Appendix H
Portfolio Evaluation Details

APPENDIX H. PORTFOLIO EVALUATION DETAILS

Appendix H contains detailed information referenced in Chapter 7, including:

- Summary table of options included in each portfolio
- Criteria weighting exercise
- Description of the scoring scales for all metrics
- Information on the process used to analyze portfolio reliability and resiliency
- Detailed comparison of portfolios
- Full collection of scores for all portfolios

H.1 SUPPLY AND PRODUCTION OPTIONS USED IN PORTFOLIOS

Selection of supply and production options to include in each of the portfolios, discussed in Chapter 7, was based on the main themes selected to be the basis of each portfolio. Table H-1 provides a table that shows the supply and production options included in each portfolio (indicated by the coloring in of the cell).

As shown in the table, most options discussed in Chapter 5 of the WSRP were included in a portfolio. The large number and variety of options meant that it was possible to build portfolios to meet future demand without having to implement all options. Therefore, options that may achieve similar results were weighed against each other in terms of cost, reliability and the overall theme of the portfolio to determine which option would be implemented, For example, ocean desalination was not included in any of the portfolios as implementation of this option would require PWP to enter into partnership with another agency that would take the desalinated ocean water in exchange for imported water rights. Given that this would be similar to directly increasing imported water use either through more purchases from Metropolitan or rights purchase, options to directly increase imported water were selected due to their ease of implementation.

Table H-1: Supply and Production Options Included Under Each Theme

#	Water Supply Options	A. PWP Pivot	B. Maximize MWD Supply	C. Maximize Local Supplies	D. Maximize Sustainable Sources	E. Maximize Direct Use of SW and RW	F. Max Value GW/ Non-potable
IW-0	Treated Imported MWD Water						
IW-1	Agricultural Spot Market or Long-Term Transfer						
IW-2	Pasadena Groundwater Storage Program						
IW-3	External Groundwater Banking						
IW-4	Raw Imported Water Pipeline Connecting to San Gabriel Valley Municipal Water District's (SGVMWD's) Devil Canyon-Azusa Feeder and Carson Recycled Water Pipelines						
LSW-0	Arroyo Seco Canyon Project						
LSW-1a	Arroyo Seco to Eaton Canyon Raw Water Pipeline						
LSW-1	Arroyo Seco Pump Back Project						
LSW-4	Re-Open and Upgrade Behner WTP to Use Arroyo Seco Water for Drinking						
LSW-5	Natural Infrastructure						
LAG-1	Phase 1 Non-Potable Reuse Using LAG-WRP Recycled Water						

#	Water Supply Options	A. PWP Pivot	B. Maximize MWD Supply	C. Maximize Local Supplies	D. Maximize Sustainable Sources	E. Maximize Direct Use of SW and RW	F. Max Value GW/ Non-potable
LAG-3a	Advanced Treatment of Recycled Water from LAG-WRP for Recharge						
LAG-3b	Advanced Treatment of Recycled Water from LAG-WRP for Direct Use						
NP-1	Tunnel Water to Brookside Golf Course						
NP-2	Arroyo Seco Diversions from Channel to Brookside Golf Course						
NP-3	Local Non-Potable Project						
NP-5	Satellite Plant to Treat Wastewater near the Eaton Wash Spreading Grounds						
NP-6	Wastewater and Stormwater Supply Capture at Glenarm Power Plant						
Grey-1	Greywater Program						
Desal-1	Ocean Desalination						
SW-1	Infiltration Galleries						
SW-2	Altadena Drain Diversion to the Arroyo Seco Spreading Grounds						
SW-3	Centralized Stormwater Capture and Conveyance to Eaton Wash for Recharge						

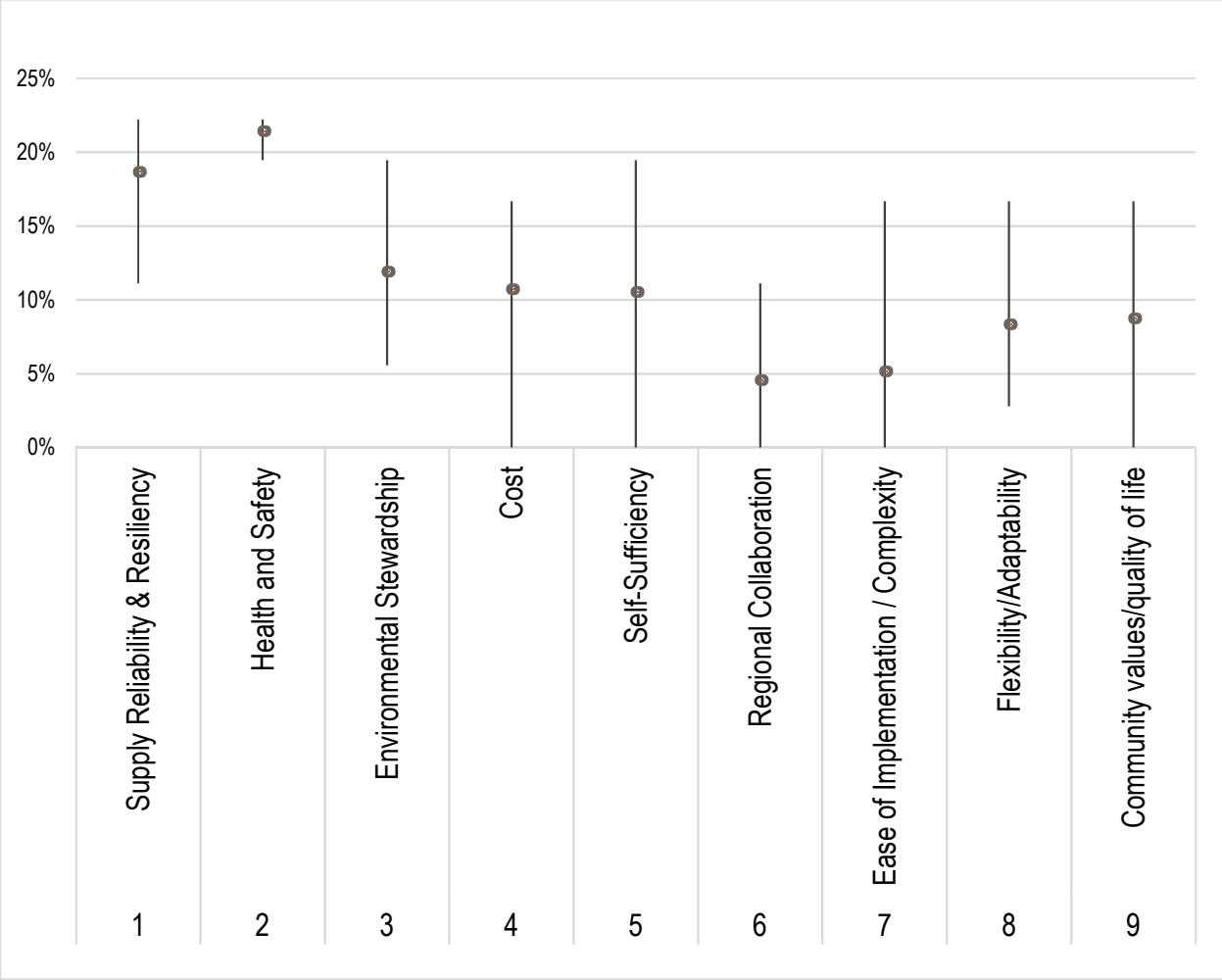
#	Water Supply Options	A. PWP Pivot	B. Maximize MWD Supply	C. Maximize Local Supplies	D. Maximize Sustainable Sources	E. Maximize Direct Use of SW and RW	F. Max Value GW/ Non-potable
SW-4	Decentralized Stormwater Recharge, Tier 1						
SW-5	Decentralized Stormwater Recharge, Tier 2						
WUE-0	Conservation Programming to Meet Future Regulations						
WUE-1	Conservation Programming to Meet Future Regulations Plus 10% Additional Outdoor Conservation						
WUE-2	Conservation Programming to Meet Future Regulations Plus 25% Additional Outdoor Conservation						
Base GW	Current Groundwater Production						
GW-0	Well Rehabilitation and New Well Replacement, Importance Level 1						
GW-00	Well Rehabilitation and Equipment Replacement, Importance Level 2						
GW-2a	Monk Hill Wells Nitrate Treatment						
GW-2b	Nitrate, Perchlorate and Volatile Organic Compounds Treatment of the Sunset Wells						
GW-3	Connect High Nitrate Wells to a Local Non-Potable System						

H.2 CRITERIA WEIGHTING EXERCISE

Criteria weightings were determined based on a weighting exercise completed by PWP and stakeholders. The exercise used “forced pair weighting”, which is a head-to-head comparison of pairs of criteria. PWP staff and stakeholders were provided with all possible pairs of criteria, and, for each pair, asked to select the criterion they felt was most important. The number of times a criterion was selected to be more important was counted. These counts were then used to develop a weighting percentage for each criterion based on the percent of time the criterion was selected as being more important than another. The results for each individual completing the exercise were calculated and summarized to create the chart shown in Figure H-1.

Figure H-1 presents the results of the weighting exercise. The dots on Figure H-1 indicate the average weight of each criteria, while the lines indicate the spread of results from individuals (where the upper and lower extents indicate the highest and lowest weighting based on individual weighting exercise results). As shown below, no criteria had more than approximately 10% of difference in weighting above or below the average, and no results indicated a criteria weighting of higher than 22%. It was decided to use the average results of the PWP and stakeholder weighting activity as the criteria weighting for the portfolios.

Figure H-1: Results of Criteria Weighting Exercise



H.3 SCORING METRICS AND POINT SYSTEM

An integrated planning approach such as the one used in the WSRP that includes stakeholder participation and the formal assessment of non-traditional metrics, naturally elevates the complexity of the planning effort. Systems models are valuable tools to conduct the analysis and support the decision-making process in these, more complex, projects. The WSRP used a GoldSim systems model (described in Section 4) as the primary analytical tool, coupled with cost estimating and additional technical information. These tools and analysis steps were used in the evaluation of portfolios. The GoldSim model was used to generate the values needed to score for the most critical metrics: cost and reliability. Table H-2 shows the sources for the scores in each of the metrics used in assessing a portfolio, as well as the point system used to score each metric. In general, points from one to five were given to each criteria based on the qualitative or quantitative measure indicated.

Table H-2: Metrics and Tools or Method Used to Score Portfolios

Criteria & Sub-Criteria	Metric	Description	Points
Criteria 1: Supply Reliability and Resiliency			
1a. Long-Term Reliability	Percent of time demand is met	Quantitative (GoldSim)	5 = Demand met 100% of time 4 = 95%-100% of time 3 = 90%-94% 2 = 85%-89% 1 = <85% of time
	Average Shortage	Quantitative (GoldSim)	5 = No shortage 4 = 500 AFY shortage 3 = 1,000 AFY shortage 2 = 1,500 AFY shortage occurs 1 = 2,000 AFY shortage occurs
1b. Long-Term Disruption Resiliency	Shortage During Disruptions of Metropolitan of 24 months	Quantitative (GoldSim)	5 = 10% shortage or less with a 12-month IW disruption 4 = 20% shortage 3 = 30% shortage 2 = 40% shortage 1 = greater than 40% shortage with a 12-month IW disruption
1c. Emergency resilience	Redundancy score (derived from resulting distribution system in each alternative)	Qualitative	5 = Redundancy-related improvements are implemented 1 = No redundancy-related improvements made
Criteria 2: Health and Safety			
2a. Water quality (Potable)	Change in salinity of groundwater basin close to MCL	Quantitative	5 = Salinity loading to basin unchanged or reduced 4 = Significant salinity loading from imported water recharge
	Nitrate or VOC treatment implemented	Qualitative	5 = Nitrate AND VOC treatment implemented 3 = Nitrate OR VOC treatment implemented 1 = No additional groundwater treatment implemented

Criteria & Sub-Criteria	Metric	Description	Points
2b. Level of service / risk of failure	Dollar value of "rehab/replacement" distribution and storage improvements , or percent of overall R/R invested	Quantitative	5 = Level 1 and 2 "rehab/ replacement" improvements implemented 3 = Level 1 "rehab/ replacement" improvements implemented 1 = No "rehab/ replacement" improvements implemented
Criteria 3: Environmental Stewardship			
3a. Water quality (environmental)	Volume of urban runoff captured	Quantitative	5 = 2000+ AFY urban runoff captured 4 = 1000-2000 AFY 3 = 500-1000 AFY captured 2 = <500 AFY captured 1 = 0 AFY captured
3b. Energy efficiency / carbon footprint	Dollar value of "energy efficiency" distribution improvements	Quantitative	5 = $350,000 (all energy efficiency improvements implemented) 3 = up to $175,000 (50% of energy efficiency improvements implemented) 1 = up to $87,500 (25% of energy efficiency improvements implemented)
	Carbon footprint or energy intensity of new sources	Quantitative	5 = New sources have a low carbon footprint or energy intensity (local sources) 3 = One new source implemented that is considered to have a high carbon footprint or energy intensity (i.e. recycled water or imported water) 1 = Two or more new sources implemented that are considered to have a high carbon footprint or energy intensity (i.e. recycled water and imported water)
Criteria 4: Cost			
4a. Unit cost	Unit cost of portfolio in average year	Costs based on modeled portfolio volumes	5 = Unit cost is equal to or lower than $1,000/AF 4 = Unit cost is $1,000/AF to $1,200/AF 3 = Unit cost is $1,200/AF to $1,300/AF 2 = Unit cost is $1,300/AF to $1,400/AF

Criteria & Sub-Criteria	Metric	Description	Points
			1 = Cost is higher than Tier 1 treated imported water ($1,400/AF or more)
4b. Capital cost	Capital cost of portfolio	Quantitative	5 = Capital cost less than $200M 4 = Capital cost less than $300M 3 = Capital cost less than $400M 2 = Capital cost less than $500M 1 = Capital cost >$500M
Criteria 5: Self-Sufficiency			
5a. Local portfolio	Percent of supply portfolio derived locally	Quantitative	5 = >80% of supply portfolio derived locally 4 = 60-80% of derived locally 3 = 40-60% of derived locally 2 = 20-40% of derived locally 1 = <20% derived locally
5b. Effective basin management	Recharge to Pump Ratio	Quantitative. Does not include imported water storage program (no "leave behind")	5 = 1:3 ratio of recharge to pumping or better 4 = 1:4 to 1:6 3 = 1:6 to 1:8 ratio of recharge to pumping 2 = 1:8 to 1:10 1 = 1:11 or higher ratio of recharge to pumping
Criteria 6: Regional Collaboration			
n/a	Number of supply partnerships	Quantitative	5 = several 3 = few partnerships 1 = only Met
Criteria 7: Ease of Implementation/Complexity			
n/a	Qualitative 'time to implement' score based on permits, institutional arrangements, CEQA, and other considerations	Quantitative	5 = 0-2 projects to be implemented that will require additional permits, institutional arrangements, CEQA, etc. 3 = 2-4 projects 1 = 4+ projects

Criteria & Sub-Criteria	Metric	Description	Points
Criteria 8: Flexibility/Adaptability			
8a. Flexibility of Operations	Number of interconnections	Quantitative	5 = 2 or more new interconnections with other agencies 3 = 1 new interconnections with other agencies 1 = No new interconnections
8b. Adaptability on Implementation	Qualitative Score for Scalability and Phasing	Qualitative	5 = Projects can be scaled or phased, several flexible projects 3 = No new projects 1 = Projects cannot be scaled or phased
Criteria 9: Community Values/Quality of Life			
9a. Efficient Use of Resources	Volume of WUE and non-potable direct use (WUE needs to be “middle of the road”)	Quantitative	5 = Mid or Low WUE and Max Non-Potable 4 = Mid Low WUE and Mid Non-Potable 3 = Max WUE and Low or Mid Non Potable 2 = Low or Max WUE and Low Non Potable 1 = Low WUE and No Non Potable
9b. Aesthetics and Character	Qualitative score for greening, urban canopy and environmental improvement	Does it improve greening, urban canopy and environmental improvement	5 = Projects in place to maintain green areas and/or capture stormwater to improve surface water quality 1 = Projects not expected to increase or maintain greenspace and/or improve the environment

H.4 PORTFOLIO RELIABILITY AND RESILIENCY EVALUATION

The basis of the reliability analysis described in Chapter 4, for the baseline condition, was applied to analyze the reliability of each portfolio. The GoldSim model provided output for each portfolio's supply-demand balance for each of the planning years (2020 to 2045) under multiple hydrology conditions. With this output, the metrics of percent of time demands are met and the average shortage when shortages happen were derived. The emergency condition with no MWD supply for 12 months was also computed from the GoldSim model output. The long-term supply from each source combined into the overall portfolio in the model simulation was used with cost estimating information for the computation of the overall unit cost ($ per AF) of each portfolio. Cost estimating provided some of the other key metrics, while a qualitative scale based on objective information was developed for each of the remaining metrics.

H.5 EVALUATION RESULTS

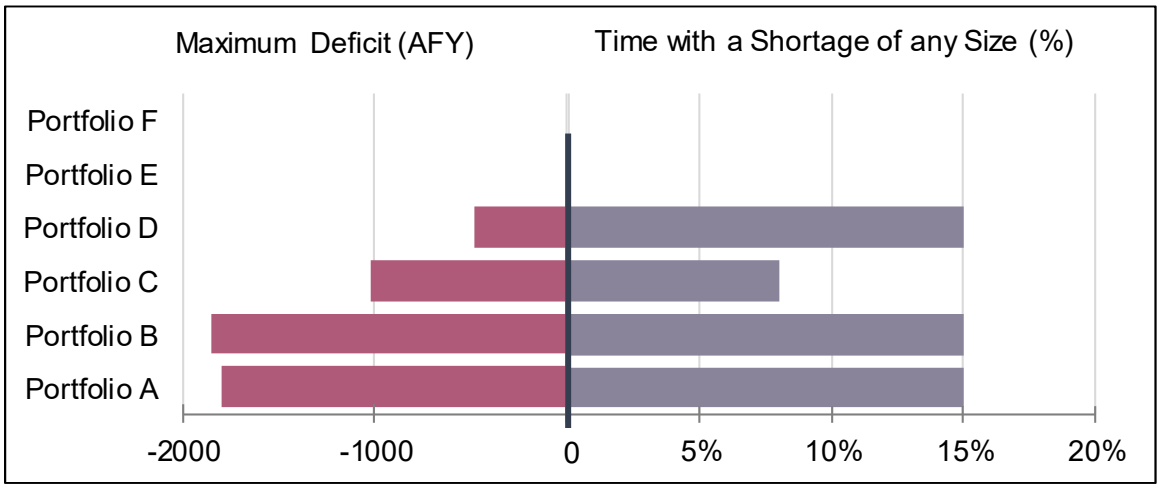
The analysis of portfolios reflects the difference they have related to the criteria for evaluation, and in turn, related to the objectives of the WSRP. Portfolios have different degrees of reliability, cost effectiveness, local control, water quality protection, etc. While the multi-criteria ranking method results in a comprehensive single score, the comparison of portfolios for a single criterion (such as long-term disruption resiliency, effective basin management, cost to PWP, etc.) is a useful exercise informing decision-making.

While the multi-criteria ranking method results in a comprehensive single score, the comparison of portfolios for a single criterion (such as long-term disruption resiliency, effective basin management, cost to PWP, etc.) is a useful exercise informing decision-making.

H.5.1 Portfolio Reliability and Costs

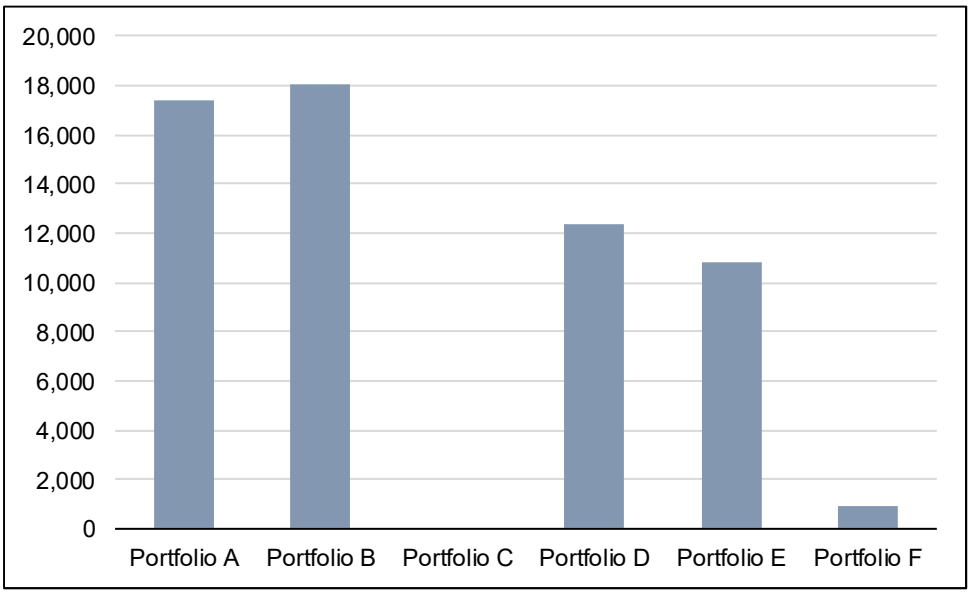
Results indicate that all portfolios are consistently reliable on a long-term basis, with all portfolios being able to meet demands at least 85% of the years analyzed (2020 to 2045 under multiple hydrology conditions). Some deficits, however, are as high as 3,400 AFY, with average deficits of 1,800 AFY. Those maximum deficits correspond to about 10% of demand. Figure H-2 shows the percent of time with deficit and the size of the maximum deficits for each portfolio.

Figure H-2: Portfolio Long-Term Reliability



In terms of resiliency under an extended disruption (see description of the Great ShakeOut seismic scenario in Chapter 4) where imported supply is not available for 12 months, the difference in reliability is much more pronounced. Portfolios that rely heavily on MWD supplies present large shortages that would be likely unmanageable over a period of 12 months or longer. Figure H-3 presents the results of the resiliency under an extended disruption, with the bars representing the deficit that would be observed if MWD imported water supplies were not available during a 12 months period.

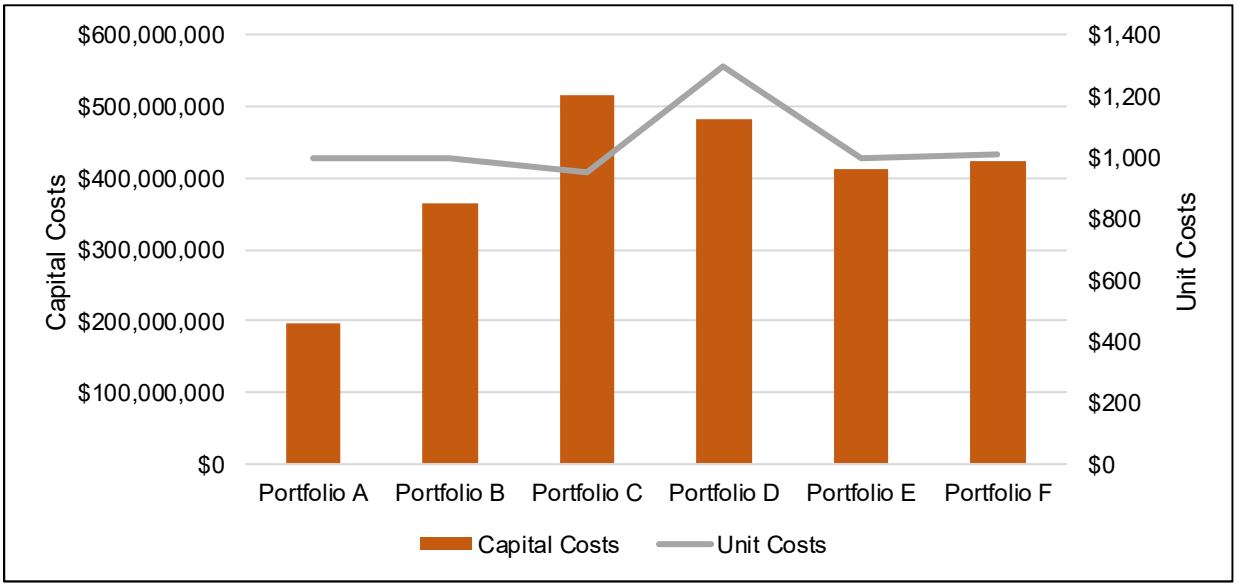
Figure H-3: Resiliency under an Extended Disruption



The capital costs and unit costs of portfolios are an important criterion in decision-making, beyond the multi-criteria method score and it is of interests to stakeholders, decision-makers and rate payers in general. Figure H-4 presents the capital and unit costs for all

portfolios. A high capital costs for a portfolio does not necessarily translate into a proportionally high unit costs, since the cost of imported supply (which has no capital costs) is significantly higher than some other supplies included in some portfolios. The unit cost presented in Figure H-4 and used in the multi-criteria ranking calculations includes the capital and O&M of all projects in a portfolio as well as the costs of imported water and the costs of pumping the local groundwater.

Figure H-4: Capital and Unit Costs for All Portfolios

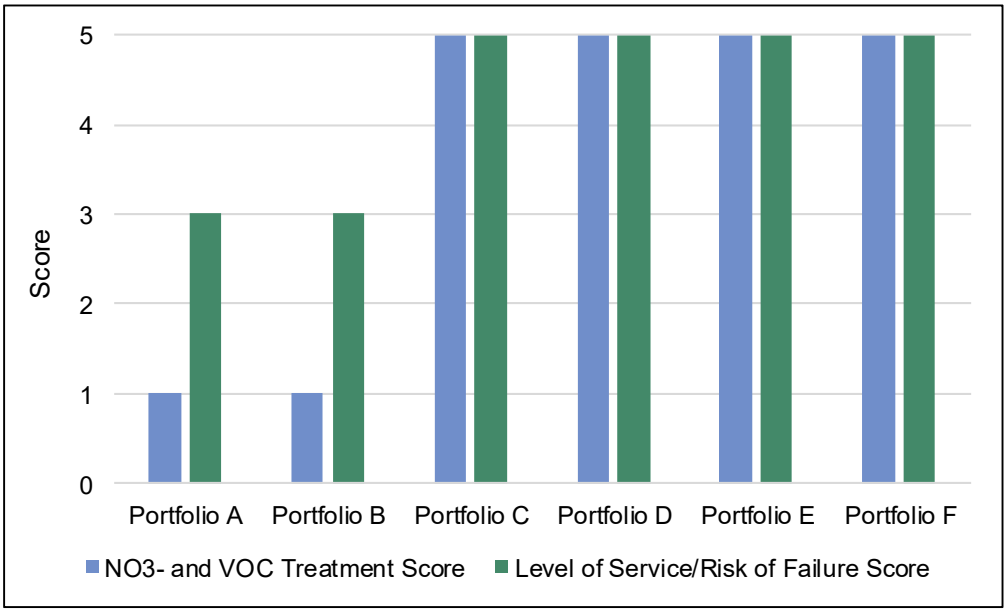


H.5.2 Portfolio Performance for Other Criteria

Along with reliability and costs, the Health and Safety criterion and the Self Sufficiency criterion were considered very important for decision-making based on the weighting exercise discussed above. Portfolios C, D, E and F are the better performing portfolios for the Health and Safety criterion, as shown in Figure H-5, which presents the qualitative scores on a scale of 1 to 5 used in the ranking. Two sub-criteria are shown in Figure H-5:

- Level of Treatment of Nitrates and VOCs in Groundwater: This score is assigned based on the treatment of these constituents that is provided by the portfolio. The score is not an output of the systems model but rather assigned based on the capital projects included in the portfolio directly targeting treatment for these pollutants
- Level of Service and Risk of Failure for the overall treated water system: this score is assigned based on the dollar value of rehabilitation/replacement and other improvements in the distribution and storage components of the portfolio.

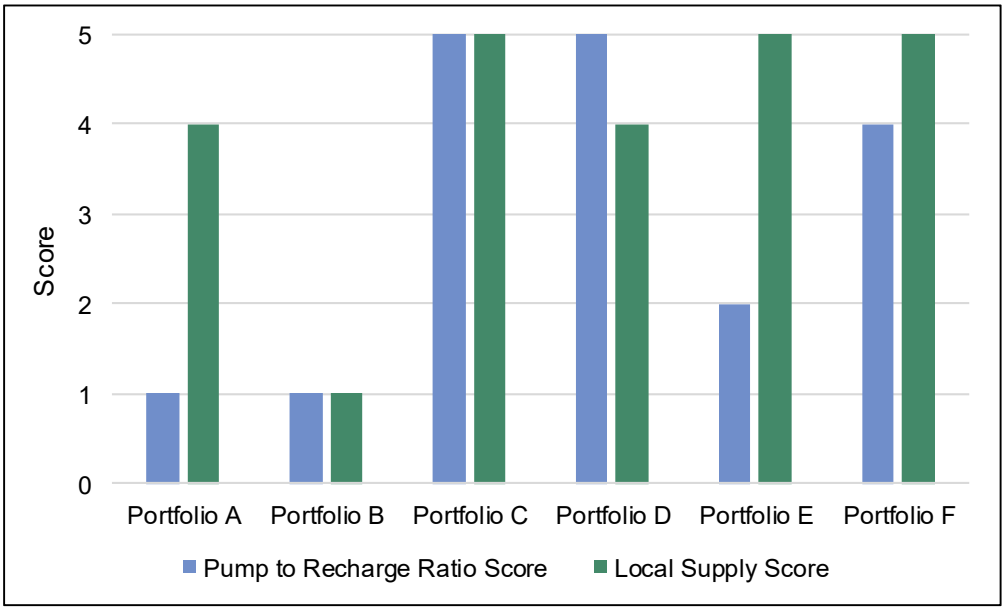
Figure H-5: Health and Safety Scores for All Portfolios



Portfolios C, D and F are the best performing portfolios for the Self Sufficiency criterion as shown in Figure H-6. This criterion includes two sub-criteria:

- Pump-to-Recharge Ratio: score is defined by quantifying the annual pumping and the annual recharge, both on an average basis and computing the ratio to reflect how much of the pumping is supported by artificial recharge. It should be noted that this does not imply that artificial recharge is necessarily required in Raymond Basin. As explained in detail in Chapter 4, the basin has an estimated yield that can be supported by natural recharge. This criterion focuses on artificial recharge as a component of portfolios due to the fact that several of them increase pumping considerably above the decreed rights for PWP, which is allowed in the Raymond Basin as long as recharge is provided.
- Local Supply: This score is simply based upon the amount of local supply that is provided locally compared to the total demand.

Figure H-6: Self-Sufficiency Scores for All Portfolios



H.6 PORTFOLIO SCORES

The table on the following pages contains the full collection of scores for all portfolios.

Criteria (Weight)	(Weight) Sub-Criteria	Metric	Points	Portfolio A: Status Quo & Stormwater Capture		
				Data	Points	Score
1. Supply Reliability & Resiliency / 19%	1a. (37%) Long-Term Reliability	% of time demand met	5 = 100%; 4 = 95%-99%; 3 = 90%-94%; 2 = 85%-89%; 1 = <85%	85%	2	0.3
		Average shortage	5 = No shortage; 4 = 500 AFY; 3 = 1,000 AFY; 2 = 1,500 AFY; 1 =	1,794 AFY	2	
	1b. (26%) Long-Term D. Resiliency	24 months no MWD	5 =<10% shortage w/ 12-mo imported water disruption; 4 = 20%; 3 = 30%; 2 = 40%; 1 = >40%	17411 AFY	1	
	1c. (37%) Em Resilience	Redundancy from distr. s.	5 = Redundancy improvements (RI) made, 1 = No RI made	Distrib. & storage RI not made	1	
2. Health and Safety / 21%	2a. (25%) Water Quality (WQ): Potable	GW salinity incr. to MCL	5 = Salinity unchanged or reduced 4 = Significant salinity loading	No change in salinity	5	0.6
		NO3 or VOC treatment	5 = NO3 & VOC treatment; 3 = NO3 or VOC treatm.; 1 = No treatm.	No treatment implemented	1	
	2b. (75%) Service Level / Failure Risk	RR impr. cost , or % of RR invested	5 = Levels 1 & 2 rehab/ replacement (RR) improvements; 3 = Level 1 RR; 1 = No RR impr	Level 1 RI implemented	3	
3. Enviro Stewardshp / 10%	3a. (50%) Envirom. WQ	SW captured	5:>2000 AFY; 4: 1000-2000 AFY; 3: 500-1000 AFY; 2:<500 AFY; 1: 0	0 AFY stormwater captured	1	0.1
	3b. (50%) Energy Eff / Carbon Footprint	Energy effic. Improv.- EEI	5=$350K (all EEI); 3= up to $175K (50%); 1=up to $87.5K (25%)	No EEI implemented	1	
		Carbon footprint /energy intensity	5=Low carbon footpr./energy intensity (CF/EI); 3= High CF/EI; 1=>1 sources w/high CF/EI	High energy & carbon, IW	1	
4. Cost / 11%	4a. (50%) Unit Cost	Unit cost in ave. year	5=<$1,000/AF; 4=<$1,200/AF; 3=<$1,300/AF; 2=<$1,500/AF; 1=>Tier 1 ($1,500/AF)	$1,000	5	0.5
	4b. (50%) Capital Cost	Capital cost of portfolio	5 = < $200M; 4 = < $300M; 3 = < $400M; 2 = < $500M; 1 = >$500M	$197,900,000	5	
5. (11%) Self-Reliance	5a. (50%) Local Portfolio	% local supplies	5 = >80% local; 4 = 60-80%; 3 = 40-60%; 2 = 20-40%; 1 = <20%	60%-80%	4	0.3
	5b. (50%) Eff. Basin Mngmnt	Recharge to pump ratio	5= 1:3 ratio or better; 4=1:4 -1:6; 3 = 1:6 - 1:8; 2 = 1:8 - 1:10; 1 = >1:10	2,070:15,400, or 1:13	1	
6.(4%) Regional Collabor	n/a	Number of supply partnerships	5 = several; 3 = few partnerships 1 = only MWD	MWD only	1	0.0
7. (6%) Complexity	n/a	Time score: permits, agrmnts, CEQA	5 = 0-2 projects to be implemented that require permits, arrangements, CEQA 3 = 2-4 projects; 1 = 4+ projects	No new projects that would require time to implement	5	0.3
8. Flexibility (8%)	8a. (50%) Op. Flexibility	# intercontns	5 = >2 new interconnections (IC); 3 = 1 new IN.; 1 = No new IC	No new interconnections	1	0.2
	8b. (50%) Adaptability	Score for Scalability and Phasing	5 = Projects scaled/phased, flexible; 3 = No new projects; 1 = No scaled or phased projects	No new projects	3	
9. (11%) Comm values/ quality of life	9a. (50%) Eff Resources Use	Volume of WUE & NP direct use	5= Mid WUE/Max Non-Potable (NP); 4= Mid WUE/Mid NP; 3= Max WUE/Mid NP; 2= Max WUE/Low NP; 1= Low WUE/No NP	Low WUE and No NP	1	0.1
	9b. (50%) Aesthetics	Urb. canopy & env impr. score	5=Maintain green areas, capture SW, improve surface WQ; 1 = No environment improvement	No new projects	1	
						2.3

Criteria (Weight)	(Weight) Sub-Criteria	Metric	Points	Portfolio B: Maximize MWD Supply/ Minimize Local CIP		
				Data	Points	Score
1. Supply Reliability & Resiliency / 19%	1a. (37%) Long-Term Reliability	% of time demand met	5 = 100%; 4 = 95%-99%; 3 = 90%-94%; 2 = 85%-89%; 1 = <85%	85%	2	0.3
		Average shortage	5 = No shortage; 4 = 500 AFY; 3 = 1,000 AFY; 2 = 1,500 AFY; 1 =	1,848 AFY	2	
	1b. (26%) Long-Term D. Resiliency	24 months no MWD	5 =<10% shortage w/ 12-mo imported water disruption; 4 = 20%; 3 = 30%; 2 = 40%; 1 = >40%	18, 071 AFY	1	
	1c. (37%) Em Resilience	Redundancy from distr. s.	5 = Redundancy improvements (RI) made, 1 = No RI made	Distrib. & storage RI not made	1	
2. Health and Safety / 21%	2a. (25%) Water Quality (WQ): Potable	GW salinity incr. to MCL	5 = Salinity unchanged or reduced 4 = Significant salinity loading	Increase salinity - imported water	5	0.6
		NO3 or VOC treatment	5 = NO3 & VOC treatment; 3 = NO3 or VOC treatm.; 1 = No treatm.	No additional GW treatment	1	
	2b. (75%) Service Level / Failure Risk	RR impr. cost , or % of RR invested	5 = Levels 1 & 2 rehab/ replacement (RR) improvements; 3 = Level 1 RR; 1 = No RR impr	Level 1 RR implemented	3	
3. Enviro Stewardshp / 10%	3a. (50%) Envirom. WQ	SW captured	5:>2000 AFY; 4: 1000-2000 AFY; 3: 500-1000 AFY; 2:<500 AFY; 1: 0	0 AFY stormwater captured	1	0.1
	3b. (50%) Energy Eff / Carbon Footprint	Energy effic. Improv.- EEI	5=$350K (all EEI); 3= up to $175K (50%); 1=up to $87.5K (25%)	No EEI implemented	1	
		Carbon footprint /energy intensity	5=Low carbon footpr./energy intensity (CF/EI); 3= High CF/EI; 1=>1 sources w/high CF/EI	High reliance on imported water	1	
4. Cost / 11%	4a. (50%) Unit Cost	Unit cost in ave. year	5=<$1,000/AF; 4=<$1,200/AF; 3=<$1,300/AF; 2=<$1,500/AF; 1=>Tier 1 ($1,500/AF)	$1,000	5	0.4
	4b. (50%) Capital Cost	Capital cost of portfolio	5 = < $200M; 4 = < $300M; 3 = < $400M; 2 = < $500M; 1 = >$500M	$363,600,000	3	
5. (11%) Self-Reliance	5a. (50%) Local Portfolio	% local supplies	5 = >80% local; 4 = 60-80%; 3 = 40-60%; 2 = 20-40%; 1 = <20%	Shift to all MWD water	1	0.1
	5b. (50%) Eff. Basin Mngmnt	Recharge to pump ratio	5= 1:3 ratio or better; 4=1:4 -1:6; 3 = 1:6 - 1:8; 2 = 1:8 - 1:10; 1 = >1:10	Shift to all MWD water	1	
6.(4%) Regional Collabor	n/a	Number of supply partnerships	5 = several; 3 = few partnerships 1 = only MWD	No partnerships or agreements	1	0.0
7. (6%) Complexity	n/a	Time score: permits, agrmnts, CEQA	5 = 0-2 projects to be implemented that require permits, arrangements, CEQA 3 = 2-4 projects; 1 = 4+ projects	No new projects to implement	5	0.3
8. Flexibility (8%)	8a. (50%) Op. Flexibility	# intercontns	5 = >2 new interconnections (IC); 3 = 1 new IN.; 1 = No new IC	No new interconnections	1	0.1
	8b. (50%) Adaptability	Score for Scalability and Phasing	5 = Projects scaled/phased, flexible; 3 = No new projects; 1 = No scaled or phased projects	Shifting to all MWD - no impl. flexibility	2	
9. (11%) Comm values/ quality of life	9a. (50%) Eff Resources Use	Volume of WUE & NP direct use	5= Mid WUE/Max Non-Potable (NP); 4= Mid WUE/Mid NP; 3= Max WUE/Mid NP; 2= Max WUE/Low NP; 1= Low WUE/No NP	Low WUE and No NP	1	0.1
	9b. (50%) Aesthetics	Urb. canopy & env impr. score	5=Maintain green areas, capture SW, improve surface WQ; 1 = No environment improvement	No projects for aesthetics/ character	1	
						2.0

Criteria (Weight)	(Weight) Sub-Criteria	Metric	Points	Portfolio C: Maximize Local Supplies		
				Data	Points	Score
1. Supply Reliability & Resiliency / 19%	1a. (37%) Long-Term Reliability	% of time demand met	5 = 100%; 4 = 95%-99%; 3 = 90%-94%; 2 = 85%-89%; 1 = <85%	92%	3	0.8
		Average shortage	5 = No shortage; 4 = 500 AFY; 3 = 1,000 AFY; 2 = 1,500 AFY; 1 =	1025 AFY	3	
	1b. (26%) Long-Term D. Resiliency	24 months no MWD	5 =<10% shortage w/ 12-mo imported water disruption; 4 = 20%; 3 = 30%; 2 = 40%; 1 = >40%	0 AFY	5	
	1c. (37%) Em Resilience	Redundancy from distr. s.	5 = Redundancy improvements (RI) made, 1 = No RI made	Distribution & storage RI made	5	
2. Health and Safety / 21%	2a. (25%) Water Quality (WQ): Potable	GW salinity incr. to MCL	5 = Salinity unchanged or reduced 4 = Significant salinity loading	Imported & RW recharge	4	1.1
		NO3 or VOC treatment	5 = NO3 & VOC treatment; 3 = NO3 or VOC treatm.; 1 = No treatm.	Yes, VOC and nitrate treatment	5	
	2b. (75%) Service Level / Failure Risk	RR impr. cost , or % of RR invested	5 = Levels 1 & 2 rehab/ replacement (RR) improvements; 3 = Level 1 RR; 1 = No RR impr	Level 1 and 2 RR improvements implemented	5	
3. Enviro Stewardshp / 10%	3a. (50%) Envirom. WQ	SW captured	5:>2000 AFY; 4: 1000-2000 AFY; 3: 500-1000 AFY; 2:<500 AFY; 1: 0	5,000 AFY SW captured	5	0.3
	3b. (50%) Energy Eff / Carbon Footprint	Energy effic. Improv.- EEI	5=$350K (all EEI); 3= up to $175K (50%); 1=up to $87.5K (25%)	No EEI implemented	1	
		Carbon footprint /energy intensity	5=Low carbon footpr./energy intensity (CF/EI); 3= High CF/EI; 1=>1 sources w/high CF/EI	Recharge/store imported & RW	1	
4. Cost / 11%	4a. (50%) Unit Cost	Unit cost in ave. year	5=<$1,000/AF; 4=<$1,200/AF; 3=<$1,300/AF; 2=<$1,500/AF; 1=>Tier 1 ($1,500/AF)	$900	5	0.3
	4b. (50%) Capital Cost	Capital cost of portfolio	5 = < $200M; 4 = < $300M; 3 = < $400M; 2 = < $500M; 1 = >$500M	$522,580,000	1	
5. (11%) Self-Reliance	5a. (50%) Local Portfolio	% local supplies	5 = >80% local; 4 = 60-80%; 3 = 40-60%; 2 = 20-40%; 1 = <20%	90%	5	0.6
	5b. (50%) Eff. Basin Mngmnt	Recharge to pump ratio	5= 1:3 ratio or better; 4=1:4 -1:6; 3 = 1:6 - 1:8; 2 = 1:8 - 1:10; 1 = >1:10	13,000:21,200, or 1:1.6	5	
6.(4%) Regional Collabor	n/a	Number of supply partnerships	5 = several; 3 = few partnerships 1 = only MWD	~6 agencies (MWD, FMWD, SGVMWD, Desal	5	0.2
7. (6%) Complexity	n/a	Time score: permits, agrmnts, CEQA	5 = 0-2 projects to be implemented that require permits, arrangements, CEQA 3 = 2-4 projects; 1 = 4+ projects	Complex projects: SW, recharge	1	0.1
8. Flexibility (8%)	8a. (50%) Op. Flexibility	# intercontns	5 = >2 new interconnections (IC); 3 = 1 new IN.; 1 = No new IC	2 new IC (IW-4, LAG-3a)	5	0.4
	8b. (50%) Adaptability	Score for Scalability and Phasing	5 = Projects scaled/phased, flexible; 3 = No new projects; 1 = No scaled or phased projects	Several projects phased if needed	5	
9. (11%) Comm values/ quality of life	9a. (50%) Eff Resources Use	Volume of WUE & NP direct use	5= Mid WUE/Max Non-Potable (NP); 4= Mid WUE/Mid NP; 3= Max WUE/Mid NP; 2= Max WUE/Low NP; 1= Low WUE/No NP	Low WUE and No NP	1	0.3
	9b. (50%) Aesthetics	Urb. canopy & env impr. score	5=Maintain green areas, capture SW, improve surface WQ; 1 = No environment improvement	Projects to capture urban runoff	5	
						4.0

Criteria (Weight)	(Weight) Sub-Criteria	Metric	Points	Portfolio D: Max. Sustainable Sources and Practices		
				Data	Points	Score
1. Supply Reliability & Resiliency / 19%	1a. (37%) Long-Term Reliability	% of time demand met	5 = 100%; 4 = 95%-99%; 3 = 90%-94%; 2 = 85%-89%; 1 = <85%	85%	2	0.6
		Average shortage	5 = No shortage; 4 = 500 AFY; 3 = 1,000 AFY; 2 = 1,500 AFY; 1 =	482 AFY	4	
	1b. (26%) Long-Term D. Resiliency	24 months no MWD	5 =<10% shortage w/ 12-mo imported water disruption; 4 = 20%; 3 = 30%; 2 = 40%; 1 = >40%	12,321 AFY	2	
	1c. (37%) Em Resilience	Redundancy from distr. s.	5 = Redundancy improvements (RI) made, 1 = No RI made	Distrib. & storage RI not made	5	
2. Health and Safety / 21%	2a. (25%) Water Quality (WQ): Potable	GW salinity incr. to MCL	5 = Salinity unchanged or reduced 4 = Significant salinity loading	Moderate incr. from recharge	4	1.1
		NO3 or VOC treatment	5 = NO3 & VOC treatment; 3 = NO3 or VOC treatm.; 1 = No treatm.	Yes, VOC and nitrate treatment	5	
	2b. (75%) Service Level / Failure Risk	RR impr. cost , or % of RR invested	5 = Levels 1 & 2 rehab/ replacement (RR) improvements; 3 = Level 1 RR; 1 = No RR impr	Level 1 and 2 RR improvements implemented	5	
3. Enviro Stewardshp / 10%	3a. (50%) Envirom. WQ	SW captured	5:>2000 AFY; 4: 1000-2000 AFY; 3: 500-1000 AFY; 2:<500 AFY; 1: 0	4600 AFY SW captured	5	0.5
	3b. (50%) Energy Eff / Carbon Footprint	Energy effic. Improv.- EEI	5=$350K (all EEI); 3= up to $175K (50%); 1=up to $87.5K (25%)	$350,000 energy eff improvements	5	
		Carbon footprint /energy intensity	5=Low carbon footpr./energy intensity (CF/EI); 3= High CF/EI; 1=>1 sources w/high CF/EI	Rely on local, sustainable supplies	5	
4. Cost / 11%	4a. (50%) Unit Cost	Unit cost in ave. year	5=<$1,000/AF; 4=<$1,200/AF; 3=<$1,300/AF; 2=<$1,500/AF; 1=>Tier 1 ($1,500/AF)	$1,300	2	0.2
	4b. (50%) Capital Cost	Capital cost of portfolio	5 = < $200M; 4 = < $300M; 3 = < $400M; 2 = < $500M; 1 = >$500M	$516,130,000	1	
5. (11%) Self-Reliance	5a. (50%) Local Portfolio	% local supplies	5 = >80% local; 4 = 60-80%; 3 = 40-60%; 2 = 20-40%; 1 = <20%	62%	4	0.5
	5b. (50%) Eff. Basin Mngmnt	Recharge to pump ratio	5= 1:3 ratio or better; 4=1:4 -1:6; 3 = 1:6 - 1:8; 2 = 1:8 - 1:10; 1 = >1:10	5,800:17,400, or 1:3	5	
6.(4%) Regional Collabor	n/a	Number of supply partnerships	5 = several; 3 = few partnerships 1 = only MWD	~1 (RBMB)	3	0.1
7. (6%) Complexity	n/a	Time score: permits, agrmnts, CEQA	5 = 0-2 projects to be implemented that require permits, arrangements, CEQA 3 = 2-4 projects; 1 = 4+ projects	Non-potable, SW, GW treatment	1	0.1
8. Flexibility (8%)	8a. (50%) Op. Flexibility	# intercontns	5 = >2 new interconnections (IC); 3 = 1 new IN.; 1 = No new IC	No new interconnections	1	0.2
	8b. (50%) Adaptability	Score for Scalability and Phasing	5 = Projects scaled/phased, flexible; 3 = No new projects; 1 = No scaled or phased projects	Several projects phased if needed	5	
9. (11%) Comm values/ quality of life	9a. (50%) Eff Resources Use	Volume of WUE & NP direct use	5= Mid WUE/Max Non-Potable (NP); 4= Mid WUE/Mid NP; 3= Max WUE/Mid NP; 2= Max WUE/Low NP; 1= Low WUE/No NP	Max WUE and Low NP	3	0.4
	9b. (50%) Aesthetics	Urb. canopy & env impr. score	5=Maintain green areas, capture SW, improve surface WQ; 1 = No environment improvement	NPW project for irrigation, & SW capture	5	
						3.7

Criteria (Weight)	(Weight) Sub-Criteria	Metric	Points	Portfolio E: Max. Direct Use of Stormwater & Recycled Water		
				Data	Points	Score
1. Supply Reliability & Resiliency / 19%	1a. (37%) Long-Term Reliability	% of time demand met	5 = 100%; 4 = 95%-99%; 3 = 90%-94%; 2 = 85%-89%; 1 = <85%	100%	5	0.5
		Average shortage	5 = No shortage; 4 = 500 AFY; 3 = 1,000 AFY; 2 = 1,500 AFY; 1 =	0 AFY	5	
	1b. (26%) Long-Term D. Resiliency	24 months no MWD	5 =<10% shortage w/ 12-mo imported water disruption; 4 = 20%; 3 = 30%; 2 = 40%; 1 = >40%	10,787 AFY	2	
	1c. (37%) Em Resilience	Redundancy from distr. s.	5 = Redundancy improvements (RI) made, 1 = No RI made	Distrib. & storage RI not made	1	
2. Health and Safety / 21%	2a. (25%) Water Quality (WQ): Potable	GW salinity incr. to MCL	5 = Salinity unchanged or reduced 4 = Significant salinity loading	Salinity incr. - SW recharge	5	1.1
		NO3 or VOC treatment	5 = NO3 & VOC treatment; 3 = NO3 or VOC treatm.; 1 = No treatm.	Yes, VOC and nitrate treatment	5	
	2b. (75%) Service Level / Failure Risk	RR impr. cost , or % of RR invested	5 = Levels 1 & 2 rehab/ replacement (RR) improvements; 3 = Level 1 RR; 1 = No RR impr	Level 1 and 2 RR improvements implemented	5	
3. Enviro Stewardshp / 10%	3a. (50%) Envirom. WQ	SW captured	5:>2000 AFY; 4: 1000-2000 AFY; 3: 500-1000 AFY; 2:<500 AFY; 1: 0	285 AFY SW captured	2	0.2
	3b. (50%) Energy Eff / Carbon Footprint	Energy effic. Improv.- EEI	5=$350K (all EEI); 3= up to $175K (50%); 1=up to $87.5K (25%)	No EEI implemented	1	
		Carbon footprint /energy intensity	5=Low carbon footpr./energy intensity (CF/EI); 3= High CF/EI; 1=>1 sources w/high CF/EI	RW and imported projects	1	
4. Cost / 11%	4a. (50%) Unit Cost	Unit cost in ave. year	5=<$1,000/AF; 4=<$1,200/AF; 3=<$1,300/AF; 2=<$1,500/AF; 1=>Tier 1 ($1,500/AF)	$1,000	4	0.3
	4b. (50%) Capital Cost	Capital cost of portfolio	5 = < $200M; 4 = < $300M; 3 = < $400M; 2 = < $500M; 1 = >$500M	$414,240,000	2	
5. (11%) Self-Reliance	5a. (50%) Local Portfolio	% local supplies	5 = >80% local; 4 = 60-80%; 3 = 40-60%; 2 = 20-40%; 1 = <20%	84%	5	0.4
	5b. (50%) Eff. Basin Mngmnt	Recharge to pump ratio	5= 1:3 ratio or better; 4=1:4 -1:6; 3 = 1:6 - 1:8; 2 = 1:8 - 1:10; 1 = >1:10	2,285:17,770, or 1:9	2	
6.(4%) Regional Collabor	n/a	Number of supply partnerships	5 = several; 3 = few partnerships 1 = only MWD	5 (MWD, imp. rights transfer, ext. banking, LAG,	5	0.2
7. (6%) Complexity	n/a	Time score: permits, agrmnts, CEQA	5 = 0-2 projects to be implemented that require permits, arrangements, CEQA 3 = 2-4 projects; 1 = 4+ projects	New LAG, non-potable,	3	0.2
8. Flexibility (8%)	8a. (50%) Op. Flexibility	# intercontns	5 = >2 new interconnections (IC); 3 = 1 new IN.; 1 = No new IC	1 new IC (LAG-3a)	3	0.3
	8b. (50%) Adaptability	Score for Scalability and Phasing	5 = Projects scaled/phased, flexible; 3 = No new projects; 1 = No scaled or phased projects	Several projects phased if needed	5	
9. (11%) Comm values/ quality of life	9a. (50%) Eff Resources Use	Volume of WUE & NP direct use	5= Mid WUE/Max Non-Potable (NP); 4= Mid WUE/Mid NP; 3= Max WUE/Mid NP; 2= Max WUE/Low NP; 1= Low WUE/No NP	Low WUE and Low NP	2	0.4
	9b. (50%) Aesthetics	Urb. canopy & env impr. score	5=Maintain green areas, capture SW, improve surface WQ; 1 = No environment improvement	NPW project for irrigation, & SW capture	5	
						3.5

Criteria (Weight)	(Weight) Sub-Criteria	Metric	Points	Portfolio F: Sustainable Groundwater, Conservation, Stormwater Capture		
				Data	Points	Score
1. Supply Reliability & Resiliency / 19%	1a. (37%) Long-Term Reliability	% of time demand met	5 = 100%; 4 = 95%-99%; 3 = 90%-94%; 2 = 85%-89%; 1 = <85%	100%	5	0.9
		Average shortage	5 = No shortage; 4 = 500 AFY; 3 = 1,000 AFY; 2 = 1,500 AFY; 1 =	0 AFY	5	
	1b. (26%) Long-Term D. Resiliency	24 months no MWD	5 =<10% shortage w/ 12-mo imported water disruption; 4 = 20%; 3 = 30%; 2 = 40%; 1 = >40%	931 AFY	5	
	1c. (37%) Em Resilience	Redundancy from distr. s.	5 = Redundancy improvements (RI) made, 1 = No RI made	Distrib. & storage RI not made	5	
2. Health and Safety / 21%	2a. (25%) Water Quality (WQ): Potable	GW salinity incr. to MCL	5 = Salinity unchanged or reduced 4 = Significant salinity loading	Imported recharge to Raymond Basin	4	1.1
		NO3 or VOC treatment	5 = NO3 & VOC treatment; 3 = NO3 or VOC treatm.; 1 = No treatm.	Yes, VOC and nitrate treatment	5	
	2b. (75%) Service Level / Failure Risk	RR impr. cost , or % of RR invested	5 = Levels 1 & 2 rehab/ replacement (RR) improvements; 3 = Level 1 RR; 1 = No RR impr	Levels 1 and 2 RR improvements implemented	5	
3. Enviro Stewardshp / 10%	3a. (50%) Envirom. WQ	SW captured	5:>2000 AFY; 4: 1000-2000 AFY; 3: 500-1000 AFY; 2:<500 AFY; 1: 0	0 AFY SW captured	1	0.2
	3b. (50%) Energy Eff / Carbon Footprint	Energy effic. Improv.- EEI	5=$350K (all EEI); 3= up to $175K (50%); 1=up to $87.5K (25%)	No EEI implemented	1	
		Carbon footprint /energy intensity	5=Low carbon footpr./energy intensity (CF/EI); 3= High CF/EI; 1=>1 sources w/high CF/EI	Imported water projects only	3	
4. Cost / 11%	4a. (50%) Unit Cost	Unit cost in ave. year	5=<$1,000/AF; 4=<$1,200/AF; 3=<$1,300/AF; 2=<$1,500/AF; 1=>Tier 1 ($1,500/AF)	$1,000	4	0.3
	4b. (50%) Capital Cost	Capital cost of portfolio	5 = < $200M; 4 = < $300M; 3 = < $400M; 2 = < $500M; 1 = >$500M	$432,680,000	2	
5. (11%) Self-Reliance	5a. (50%) Local Portfolio	% local supplies	5 = >80% local; 4 = 60-80%; 3 = 40-60%; 2 = 20-40%; 1 = <20%	90%	5	0.5
	5b. (50%) Eff. Basin Mngmnt	Recharge to pump ratio	5= 1:3 ratio or better; 4=1:4 -1:6; 3 = 1:6 - 1:8; 2 = 1:8 - 1:10; 1 = >1:10	3,770:20,100, or 1:5.3	4	
6.(4%) Regional Collabor	n/a	Number of supply partnerships	5 = several; 3 = few partnerships 1 = only MWD	~3 (MWDSC, RBMB, LAG)	5	0.2
7. (6%) Complexity	n/a	Time score: permits, agrmnts, CEQA	5 = 0-2 projects to be implemented that require permits, arrangements, CEQA 3 = 2-4 projects; 1 = 4+ projects	7 projects	1	0.1
8. Flexibility (8%)	8a. (50%) Op. Flexibility	# intercontns	5 = >2 new interconnections (IC); 3 = 1 new IN.; 1 = No new IC	1 new IC (IW-4)	3	0.3
	8b. (50%) Adaptability	Score for Scalability and Phasing	5 = Projects scaled/phased, flexible; 3 = No new projects; 1 = No scaled or phased projects	Several projects phased if needed	5	
9. (11%) Comm values/ quality of life	9a. (50%) Eff Resources Use	Volume of WUE & NP direct use	5= Mid WUE/Max Non-Potable (NP); 4= Mid WUE/Mid NP; 3= Max WUE/Mid NP; 2= Max WUE/Low NP; 1= Low WUE/No NP	Low WUE and Max NP	5	0.5
	9b. (50%) Aesthetics	Urb. canopy & env impr. score	5=Maintain green areas, capture SW, improve surface WQ; 1 = No environment improvement	NPW project will maintain green areas	5	
						4.1