MARIN WATER

Strategic Water Supply Assessment

COMMUNITY WORKSHOP #4

October 25, 2022

Workshop Agenda: Strategic Water Supply Assessment

- Assessment Overview
- Water Management Alternatives
- Alternatives Evaluation Process
- Summary of Initial Evaluation
- Next Steps
- Q&A

Strategic Water Supply Assessment: Schedule

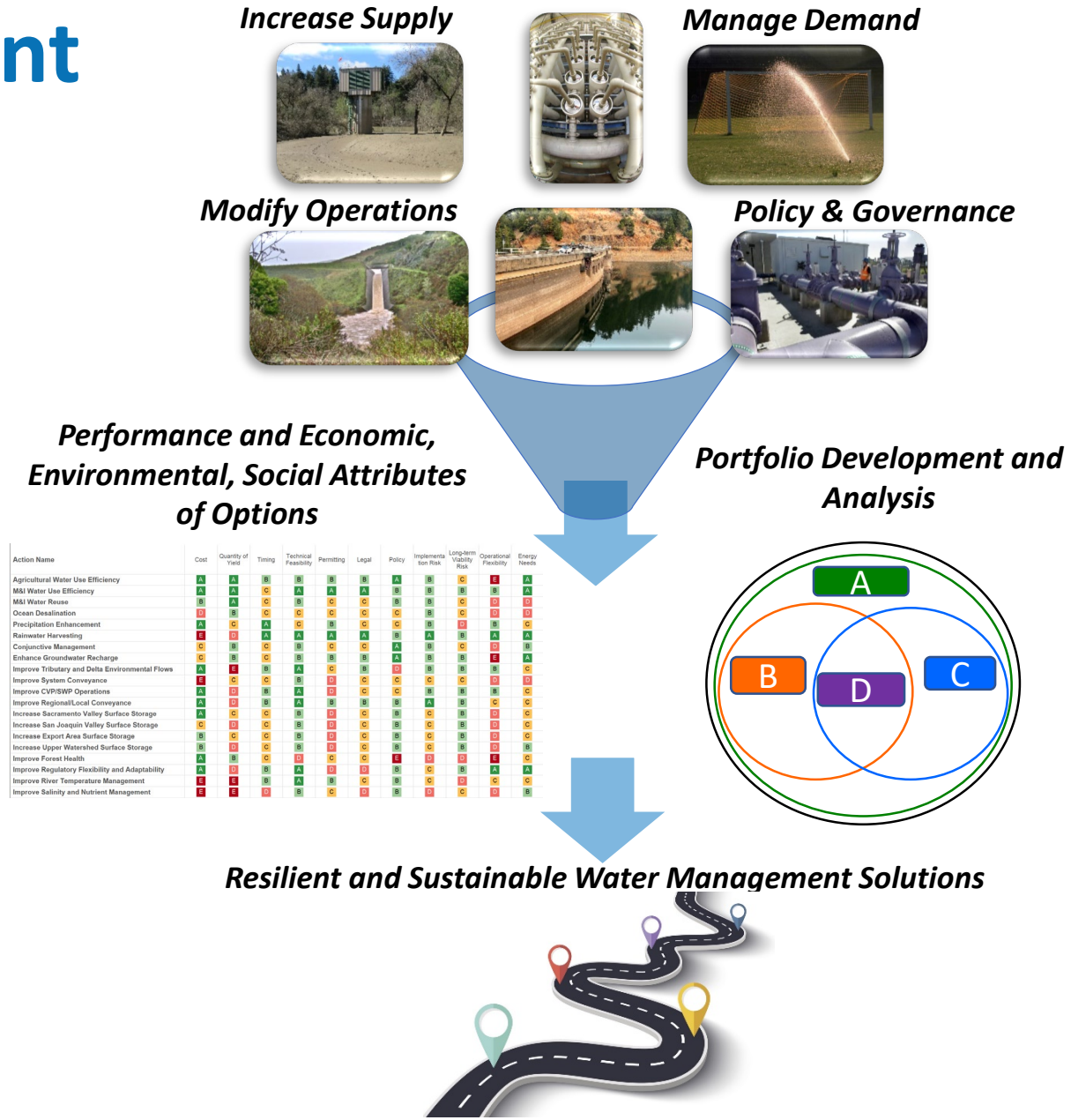
- October 25 – Public Workshop
- November – Draft Portfolios and Strategies
- December/January – Recommended Roadmap(s)

Assessment Overview

Key Project Scope Elements

Water Supply Assessment Process

- Consider a broad range of water management alternatives
- Identify most promising alternatives
- Evaluate alternatives for performance and other economic, environmental, and social criteria
- Explore strategic combinations of alternatives
- Develop roadmap with specific project, pathways, and triggers to achieve resilient and sustainable solutions

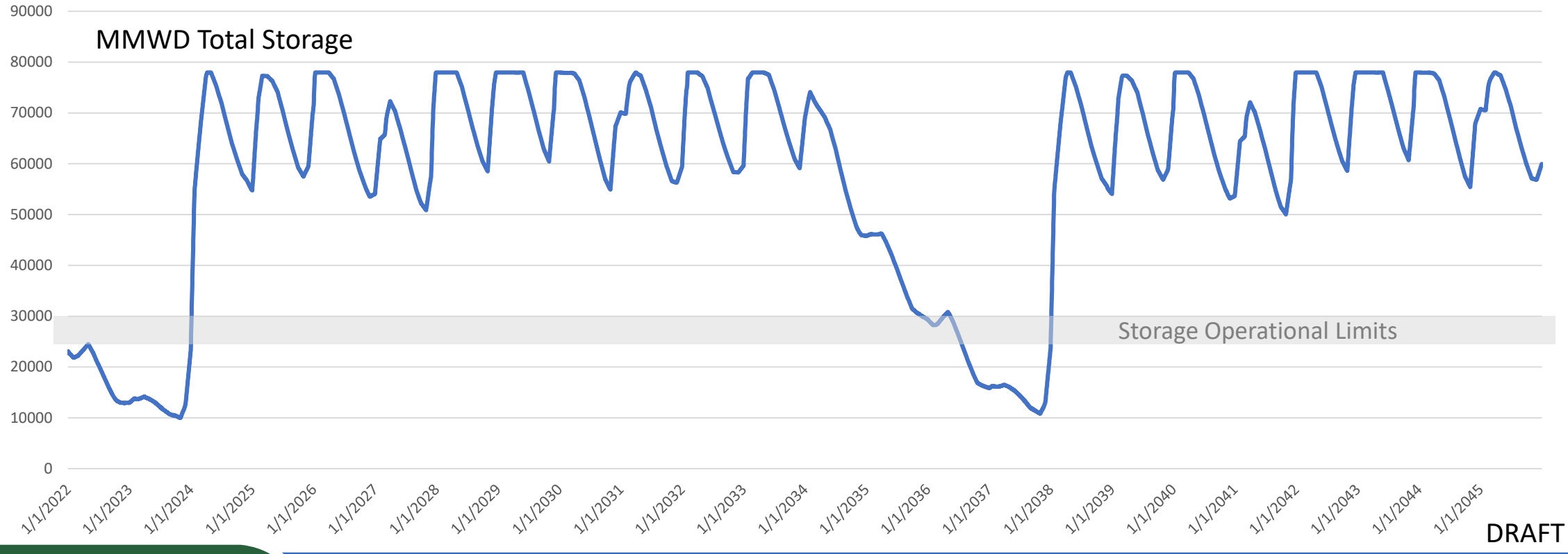


Summary of DRAFT Scenarios

- Scenario findings
  - Scenario 1 drought results in the highest short-term deficit
  - Scenario 2 conservation savings reduces the deficit
  - Scenario 3 with four-year drought results in the highest overall deficit
  - Scenario 4 with extended droughts creates a challenge of *persistence*
  - Scenario 5 with reduced treatment capacity results in *diversification* challenge

Scenario 3 – Planning Level Simulations Provide Estimate of Deficit

Scenario	Max. Deficit Duration	Annual Deficit (AFY)
Scenario 3 – Short and Severe Drought	4 years	**6,500 – 7,500 AFY (4 yrs)**



DRAFT RESULTS

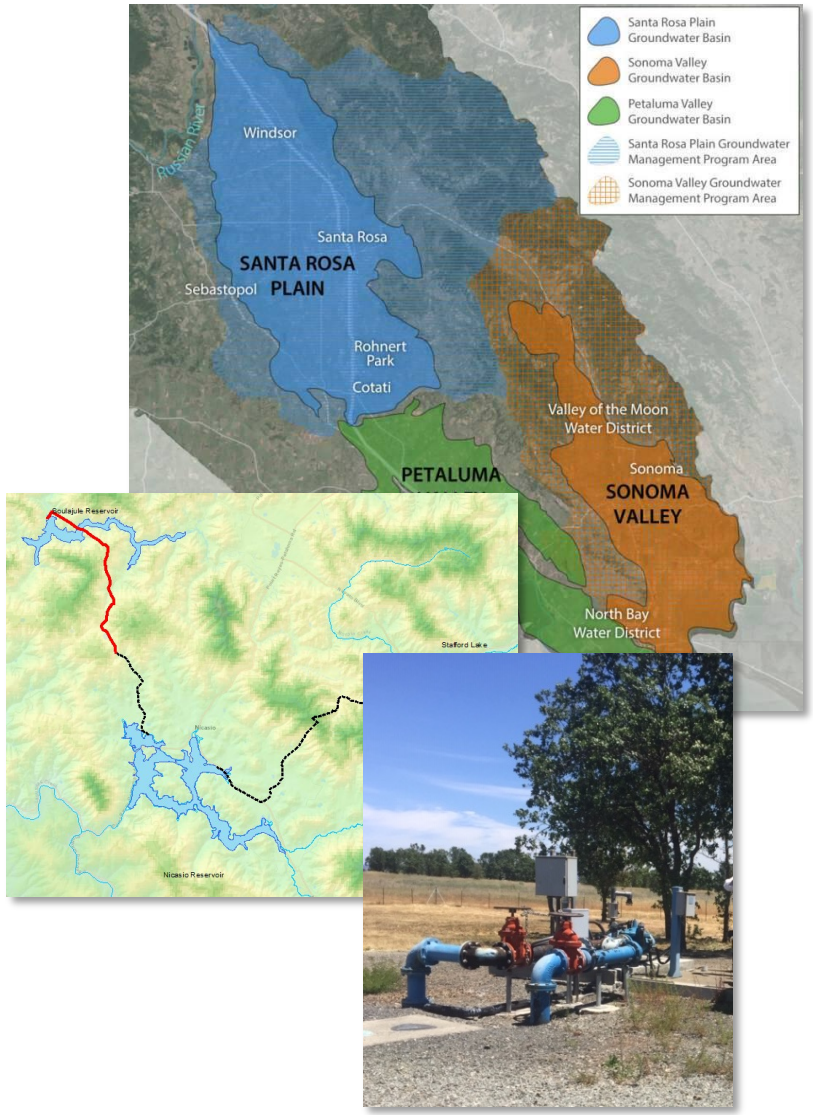
Water Management Alternatives

Water Management Alternatives Considered

- Sonoma-Marin Partnerships
- Local Surface Storage
- Water Transfers with Conveyance through Bay Interties
- Desalination
- Recycled Water
- Water Conservation

Sonoma-Marin Partnerships

1. Maximize Use of Sonoma Water (Existing Facilities)
2. Maximize Use of Sonoma Water (Resolve Conveyance Bottlenecks)
3. Maximize use of Sonoma Water (Dedicated Conveyance to Nicasio Reservoir)
4. Groundwater Well Rehabilitation
5. Regional Groundwater Bank

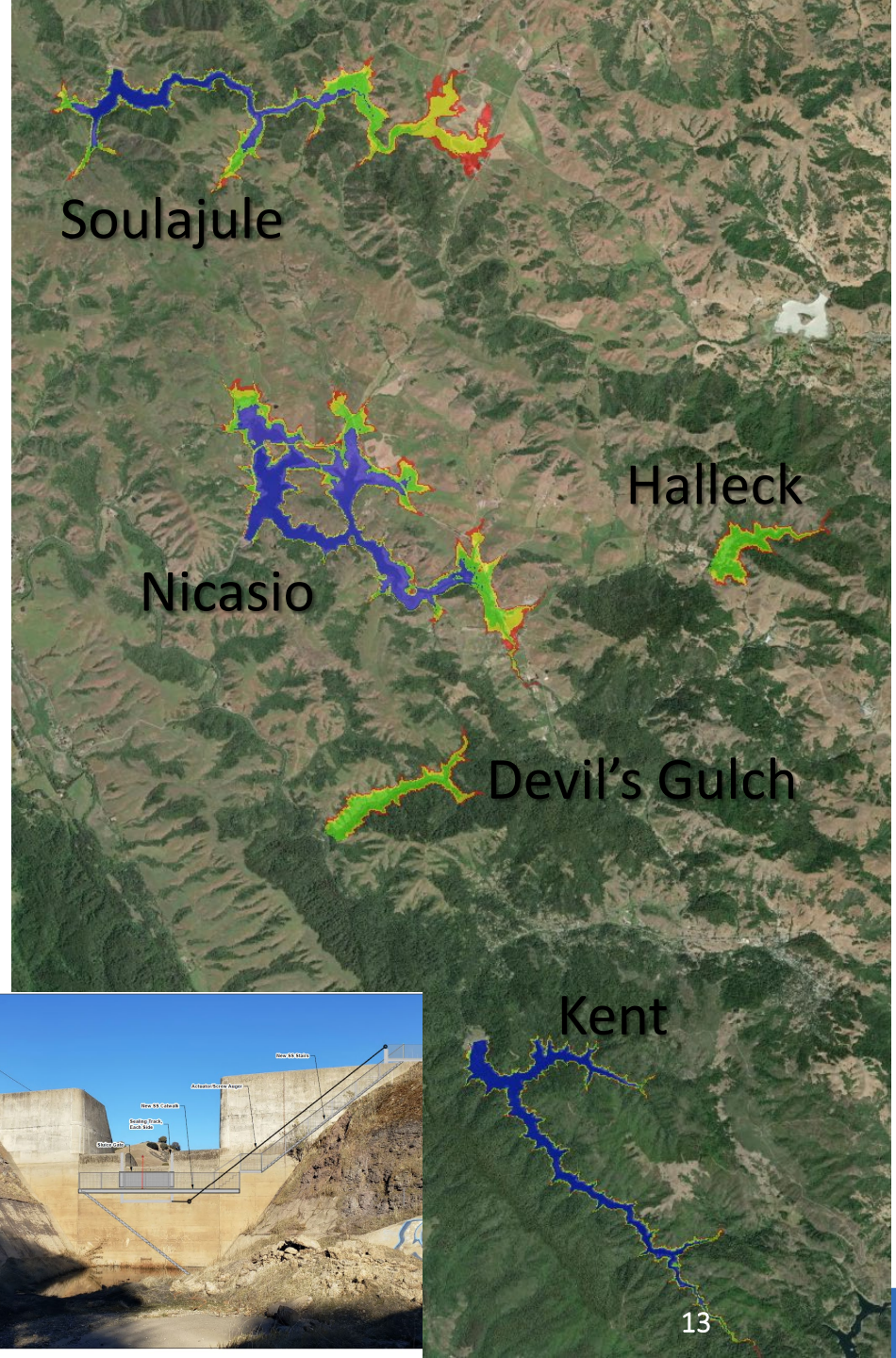


Sonoma-Marin Partnership Options Yield and Cost Summary

Option	Potential New Supply (AFY)	Capital Cost ($M)	Annual O&M Cost ($M)	Cost Range Estimate ($/AF)
1. Maximize Sonoma Water Supply (Existing Facilities)	**1,500**			**$1,300**
2. Maximize Sonoma Water Supply (Resolve Existing Conveyance Bottlenecks)	**2,500**	$16-50	$3	**$2,100 – 2,900**
3. Maximize Sonoma Water (Dedicated Conveyance to Storage)	**4,000**	$60 - 90	$3 - 5	**$2,700 – 3,000**
4. Sonoma Groundwater Well Rehab	**2,000**	$3	$3	**$1,400 – 1,600**
5. Regional Groundwater Bank	**2,500**	$10	$3-4	**$1,500 - 2,000**

Local Storage Augmentation

1. Local Surface Storage Enlargement
2. New Surface Storage
3. Adjustable Spillway Gates

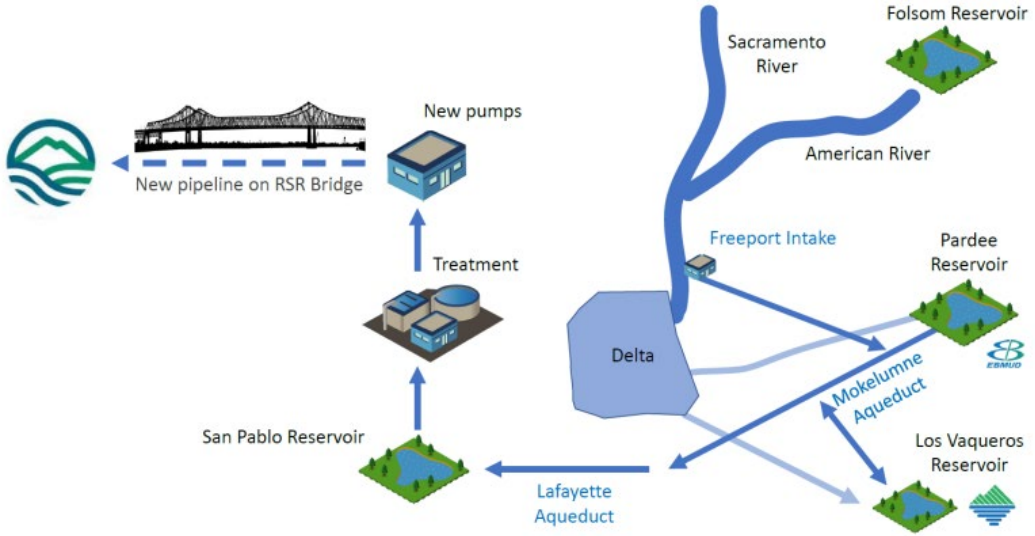


Local Surface Storage Options Yield and Cost Summary

Option	Potential New Supply (AFY)	Capital Cost ($M)	Annual O&M Cost ($M)	Cost Range Estimate ($/AF)
1. Surface Storage Enlargement (20 TAF @ Soulajule, Nicasio, or Kent)	**5,000**	$105 – 170	$3	**$1,700 – 2,400**
2. New Surface Storage (10 TAF @ Devil's Gulch or Halleck)	**2,500**	$200 - $300	$3	**$4,100 – 6,100**
3. Adjustable Spillway Gates (Kent, Nicasio, Soulajule, and Alpine)	**1,300**	$20-40	$1	**$1600 – 2,300**

Water Purchases with Conveyance through Bay Interties

1. EBMUD Intertie (Sac Valley purchases)
2. CCWD Intertie (Sac Valley purchases)
3. North Bay Aqueduct Intertie (Sac Valley purchases)
4. SFPUC Intertie (Golden Gate Bridge)



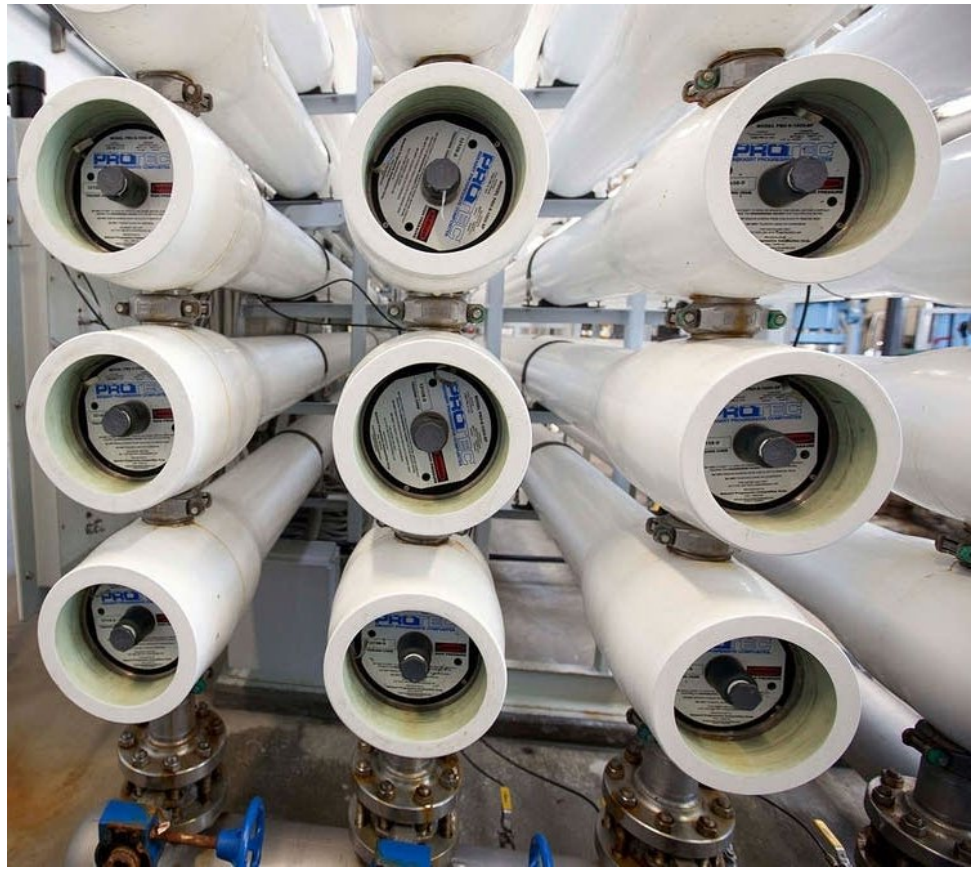
Water Purchases with Conveyance through Bay Intertie Options Yield and Cost Summary

Option	Potential New Supply (AFY)	Capital Cost ($M)	Annual O&M Cost ($M)	Cost Range Estimate ($/AF)
1. EBMUD Intertie	**5,000**	$111	$7-9	**$2,600 – 2,900**
2. CCWD Intertie	**5,000**	$280	$7-9	**$4,300 – 4,600**
3. North Bay Aqueduct Intertie	**5,000**	$346 – 410	$6-8	**$4,800 – 5,800**
4. SFPUC Intertie	**1,000**	$31	$1-2	**$2,900 – 3,200**

* EBMUD, CCWD, and NBA interties assume a maximum of 20,000 AF of Temporary transfer supplied over 4-year dry period

Desalination

1. Marin Regional Desalination Facility
2. Containerized Desalination Facility
3. Bay Area Regional Desalination Facility
4. Petaluma Brackish Desalination Facility



Desalination Options Yield and Cost Summary

Option	Potential New Supply (AFY)	Capital Cost ($M)	Annual O&M Cost ($M)	Cost Range Estimate ($/AF)
1. Marin Regional Desalination Facility				
5 MGD (stand alone)	**5,600**	$234 - 260	$12- 13	**$4,200 – 4,600**
5 MGD (expandable)	**5,600**	$246 - 274	$12- 13	**$4,400 – 4,900**
10 MGD (expandable)	**11,200**	$320 - 331	$20 – 22	**$3,300 – 3,400**
15 MGD	**16,800**	$373 - 401	$28 – 29	**$2,800 – 2,900**
2. Containerized Desalination Facility (5.4 MGD)	**6,050**	$121 - 132	$12 – 13	**$2,700 – 2,900**
3. Bay Area Regional Desalination Facility (5 MGD)	**5,600**	$253 – 268	$5 - 6	**$3,300 – 3,800**
4. Petaluma Brackish Groundwater Desalination Facility (5 MGD)	**5,600**	$105 – 175	$3 – 4	**$1,500 – 2,500**

Water Reuse

1. Recycled Water – expansion of non-potable reuse systems: Peacock Gap and San Quentin
2. Indirect Potable Reuse (IPR): Advanced treatment, conveyance to Kent Lake
3. Direct Potable Reuse (DPR) - Central Marin Sanitation Agency (CMSA):
   - Raw Water Augmentation – CMSA to Bon Tempe Lake
   - Treated Water Augmentation - CMSA to distribution system
4. Direct Potable Reuse (DPR) - Regional
   - Raw Water Augmentation – CMSA, Las Gallinas Valley, SASM to Bon Tempe Lake

Water Reuse Options Yield and Cost Summary

Option	Potential New Supply (AFY)	Capital Cost ($M)	Annual O&M Cost ($M)	Cost Range Estimate ($/AF)
1. Recycled Water Expansion				
Peacock Gap	**285**	$22 - 30	$0.2 – 0.3	**$5,000 – 5,600**
San Quentin	**154**	$13 - 15	$0.2	**$3,900 – 4,500**
2. Regional Indirect Potable Reuse (IPR)	**7,300**	$427 - 477	$9 - 11	**$4,200 – 4,800**
3. CMSA Direct Potable Reuse (DPR)				
Raw Water Augmentation	**4,480**	$165 - 183	$9 – 11	**$3,900 – 4,500**
Treated Water Augmentation	**4,480**	$117 - 131	$8 – 10	**$3,200 – 3,600**
4. Regional Direct Potable Reuse (DPR)	**7,300**	$392 – 439	$16 - 19	**$4,900 – 5,600**

Water Conservation Project Summary

- 2045 Adjusted Water Use
  - 2045 demands: 27,427acft, 15% reduction in projected demands
    - **106 GPCD**
    - **73 R-GPCD**
- Cumulative Savings in 2045: 22,515 acft
- UPDATED Cost to Fund Conservation as Supply
  - District Cost: $1,792/acft
    - Annual Budget Estimate: $1.7M for incentives and associated program management
      - Does not include School Education Program and other non-incentive based program expenditures
  - Customer Cost: $2,883/acft
    - Estimated hardware, installation, and maintenance costs for each incentivized program

Water Conservation Project

	Water Conservation Project (Annual Participation)	Past Annual Participation	
		Pre-Drought	2021 Drought
AMI Leak Letter Notifications (/yr)	1,250	1,140	1,601
Non-Functional Turf Conversion (sqft/yr)	70,000	0	0
Turf Conversion (sqft/yr)	100,000	7,736	410,000
Pool Covers (/yr)	90	12	399
SMART Irrigation Controllers (/yr)	100	50	480
Conservation Assistance Program (/yr)	500	195	667
Laundry to Landscape Graywater Kits (/yr)	40	5	44
Rain Barrels (gallons/yr)	15,000	460	43,497

Regulatory Driven Project

- Regulatory Driven Project builds on the savings projected in Option 1: Water Conservation Project
- Water Savings Estimate resulting from adoption of strict landscape codes and associated enforcement:
  - 2045 demands: 25,875 acft
    - **100 GPCD (vs 106 GPCD)**
    - **69 R-GPCD (vs 73 GPCD)**
- Cost to Fund a Regulatory Driven Project
  - District Cost: ~$4,000/acft
  - Customer Cost: ~$3,700/acft

Regulatory Driven Project

Regulations and Enforcement would need to be developed and would require:

- Enforcement of water budgets and penalties
- Expanded Water Efficient Landscape Ordinance regulations
  - Limit turf installations in all new development and remodels
  - Only allow low water use plants, drip irrigation in all new development and remodels
  - Prohibit non-functional turf in existing non-residential sites
  - Prohibit turf in front yards and limit allowable turf area in existing single-family homes
- Indoor fixture standards/requirements
- Retrofit on Resale and/or Change of Customer
  - Ensure fixture, landscape, and irrigation requirements are met.
- Consider community impact of deeper demand reductions particularly to landscapes and the non-residential sector.

Water Conservation Options Yield and Cost Summary

Option	Potential Demand Reduction (AFY)	Capital Cost ($M)	Annual O&M Cost ($M)	Cost Range Estimate ($/AF)
1. Water Conservation Project	**4,000**		$1.7	**$1,800**
2. Regulatory Driven Project	**5,560**		$5.0	**$4,000**

* As presented to Board on 9/6. Water savings estimated for 2045.

Maddaus review underway

Alternatives Evaluation

Goals of Evaluation Process

- Help discern differences between alternatives
- Illustrate positive and challenging characteristics associated with alternatives
- Identify synergies and challenges of alternatives
- Support eventual strategy and portfolio development process

Evaluation of Water Management Alternatives

- Performance Criteria
  - How well do each of the alternatives resolve system performance challenges during critical dry period?
    - Manage MMWD reservoir storage above operational reserve storage (30,000 AF)
    - Reduce potential delivery shortages
- Evaluation Criteria
  - How to compare alternatives that have similar levels of “performance”?
- Application Approach
  - How do individual alternatives perform?
  - What combination of alternatives could be considered?
  - What portfolio strategy is most strategic?

Evaluation Criteria

Criteria	Description	Measurement
Yield	Estimate of new supply or reduced demand option can provide during dry years.	AF
Cost	Cost per acre-foot of supply or demand reduction.	$/AFY
Timing	Estimate of time required before project could be implemented considering planning, design, permitting, and implementation.	Years before alternative could begin operation
Reliability	Reliability of supply during periods of dry year need	5-pt qualitive scale
Flexibility	Degree to which the option could be operated (or implemented) across a wide range of hydrologic conditions by having ability to adjust the magnitude of operation each year to meet required conditions	5-pt qualitive scale
Environmental	Anticipated positive or negative impacts on the natural environment.	5-pt qualitive scale
Feasibility	Maturity of the concept and technical ability to implement.	5-pt qualitive scale
Energy	Estimated change in energy required to implement and operate.	KWH/AF
Permitting/Legal	List of permits required and status if option has begun permitting process.	5-pt qualitive scale
Social	Description of positive or negative socioeconomic effects.	5-pt qualitive scale
Jurisdiction	Primary jurisdiction for implementation	5-pt qualitive scale
Public Acceptance	Anticpated public acceptance	5-pt qualitive scale

Initial Evaluation Summary

Water Management Alternatives Considered

- Sonoma-Marin Partnerships
- Local Surface Storage
- Water Transfers with Conveyance through Bay Interties
- Desalination
- Recycled Water
- Water Conservation

Sonoma-Water Partnerships

Cost ($/AF) and Yield (AFY) Information

Reference Location of Alternatives

Evaluation Summary of Alternatives

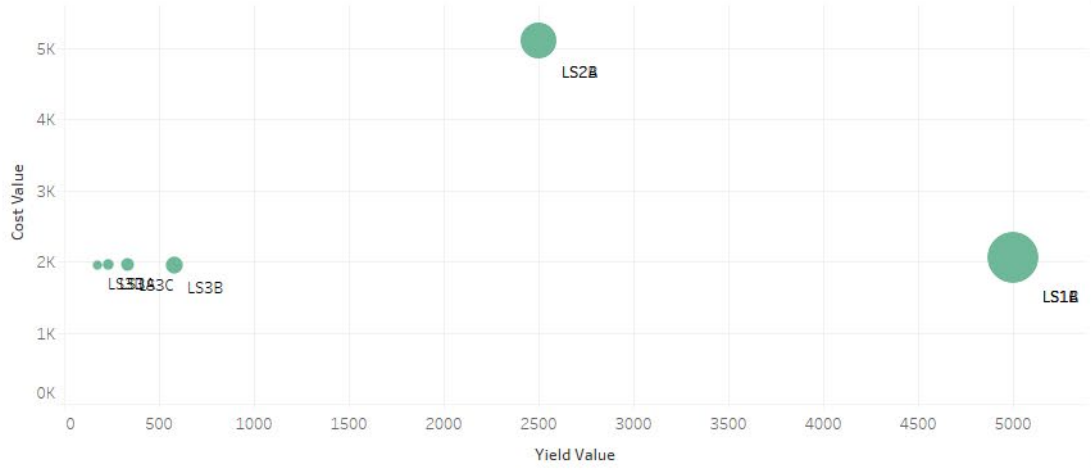
Code	Name	Yield Rating	Cost Rating	Timing Rating	Reliability Rating	Flexibility Rating	Feasibility Rating	Environmental Rating	Energy Rating	Permitting/Legal Rating	Social Rating	Jurisdiction Rating	Public Acceptance Rati..
SM1	Maximize Use of Sonoma Water - Existing Facilities												
SM2A	Maximize Use of Sonoma Water - Resolve Bottlenecks												
SM2B	Maximize Use of Sonoma Water - Resolve Bottlenecks+South Transmission ..												
SM3A	Maximize Use of Sonoma Water - Dedicated Conveyance Stafford to Nicasio												
SM3B	Maximize Use of Sonoma Water - Dedicated Conveyance Kastania to Nicasio												
SM3C	Maximize Use of Sonoma Water - Dedicated Conveyance Cotati to Soulajule												
SM4	Regional Groundwater Bank												

- **Maximizing use of Sonoma Water** supply provides moderate additional supply at low cost; immediate implementation; highly flexible
- **Resolving conveyance bottlenecks** will increase supply at moderate cost; reliable at lower quantities in drier years; flexible operations; and low environmental and permitting impacts
- **Dedicated conveyance to MMWD storage** can increase yield at higher cost; improves reliability; modest environmental, permitting, and jurisdiction complexities with new conveyance

Measure Values
1.000 5.000

Local Storage Augmentation

Cost ($/AF) and Yield (AFY) Information



Reference Location of Alternatives

Evaluation Summary of Alternatives

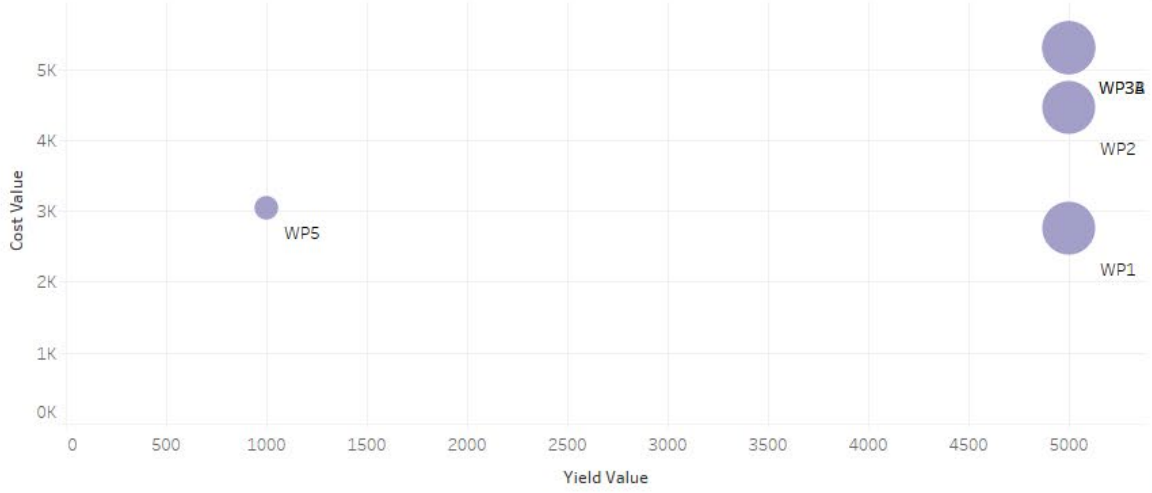
Code	Name	Yield Rating	Cost Rating	Timing Rating	Reliability Rating	Flexibility Rating	Feasibility Rating	Environmental Rating	Energy Rating	Permitting/Legal Rating	Social Rating	Jurisdiction Rating	Public Acceptance Rati..
LS1A	Soulajule Enlargement												
LS1B	Nicasio Enlargement												
LS1C	Kent Enlargement												
LS2A	Halleck Reservoir												
LS2B	Devil's Gulch Reservoir												
LS3A	Movable Spillway Gates - Soulajule												
LS3B	Movable Spillway Gates - Nicasio												
LS3C	Movable Spillway Gates - Kent												
LS3D	Movable Spillway Gates - Alpine												

- **Storage augmentation** will produce new supply at moderate cost; reliable in most years; low energy and carbon footprint; potential for moderate to high environmental and social impacts
- **New storage** is likely to produce lower yields at higher costs; environmental impacts and permitting challenges are likely high
- **Movable spillway gates** will generate relatively low to moderate yield at low cost; early implementation; high flexibility; likely lower environmental and permitting challenges

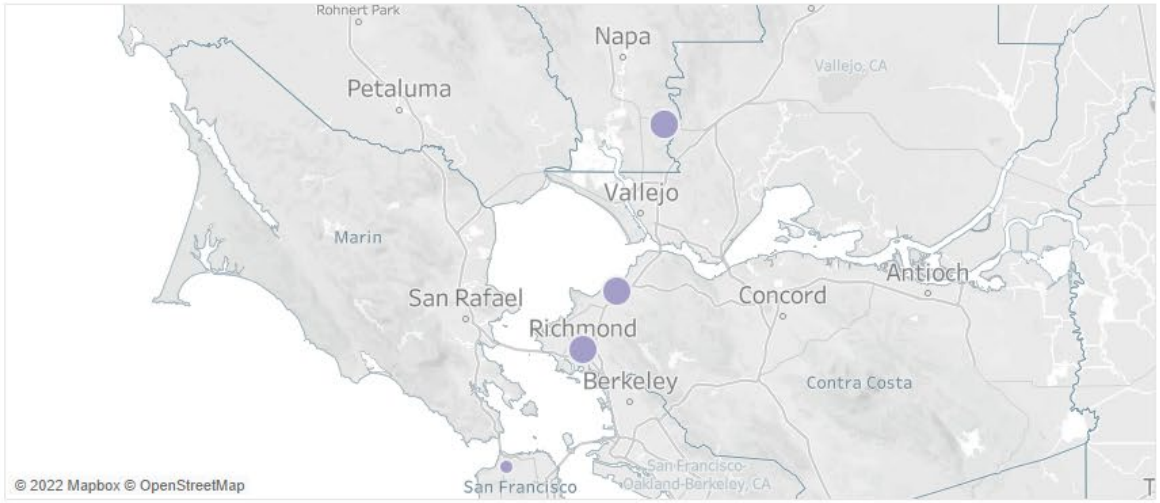
Measure Values
1.000 5.000

Water Transfers with Conveyance through Bay Interties

Cost ($/AF) and Yield (AFY) Information



Reference Location of Alternatives



Evaluation Summary of Alternatives

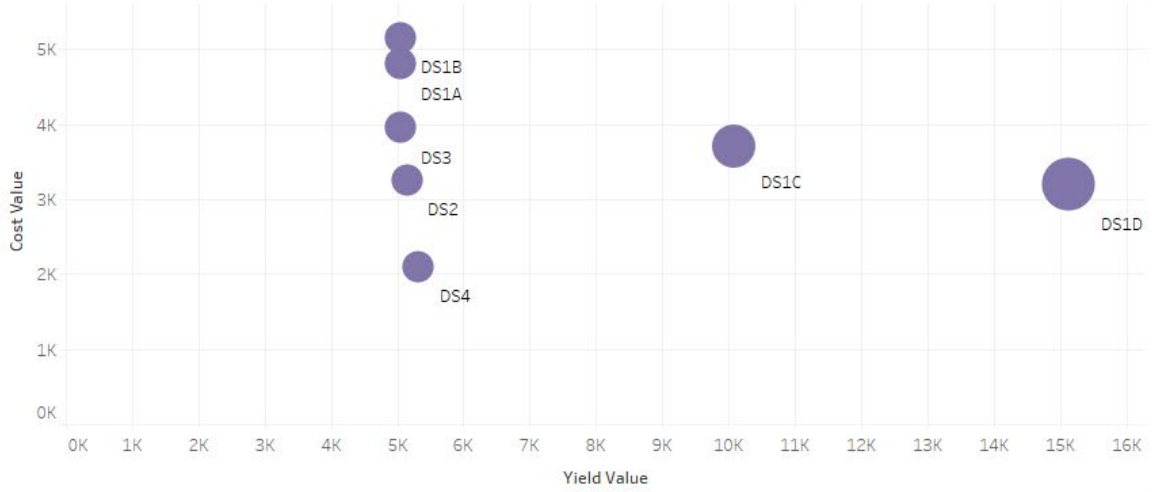
Code	Name	Yield Rating	Cost Rating	Timing Rating	Reliability Rating	Flexibility Rating	Feasibility Rating	Environmental Rating	Energy Rating	Permitting/Legal Rating	Social Rating	Jurisdiction Rating	Public Acceptance Rati..
WP1	EBMUD Intertie												
WP2	CCWD Intertie												
WP3A	NBA Intertie - MMWD												
WP3B	NBA Intertie - Sonoma Aqueduct												
WP5	SFPUC Intertie												

- **Water Transfers:** provide moderate additional supply; high flexibility; reliability is uncertain in critical year market and Delta regulations; complex permitting involving multiple jurisdictions
- Dependence on use of third party conveyance and treatment increases uncertainty and cost
- Delivery to MMWD involves significant new conveyance with increased costs

Measure Values
1.000 5.000

Desalination

Cost ($/AF) and Yield (AFY) Information



Reference Location of Alternatives

Evaluation Summary of Alternatives

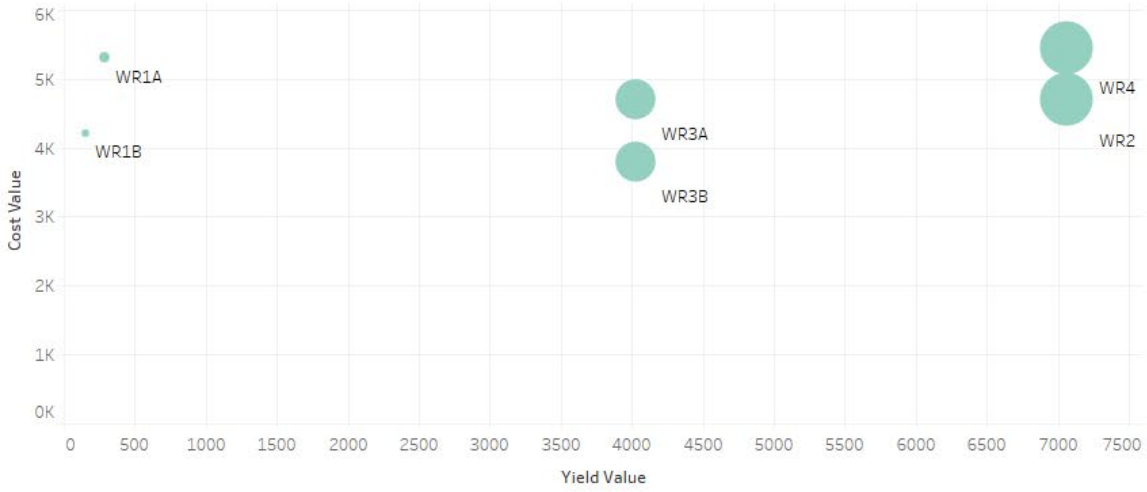
Code	Name	Yield Rating	Cost Rating	Timing Rating	Reliability Rating	Flexibility Rating	Feasibility Rating	Environmental Rating	Energy Rating	Permitting/Legal Rating	Social Rating	Jurisdiction Rating	Public Acceptance Rati..
DS1A	Marin Regional Desalination Facility- 5 MGD Stand Alone												
DS1B	Marin Regional Desalination Facility - 5 MGD Expandable												
DS1C	Marin Regional Desalination Facility - 10 MGD Expandable												
DS1D	Marin Regional Desalination Facility - 15 MGD												
DS2	Containerized Desalination Facility												
DS3	Bay Area Regional Desalination Facility												
DS4	Petaluma Brackish Groundwater Desalination Facility												

- **Desalination alternatives** will produce high new supply at high cost; highly reliable supply; less flexible; higher energy use, environmental impact, and permitting complexity; requires vote by customers
- **Petaluma Brackish Groundwater Desalination** likely to produce moderate to high supply at moderate cost; implementable more quickly; likely moderate impacts; reliability is not yet known (conceptual nature of alternative)

Measure Values
1.000 5.000

Water Reuse

Cost ($/AF) and Yield (AFY) Information



Reference Location of Alternatives

Evaluation Summary of Alternatives

Code	Name	Yield Rating	Cost Rating	Timing Rating	Reliability Rating	Flexibility Rating	Feasibility Rating	Environmental Rating	Energy Rating	Permitting/Legal Rating	Social Rating	Jurisdiction Rating	Public Acceptance Rati..
WR1A	Recycled Water Expansion - Peacock Gap												
WR1B	Recycled Water Expansion - San Quentin												
WR2	Regional Indirect Potable Reuse (IPR)												
WR3A	CMSA Direct Potable Reuse (DPR) - Raw Water Augmentation												
WR3B	CMSA Direct Potable Reuse (DPR) - Treated Water Augmentation												
WR4	Regional Direct Potable Reuse (DPR)												

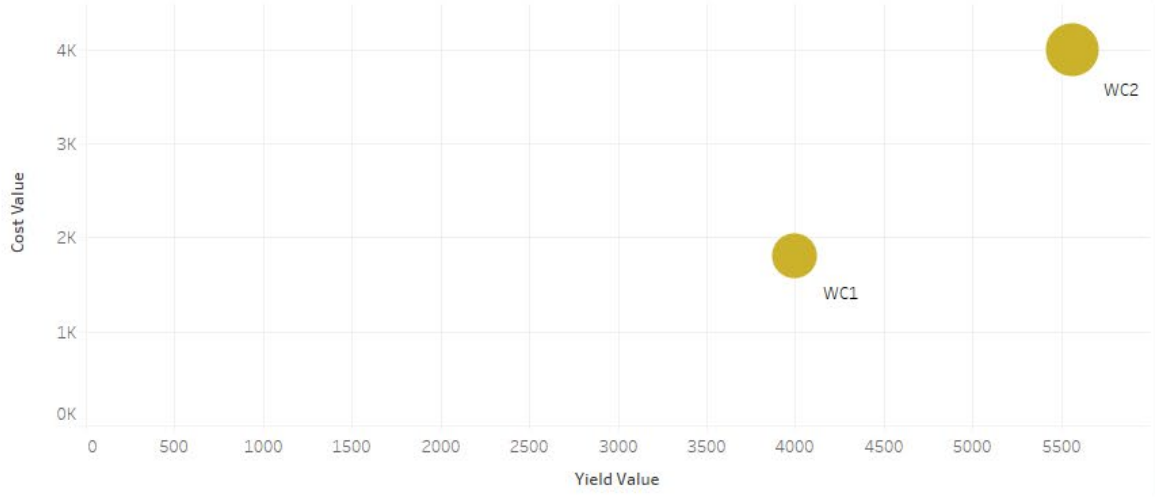
- **Recycled Water projects** provide low yield at high costs; reliability is high; negative impacts are unlikely
- **IPR and DPR alternatives** provide high yield at high costs; reliability is high; moderate to high energy use and environmental challenges; permitting is likely complex; DPR is further challenged with yet unestablished state regulations; first of kind project

Measure Values

1.000 5.000

Water Conservation

Cost ($/AF) and Yield (AFY) Information



Reference Location of Alternatives

Evaluation Summary of Alternatives

Code	Name	Yield Rating	Cost Rating	Timing Rating	Reliability Rating	Flexibility Rating	Feasibility Rating	Environmental Rating	Energy Rating	Permitting/Legal Rating	Social Rating	Jurisdiction Rating	Public Acceptance Rati..
WC1	Water Conservation Program												
WC2	Regulatory Driven Program												

- Moderate supply (demand reduction); early implementation; highly flexible; and positive environmental, energy, and permitting; jurisdiction within Marin
- **Larger program** will increase yield at higher cost, may be less reliable, could face public acceptance challenges

Measure Values

1.000 5.000

Moving Toward Strategies and Portfolios

- **Strategies –** a particular plan of action or policy designed to achieve the overall water management goals
- **Portfolios –** a combination of actions designed to implement a particular strategy
- Recognizing no singular alternative is likely to achieve all goals
  - How to balance long-term and shorter-term actions?
  - Are some alternatives synergistic? Can one set of alternatives amplify the benefit of other alternatives or preclude others?
  - Develop select strategies and associated portfolios for testing performance

Next Steps

Next Steps

- Maddaus review of conservation as water management alternative
- Integration of water management alternatives into decision support model
- Structuring strategies and portfolios and roadmap strategies
- Evaluate the performance of portfolios across range of scenarios
- Analysis of financial impact
- Upcoming schedule – dates TBD
  - Public Workshop
  - Draft Portfolios and Strategies
  - Recommended Roadmap(s)

Attendee Questions & Comments

Instructions for indicating you have a question/comment

If watching from a computer or smart device:

- Use the **raise hand**  **feature** in Zoom

If listening from a phone:

- Dial ***9** to let the Zoom host know your hand is raised