources**.	• Minimize short term & long term **greenhouse gas emissions** from construction. • Maximize **energy efficiency** associated with operations & maintenance. • Maximize contributions to **AB 32 goals.**	
4	A	Groundwater / Conjunctive Use & Water Transfers	L	H	L	H	L	H	M	M	H	M	A
5	B	Regional Partnerships	H	M	L	H	M	H	L	M	M	L	B
8	C	Local System Reliance	H+	H+	M	L	H	L	M	L	L	M	C
10	D	Lower Carbon Footprint	L	H	M	M	M	M	H+	M	M	H	D
12	E	Recycled Water & Water Transfers	L	H	L	H	L	H	M	M	H	M	E

H+ = Very High Response to Evaluation Criteria; H = High Response to Evaluation Criteria; M = Moderate Response to Evaluation Criteria; L = Low Response to Evaluation Criteria

EDAW

Figure 1-5: Primary Portfolio Evaluation and Recommendations

Note: The portfolio scoring was conducted prior to the CEQA revision effort.

Each of the portfolios that have been carried forward to the Primary Portfolio phase for evaluation has particular advantages and disadvantages. For example, Portfolio B scored higher on reliability and maximizing partnerships but lower on minimizing institutional and legal complexities and barriers. Portfolio C performed well in terms of reliability, but lower in the public health, safety, and community, and environmental criteria. Because of these trade-offs, no one alternative portfolio could be identified at this time as superior to another.

The evaluation criteria described in Section 1.2.1, Screening Criteria Used in the Portfolio Evaluation, were then used to evaluate the primary portfolios (see Figure 1-5). When possible, a portfolio was scored as a whole under each of the criterion; however, in some cases, the largest, most dominant component making up the portfolio (e.g., Buckhorn Canyon Reservoir or Enlarge Pardee Reservoir) also dominated and determined the overall portfolio score on a particular criterion. Table 1-8 provides a summary of the scoring methodology. A summary of the Economic criteria scoring is provided in Table 1-9.

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Table 1-8: Primary Portfolio Screening Summary Rationale

	Criteria	Score			
		H+	H	M	L
Operations, Engineering, Legal & Institutional	Minimize the vulnerability & risk of disruptions (i.e., reliability).	Provides significant storage west of the Delta; contributes to standby storage requirements.	While most supplies depend on the Mokelumne Aqueducts for distribution, Regional Desalination is close by and can use interties for distribution in an emergency.	None given, as portfolios were more suitably scored on the low and high ends of the spectrum for this criterion.	Majority of supply has to come cross Delta; groundwater banking projects in areas vulnerable to natural disasters (floods & earthquakes).
	Maximize the system's operational flexibility.	Per the District Operations Group, Buckhorn really maximizes operational flexibility.	Transfers and groundwater banking components can be turned up or down as needed.	None given.	None given. All portfolios increase the system's operational flexibility to some degree.
	Minimize institutional & legal complexities & barriers.	None given, as all components and overall portfolios will encounter a difficult level of institutional and legal complexities and barriers.	None given, as all components and overall portfolios will encounter a difficult level of institutional and legal complexities and barriers.	Large components within the portfolios are located totally within EBMUD-owned lands, but may require changes to triggers for rationing, etc.	Components in the portfolio have significant regulatory and legal barriers to overcome (i.e. San Joaquin groundwater export ordinance; brine disposal for desalination.)
	Maximize partnerships & regional solutions.	None given, as many of the portfolios scored high on this criterion and none stood out as deserving of an H+.	Portfolios would include multiple partners in multiple areas (e.g., Sacramento and San Joaquin County, upcountry, as well as local East Bay service area.)	The dominant component of the portfolio would require coordination with upcountry partners.	The dominant component is an EBMUD-only project and does not help maximize partnerships and regional solutions.

	Criteria	Score			
		H+	H	M	L
Economic	Minimize the financial cost to the District of meeting customer demands for given level of system reliability.	None given, as three levels of scoring were sufficient to score this criterion.	Median Present Value Cost Under $500 Million (<$500 Million)	Median Present Value Cost Between $500 and $525 Million (>$500 & <$525 Million)	Median Present Value Cost Above $525 Million (>$525 Million)
	Minimize customer water shortage costs.	None given, as three levels of scoring were sufficient to score this criterion.	Median Present Value Cost Under $150 Million (<$150 Million)	Median Present Value Cost Between $150 and $300 Million (>150 & <$300 Million)	Median Present Value Cost Above $300 Million (>$300 Million)
Public Health, Safety & Community	• Minimize potential adverse impacts to the public health of District customers. • Maximize use of water from the best available source.	Use of high quality Mokelumne River water would provide District customers with water from the best available source.	None given.	Local East Bay service area runoff and non-Mokelumne River water sources provide moderate water quality.	Delta and non-Mokelumne River water are not the best available sources of water.
	• Minimize potential adverse impacts to the public health of District customers. • Maximize use of water from the best available source.	None given, as the components with the most serious social and community impacts were not included in the portfolio analysis.	None given, as the components with the most serious social and community impacts were not included in the portfolio analysis.	Moderate community impacts and adverse social effects are expected for any portfolio that includes construction.	The portfolio containing the Buckhorn Canyon Reservoir component has significant local opposition and would require construction of a new reservoir.
Environmental	• Minimize adverse impacts on the environment. • Minimize construction & operation effects on environmentally sensitive resources.	None given, as the components with the most serious environmental impacts were not included in the portfolio analysis.	Would involve construction of groundwater banking and recycling components with relatively small footprints; water transfers would not require any construction activities.	Includes desalination and the associated brine discharge and intake concerns; would enlarge a reservoir and increase the inundation area.	Would include construction of a new reservoir and the associated construction and long-term inundation impacts.

	Criteria	Score			
		H+	H	M	L
	• Minimize short term & long term greenhouse gas emissions from construction. • Maximize energy efficiency associated with operations & maintenance. • Maximize contributions to AB 32 goals.	None given, as the components with the most serious environmental impacts were not included in the portfolio analysis.	Median greenhouse gas emissions for the portfolio were less than 225 million metric tones of $CO_{2.}$	Median greenhouse gas emissions for the portfolio were between 225 and 290 million metric tones of $CO_{2.}$	Median greenhouse gas emissions for the portfolio were more than 290 million metric tones of $CO_{2.}$

Table 1-9: Primary Portfolio Screening for Economic Criteria, Detailed Breakdown

Portfolio	**Score & Score Range**	**Median Present Value Cost (Million $)**
Criteria: Minimize customer water shortage costs.		
Portfolio E	High (H) <$150 Million	$107
Portfolio A		$109
Portfolio B		$110
Portfolio D	Medium (M) Between $150 and $300 Million	$194
Portfolio C	Low (L) >$300 Million	$354
Criteria: Minimize the financial cost to the District of meeting customer demands for given level of system reliability.		
Portfolio C	High (H) <$500 Million	$451
Portfolio D	Medium (M) Between $500 and $525 Million	$506
Portfolio B		$512
Portfolio A	Low (L) >$525 Million	$540
Portfolio E		$555

The WSMP 2040 Portfolio is therefore designed to be robust, flexible, diverse, and to pursue projects on multiple, parallel tracks in order to respond flexibly to an uncertain water future. Many of the supplemental supply and recycled water projects that are proposed in the WSMP 2040 have institutional or legal complexities or will require an unknown amount of time to develop, design, and construct. In order to provide flexibility and a robust strategy to deal with these uncertainties, as well as those relating to global climate change, an adaptable and flexible WSMP 2040 Portfolio was developed.

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