



Technical Memorandum 2

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16 List of Abbreviations

17	ABAG	Association of Bay Area Governments	35	DAC	disadvantaged community
18	ACWD	Alameda County Water District	36	DCP	Drought Contingency Plan
19	AF	acre-foot/feet	37	DDW	State Water Resources Control Board
20	AFY	acre-foot/feet per year	38		Division of Drinking Water
21	AMI	advanced metering infrastructure	39	Delta	Sacramento-San Joaquin River Delta
22	BARDP	Bay Area Regional Desalination Plant	40	DOT	Department of Transportation
23	BARR	Bay Area Regional Reliability	41	DPR	direct potable reuse
24	BAWSCA	Bay Area Water Supply and Conservation	42	DSRSD	Dublin San Ramon Services District
25		Agency	43	DWR	California Department of Water Resources
26	BiOp	Biological Opinion	44	EA	Environmental Assessment
27	CA	California	45	EBMUD	East Bay Municipal Utility District
28	Cal Water	California Water Service Company	46	EBRPD	East Bay Regional Park District
29	CCWD	Contra Costa Water District	47	EDA	economically distressed area
30	CDFW	California Department of Fish and Wildlife	48	EIR	Environmental Impact Report
31	CEQA	California Environmental Quality Act	49	EIS	Environmental Impact Statement
32	cfs	cubic foot/feet per second	50	EO	Executive Order
33	CVP	Central Valley Project	51	ESA	Endangered Species Act
34	CWC	California Water Code	52	FIRO	Forecast Informed Reservoir Operation

1	FRWA	Freeport Regional Water Authority	42	SWP	State Water Project
2	FRWP	Freeport Regional Water Project	43	TBD	to be determined
3	GHG	greenhouse gas	44	TDS	total dissolved solids
4	IFA	Infrastructure Finance Act	45	TM	technical memorandum
5	in.	inch(es)	46	TOC	total organic carbon
6	IPR	indirect potable reuse	47	USACE	United States Army Corps of Engineers
7	IRWM	Integrated Regional Water Management	48	USBR	United States Bureau of Reclamation
8	ISD	Ironhouse Sanitary District	49	USFWS	United States Fish and Wildlife Service
9	JPA	joint powers authority	50	UWMP	Urban Water Management Plan
10	LF	linear foot/feet	51	WCWTP	Walnut Creek Water Treatment Plant
11	LV	Los Vaqueros	52	WSCP	Water Shortage Contingency Plan
12	mgd	million gallons per day	53	Zone 7	Zone 7 Water Agency
13	MMWD	Marin Municipal Water District			
14	MOA	Memorandum of Agreement			
15	NDF	Newark Desalination Facility			
16	NEPA	National Environmental Policy Act			
17	NMFS	National Marine Fisheries Service			
18	NOAA	National Oceanic and Atmospheric Administration			
19					
20	NPDES	National Pollutant Discharge Elimination System			
21					
22	O&M	operations and maintenance			
23	P3	public-private partnership			
24	PREP	Potable Reuse Exploratory Plan			
25	psi	pound(s) per square inch			
26	R&R	repair and replacement			
27	RWF	Regional Wastewater Facility			
28	RWQCB	Regional Water Quality Control Board			
29	SBA	South Bay Aqueduct			
30	SCADA	supervisory control and data acquisition			
31	SCVWD	Santa Clara Valley Water District			
32	SCWA	Sacramento County Water Agency			
33	Semitropic	Water Storage District			
34	SFPUC	San Francisco Public Utilities Commission			
35	SGWP	Sustainable Groundwater Planning			
36	SRA	Shortage Response Action			
37	SRF	State Revolving Fund			
38	State Board	State Water Resources Control Board			
39	SVAWPC	Silicon Valley Advanced Water Purification Center			
40					
41	SVCW	Silicon Valley Clean Water			

1 Executive Summary

2 BARR and the DCP Background

3 Eight of the San Francisco Bay Area's largest public water agencies are working together through the Bay
4 Area Regional Reliability (BARR) partnership toward regional solutions to improve water supply reliability for
5 the more than six million residents and thousands of businesses and industries in the area. As a first step in
6 this unprecedented partnership, the BARR agencies are developing a regional Drought Contingency Plan
7 (DCP).

8 To support their efforts, the BARR agencies, including Alameda County Water District (ACWD), Bay Area
9 Water Supply and Conservation Agency (BAWSCA), Contra Costa Water District (CCWD), East Bay Municipal
10 Utility District (EBMUD), Marin Municipal Water District (MMWD), San Francisco Public Utilities Commission
11 (SFPUC), Santa Clara Valley Water District (SCVWD), and Zone 7 Water Agency (Zone 7), secured a grant
12 from the United States Bureau of Reclamation (USBR) to help develop the DCP.

13 The outcomes of the DCP development effort conducted by the BARR member agencies through much of
14 2016 are summarized in two technical memoranda – TM1 and TM2 – that, taken together, will compose the
15 DCP. While TM1, distributed in August 2016, lays the foundation for the DCP with a comprehensive view of
16 Bay Area water supply, demand, and potential vulnerabilities to drought conditions, TM2 outlines potential
17 regional drought response actions and mitigation measures.

18 DCP Objectives

19 The motivation for BARR is for partner agencies to cooperatively develop regional projects to strengthen
20 long-term water supply reliability and resilience, better leveraging water and infrastructure resources and
21 exploring new operations strategies. The DCP specifically addresses potential drought-related impacts.
22 Regional drought mitigation measures for sustained supply are augmented by near-term drought response
23 actions to manage limited supply and meet immediate needs. Though planning for catastrophic events is
24 also critical for ensuring the region's health, safety, and prosperity, emergency response staff from the BARR
25 agencies and other agencies are working directly with the Association of Bay Area Governments (ABAG) to
26 develop a complementary program that will identify emergency response procedures and actions (the
27 Regional Lifelines Council).

28 TM2 Elements

29 TM2 focuses primarily strategies to improve regional reliability and resilience—drought response actions and
30 drought mitigation measures—as well as an operational and administrative framework for implementation.

31 Drought Response Actions

32 Response actions are triggered during specific stages of drought to manage limited supplies and decrease
33 the severity of immediate impacts over short durations. As described in detail in TM1, each BARR agency
34 has its own unique set of drought response actions dictated by agency-specific conditions and documented
35 in Water Shortage Contingency Plans (WSCPs). The BARR agencies submit WSCPs with their Urban Water
36 Management Plans (UWMPs) every five years. Governor Brown's Executive Order (EO) in May 2016 and the
37 subsequent Water Use Efficiency framework released in draft form by the California Department of Water
38 Resources (DWR) and State Water Resources Control Board (State Board) in November 2016 would update
39 WSCP requirements to include "adequate actions to respond to droughts lasting at least five years" and to
40 remain "customized according to local conditions." Specifically, agencies would be required to submit
41 drought planning/projection information annually as well as once every five years with their UWMP update.

- 1 Beyond individual BARR agency drought response actions already being taken, the following two joint
 2 drought response actions show promise for implementation in the future:
- 3 • **Regional drought response communications:** Consistent regional messaging is key to effectively
 4 reaching the public regarding the need for water savings. BARR agencies would benefit from economies
 5 of scale by coordinating regional outreach campaigns building on effective local programs and/or
 6 leveraging models from other regions.
 - 7 • **Mobile water treatment facilities:** Short-term leases of mobile trailers with various treatment units could
 8 be used to treat saline surface water, groundwater, and/or recycled water in times of severe shortage.
 9 Significant logistical challenges would need to be explored, including mobilization and startup, as well as
 10 operation, maintenance, and any legal or environmental issues.

11 Drought Mitigation Measures

12 When collectively developing a list of drought mitigation measures to characterize and assess for the DCP,
 13 the BARR agencies focused on those that would benefit multiple agencies and are justifiably characterized
 14 as “regional in nature.” More specifically, given the objective of the BARR effort—to jointly advance a suite of
 15 projects uniquely enabled by this regional partnership effort—all BARR drought mitigation measures must
 16 increase regional water supply reliability during drought and engage two or more BARR agencies, as
 17 summarized in Table ES-1. The BARR agencies provided the Drought Task Force, an advisory stakeholder
 18 group, a preview of the measures for their review and input.

19 Many of the measures involve leveraging/expanding existing assets and/or potentially constructing new
 20 facilities—such as interties, storage, and treatment—which typically require thoughtful and often lengthy
 21 planning and implementation. In addition, the BARR agencies are exploring a few early-action measures to
 22 further exercise the partnership and produce tangible joint outcomes that can be implemented relatively
 23 quickly, including a regional water market program to facilitate voluntary exchanges and transfers and
 24 maximize efficient use of existing assets and resources.

25 The measures are each at various stages of planning. The assessment of the potential measures in this TM
 26 is based on current knowledge and planning objectives, which will evolve over time.

27 Rather than rank or prioritize, the BARR agencies consider the entire list of 15 measures viable possibilities
 28 depending on need and timing. In assessing the measures, the BARR agencies are applying several factors
 29 including benefits (e.g., yield, flexibility/sustainability, and timing), costs, implementability (during non-
 30 emergency conditions), and social and environmental considerations.

31

Table ES-1. BARR Drought Mitigation Measures

No.	Drought Mitigation Measure	Engaged BARR Agencies
Interties		
1	Transfer-Bethany Pipeline	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, and Zone 7
2	Zone 7-EBMUD Intertie	Zone 7 and EBMUD
3a	ACWD-SFPUC Intertie and Local Supply	ACWD, BAWSCA, and SFPUC
3b	ACWD-SFPUC Intertie and IPR	ACWD, BAWSCA, and SFPUC
4	West Side SFPUC-SCVWD Intertie	SFPUC, BAWSCA, and SCVWD
5	SFPUC-Zone 7 Intertie	SFPUC, BAWSCA, and Zone 7
6	MMWD-EBMUD Intertie	MMWD and EBMUD
Storage		
7	LV Expansion	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, and Zone 7

Table ES-1. BARR Drought Mitigation Measures

No.	Drought Mitigation Measure	Engaged BARR Agencies
Treatment/Supply		
8	Walnut Creek Water Treatment Plant Pretreatment Facility	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, and Zone 7 (to be confirmed)
9	Regional Desalination Plant	CCWD, EBMUD, SCVWD, SFPUC, and Zone 7
10	Silicon Valley Advanced Water Purification Center (SVAWPC) Expansion	SCVWD, SFPUC, and BAWSCA
11	Mid-Peninsula Potable Reuse Exploratory Plan (PREP)	SFPUC and BAWSCA
12	Joint Tri-Valley Potable Reuse Feasibility Study	Zone 7, EBMUD, and SFPUC
Operations		
13	Regional Advanced Metering Infrastructure (AMI) Feasibility Assessment	ACWD, CCWD, EBMUD, MMWD, and SCVWD
14	Del Valle Reservoir Water Supply Storage Expansion Project	ACWD, SCVWD, and Zone 7
15	Bay Area Regional Water Market (Exchanges/Transfers) Program	ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC, and Zone 7

1

2 Operational and Administrative Framework

3 Sharing water resources and facilities across the region will require new operational and administrative
4 mechanisms with a range of considerations, as listed below and detailed in this TM:

- 5 • **Institutional:** Transferring water and/or sharing infrastructure among users often requires new
6 institutional agreements to specify roles, responsibilities, and key implementation steps.
- 7 • **Operational:** To achieve regional water solutions, the BARR agencies may need to modify current
8 operations. For example, agencies may need to coordinate water quality monitoring and changes in
9 water treatment operations to address the transfer and blending of supplies, including water quality
10 effects such as taste and odor, treatability, or corrosion concerns.
- 11 • **Permitting and environmental documentation:** Implementation of drought mitigation measures would
12 require obtaining regulatory approvals and permits; coordinating with relevant governmental agency(ies)
13 issuing the needed permit(s) at federal, state, and/or local levels; and completing specific
14 environmental analysis/documentation as mandated by federal and state regulations.
- 15 • **Water rights:** Supply transfers often trigger needed modifications to water-rights permits to address
16 changes in points of diversion, place of use, and/or purpose of use. While specific operational and legal
17 limitations apply, two potential areas of flexibility show promise:
 - 18 – Conjunctive use of transferred supplies (transferring water to storage in non-dry years for use during
19 dry years) would improve water management.
 - 20 – Changes to points of diversion would allow exchanges of water between BARR agencies, especially
21 those that have local storage capability.
- 22 • **Funding:** Viable funding sources can expedite and facilitate implementation of mitigation measures or
23 drought response actions. Several state, federal, and local funding sources are currently available,
24 including grant and loan opportunities. Funding eligibility and other requirements, such as local cost-
25 share for grants and repayment terms for loans, are important considerations. In addition, grant funding
26 is competitive (thus, less certain to materialize). Alternative funding mechanisms, such as public-private
27 partnerships (P3s), are other pathways to consider.
- 28 • **Governance:** BARR agencies may further consider formation of a joint powers authority (JPA) in future
29 phases of work to exercise their powers as a single agency to accomplish specific common goals.

1 Next Steps

2 The BARR partnership holds tremendous potential to forge new regional approaches for reliable water supply
3 in the Bay Area. Together, the BARR agencies are pursuing measures and actions collaboratively that would
4 use existing infrastructure and water resources more fully to produce greater efficiencies and improved
5 water supply reliability for the area. Through this collaborative process, the BARR agencies now have a
6 regional platform for water management, one that enables joint measures and actions to meet Bay Area
7 water needs while also meeting individual agencies' site-specific needs.

8 Though the BARR agencies are not currently obligated to update the initial DCP, the agencies (or some
9 variation/subset) may produce future updates, modified drought mitigation measures, and/or response
10 actions.

11 In addition to this joint DCP, the BARR agencies also individually maintain UWMPs as living documents that
12 reflect long-term planning to ensure reliable, adequate water supplies for existing and future water
13 demands. UWMP data have traditionally been presented in various forms, to reflect agency-specific
14 conditions. In the future, BARR agencies may consider integrating some aspects of the DCP into their
15 UWMPs to enable greater consistency and to reflect the regional partnership.

16 As the State Board finalizes a new Water Use Efficiency framework, "Making Water Conservation a California
17 Way of Life" (State Board 2016), future Bay Area water demands may remain constant or decline. At the
18 same time, climate-change uncertainties and the potential for catastrophic events to threaten water supply
19 require that Bay Area water agencies take further actions to guard against these challenges and improve
20 reliability and resilience. The measures and actions laid out in this DCP better prepare BARR agencies for the
21 future. The BARR agencies or some subset expect to further advance plans, explore funding options, and
22 study feasibility for at least some of these measures in the near term. To facilitate exchanges/transfers
23 during future droughts, the BARR agencies are pursuing funding for the Bay Area Water Market Program. In
24 the coming years, the agencies may also update or expand this BARR DCP.

25 Beyond the measures considered here, BARR agencies are also currently pursuing other projects individually
26 or with agencies outside of the BARR construct to further improve Bay Area supply reliability. Taken together,
27 joint BARR and individual agency efforts are solidifying systems and resources to provide a sustainable,
28 reliable, high-quality water supply for a healthy community and vibrant economy in the Bay Area.

29

1 Section 1: Introduction

2 California has been facing extraordinary drought from 2012 through 2016. In 2015, the Sierra Nevada
3 Mountains had the lowest snowpack in recorded history and, as a result, the U.S. Drought Monitor classified
4 the Bay Area and most of California as experiencing “exceptional” drought conditions. Most Bay Area water
5 supply agencies rely on snowmelt in the Sierra Nevada Mountains for at least a portion of their supplies.
6 Below-normal local rainfall also affected local supplies. While hydrologic and supply conditions improved
7 significantly in most parts of the state during the 2016 water year, as of early March 2017, it remains to be
8 seen whether this change signals the end of the recent (and potentially ongoing) drought or whether dry
9 conditions will persist next year and beyond.

10 **Regional planning context:** The region’s previous drought planning efforts may need to be expanded given
11 potential climate-change impacts, uncertainty in future regulations, and projected increases in Bay Area
12 population and water demands. As the first installment of the Bay Area Regional Reliability (BARR) Drought
13 Contingency Plan (DCP), TM1—the work that preceded this document—provided a summary of the Bay Area
14 water systems, the BARR agencies’ current drought monitoring programs, and a vulnerability assessment.
15 TM2—this document—presents an evaluation of potential cooperative drought mitigation and response
16 actions identified by the BARR agencies with the overarching goal of improving water supply reliability for the
17 Bay Area.

18 The BARR DCP differs from past planning efforts because it integrates information from eight individual
19 water agencies and focuses on regional actions to benefit the Bay Area as a region. Specifically, the eight
20 agencies include Alameda County Water District (ACWD), Bay Area Water Supply and Conservation Agency
21 (BAWSCA), Contra Costa Water District (CCWD), East Bay Municipal Utility District (EBMUD), Marin Municipal
22 Water District (MMWD), San Francisco Public Utilities Commission (SFPUC), Santa Clara Valley Water District
23 (SCVWD), and Zone 7 Water Agency (Zone 7). Collectively, the BARR agencies serve more than six million
24 people.

25 Drought mitigation measures must account for potential climate change impacts and other water supply
26 uncertainties. While extensive scientific research has explored potential climate change impacts with
27 findings published in peer-reviewed technical literature, existing climate models predict a wide range of
28 potential water-resources effects. Nonetheless, given the potential for increased extreme climatic events
29 such as the unprecedented recent/ongoing drought, as well as infrastructure and regulatory risks, the BARR
30 agencies are evaluating several measures aimed at improving the region’s collective drought resilience.
31 Through this coordinated regional approach to drought contingency planning, the BARR agencies plan to
32 improve water supply reliability, leverage existing infrastructure investments, facilitate water transfers during
33 shortages, and improve climate-change resilience.

34 BARR is not a water supply master plan or a justification for growth or new supplies. Rather, the effort is
35 focused on combining/integrating existing assets to improve resilience for droughts (i.e., not demand
36 sensitive). A balance is needed in planning adequate supplies to meet demands without over-projecting and
37 constructing stranded assets. Demand projections, as summarized in TM1, reflect the outcome of BARR
38 agencies’ other planning documents. The agencies continually update demand forecasts and will reflect
39 lessons learned from the recent drought in updated projections.

40 The potential drought mitigation measures presented in this TM do not reflect all water supply reliability
41 projects that the BARR agencies are developing or considering. As further described in Section 4, additional
42 potential regional projects are being explored by BARR agencies as well as other Bay Area water and
43 wastewater agencies, such as a suite of Western Recycled Water Coalition projects. Many are similar in
44 nature to the BARR measures.

1 Though planning for catastrophic events is also critical for ensuring the region's health, safety, and
2 prosperity, emergency response staff from the BARR agencies and other agencies are working directly with
3 ABAG to develop a complementary program that will identify emergency response procedures and actions
4 (the Regional Lifelines Council).

5 **Role of water conservation/demand reductions:** For the purpose of this DCP, the BARR agencies
6 acknowledge the distinction between long-term water conservation (ongoing water use efficiency) and short-
7 term emergency water use reductions (temporary cutbacks) and the difference between actions to
8 appropriately support each. Water shortage conditions, such as the recent drought, can necessitate actions
9 to support short-term emergency water use cutbacks. However, extraordinary cutbacks are unsustainable
10 and can result in potential unintended consequences, such as long-term economic impacts (e.g., California
11 business climate and residential property values), utility revenue instability, water affordability issues,
12 disincentive for future capital investment to improve local reliability, compromised quality of life, as well as
13 other potential long-term impacts.

14 Water use over the past several years has been significantly reduced because of the recent drought, based
15 on policy changes and actions taken at both the state and local levels. Public awareness and actions during
16 the drought have resulted in lasting efficiencies (cultural changes and passive savings) and temporary
17 reductions (behavioral changes).

18 Long-term water use efficiency is a fundamental, core component of BARR agencies' water management.
19 The BARR agencies remain committed and will continue ongoing water conservation efforts, regardless of
20 hydrologic conditions. When properly designed and implemented, water use efficiency programs result in
21 sustainable potable demand offsets that support the economy, environment, and communities.

22 As the State Board finalizes a new Water Use Efficiency framework, "Making Water Conservation a California
23 Way of Life" (State Board 2016) and refines the framework over the next three to four years, future Bay Area
24 water demands may remain constant or decline.

1 Section 2: Regional Reliability Assessment

2 The motivation for BARR is to enable Bay Area agencies to develop long-term regional projects cooperatively
3 to mitigate potential drought-related impacts and build long-term water supply reliability and resilience. As a
4 guiding principle, all BARR drought mitigation measures engage two or more BARR agencies and provide
5 increased regional water supply reliability during droughts. The BARR agencies are applying several factors
6 in assessing the measures.

7 For the purpose of this DCP, drought strategies are defined in the following two distinct ways:

- 8 • **Drought response actions** are specific actions triggered during specific drought stages to manage the
9 limited supply and decrease the severity of immediate impacts (e.g., curtailing lawn watering). Drought
10 response actions use temporary, short-term infrastructure and activities that agencies and the public
11 can implement quickly and that provide expeditious benefits. Section 3 includes further discussion on
12 the drought response actions considered for BARR.
- 13 • **Drought mitigation measures** are actions, programs, and strategies implemented before drought to
14 address potential risks and reduce potential drought-related impacts when the event occurs. Many
15 drought mitigation measures considered for BARR involve leveraging/expanding existing assets and/or
16 potentially constructing new facilities—such as interties, storage, and treatment—which typically require
17 thoughtful and often lengthy planning and implementation. In addition, the BARR agencies are exploring
18 actions that can be implemented relatively quickly, including development of a regional water market
19 program to facilitate water exchanges/transfers. Potential BARR drought mitigation measures are
20 described in more detail in Section 4.

21 The framework for assessing potential drought mitigation measures is described further throughout this
22 section.

23 2.1 Overview

24 The assessment and presentation of these drought mitigation measures is not intended to result in
25 prioritization or ranking. Rather, the objective is to profile the measures being considered and assess them
26 individually.

27 2.2 Assessment Factors

28 To characterize the drought mitigation measures, the BARR agencies and project team developed four
29 categories of assessment factors—benefits, costs, implementability, and social and environmental
30 considerations. Table 1 below summarizes the assessment factors by category. As stated above, these
31 factors do not reflect a grading and ranking of the measures relative to each other; rather, these factors are
32 used to characterize some of the key strengths and challenges of each potential measure.

33

Table 1. BARR Drought Mitigation Measure Assessment Factors

Assessment Factors	Definitions
Benefits: • Water supply yield and availability • Regional resilience • Efficiency • Flexibility/sustainability • Water quality considerations	The positive impacts and attributes of a measure with respect to the following factors: • The ability of the measure to address vulnerabilities (as identified in BARR TM1), and the amount of water made available under various hydrologic conditions (wet, normal, and dry years), supply storage for multi-year droughts, and emergency supply (AFY). Note that yield does not necessarily represent a new water supply source to the region. • Improvement of supply reliability for two or more agencies through diversification of supply portfolios and/or expansion of local sources to improve regional self-reliance and prevent economic loss (from a qualitative perspective). • Increased efficiency in use of existing assets, facilities, and resources. • Ease of adaptation to changes in physical or statutory conditions (e.g., climate change, catastrophic events, population or economic growth, regulatory changes). • Potential to change water quality, including improvements, degradation, treatment compatibility, and/or stability. • Fit-for-purpose water, as a function of water quality.
Costs: • Capital costs • O&M costs	The financial costs associated with a measure, including the following assessment factors: • Estimated total capital cost and unit cost of water supply developed (\$/AF yield). Capital costs typically include planning, permitting, public outreach, engineering, legal and administrative, and construction costs, but as the BARR agencies developed the cited measure costs on a case-by-case basis, the exact details of the approach to each cost estimate varies somewhat. • Annual cost to operate and maintain a measure may be presented qualitatively as a range of costs, low ($\leq \\$300/\text{AF}$), moderate ($\\$300 - \\$700/\text{AF}$), or high ($> \\$700/\text{AF}$), to reflect uncertainty or changes in conditions. • Anticipated annualized rehabilitation and replacement costs, which may be presented qualitatively as a range of costs.
Implementability and timing	The ability to take a measure from concept to execution during non-emergency conditions. Implementability considers the following factors: local control, regulatory/permitting requirements, institutional needs, water rights, hydraulic constraints, water quality compatibility, constructability, and funding. The potential for a measure to be advanced in the near-term to address pending needs or longer-term efforts.
Social and environmental considerations	The effects of a measure on the community, economy, and environment, potential impacts (positive or negative) on disadvantaged communities (DACs), energy, instream flows, and the acceptability of the measure to customers/ratepayers and local interest groups.

1 AF = acre-foot.

2 O&M = operations and maintenance.

3

1 Section 3: Drought Response Actions

2 Drought response actions are near-term actions triggered during specific stages of drought to manage the
3 limited supply and decrease the severity of immediate impacts from drought. As described in detail in TM1,
4 each BARR agency has its own unique set of drought response actions.

5 State law requires retail and wholesale urban water suppliers to adopt and submit an Urban Water
6 Management Plan (UWMP) every five years to the California Department of Water Resources (DWR). As part
7 of UWMP development, urban water suppliers prepare Water Shortage Contingency Plans (WSCPs) that
8 document the individual agency's drought response plan. While state law requires WSCPs to contain certain
9 elements, agencies may tailor the plans as appropriate to their local characteristics.

10 In May 2016, Governor Brown issued an Executive Order (EO) that directed state agencies to "strengthen
11 local drought resilience," among several other actions. The EO specifically calls for updating WSCP
12 requirements to include "adequate actions to respond to droughts lasting at least five years" and to remain
13 "customized according to local conditions." DWR and the State Board released a public draft report in
14 November 2016 describing a proposed framework for implementing actions in response to the Governor's
15 EO directives. The framework proposes new requirements for water agencies to submit specific drought
16 planning/projection information at two different frequencies as follows:

- 17 • **Each year**, agencies will submit an Annual Water Budget Forecast (projecting supplies and demands
18 based on current conditions and an additional dry year), Shortage Response Actions (SRAs) tied to
19 specific water shortage levels, and protocols for implementing drought response actions (e.g.,
20 communication plan, customer compliance/enforcement, implementation authorities, financial plan for
21 drought condition, and monitoring/reporting).
- 22 • **Every five years**, as part of their updated UWMPs, agencies will submit updated WSCPs that include a
23 five-year drought risk assessment that examines shortage risks for the next five or more consecutive
24 years, based on historical drought hydrology, plausible climate and regulatory changes, and demand
25 projections.

26 In addition to the individual BARR agencies' drought response plans and water shortage response actions,
27 the following two drought response actions show promise for potential regional implementation:

- 28 • **Regional drought response communications:** Consistent regional messaging is key to effectively
29 reaching the public regarding the need for water savings. Given the Bay Area's dense population,
30 conflicting, inconsistent messages from individual water agencies can confuse and mislead the public.
31 BARR agencies can benefit from an economy of scale by coordinating an expanded regional outreach
32 campaign (e.g., press releases; media; and public service announcements on television, radio, and
33 billboards) across the Bay Area to provide consistent messaging to the public. Such a regional
34 communications program could leverage successful large-scale outreach campaign examples from
35 places such as Australia and/or build on effective local programs.
- 36 • **Mobile water treatment facility:** Use of mobile treatment units would enhance the BARR agencies'
37 ability to provide drinking water during drought or other emergencies. This would protect health and
38 safety and improve economic resilience and quality of life during emergency conditions. The concept
39 involves leasing mobile trailers containing microfiltration pretreatment units and reverse osmosis filters
40 to treat saline surface water, groundwater, and/or recycled water. BARR agencies would deploy the units
41 in Bay Area locations experiencing severe water shortage (because of drought or a catastrophic event),
42 as long as power and appropriate waste disposal are available.

43 Mobile package water treatment plants are commonly used by the military and emergency relief
44 organizations where access to a local high-quality potable water supply is limited or absent. Off-the-shelf
45 packages are also available to provide water treatment in small developments isolated from centralized

1 water treatment and distribution systems. These package plants can offer both conventional treatment
2 and advanced treatment systems, like reverse osmosis.

3 Significant logistical challenges would need to be addressed by participating agencies, and
4 implementation is expected to be challenging. Studies to date have not identified potential sites well-
5 suited for the units. Institutional, environmental, permitting, and engineering challenges will need to be
6 overcome. Developing and permitting use scenarios, conducting environmental analysis, working with
7 local agencies, designing and engineering built-in flexibility to operate under various use scenarios,
8 construction, and startup will all pose challenges. Appropriate waste disposal would be needed to avoid
9 environmental impacts. Energy needs of such units are anticipated to be high.

10 Though planning for catastrophic events is also critical for ensuring the region's health, safety, and
11 prosperity, emergency response staff from the BARR agencies and other agencies are working directly with
12 ABAG to develop a complementary program that will identify emergency response procedures and actions
13 (the Regional Lifelines Council).
14

1 Section 4: Drought Mitigation Measures

2 When collectively developing a list of drought mitigation measures to characterize and assess for the DCP,
3 the BARR agencies focused on those that would benefit multiple agencies and are justifiably characterized
4 as “regional in nature.” More specifically, given the objective of the BARR effort—to jointly advance a suite of
5 projects uniquely enabled by this regional partnership effort—all BARR drought mitigation measures must
6 increase regional water supply reliability during drought and engage two or more BARR agencies.

7 The measures are each at various stages of planning. The assessment of the potential measures in this TM
8 is based on current knowledge and planning objectives, which will evolve over time.

9 4.1 Overview of Potential BARR Drought Mitigation Measures

10 For this TM, each of the 15 potential BARR drought mitigation measures falls into one of the following four
11 categories:

- 12 • **Interties:** construction of new physical pipeline connections between agencies that would allow transfer
13 of water supply between and among BARR agencies
- 14 • **Storage:** construction of new water storage capacity in existing reservoirs (i.e., no new surface water
15 reservoirs)
- 16 • **Treatment/supply:** creation of access to additional water supplies that leverages existing water supply
17 sources, create new sources of supply (e.g., through indirect potable reuse [IPR]), and/or improves
18 treatment capacity in existing plants to treat new, more challenging local water supplies
- 19 • **Operations:** changes in water management practices that do not require new infrastructure (e.g.,
20 alternative storage locations)

21 Each of the potential measures feature shared benefits for multiple BARR agencies and, wherever possible,
22 make use of existing resources, facilities, and infrastructure to reduce both the overall cost and the
23 environmental footprint of the measure, as summarized in Table 2. The measures are each further
24 described in individual profiles in Attachment A. The profiles characterize the measures in context of the
25 assessment factors described in Section 2 and reflect currently available information from existing
26 resources (e.g., technical studies/plans and funding applications).

27 Figure 1 presents the geographic coverage areas of the eight BARR agencies and highlights some key
28 existing water infrastructure, as well as the general location of the potential measures.

29 4.2 Other Projects

30 The potential drought mitigation measures presented in this TM do not reflect all water supply reliability
31 projects that the BARR agencies are developing or considering. Attachment B describes some additional
32 potential regional projects including some being explored by BARR agencies as well as other Bay Area water
33 and wastewater agencies, such as a suite of Western Recycled Water Coalition projects. Many are similar in
34 nature to the BARR measures, as they involve expanding groundwater recharge (i.e., using IPR and/or
35 surface water), adding wells to increase production capacity for use during drought and emergencies,
36 expanding stormwater capture, expanding non-potable reuse, and implementing direct potable reuse (DPR).
37 While each project described in Attachment B provides unique value, many benefit only one BARR agency or
38 multiple agencies that are not members of the BARR partnership. As a result, the list of projects in
39 Appendix B are considered complementary to BARR’s efforts, as they collectively build increased regional
40 reliability and water use efficiency within the Bay Area.

41

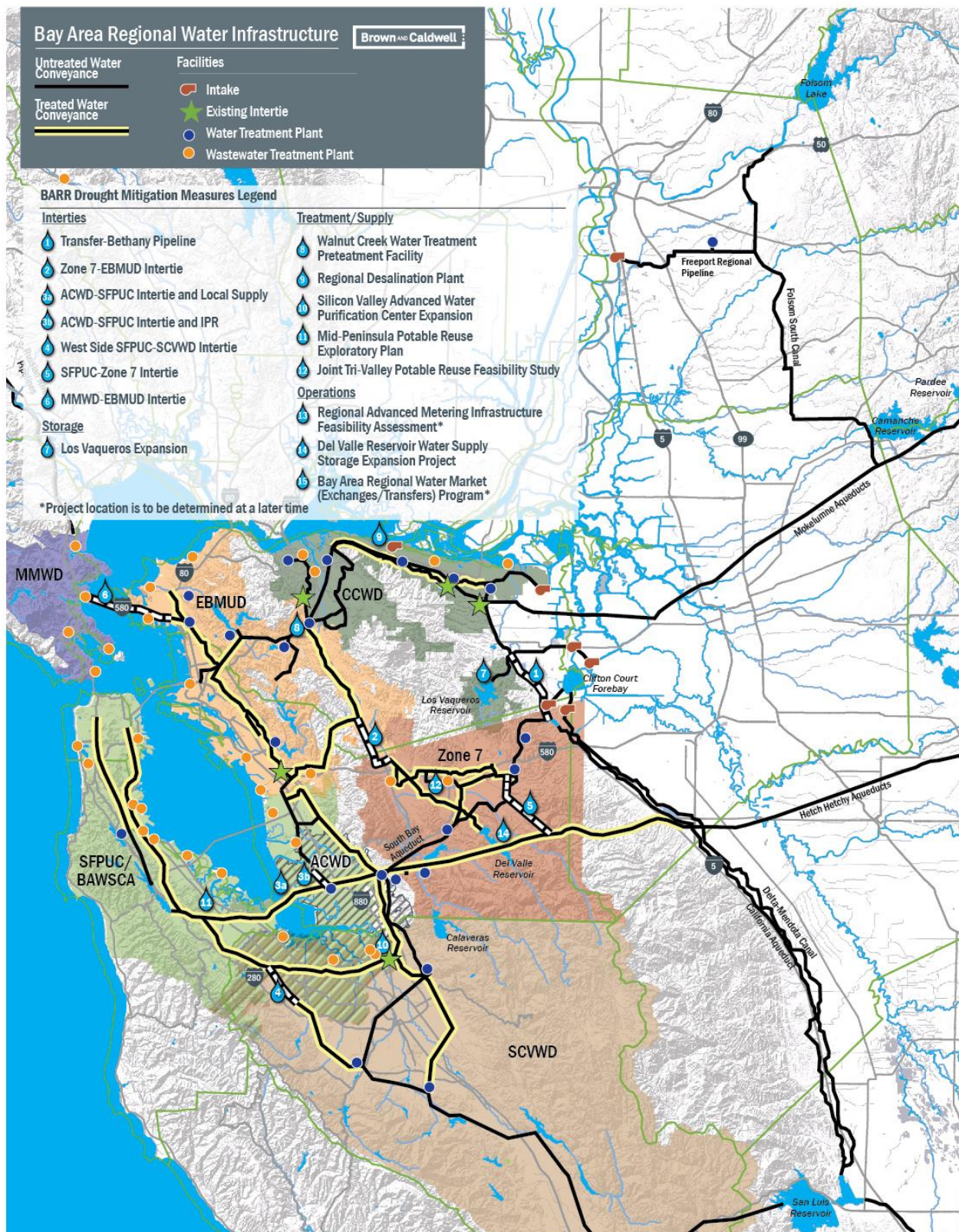


Figure 1. Existing Bay Area Regional Water Systems and Potential Drought Mitigation Measures

1

Table 2. Overview of BARR Drought Mitigation Measure Characteristics									
No.	Drought Mitigation Measure	Engaged BARR Agencies	Description	Cost ^a	Availability and Yield of Water (AFY)	Status	Implementability	Timing	Social & Environmental Considerations
Interties									
1	Transfer-Bethany Pipeline	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, and Zone 7	Connects LV Reservoir, CCWD's intakes, and EBMUD's intakes to the Bethany Reservoir and enable water conveyance to the South Bay Aqueduct (SBA) using a new pipeline around the east side of Mt. Diablo.	Capital: \$200 million* O&M: TBD (likely moderate) *Not including costs of related measures (LV Expansion and WCWTP Pretreatment Facility)	217,000 AFY capacity in all water year types; actual yield would depend on system operations	Preliminary design	Draft supplemental EIR/EIS due in summer of 2017. Modification of water rights may be required to share water among potential partners. New easements are required for construction.	Construction could start as early as 2020	Benefits Delta fisheries through state-of-the-art fish screens and increased operational flexibility. Presents potential partnership opportunity with Central Valley wildlife refuges (south of the Delta), due to resulting ecosystem benefits.
2	Zone 7-EBMUD Intertie	Zone 7 and EBMUD	Connects EBMUD's water delivery system to Zone 7's, providing potential water sharing during emergencies and transfer/exchange opportunities.	Capital: \$43 million O&M: TBD (likely low from EBMUD to Zone 7 and likely moderate from Zone 7 to EBMUD, because of pumping costs)	11,200 to 28,000 AFY (10 to 25 mgd), depending on the need and water availability Wet/normal year yield may be limited by EBMUD's wheeling transmission capacity of approximately 10 mgd. More transmission capacity may be available during dry years and emergencies.	Conceptual	Permits and traffic control plans would be needed to construct the intertie pipeline.	CEQA review could be completed in one year. Full implementation could be completed within four to five years.	Requires mitigation of environmental impacts and community impacts (e.g., disruptive traffic conditions).
3a	ACWD-SFPUC Intertie and Local Supply	ACWD, BAWSCA, and SFPUC	Connects ACWD's Newark Brackish Groundwater Desalination Facility (NDF) with SFPUC's Bay Division Pipeline to provide emergency supplies and water transfer opportunities. NOTE: Measure 3b is a variation of Measure 3a. If Measure 3b were constructed, all elements of Measure 3a would be included.	Capital: \$7.7 million O&M: TBD (likely moderate)	Up to 5,600 AFY (to be stored) in normal and wet years	Conceptual	Permits would be needed to construct the intertie pipeline. An operating plan and booster pump station would be needed to address the differential in the ACWD and SFPUC systems' operating pressures.	Implementable within two to five years	Provides environmental benefits by reducing demand on surface water supplies within ACWD's service area. Warrants outreach and communications with customers regarding modifying water supply.
3b	ACWD-SFPUC Intertie and IPR	ACWD, BAWSCA, and SFPUC	Produces purified local wastewater effluent to recharge the Niles Cone Groundwater Basin as a new source of supply. Measure 3b is a variation and extension of Measure 3a and includes all elements of Measure 3a, as well as IPR. IPR capacity could range from 4 mgd up to 15 mgd depending upon future demands, distribution system modifications, and facility sizing.	Capital: \$93 million to \$500 million O&M: TBD (likely high)	4,480 to 17,000 AFY in dry years 10,000 to 22,600 AFY in normal and wet years	Conceptual	Permits would be needed to construct the intertie pipeline. An operating plan and booster pump station would be needed to address the differential in the ACWD and SFPUC systems' operating pressures. Additional limnological studies would be needed to evaluate the effect of advanced treated water for IPR into Quarry Lakes, a park facility with recreational and human contact (e.g., swimming and fishing) beneficial uses.	Implementable within five to ten years	Provides environmental benefits by reducing demand on surface water supplies within ACWD's service area. Warrants outreach and communications with customers regarding modifying water supply and adding advanced treated water to Quarry Lakes.
4	West Side SFPUC-SCVWD Intertie	SFPUC, BAWSCA, and SCVWD	Adds a second intertie between SFPUC and SCVWD, providing potential water sharing during emergencies and transfer/exchange opportunities, including potable reuse opportunities.	Capital: \$150 million O&M: TBD (likely moderate)	Up to 55,000 AFY capacity in normal and wet years	Conceptual	Permits would be needed to construct the intertie pipeline	Implementable within seven to nine years	Requires mitigation of environmental impacts and community impacts (e.g., disruptive traffic conditions). Any additions or modifications to water supply would involve outreach and communications with customers.

Table 2. Overview of BARR Drought Mitigation Measure Characteristics									
No.	Drought Mitigation Measure	Engaged BARR Agencies	Description	Cost ^a	Availability and Yield of Water (AFY)	Status	Implementability	Timing	Social & Environmental Considerations
5	SFPUC-Zone 7 Intertie	SFPUC, BAWSCA, and Zone 7	Connects SFPUC’s and Zone 7’s water delivery systems, providing potential water sharing during emergencies and transfer/exchange opportunities.	Capital: \$66 million O&M: TBD (low from SFPUC to Zone 7; medium from Zone 7 to SFPUC, because of pumping costs)	11,200 to 28,000 AFY (10 to 25 mgd), depending on the need and water availability, in all water year types	Conceptual	Permits would be needed to construct the intertie pipeline. Some construction in a highly urbanized area can be challenging and disruptive.	CEQA review could be completed in one year. Full implementation could be completed within four to five years.	Requires mitigation of environmental impacts and community impacts (e.g., disruptive traffic conditions).
6	MMWD-EBMUD Intertie	MMWD and EBMUD	Connects EBMUD’s and MMWD’s water delivery systems either with a pipeline across the Richmond-San Rafael Bridge or across the Bay’s bottom, providing potential water sharing and transfer opportunities.	Capital: \$45 million O&M: \$100/AF (low)	5,600 to 10,000 AFY capacity in all water year types	Conceptual	Pipeline construction in an urban area would necessitate CEQA compliance; coordination with many jurisdictions, property owners, and permitting agencies; permits; an agreement with Caltrans for access and use of to the Richmond-San Rafael Bridge; and traffic control plans. Water rights modifications may be needed. Construction across the bridge could be challenging and disruptive to traffic flow.	Implementable within three to five years	Requires mitigation of environmental impacts and community impacts (e.g., disruptive traffic conditions).
Storage									
7	LV Expansion	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, and Zone 7	Expands reservoir capacity and connect to the Transfer-Bethany Pipeline. Measures 1 and 8 are companion measures to the LV Expansion.	Capital: \$600 million* O&M: TBD (likely low) *Not including costs of related measures (Transfer-Bethany and WCWTP Pretreatment Facility)	115,000 AF (expansion of existing 160,000 AF capacity reservoir to 275,000 AF capacity) in all water year types	Preliminary design	Draft supplemental EIR/EIS due in summer of 2017. Modification of water rights may be required to share water among potential partners.	Initial CEQA review is complete; supplemental CEQA review is expected in 2017. Construction could start as early as 2022.	Benefits Delta fisheries with state-of-the-art fish screens and increased operational flexibility. Inundates additional areas in the watershed and may affect terrestrial habitat and cultural resources.
Treatment/Supply									
8	Walnut Creek Water Treatment Plant (WCWTP) Pretreatment Facility	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, and Zone 7 (to be confirmed)	Allows EBMUD to treat water from the Sacramento River, LV Reservoir, and other sources, enabling EBMUD to deliver supplies to neighboring water agencies. Measures 1 and 7 are companion measures to the WCWTP Pretreatment Facility.	Capital: \$35-60 million* (depending on scale of capacity) O&M: TBD (likely moderate) *Not including costs of related measures (Transfer-Bethany and LV Expansion)	128,800 AFY in normal and dry years WCWTP capacity: 115 mgd. Pretreatment facility must match treatment plant, aqueduct, and wheeling capacity.	Preliminary design	The pretreatment facility is feasible from a constructability standpoint. However, community involvement and outreach for the project would be required.	Conceptual plans, CEQA, land acquisition are done; detailed design and construction may take up to three years	Improves EBMUD’s ability to provide high-quality drinking water during droughts, emergencies, and planned and unplanned shortages. Reduces energy use and greenhouse gases produced to treat supplemental drought supply. No significant environmental effects are anticipated.
9	Regional Desalination Plant	CCWD, EBMUD, SCVWD, SFPUC, and Zone 7	Provides a new water supply source for the region; install a 20 mgd brackish water treatment plant at CCWD’s Mallard Slough Pump Station.	Capital: \$175 million O&M: \$300–\$390/AF (moderate)	22,400 AFY treated water in all water year types (28,000 AFY diverted to the intake; ~80% recovery)	Preliminary design	Environmental review has not been completed. In the past, similar desalination projects in the region have lacked public support or received strong public opposition. Conveying new supplies and transferring/exchanging supplies may be challenging and require new agreements and additional infrastructure. Water rights modifications would be required to share water among partner agencies. During critically dry water years, operations would need to be coordinated with CVP/SWP and the City of Antioch to avoid potential impacts.	Feasibility study, pilot testing, and Delta modeling have been conducted. Environmental review is needed. The plant could be constructed by 2030.	Lacks public support/faces public opposition regarding potential impacts to fisheries, increased energy consumption, increased greenhouse gas emissions. Potential impacts on fisheries could be reduced or avoided through operational best practices and facility design. Recent advances in treatment technologies may also decrease energy usage.
10	Silicon Valley Advanced Water Purification Center (SVAWPC) Expansion	SCVWD, SFPUC, and BAWSCA	Expands the existing SVAWPC to provide purified water directly to regional partners or indirectly through banking/exchanges/transfers.	Capital: \$600 million O&M: \$700/AF (high)	Up to 25,000 AFY in all water year types	Preliminary design – SVAWPC Expansion); Planning – regional partnerships	Challenges include managing reverse osmosis concentrate; fully utilizing purified water during low-demand periods; and determining the allocation of wastewater flows between potable reuse, non-potable reuse, and outflows to the Bay. Close coordination and collaboration with the City of San Jose on securing source water and managing reverse osmosis concentrate management/disposal.	Implementable within five to ten years (estimated)	Improves supply reliability which protects and benefits health and safety, customers’ quality of life local agriculture, and many Silicon Valley businesses that contribute significantly to the economic health of the Bay Area. Requires CEQA review and engineering controls to mitigate increased salinity concentrate disposal that could increase receiving water salinity.

Table 2. Overview of BARR Drought Mitigation Measure Characteristics									
No.	Drought Mitigation Measure	Engaged BARR Agencies	Description	Cost ^a	Availability and Yield of Water (AFY)	Status	Implementability	Timing	Social & Environmental Considerations
11	Mid-Peninsula Potable Reuse Exploratory Plan (PREP)	SFPUC and BAWSCA	Develops an IPR partnership for the mid-peninsula region.	Capital: TBD O&M: TBD (likely high)	Up to 6,720 AFY (6 mgd) in all water year types	Planning	The initial feasibility study will identify implementation challenges. Interagency agreements would be required to share water among partner agencies. The project may require a wastewater change petition, as well as significant permitting and CEQA review.	An initial feasibility study is currently underway and will be complete in mid-2017.	Improves supply reliability which protects and benefits health and safety, customers' quality of life, and many Silicon Valley businesses that contribute significantly to the economic health of the Bay Area. Concentrate disposal could increase salinity in receiving waters and would have an environmental impact (which may be positive). Rigorous analysis would be needed to select the best disposal option(s).
12	Joint Tri-Valley Potable Reuse Feasibility Study	Zone 7, EBMUD, and SFPUC	Explores a potential potable reuse partnership for the Tri-Valley (Amador Valley, Livermore Valley and San Ramon Valley) region.	Capital: \$76M - \$152M O&M: \$3M to \$6M/year (high)	4,800 to 7,700 AFY in all water year types	Planning	The initial feasibility study will identify implementation challenges. Interagency agreements would be required to share water among partner agencies. The project may require a wastewater change petition, as well as significant permitting and CEQA review. Local control of this water supply would likely be a motivating factor and implementation driver.	An initial feasibility study is currently underway and will be complete in mid-2017.	Improves supply reliability which protects and benefits health and safety, customers' quality of life, local agriculture, and many Silicon Valley businesses that contribute significantly to the economic health of the Bay Area. Concentrate disposal could increase salinity in receiving waters and would have an environmental impact (which may be positive). Rigorous analysis would be needed to select the best disposal option(s). Effective public communication and education will be needed to address any public concerns over the safety of potable reuse.
Operations									
13	Regional Advanced Metering Infrastructure (AMI) Feasibility Assessment	ACWD, CCWD, EBMUD, MMWD, and SCVWD	Assesses the feasibility for potential regional AMI expansion.	Capital: \$250/meter installed (\$250 million for 1 million meters) O&M: moderate	0.07 AFY/meter installed, in all water year types (70,000 AF for one million meters)	Planning	Based on the results of existing AMI programs, the most significant concern of AMI implementation is related to cost. AMI meter installation may be phased over time.	The regional feasibility assessment is currently conceptual, though some agencies are further along in planning or implementing AMI.	Requires significant customer outreach to garner support for implementation. Increased accuracy of water use data can improve billing equity among ratepayers and support collection of fees for all water used, eventually providing dividends that delay the need for water rate increases. Improves customer understanding of where and how they can use water more efficiently to reduce demand on surface water and groundwater supplies.
14	Del Valle Reservoir Water Supply Storage Expansion Project	ACWD, SCVWD, and Zone 7	Modernizes the flood management rules to use a greater portion of existing reservoir capacity to capture additional local supply and store additional emergency water supply while maintaining necessary flood protection. Implements Forecast Informed Reservoir Operation (FIRO) and uses modeling, forecasting tools, and improved information to improve flood-control and water supply operations.	Capital: \$150 million (Study under way) O&M: TBD (likely low, studies under way)	Up to 35,000 AFY (additional storage) in normal and dry years	Conceptual	The SBA Contractors are currently seeking state funding for this project, as well as evaluating the feasibility of modernizing flood rules, expanding emergency storage, and replacing/relocating EBRPD facilities (which may be costly). Federal, state, and local review and permits would be required, and additional project constraints may be identified during that process that could affect implementation feasibility.	The project could be implemented within five years.	Benefits the environment by improving the operational flexibility of the SWP in managing pumping from the south Delta to minimize fish entrainment and meet water quality and flow objectives. Increases the area available for enhanced recreational opportunities, replaces EBRPD facilities, and improves water quality. Requires public support and cooperation from EBRPD to update recreational facilities.
15	Bay Area Regional Water Market (Exchanges/Transfers) Program	ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC, and Zone 7	Establishes a program for short-term interagency exchanges/transfers (specific TBD) to enable long-term resilience and flexibility for emergency conditions or events. Develops a tool (a "roadmap document") to enable future water exchanges and transfers by leveraging best practices based on the short-term interagency transactions completed as part of this effort.	TBD (depends on exchange/transfer scenario; at least \$1.6 million to convey and store 3,000 AF of transferred supply in LV)	One-time exchange of water (at least 3,000 AF)	Planning	Implementation challenges would be specific to the agencies, facilities, and water sources involved in the transfer/exchange. Most would involve filing for a short-term transfer with the State Board, modifying water rights, securing additional permits, determining restrictions, and seeking approvals by agencies at federal, state, and/or local levels. Participating agencies would resolve technical challenges (water quality, treatment, intertie operations) before conducting this one-time demonstration test.	Depends on exchange/transfer scenario. Anticipated to be short-term and implementable between one to three years.	Leverages existing resources, supplies, and assets, thereby lowering their environmental burden. Facilitates development of a regional exchange project to improve dry-year supply resilience, which improves economic security and quality of life for the Bay Area.

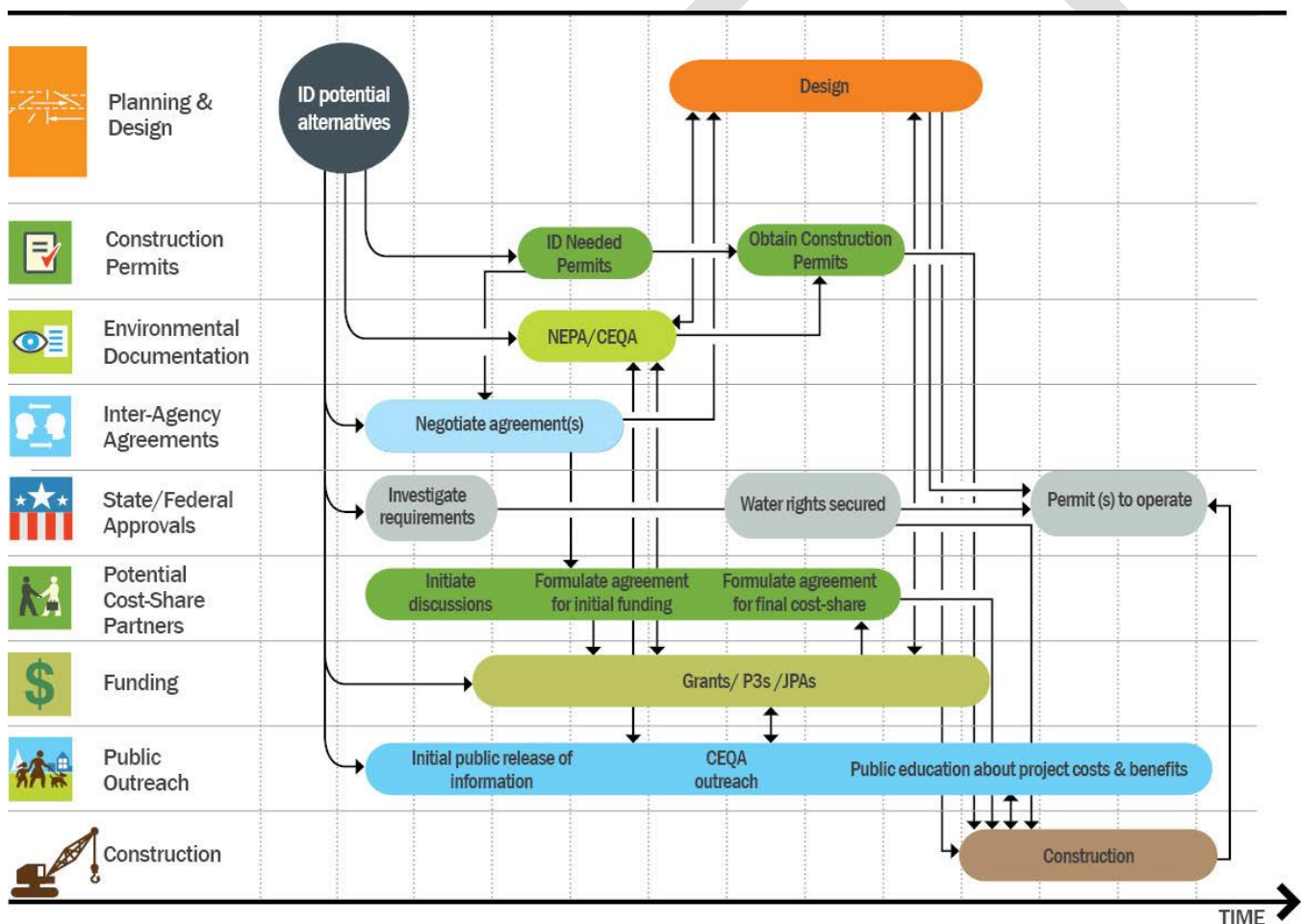
1 a. Capital costs are listed in millions of dollars. Operations and maintenance (O&M) costs are estimated as low (≤\$300/AF), moderate (\$300–\$700/AF), or high (>\$700/AF).

1 Section 5: Operational and Administrative Framework

2 Given that most BARR drought mitigation measures involve using BARR agencies' collective assets and
3 resources, an operational and administrative framework is critical for supporting implementation. Numerous
4 implementation steps are needed to progress implementation of a drought mitigation measure from
5 planning/design to construction during non-emergency conditions, including actions related to permits,
6 environmental evaluation/ documentation, partnerships (interagency agreements/cost sharing),
7 state/federal approvals, funding, and public outreach.

8 As shown in Figure 2, key implementation steps are interrelated. Timely and successful implementation
9 requires deliberate, thoughtful planning and ongoing coordination among project partners and with
10 regulating agencies.

11



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Figure 2. Critical-Path Actions for Potential BARR Drought Mitigation Measures Implementation

15 Components of the operational and administrative framework that support implementing drought mitigation
16 measures and sharing BARR agencies' collective assets and resources involve a range of considerations,
17 including institutional, governance, operations, water rights, and funding.

1

2 **5.1 Institutional Considerations**

3 Similar to most projects involving water transfer and/or shared infrastructure, the BARR agencies executed a
4 Memorandum of Agreement (MOA) in September 2015 to specify roles, responsibilities, and key
5 implementation steps for their partnership. The MOA acknowledges that each BARR agency owns and
6 operates independent water systems, and that integrated use of capacity in existing infrastructure and new
7 interconnections or facilities may provide water supply reliability and/or water quality benefits to multiple
8 BARR agencies or other regional partners.

9 The BARR agencies approved a set of principles related to their partnership, including:

- 10 • The BARR agencies will participate in the evaluation of near- and long-term joint water supply reliability
11 projects including, but not limited to, use of capacity of existing facilities; changes to infrastructure
12 including new interconnections, recycled water, water conservation, expanded treatment, regional
13 desalination, and water transfers and exchanges; and development of other projects or institutional
14 arrangements that encourage a regional approach to achieving water supply reliability in the Bay Area.
- 15 • The BARR agencies will conduct BARR activities in an inclusive manner that encourages voluntary
16 participation by BARR agencies as well as other interested persons or organizations.
- 17 • A specific project or activity does not have to involve all BARR agencies, but it is expected that each
18 agency will endeavor to communicate planning efforts initiated by two or more BARR agencies to
19 improve water supply reliability including water transfers, wheeling agreements, interties, and additional
20 water supply infrastructure improvements.
- 21 • Partnerships are expected to result in betterment for the public served by the agencies involved and to
22 be conducted in a manner that does not adversely affect any of the BARR agencies. The BARR agencies
23 will not undertake Bay Area regional projects or activities that may impact the conditions within the
24 service area of another agency without first obtaining that agency's approval.
- 25 • The BARR agencies will strive to achieve equitable cost and risk sharing for future projects or concepts
26 commensurate with the benefits to be received.
- 27 • The BARR agencies agree to provide transparency with regard to costs and the expectation is that actual
28 costs will be used in determining reimbursements unless another acceptable arrangement is
29 determined by the participants.
- 30 • To the extent to which a partnership relies on regional, state, or federal grant money to evaluate regional
31 reliability, the grant recipients will work with the BARR agencies to balance priorities for regional
32 reliability against other individual agency priorities.
- 33 • The BARR agencies agree to coordinate prior to characterization and evaluation of facilities, water rights,
34 or water contracts owned by another agency.
- 35 • The BARR agencies undertaking specific projects identified through the BARR partnership will cooperate
36 in and, to the extent applicable, facilitate, efforts to obtain regulatory approvals necessary to conduct
37 demonstration and full-scale projects.

38 The MOA specifies the following general responsibilities of all BARR agencies:

- 39 • Continue working cooperatively to develop the BARR studies (i.e., the DCP and Feasibility Study).
- 40 • Work with the BARR team in conducting the BARR studies.
- 41 • Share relevant engineering, permitting, regulatory, and operational information regarding their own
42 facilities and permits with other BARR agencies for the benefit of the studies.

- 1 • Provide access to facilities and operational data that may be needed for the BARR studies (such as
- 2 intakes, aqueducts and pumping plants, treatment plants, interties, etc.). If needed, conduct necessary
- 3 analysis of their own facilities, permits, operational data, procedures or requirements, or any other data
- 4 that are needed by the BARR studies and share the information with other BARR agencies. Access to
- 5 facilities will be consistent with, and will follow, the facility owner's standard safety and notification
- 6 requirements.
- 7 • Provide engineering oversight and review of BARR studies' work products.
- 8 • Conduct general work that is needed to advance the BARR studies. These efforts may include state and
- 9 federal grant applications, website update, and outreach.

10 The MOA is an ongoing, long-term agreement among the agencies. However, as described in the MOA, a
11 subset of agencies may advance some BARR measures through a separate, parallel process (particularly if a
12 measure does not directly benefit all BARR agencies). Taken together, joint BARR partnership and individual
13 agency efforts are connecting systems and resources to provide sustainable, reliable, high-quality water
14 supply for a healthy community and vibrant economy in the Bay Area.

15 **5.2 Operational Considerations**

16 In addition to institutional agreements that establish roles and responsibilities, BARR agencies must
17 consider the effects of regional drought mitigation measures on system operations, such as water quality,
18 conveyance, and distribution. The BARR agencies will need to develop coordinated operations plans for
19 individual measures that are implemented among two or more partners. Elements of operations plans may
20 include:

- 21 • Water quality monitoring and evaluation
- 22 • Public notification of changes in water blends (particularly to address taste and odor concerns)
- 23 • Pressure differentials between interconnected systems
- 24 • Water delivery timing
- 25 • Guidelines regarding how systems can, and cannot, be operated

26 BARR agencies will also coordinate with relevant federal/state agencies (e.g., Reclamation, State Board,
27 DWR) and local agencies whose facilities are involved in potential BARR measures to ensure their respective
28 operations are not affected.

29 **5.3 Permitting and Environmental Documentation**

30 Implementation of projects like most BARR drought mitigation measures requires obtaining regulatory
31 approvals and permits and coordinating with relevant governmental agency(ies) issuing the needed permit(s)
32 at federal, state, and/or local levels. In addition, specific environmental analysis/documentation are
33 required, as mandated by federal and state regulations.

34 The specific permits and environmental analysis required vary depending on the nature and details of
35 individual projects. Because the measures are each at various stages of planning, permitting and
36 environmental requirements are more clearly defined for some measures than others. Based on currently
37 available information, potential permitting and environmental requirements are summarized in Table 3.

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Table 3. Initial Assessment of Potential Permitting and Environmental Documentation Needs for BARR Drought Mitigation Measures ^a																					
No.	Drought Mitigation Measures	Federal					Federal/ State	State												Local	
		NMFS (ESA)	USACE (Section 404)	US Coast Guard (fisheries)	USFWS (EA compliance)	Western Power Administration (transmission and open access)	NEPA ^a /CEQA	CA DOT (encroachment)	CA Reclamations Board (encroachment)	CDFW (CA ESA)	Division of Safety of Dams	DDW (groundwater injection permit)	DWR (encroachment)	RWQCB (dewatering)	RWQCB (construction NPDES stormwater)	RWQCB (Section 401)	State Board (water right)	State Lands Commission	State Historic Preservation Office (Section 106)	Encroachment permits	
Interties																					
1	Transfer-Bethany Pipeline	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	Contra Costa County and/or Alameda County, cities	
2	Zone 7-EBMUD Intertie		✓		✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	Contra Costa County and/or Alameda County, San Ramon, Dublin and San Leandro	
3a	ACWD-SFPUC Intertie and Local Supply		✓		✓		✓	✓	✓	✓			✓		✓	✓				Alameda County, Newark	
3b	ACWD-SFPUC Intertie and IPR		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	Alameda County, Newark	
4	West Side SFPUC-SCVWD Intertie		✓		✓		✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	Santa Clara County, Los Gatos, Saratoga, Cupertino, Los Altos, Palo Alto	
5	SFPUC-Zone 7 Intertie		✓		✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	Alameda and/or San Joaquin County, Tracy, Livermore	
6	MMWD-EBMUD Intertie		✓		✓		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	Contra Costa County and Marin County, San Rafael, Richmond	
Storage																					
7	LV Expansion	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	Contra Costa County and/or Alameda County, cities	
Treatment/Supply																					
8	WCWTP Pretreatment Facility		✓				✓							✓	✓	✓	✓			Contra Costa County, Walnut Creek	
9	Regional Desalination Plant	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	Contra Costa County, Antioch, Pittsburg	
10	SVAWPC Expansion		✓		✓			✓		✓		✓		✓	✓	✓	✓	✓	✓	Santa Clara County, San José	
11	Mid-Peninsula PREP ^b	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	Local county/ies, city/ies	
12	Joint Tri-Valley Potable Reuse Feasibility Study		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	Local county/ies, city/ies	
Operations																					
13	Regional AMI Feasibility Assessment ^c																				
14	Del Valle Reservoir Water Supply Storage Expansion Project		✓		✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	Local county/ies, city/ies	
15	Regional Exchange Demonstration Project ^d		✓		✓		✓			✓										Local county/ies, city/ies	

- 3
- a. NEPA may be required if federal agencies are involved.
- 4
- b. Potential permits listed, unknown which permits required until site(s) is/are selected.
- 5
- c. Minimal permitting requirements anticipated.
- 6
- d. Federal Warren-Act contract may be needed. Potential refill or conveyance agreements needed from CVP/SWP.
- 7
- 8
- CA = California
- 9
- CDFW = California Department of Fish and Wildlife
- 10
- CEQA = California Environmental Quality Act
- 11
- DDW = State Water Resources Control Board Division of Drinking Water
- 12
- DOT = Department of Transportation
- 13
- DWR = California Department of Water Resources
- 14
- EA = Environmental Assessment
- 15
- ESA = Endangered Species Act

- 16
- NEPA = National Environmental Policy Act
- 17
- NMFS = National Marine Fisheries Service
- 18
- NPDES = National Pollutant Discharge Elimination System
- 19
- RWQCB = Regional Water Quality Control Board
- 20
- USACE = United States Army Corps of Engineers
- 21
- USBR = United States Bureau of Reclamation
- 22
- USFWS = United States Fish and Wildlife Service



5.4 Water Rights

The BARR agencies developed the list of potential drought mitigation measures with a primary focus on sharing and exchanging water among the BARR agencies. The BARR agencies collectively have a diverse portfolio of water supplies and water rights (DWR 2016). For example, SFPUC has pre-1914 water rights for its Hetch Hetchy Project on the Tuolumne River. EBMUD has post-1914 water rights for its Pardee Project on the Mokelumne River. MMWD has local area both pre- and post-1914 water rights and receives approximately 25 percent of its water supply from the Sonoma County Water Agency. In addition, SCVWD has contracts for water supply from both the SWP and CVP and local water rights, while CCWD has both CVP contracts and local water rights for LV.

Water rights issues must be considered and addressed for each drought mitigation measure. The BARR measures span a range of supplies with various water rights requirements, including some that may require water rights modifications.

Several general categories of water rights modifications may apply to the measures, including:

- **Place of use modifications:** Allows use transferred supply in an area outside the place of use specified in the original water rights. Place of use modifications may be required to individual agencies' water rights permits for local/other surface water supplies and/or SWP/CVP contract supplies.
- **Point of diversion modifications:** Allows for diversion of supply at a location other than the point specified in the original water rights.
- **Pre-1914 water rights "no injury" rule:** Allows pre-1914 water rights holders to change their place/purpose of use or point of diversion provided that the change causes "no injury" to other legal users of water (both junior and senior water right holders), per the California Water Code (CWC).
- **No Unreasonable Effects on Fish and Wildlife:** Allows changes to water rights in an expedited fashion to enable water transfers provided that the transfers do not result in "unreasonable effect of fish, wildlife or other instream beneficial uses."
 - CWC Section 1725: For short-term transfers (occurring in 1 year or less). Transfers approved by the State Board under CWC Section 1725 are exempt from CEQA.
 - CWC Section 1735: For long-term water transfers (occurring over more than 1 year).
- **New water rights:** Enables use or storage of a water supply not previously permitted.
- **Wastewater change petition:** Allows for diversion of wastewater flow for reuse/recycling.

Table 4 summarizes potential water rights modifications that may be needed to implement the BARR drought mitigation measures. When further evaluating implementation feasibility beyond the DCP, the BARR agencies may use this table as a guide to identify water-rights issues that require further assessment and warrant specific permit changes.

The BARR agencies evaluated several different potential approaches for transferring SWP/CVP water supplies considering water rights and operational factors. (See Attachment C for more detail.) Two showed promise, including:

- **Conjunctive use of transferred supplies:** BARR agencies could purchase supplies from willing sellers during non-dry (normal/wet) years to transfer for local storage and for use during dry years. Factors directly affecting the viability of this approach include water availability, conveyance capacity, and storage availability.
- **Changes to points of diversion changes:** Changes to points of diversion for BARR agencies' existing CVP/SWP water rights could increase access to the agencies' storage facilities. Increased supply in storage could provide a mechanism for long-term regional exchanges. The BARR agencies could also

- 1 take advantage of the currently permitted CVP/SWP joint point of diversion in their water-right permits
- 2 when the conditions allowing its use are met.

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Table 4. Water Rights Assessment for Specific Proposed Drought Mitigation Measures													
No.	Drought Mitigation Measure	Summary	Potential Water Rights Modifications Needed									State/ Federal Approvals Needed	
			Place of Use for Local/ Other	Place of Use for SWP	Place of Use for CVP	Point of Diversionr	Pre-1914 Rights ("No Injury")	CWC Section 1725 (if ≤1 year)	CWC Section 1735 (if >1 year)	New Water Rights	Wastewater Change Petition		
Interties													
1	Transfer-Bethany Pipeline	This intertie would likely require permit changes for both CCWD and EBMUD to include areas to be served outside existing permitted places of use. The permit changes could be accomplished in any one year through CWC Section 1725 or, if longer than one year, CWC Section 1735. If CCWD uses CVP water, USBR would need to file the petition.	✓					✓	✓			USBR, State Board	
2	Zone 7-EBMUD Intertie	For transfers from EBMUD to Zone 7, an EBMUD permit change would likely be needed to include Zone 7’s service area as a place of use. For transfers from Zone 7 to EBMUD, EBMUD should review its permit and determine whether the existing SWP place of use covers all of EBMUD. If not, then EBMUD should seek a change in the SWP place of use or use local ACWD water rights and change the place of use for those water rights. These changes could be accomplished in any one year through CWC Section 1725 or, if longer than one year, CWC Section 1735. If using water supplied by SWP contracts, this transaction will need to be an exchange of water with EBMUD and not a sale. DWR would need to file the petition with the State Board.	✓	✓				✓	✓			State Board	
3a	ACWD-SFPUC Intertie and Local Supply	ACWD’s NDF does not have a water-right permit because it does not divert from a “usable” water source. Thus, the expansion of use to SFPUC does not pose a water-right issue. However, if ACWD water-right water is moved to the SFPUC service area, ACWD should seek appropriate water-right changes to the places of use in those water rights. For SFPUC’s pre-1914 water rights, SFPUC should check for “no injury” and notify the State Board of the change through its Report of Water Diversion and Use. ACWD may want to use CWC Section 1725 for a short-term transfer in any given year. If ACWD is using water supplied by SWP contracts, this transaction will need to be an exchange of water with SFPUC and not a sale. DWR would need to file the petition with the State Board.	✓	✓				✓	✓			State Board	
3b	ACWD-SFPUC Intertie and IPR	Same as above except that a Wastewater Change Petition will likely be needed.	✓	✓				✓	✓		✓	State Board	
4	West Side SFPUC-SCVWD Intertie	Because this is a second connection, how the water rights for the first connection were handled will dictate how this second connection must be permitted. A place of use change may be needed for both SFPUC and SWP/CVP water rights. It is recommended that SFPUC and SCVWD avoid a CVP place of use change if possible. If SCVWD wants to use water supplied by SWP contracts, this transaction will need to be an exchange of water with SFPUC and not a sale. DWR would need to file the petition with the State Board.	✓	✓	✓							State Board	
5	SFPUC-Zone 7 Intertie	This intertie would likely require permit changes for both SFPUC and Zone 7 for place of use of local water rights and/or SWP water rights, depending on which water rights are used. For SFPUC pre-1914 water rights, SFPUC should check for “no injury” and notify the State Board of the change through its Report of Water Diversion and Use. If Zone 7 wants to transfer SWP water, this transaction will need to be an exchange of water with SFPUC and not a sale. DWR would need to file the petition with the State Board.	✓	✓				✓				State Board	
6	MMWD-EBMUD Intertie	This intertie would likely require permit changes for both MMWD and EBMUD to include areas to be served outside existing permitted places of use. These could be accomplished by a petition to the State Board for any one year through CWC Section 1725 or, if longer than one year, through CWC Section 1735.	✓						✓	✓		State Board	
Storage													
7	LV Expansion	CCWD would need permit changes to include new areas outside CCWD’s existing permitted place of use. A new water right may be needed depending on the operation and other agencies participating in the project.	✓								✓	USBR, State Board	
Treatment/Supply													
8	WCWTP Pretreatment Facility	Depending on whose water is diverted for treatment and delivery, EBMUD will likely need either place of use or point of diversion permit changes. These could be accomplished in any one year through CWC Section 1725 or, if longer than one year, CWC Section 1735.	✓				✓		✓	✓		State Board	
9	Regional Desalination Plant	Assuming the intake would be located at Mallard Slough, CCWD’s existing water right permit and license would be used.	✓									USBR, State Board	
10	SVAWPC Expansion	A new Wastewater Change Petition would likely be needed to allow for additional wastewater to be treated and recycled. The change petition should also include any new places of use.									✓	State Board	
11	Mid-Peninsula PREP	Changes to the existing Wastewater Change Order may be needed to include new places of use.									✓	State Board	
12	Joint Tri-Valley Potable Reuse Feasibility Study	Changes to the existing Wastewater Change Order may be needed to include new places of use.									✓	State Board	
Operations													
13	Regional AMI Pilot Project	No water-right issues apply to implementing AMI.										None	
14	Lake Del Valle Re-Operation	Currently planned to stay within existing water rights permits.										State Board	
15	Regional Exchange Demonstration Project	Depending on whose water rights are used to pump water for exchange, either a change in point of diversion or place of use would be needed.	✓				✓					USBR, State Board	

1 Note: Where CVP Contract water is used, USBR will need to file the petition to modify place of use. Where SWP Contract water is used, DWR will need to file the petition to modify place of use or water exchange.

5.5 Funding

Identifying viable funding sources can often be the primary constraint in implementing any project, including the potential drought mitigation measures and response actions being contemplated by the BARR agencies. Several state, federal, and local funding sources are potentially available (i.e., current grants and loan opportunities). Funding eligibility and other requirements, such as local cost-share for grants and repayment terms for loans, are important considerations. In addition, grant funding is competitive (thus, less certain to materialize). In addition, alternative funding mechanisms, such as public-private partnerships (P3s), are additional pathways to consider.

Like other water projects, costs associated with the BARR drought mitigation measures have three components—capital costs for initial construction and operations and maintenance (O&M) costs, and repair and replacement (R&R) costs for ongoing implementation once initial construction is complete. Some funding sources can be used only for capital expenditures, while others are more broadly applicable.

5.5.1 Grants and Loans

Agencies can use grant and loan programs to finance capital projects. Table 5 provides a summary of currently available federal and state funding sources. Such programs evolve with time, and current information is typically most efficiently found on websites (refer to the embedded hyperlinks in Table 5).

When pursuing grant funding, the following general guidelines typically apply:

- Grant applications require demonstration of the ability to construct, operate, and maintain the project without grant funding.
- Grant award or funding authorization is not a promise of grant reimbursement.
 - Most grants are reimbursements and not up-front cash, which means a funding source must be available for project construction.
 - Grant reimbursements are subject to annual budget and appropriations processes. As such, disbursement of grant funds is not guaranteed to follow an established schedule.
 - It may take several years after project completion to receive reimbursements, especially in difficult economic times.
 - Most grants require a minimum cost share by the project sponsor.
 - Federal grants typically require investment of additional resources.

Despite the competitive nature of grants, securing external funding can help to minimize ratepayer impacts and the rising cost of water services, which is particularly important to the BARR agencies concerning affordability issues in low-income disadvantaged communities (DACs).

5.5.2 Public-Private Partnerships

In recent years, public agencies have explored P3s and other forms of private-sector financial involvement as possible ways to improve service, quality, and efficiency. P3s involve private financing and the sharing of a project's risks and rewards beyond the construction phase between public and private partners. In P3 projects, the private partner is typically responsible for the financing, design, construction, and O&M of the facility. In return, the private partner will typically receive a fee for the water from the public partner(s).

California's Infrastructure Finance Act (IFA) (IFA; published in California Government Code Section 5956) authorizes local governments to use private-sector investment capital for developing "fee-producing infrastructure facilities." It must be paid for by those benefiting from the facility. Among others, the IFA applies to cities (general law and charter), counties (general law and charter), public districts, JPAs, and any

1 other public or municipal corporations. The government agency may grant ownership or leasing rights to the
2 facility for up to 35-year terms.

3 Projects built under a P3 approach can offer some unique benefits. P3s provide a new source of funding for
4 projects with costly infrastructure and/or operational costs. This approach can make otherwise unaffordable
5 capital projects economically feasible. Private partners are often incentivized to complete the project as
6 soon as possible because the private partner is usually not paid until after the project has been successfully
7 constructed and is operating to predetermined performance requirements.

8 While P3s can offer many direct and indirect benefits, they also present challenges. P3 arrangements tend
9 to be fairly complex, and each agreement is unique and requires significant legal and technical input by both
10 the public and private partners. Also, by forming a P3, an agency must concede some of the control of its
11 water system to a private entity. Further, the public may perceive issues with respect to privatizing public
12 infrastructure assets and the loss of public control over such assets. While these concerns can be mitigated
13 by the terms of most agreements, they can pose challenges for a public agency to pursue projects on a P3
14 basis.

15 **5.6 Governance**

16 A joint powers authority (JPA) is an entity formed between two or more public agencies that allows them to
17 join together and exercise their powers as a single agency for the purpose of accomplishing specific common
18 goals. JPAs typically outline the ownership, governance, and financing of joint projects. California
19 Government Code Sections 6500–6538 provide the authority for public agencies to enter into JPAs. JPAs
20 may form between local entities to acquire land, construct regional infrastructure, share maintenance, or
21 operate shared facilities. Regional water districts, energy agencies, cities, counties, or any other entity
22 described in California Government Code Section 6500 can be voting members of a JPA. Private businesses,
23 individuals, and privately owned/investor-owned utilities are not allowed by law to be a voting member of a
24 JPA. JPAs have the ability to arrange capital financing by selling bonds. These bonds create the capital
25 needed to finance the design and construction of JPA projects. Bonds issued by the JPA are reimbursed over
26 time by the JPA and from the revenue generated by the projects. By sharing resources and combining
27 services, the member agencies (and their taxpayers) can use a JPA to leverage their combined resources to
28 more effectively distribute the costs and benefits of new joint projects.

1

Table 5. Federal and State Grant and Loan Funding Opportunities					
Program	Agency	Type	Description	Funding Ceiling	Minimum Cost-Share Requirement
Federal					
Basin Studies Program	USBR	Grants: Planning	Basin studies are basin-wide efforts, cost-shared with non-federal partners, to evaluate and address the impacts of climate change. Funding is available for comprehensive water studies that define options for meeting future water demands in Western river basins where imbalances in water supply and demands exist or are projected. (http://www.usbr.gov/watersmart/bsp/index.html)	TBD	50% (non-federal cash or in-kind services)
Drought Response Program	USBR	Grants: Planning	The Drought Response Program is administered by the USBR. It supports a proactive approach for addressing drought by providing assistance to water users to conduct drought contingency planning and to take actions that build long-term resilience to drought. The program includes two funding areas described below. (http://www.usbr.gov/drought/) Drought Contingency Planning: Financial assistance will be made available on a competitive basis to non-federal entities to develop a new DCP or update an existing plan.	\$200,000	50% (non-federal)
		Grants: Construction	Drought Resiliency Project: Financial assistance will be made available to implement small-scale projects to increase the reliability of water supplies; improve water management; implement systems to facilitate the voluntary sale, transfer, or exchange of water; and benefit fish and wildlife and the environment.	\$750,000	50% (non-federal)
Title XVI	USBR	Grants: Construction	USBR administers funds for recycled water feasibility, demonstration, and construction projects through the Water Reclamation and Reuse Program authorized by the Reclamation Wastewater and Groundwater Study and Facilities Act of 1992 (Title XVI) and its amendments. To meet eligibility requirements, a project must have a feasibility study, comply with environmental regulations, and demonstrate the ability to pay the remainder of the construction costs. Programs/projects that provide regional benefits are more likely to be funded under this program. Projects successful in the application process are authorized by Congress and included in USBR's annual budget request to the president. Congress then appropriates funds, and USBR ranks and prioritizes projects and disburses the money on a competitive grant basis each year. Prioritized projects are those that postpone the development of new water supplies, reduce diversions from natural watercourses, and reduce demand on federal water supply facilities, or that have a regional or watershed perspective. (http://www.usbr.gov/watersmart/title/)	Up to 25% of construction costs, with a maximum of \$20 million	75% of construction costs
WaterSMART Water and Energy Efficiency Grants	USBR	Grants: Implementation	WaterSMART Water and Energy Efficiency Grants provide cost-shared funding for projects that save water, increase energy efficiency and the use of renewable energy in water management, support environmental benefits (i.e., make conserved water available instream or otherwise address endangered species issues), mitigate conflict risk in areas at a high risk of future water conflict, and accomplish other benefits that contribute to water supply sustainability in the western United States. Projects are selected through a competitive process and the focus is on projects that can be completed within 24 months that will help sustainable water supplies in the western United States. (http://www.usbr.gov/watersmart/weeg/index.html)	Up to 50%, with a maximum of \$1 million	50% (non-federal)
Water Infrastructure Finance and Innovation Act (WIFIA)	EPA	Loans	The WIFIA program accelerates investment in the nation's water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects. The WIFIA program was established by the Water Infrastructure Finance and Innovation Act of 2014. EPA estimates that current budget authority may provide more than \$1 billion in credit assistance and may finance over \$2 billion in water infrastructure investment. (https://www.epa.gov/wifia).	Up to 49% of eligible project costs. Minimum project size: \$20 million for large communities (population greater than 25,000) \$5 million for small communities (population of 25,000 or less)	Not applicable to loans.

Table 5. Federal and State Grant and Loan Funding Opportunities					
Program	Agency	Type	Description	Funding Ceiling	Minimum Cost-Share Requirement
State					
Proposition 1	State Board		The Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) authorizes \$7.545 billion in general obligation bonds to fund ecosystems and watershed protection and restoration, water supply infrastructure projects, including surface water and groundwater storage, and drinking water protection. The State Board is administering funds for five programs, described below. (http://www.waterboards.ca.gov/water_issues/programs/grants_loans/proposition1.shtml)		
		Grants: Planning and Construction	Drinking Water (total funding: \$260 million)	- Planning: \$500,000 - Construction: \$5 million	Variable, depending on inclusion of DACs and/or economically distressed areas (EDAs)
		Grants: Planning and Implementation	Groundwater Sustainability (total funding: \$800 million)	- Planning: \$100,000 to \$1 million - Implementation: Two types 1st type – Offers funding starting at \$500,000 with no maximum funding limit 2nd type - Provides funding opportunities for drinking water treatment projects that only benefit a DAC/EDA. Applicants are eligible to receive up to \$5 million. No minimum funding amount is set.	Variable, depending on inclusion of DACs and/or EDAs. Non-DAC/EDA projects require a 50% match.
		Grants: Planning and Construction	Small Community Wastewater (total funding: \$260 million)	- Planning: \$500,000 - Construction: \$6 million	Variable, depending on inclusion of DACs and/or EDAs
		Grants: Planning and Implementation	Stormwater (total funding: \$200 million)	- Planning: \$50,000 to \$500,000 - Implementation: \$250,000 to \$10 million	50% (local)
		Loans	Water Recycling (total funding: \$625 million): Grant funds have been committed. However, loans currently remain available.	TBD	Not applicable to loans.
	CWC	Grants: Implementation	Water Storage Investment Program: Funding for storage projects. State funds can only be spent on the public benefits.	\$2.7B ~\$250M will be available for implementation in 2018.	50% cost share.
	CNRA	Grants: Planning and Implementation	Central Valley Project Improvement Act Grant Program (total funding: \$475 million; 2016/17 budget: \$89.15 million)	No maximum or minimum amounts have been set for 2016/17 budget	
Integrated Regional Water Management (IRWM) Implementation Grant Program	DWR	Grants: Planning and Implementation	The IRWM Grant Program provides funding for projects that help meet the long-term water needs of the state, including: - Assisting water infrastructure systems adapt to climate change - Providing incentives through each watershed to collaborate in managing the region’s water resources and setting regional priorities for water infrastructure - Improving regional water self-reliance, while reducing reliance on the Delta Proposition 1 authorized a total of \$510 million in IRWM funding. (http://www.water.ca.gov/irwm/)	- Updating an existing IRWM plan: \$250,000 (minimum request of \$50,000) - New IRWM plan: \$1 million	50%
Sustainable Groundwater Planning (SGWP) Grant Program	DWR	Grants: Planning and Implementation	The SGWP Grant Program provides funds for projects that develop and implement sustainable groundwater planning and projects consistent with groundwater planning requirements outlined in CWC Division 6. Proposition 1 appropriated a total of \$100 million for this program. (http://www.water.ca.gov/irwm/grants/sgwp/index.cfm)	- DACs/EDAs and critically over drafted: \$500,000 - All other grant applicants: \$250,000	50% (local)
Water Energy Grant Program	DWR	Grants: Implementation	The Water Energy Grant Program provides funds to implement water efficiency programs or projects that reduce greenhouse gas (GHG) emissions and reduce water and energy use, including: - Commercial water efficiency or institutional water efficiency programs - Residential water efficiency programs that benefit DACs - Projects that reduce GHG, water use, and energy use - Projects with water conservation measures that also save energy DWR was appropriated \$19 million of GHG Reduction Funds by Senate Bill 101 to administer the program. (http://www.water.ca.gov/waterenergygrant/index.cfm)	\$3 million	None required. However, projects proposing a cost share may be prioritized for funding (i.e., a “tie-breaker advantage”).

Table 5. Federal and State Grant and Loan Funding Opportunities					
Program	Agency	Type	Description	Funding Ceiling	Minimum Cost-Share Requirement
Water Desalination Grant Program	DWR		DWR provides grants to local agencies for planning, design, and construction of desalination facilities (including pilot, demonstration, and research projects) for both brackish and ocean water. DWR has conducted three funding rounds since 2005 using Proposition 50 funds. The rules and procedures for funding vary depending on funding source/availability and DWR priorities at the time of funding. A fourth funding round is planned and will use primarily Proposition 1 funds (total funding of \$100 million for desalination projects). The five relevant project categories follow below. (http://www.water.ca.gov/desalination/Water_Desal_Fund_Prog_OV.cfm)		
		Grants: Construction	• Construction projects	\$3 million	50%
		Grants: Construction	• Pilot and demonstration projects	\$1 million	50%
		Grants: Planning	• Feasibility studies	\$250,000	50%
		Grants: Planning	• Environmental documents	\$250,000	50%
		Grants: Research	• Research projects	\$500,000	50%
Clean Water State Revolving Fund (SRF)	State Board	Loans	The Clean Water SRF program offers low-interest (below-market) financing for a wide variety of water quality projects, such as construction of wastewater treatment and water recycling facilities, implementation of nonpoint source and storm drainage pollution control solutions, and development and implementation of estuary plans to protect and promote the health, safety, and welfare of all Californians. Repayment periods are usually the lesser of 30 years or the expected useful life of the financed asset. (http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/)	No maximum funding limit.	Not applicable to loans.
Drinking Water SRF	State Board	Loans	Established by an amendment to the federal Safe Drinking Water Act in 1996, the Drinking Water SRF provides low-interest loans, additional subsidy (principal forgiveness), and technical assistance to public water systems for infrastructure improvements to correct system deficiencies and improve drinking water quality for the health, safety, and welfare of all Californians. (http://www.waterboards.ca.gov/drinking_water/services/funding/SRF.shtml)	No maximum funding limit.	Not applicable to loans.

a. Though the IRWM Implementation Grant Program includes funding options for new IRWM Plans, the BARR agencies already participate in existing IRWM Plans. Thus, this funding option is not a viable option for BARR and is included only to provide a complete description of the grant program.

1 Section 6: Summary and Next Steps

2 BARR represents an unprecedented partnership among Bay Area water agencies—a partnership with
3 tremendous potential to forge new regional approaches and more fully optimize use of existing assets and
4 resources to collectively strengthen reliability and resilience. Together, the BARR agencies are collaboratively
5 pursuing measures and actions that would use existing infrastructure and water resources to produce
6 greater efficiencies and improve water supply reliability for the area. Through a collaborative process, the
7 BARR agencies have created a new regional water management platform that enables joint drought
8 mitigation measures and response actions to meet the region’s water needs while also meeting individual
9 agencies’ site-specific needs.

10 Although the potential BARR drought mitigation measures reflect a wide range of project types, all will
11 require substantial changes in how agencies work together to manage water supplies both at the
12 institutional and operational levels and in the agreements for water use (i.e., water rights and operational
13 agreements). In addition, implementing joint measures may pose challenges related to financial, logistical,
14 legal, social, and financial considerations. While more work remains to establish pathways for overcoming
15 such challenges, the BARR DCP is a significant initial milestone for enabling the further advancement of the
16 regional drought mitigation measures.

17 Beyond development of this DCP, the BARR agencies or some subset expect to further advance plans,
18 explore funding options, and study feasibility for at least some of these measures in the near term, followed
19 by developing an implementation and operations plan once measures are more fully developed. In addition,
20 the agencies may pursue funding for a BARR pilot transfer effort to prepare for future exchanges as needed
21 during drought conditions.

22 Though the BARR agencies are not currently obligated to update the initial DCP, the agencies (or some
23 variation/subset) may produce future updates, modified drought mitigation measures, and/or response
24 actions based on changed conditions. However, in addition to this joint DCP, the BARR agencies also
25 individually maintain UWMPs as living documents that reflect long-term planning to ensure reliable,
26 adequate water supplies for existing and future water demands. UWMP data have traditionally been
27 presented in various forms, to reflect agency-specific conditions. In the future, BARR agencies may consider
28 integrating some aspects of the DCP into their UWMPs to enable greater consistency and to reflect the
29 regional partnership.

30 As the State Board finalizes a new Water Use Efficiency framework, “Making Water Conservation a California
31 Way of Life” (State Board 2016), future Bay Area water demands may remain constant or decline. At the
32 same time, climate-change uncertainties and the potential for catastrophic events to threaten water supply
33 require that the BARR water agencies take further actions to guard against these challenges and improve
34 reliability and resilience. The measures and actions laid out in this DCP better prepare BARR agencies for the
35 future.

36 Beyond the measures considered here, BARR agencies are also currently pursuing other projects individually
37 or with agencies outside of the BARR construct to further improve Bay Area supply reliability. Taken together,
38 joint BARR and individual agency efforts are solidifying systems and resources to provide a sustainable,
39 reliable, high-quality water supply for a healthy community and vibrant economy in the Bay Area.

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Section 7: References

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1 **Attachment A: Complete BARR Drought Mitigation**

2 **Measure Profiles**

- 3 Drought Mitigation Measure 1: Transfer-Bethany Pipeline
- 4 Drought Mitigation Measure 2: Zone 7-EBMUD Intertie
- 5 Drought Mitigation Measure 3a: ACWD-SFPUC Intertie and Local Supply
- 6 Drought Mitigation Measure 3b: ACWD-SFPUC Intertie and IPR
- 7 Drought Mitigation Measure 4: West Side SFPUC-SCVWD Intertie
- 8 Drought Mitigation Measure 5: SFPUC-Zone 7 Intertie
- 9 Drought Mitigation Measure 6: MMWD-EBMUD Intertie
- 10 Drought Mitigation Measure 7: Los Vaqueros Expansion
- 11 Drought Mitigation Measure 8: Walnut Creek Water Treatment Plant Pretreatment Facility
- 12 Drought Mitigation Measure 9: Regional Desalination Plant
- 13 Drought Mitigation Measure 10: Silicon Valley Advanced Water Purification Center Expansion
- 14 Drought Mitigation Measure 11: Mid-Peninsula Potable Reuse Exploratory Plan
- 15 Drought Mitigation Measure 12: Joint Tri-Valley Potable Reuse Feasibility Study
- 16 Drought Mitigation Measure 13: Regional Advanced Metering Infrastructure Feasibility Assessment
- 17 Drought Mitigation Measure 14: Del Valle Reservoir Water Supply Storage Expansion Project
- 18 Drought Mitigation Measure 15: Regional Exchange Demonstration Project

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(Note – Attached as a separate PDF file.)

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1 **Attachment B: Other Bay Area Drought Projects**
2 **(outside the BARR Drought Contingency Plan scope)**

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Table B-1. Other Bay Area Drought Mitigation Projects (outside the scope of the BARR Drought Contingency Plan)									
No.	Project Sponsor or Partners	Project Name	Type (conveyance, storage, treatment/supply, operations)	Brief Description and Implementability (i.e., time frame to produce supply)	Yield and Availability of Water (AFY)	Status	Estimated Capital Costs	Estimated O&M Costs (high, moderate, low)	Other Comments
List of Western Recycled Water Coalition Member Projects in Bay Area (2016)									
1	Central Contra Costa Sanitary District (Central San)	Contra Costa County Refinery Recycled Water Project, Phase 1	Conveyance	Phased project to deliver recycled water for Shell and Tesoro refineries (for cooling towers and boiler feed water)	5,600	USBR Feasibility complete	\$25M	High	Possible Wastewater Change Petition needed
2	City of Benicia	Benicia Water Reuse Project	Conveyance	Pipeline, pump station, and additional filtration and ammonia removal for cooling tower use	2,200	Planning	\$27M	TBD (likely low)	
3	City of Brentwood	Brentwood Recycled Water Project	Conveyance	Pipelines, pump stations, and storage to extend recycled water for irrigation users	1,406	Phases in construction	\$21	TBD (likely low)	
4	City of Hayward	Hayward Recycled Water Project	Treatment/conveyance	New treatment facility and pipeline to serve new customers for irrigation and for cooling	290	USBR Feasibility complete	\$12M	TBD (likely low)	
5	City of Mountain View	Mountain View Recycled Water System Expansion	Conveyance	Storage, pumping, pipelines to expand system and serve large customers in Mountain View and Moffett Field	2,750	Planning	\$20M	TBD (likely low)	
6	City of Palo Alto	Palo Alto Recycled Water Pipeline	Conveyance	Pipelines and pump stations for residential, commercial, and municipal uses	916	USBR Feasibility complete	\$33M	TBD (likely low)	
7	City of Pleasanton	Pleasanton Recycled Water Project	Conveyance	Pipelines expanding recycled water for irrigation users	1,720	In construction	\$20M	TBD (likely low)	
8	City of Redwood City	Central Redwood City Recycled Water Project	Conveyance	Pipelines, pump stations, and storage to expand system to central Redwood City	507	USBR Feasibility complete	\$32M	TBD (likely low)	
9	Delta Diablo Sanitation District	High Purity Treatment	Treatment/supply	Treatment to improve recycled water quality for industrial uses and urban landscape projects	5,600	USBR Feasibility complete	\$50M	TBD (likely low)	
10	Delta Diablo Sanitation District	Delta Diablo Recycled Water Project	Conveyance	Phased storage and pipeline/expansion to serve new users	4,380	USBR Feasibility complete	\$34M	TBD (likely low)	
11	Dublin San Ramon Services District (DSRSD)	Dublin and San Ramon Recycled Water Expansion	Treatment/conveyance/ storage	Treatment, pipelines, pump stations, and reservoirs for irrigation customers	6,460	USBR Feasibility complete	\$22M	TBD (likely low)	
12	Ironhouse Sanitary District (ISD)	ISD Cypress Recycled Water	Conveyance	Pipelines and pump station to serve recycled water to Cypress corridor	173	USBR Feasibility complete	\$5M	TBD (likely low)	
13	ISD	ISD Industrial Recycled Water Project	Conveyance	Pipelines, pump station, and storage for various users	2,350	USBR Feasibility complete	\$29M	TBD (likely low)	
14	ISD and CCWD	ISD Direct Potable Reuse Project	Treatment/supply	Recycled water to Contra Costa Canal DPR; implementability TBD, pending DPR regulations	4,350	USBR Feasibility complete	\$40M	High	
15	San Jose Water Company	SJWC Recycled Water Project	Conveyance	Pipelines to expand system for irrigation and industrial users	1,203	USBR Feasibility complete; phases under way	\$24M	TBD (likely low)	
16	SCVWD	Various IPR and DPR projects	Treatment/supply/conveyance	Long-term potable reuse projects	~80,000	Planning	>\$800M	TBD (likely moderate to high)	
17	SCVWD	South Santa Clara County Recycled Water Project	Conveyance	Pipelines, pumping, and storage to expand service for agriculture and other irrigators	30,000	Phases in construction	\$72M	TBD (likely low)	
18	SCVWD	Wolfe Road Recycled Water Project	Conveyance	Pipeline and pump station to expand service to Sunnyvale and Apple Campus 2	903	Under construction	\$18M	TBD (likely low)	
19	Sunnyvale	Sunnyvale Continuous Recycled Water Production	Conveyance	Pump station to serve recycled water expansion	500	Under construction	\$2M	TBD (likely low)	
20	West Bay Sanitary District	WBSD Recycled Water Project	Treatment/conveyance	Satellite treatment facility, pump station, and pipelines for irrigation	152	Planning	\$19M	TBD (likely low)	

Table B-1. Other Bay Area Drought Mitigation Projects (outside the scope of the BARR Drought Contingency Plan)									
No.	Project Sponsor or Partners	Project Name	Type (conveyance, storage, treatment/supply, operations)	Brief Description and Implementability (i.e., time frame to produce supply)	Yield and Availability of Water (AFY)	Status	Estimated Capital Costs	Estimated O&M Costs (high, moderate, low)	Other Comments
Other Projects Involving BARR Agencies ^a									
21	Zone 7	Additional Wells in the Livermore Valley Groundwater Basin	Treatment/supply	Constructing several new wells in the Livermore Valley Groundwater Basin to increase total production capacity for use particularly during droughts and emergencies while also increasing potential exchange opportunities with other agencies	7,300	Planning	\$54M	Low	Chain of Lakes 3 and 4 planned to be constructed by 2030, Busch Valley Well by 2020, and Bernal Wells by 2025
22	Zone 7	Chain of Lakes Pipeline	Treatment/supply	A 36-inch-diameter pipeline from Cope Lake to Del Valle Water Treatment Plant (~6 miles) and a 12 mgd pumping station, allowing Zone 7 the ability to better manage local water supplies, recharge the local groundwater basin, help perfect local water rights, and meet demands with stored water in the Chain of Lakes during catastrophic events (e.g., loss of the Delta)	TBD	Planning	\$57M	Low	Planned for construction by 2020
23	Central San, EBMUD, and CCWD	Canal Loop Recycled Water Project	Treatment/supply	Central San would provide recycled water to existing irrigation customers currently served by EBMUD and CCWD on the loop portion of the Contra Costa Canal	6,700	Planning	TBD	High	Possible Wastewater Change Petition needed
24	All BARR Agencies	Regional Stormwater Capture	Treatment/supply	Develop centralized and decentralized stormwater capture projects to enhance local storm runoff capture for recharge or potable use offset	TBD	Conceptual	TBD	Low to high (would vary project to project)	Possible Wastewater Change Petition needed for some projects
25	Central San and CCWD	Central San Direct Potable Reuse	Treatment/supply	Central San would provide CCWD with DPR supplies	26,800	Conceptual	\$535M	High	Implementation pending regulations on DPR Possible Wastewater Change Petition needed
26	Central San, EBMUD, and DSRSD	Raw wastewater from Central San to DSRSD	Treatment/supply	New trunk sewer to increase supply to DSRSD's recycled water plant, 2.7 mgd	TBD	Conceptual	TBD	Moderate	Possible Wastewater Change Petition needed

¹ a. The agencies are considering many projects beyond those listed below as part of their long-term planning efforts.

1 **Attachment C: Water Rights Background and Water** 2 **Transfer Mechanisms**

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1 Water Rights Background

2 Water rights in California have a complex history. Three different classes of rules—pre-1914, post-1914, and
3 recycled water—come into play among the potential BARR drought mitigation measures.

4 Pre-1914 Water Rights

5 Prior to 1914, appropriative water rights were established by posting a notice near the point of diversion or
6 filing a plan with the county and beginning work. After 1914, appropriative water rights were obtained by
7 filing an application with the State Water Resources Control Board (State Board) to receive a permit for the
8 water supply development project. These permits specify:

- 9 • The amount of water that can be appropriated by direct diversion to use, store, or both.
- 10 • The season of diversion, points of diversion, places of use, purposes of use, conditions to protect prior
11 rights, public trust resources and the public interest, and a timeframe to put the water to reasonable
12 use.

13 The California Water Code¹ (CWC) allows pre-1914 water-rights holders to change their points of diversion,
14 place of use, or purpose of use provided that the change causes “no injury” to any legal user of water (see
15 CWC 1706). The CWC does not allow expansion of the pre-1914 water right in terms of the amount of water
16 diverted or the season of diversion. There is no formal process for changing the point of diversion, place of
17 use, or purpose of use of pre-1914 water rights. Typically, the pre-1914 water-right holder reports such
18 changes in its Statements of Water Diversion and Use filed annually with the State Board. The State Board
19 does not have permitting authority over pre-1914 water rights and does not typically review such changes.

20 Post-1914 Water Rights

21 Changes in post-1914 water rights points of diversion, places of use, or purpose of use are allowed under
22 the CWC (Sections 1701–1705), but the process is more complicated. While the “no injury” rule also applies
23 to post-1914 rights, a change petition needs to be filed with the State Board. The petition is publicly noticed
24 and specifically noticed to water right holders downstream. Protests can be filed. If protests cannot be
25 resolved by the parties, the State Board holds a water right hearing on the change petition and issues an
26 order either approving or denying the change petition.

27 Water Reuse

28 Early on, the State Legislature recognized the benefits of reusing wastewater discharges for beneficial use. It
29 also recognized that some of these discharges to natural stream courses provided benefits to public trust
30 resources, especially in areas and at times when natural flows are low. In 1980 and 2001, the legislature
31 changed the California Water Code (adding Sections 1210 to 1211) to provide a process for the State Board
32 to review changes in the point of discharge and place of use of wastewater discharges. The process calls for
33 the discharger to file a wastewater change petition with the State Board, describing the amount of water to
34 be removed from the receiving waterbody for reuse and the place of use for the treated reuse supply. The
35 State Board publicly notices wastewater change petitions, and protests can be submitted. If protests cannot
36 be resolved by the parties, the State Board holds a water right hearing on the change petition and issues an
37 order either approving or denying the change petition.

¹ The California Water Code can be accessed as follows: <http://leginfo.ca.gov/faces/codes.xhtml>

1 Modifying Water Rights

As described throughout TM2, the BARR drought mitigation measures focus primarily on sharing supplies through exchanges and transfers. Some measures involve potentially using water outside originally permitted conditions, requiring water rights permit modifications for points of diversion, place of use, and/or purpose of use. To enable exchanges and transfers, water rights changes can be accomplished in many ways, as summarized below and described in detail in the State's Board's "Guide to Water Transfers" (State Board, 1999).

1. No Injury Rule

For pre-1914 and post-1914 appropriative water rights, a change to an existing water right must not injure any legal user of water. This principle, referred to as the "no injury rule," prohibits injury to other legal users of water (both junior and senior water rights holders), caused by a change in place or purpose of use or point of diversion for any reason, including changes necessary to facilitate a water transfer. For example, a water transfer could cause injury to other legal users of water by reducing the net downstream flow, or attempting to transfer previously abandoned flows that otherwise would have been available to other water users absent the transfer. The "no injury rule" is rooted in historical court doctrine dating back to the early days of California statehood and was codified in 1914.

2. No Unreasonable Effects on Fish and Wildlife

The legislature changed the CWC after the 1976–77 drought to help expedite water transfers. CWC Sections 1725 and 1735 were added to allow water rights changes for both short-term (one year or less, CWC Section 1725) and long-term (longer than one year, CWC Section 1735) water transfers in an expedited fashion. Transfers conducted under CWC Section 1725 are exempt from CEQA. However, both CWC Sections 1725 and 1735 require that the water transfers not have an "unreasonable effect on fish, wildlife or other instream beneficial uses." This test is different from the "significant effect" test under CEQA and is generally considered a higher bar. The water right holder that petitions for a change under these CWC sections needs to provide the State Board an analysis that shows that the fish and wildlife effects of the water transfer are not "unreasonable."

3. CWC 1810 and Economic Effects

In 1986 the legislature added CWC Section 1810, which requires state, local, and regional agencies to make excess conveyance capacity available to others (for a reasonable fee) for water transfers, provided that the action: (1) causes no injury to any legal user of water, (2) has no unreasonable effects on fish and wildlife, and (3) has no "unreasonable effects on the overall economy or environment of the county" from which the water was transferred. The economic effects evaluation required by CWC Section 1810 is a countywide assessment (not a person-by-person or a "third-party" evaluation).

Water Transfer Mechanisms

Short-term water transfers have been an effective tool for addressing water rights changes needed to move water from one water supplier to another. DWR's Background and Recent History of Water Transfers in California (DWR and State Board, 2015) includes a detailed review of water transfers from 1995 through 2015 from areas north of the Delta to areas south and west of the Delta.

BARR drought mitigation measures involving transfers of SWP water supplies will need to be part of a water exchange, where water is returned to the SWP contractor in a subsequent year. According to the SWP contracts, SWP water cannot be sold for use by another SWP contractor except through the turn-back pool or a long-term reallocation of the Table A Entitlements (a complicated process). Furthermore, SWP water cannot be sold to a non-SWP contractor. However, in the cases of both SWP and non-SWP buyers, water can be exchanged for water that is returned to the original SWP contractor in a future year. These exchanges are

1 still processed as water transfers with specific terms that call for the water to be “paid back” with a like
2 amount of water in a future year on a 1:1, or perhaps 2:1 or better, basis, depending on what the parties
3 negotiate.

4 Use of CVP or SWP water supply contracts in a flexible manner is a key consideration for Bay Area exchanges
5 and transfers but must not result in changes to the operational rules of the CVP or SWP. Modifying those
6 operational rules would require either re-consultation under the existing CVP/SWP Biological Opinions
7 and/or changes to water-right permit conditions (NMFS 2009 and USBR 2008).

8 The BARR agencies considered five potential approaches for flexible use of SWP and CVP water supplies and
9 facilities to support water transfers, including:

- 10 • Conjunctive use of transferred supplies
- 11 • Changes in points of diversion
- 12 • Changes in demand
- 13 • “Backing up” water in CVP or SWP reservoirs
- 14 • Water quality benefits

15 **Conjunctive Use of Transferred Supplies**

16 BARR agencies could purchase supplies from willing sellers during non-dry (normal/wet) years to transfer for
17 local storage and for use during dry years. Factors directly affecting the viability of this approach include
18 water availability, conveyance capacity, and storage availability.

19 Water transfers have been common in California for decades, particularly in dry years. In the past, DWR
20 assembled water banks or dry-year programs that purchased water from willing sellers and sold it to willing
21 buyers. During the last DWR Dry Year Program (in 2009), about three times the amount of water developed
22 by the program was obtained by parties outside the program between willing sellers and buyers. In effect,
23 the water market has matured to the point that DWR’s facilitation is no longer needed. Over the years,
24 interested parties have developed their own expertise in securing water transfers that meet the
25 requirements of the CWC. Willing buyers and willing sellers are able to find each other without DWR
26 involvement, bringing “new water” to systems through transfers. The roles of DWR and USBR have become
27 focused solely on conveying water, including transfers, to areas south and west of the Delta.

28 **Water Transfer Constraints.** Two constraints limit the amount of water that can be transferred to BARR
29 agencies—water availability and conveyance capacity to move water from north of the Delta to BARR
30 partners’ service areas. In terms of water availability for transfers, the price that potential buyers are willing
31 to pay and water supply in the potential sellers’ watersheds are critical factors. Higher prices typically bring
32 more sellers into the water market.

33 Water availability in the sellers’ watersheds can have a substantial effect on water transfers, as in 2015. In
34 2014, more than 400,000 AF of water was transferred from north of the Delta to areas south and west of
35 the Delta. However, the low rainfall and historically low snowmelt in 2015 led the State Board to initiate
36 curtailments to all post-1914 water rights in the Sacramento Valley watershed and curtailments to many pre-
37 1914 water rights. Also, both the SWP and CVP curtailed deliveries to their water-right settlement
38 contractors in the Sacramento Valley. Therefore, the water users in the Sacramento Valley needed almost all
39 of their water to meet local demands and simply did not have very much water available for transfer to
40 others regardless of price. As a result, in 2015 only a little more than 250,000 AF of water was transferred,
41 even though demand for water both south and west of the Delta was greater than in 2014.

42 The other factor that constrains water transfers to areas south and west of the Delta is excess capacity at
43 the SWP or CVP pumping facilities in the southern Delta to convey water transfers for others. The priorities
44 for pumping water by the SWP and CVP are: (1) water to meet the water allocations to their contractors and

1 other firm commitments (like refuge water under CVP Improvement Act), (2) contractual access to excess
2 conveyance capacity by the CVP and SWP water supply contractors, and (3) access to excess capacity by
3 others.

4 The SWP operates two diversion systems in the Delta for conveying water to users south and west of the
5 Delta—the North Bay Aqueduct, which draws water from Barker Slough, and the Harvey O. Banks Pumping
6 Plant in the southern Delta, which diverts water from Clifton Court Forebay into the California Aqueduct. The
7 long-term SWP contractors are required contractually to pay all SWP costs associated with the SWP water
8 service; non-SWP contractors proposing to use SWP conveyance capacity are required to pay reasonable
9 fees including power for this use. The Banks Pumping Plant often has excess capacity for conveyance of
10 water transfers purchased by others in drier years but does not have capacity in average or wetter years.
11 During the very dry years of 2013, 2014, and 2015, DWR had conveyance capacity for all requested water
12 transfers. However, in 2016, a below-normal year in the Sacramento Valley, the Banks Pumping Plant had
13 no excess capacity because all of the available pumping capacity was used to deliver SWP water to agencies
14 with long-term contracts. The CVP has diversion facilities at the Jones Pumping Plant near Tracy. The
15 maximum capacity at the CVP Jones Pumping Plant is less than that of the SWP Banks Pumping Plant.
16 Typically, the CVP does not have excess conveyance capacity for water transfers except in the driest years.

17 A major factor that affects excess conveyance capacity of both the CVP and SWP is the 2008 and 2009
18 BiOps. These BiOps restrict the amount of water that can be diverted in the southern Delta in the winter and
19 spring and result in forcing water diversions for CVP and SWP contractors into the summer. In addition, the
20 BiOps limit the water transfers by others at the SWP and CVP facilities in the southern Delta to three months;
21 July, August, and September. Therefore, excess CVP and SWP pumping capacity for water transfers exists in
22 about one-third of the years (dry and extremely dry years and below normal years).

23 In normal and wetter years, available pumping capacity for water transfers will not be known until as late as
24 April. This late of a “call” date for water for a prospective seller is often not acceptable, especially for crop
25 idling water transfers. However, it can work for groundwater substitution transfers and reservoir re-operation
26 transfers. Therefore, one way to increase water transfers in normal and wet years would be to pursue such
27 late call date transfers. Wetter years also have more potential sellers, which often reduces price. While 1-
28 year water transfers are more common currently, the BARR agencies should consider negotiating long-term
29 water transfer agreements with willing sellers. These long-term agreements should contain flexible call dates
30 to ensure that the water can be pumped in the Delta and a process to adjust price that is acceptable to all
31 parties.

32 **Points of Delta Diversions Farther Upstream.** Use of southern Delta facilities, other than those of the SWP
33 and CVP, is another consideration and includes the Freeport Regional Water Authority (FRWA) facilities near
34 the town of Freeport on the Sacramento River. In February 2002, the JPA of the Sacramento County Water
35 Agency (SCWA) and EBMUD created the FRWA. FRWA guides the financing, ownership, development,
36 construction, and operation of the Freeport Regional Water Project (FRWP).

37 The FRWP diversion capacity is 286 cfs (185 mgd), which is a maximum possible annual diversion of
38 207,000 AF. The 2003 Draft EIR/EIS evaluated diversions at this location at “full build-out” with the
39 maximum combined diversions of 155,000 AF. SCWA and EBMUD share the FRWP diversions. SCWA is
40 allowed up to 131 cfs (85 mgd) and EBMUD gets 155 cfs (100 mgd). Therefore, the maximum quantity
41 EBMUD can divert in any year is 112,000 AF.

42 Assumptions in the 2003 Draft EIR/EIS for FRWP are contained in Technical Appendix 3, Modeling Appendix
43 (starting on page 3-84). This appendix cites the constraints of EBMUD’s use of FRWP for CVP water, which
44 limit EBMUD to using FRWP facilities only in dry years (an assumption consistent with the EIR/EIS
45 evaluation). The modeling studies were conducted for the historical hydrologic conditions experienced from
46 1922 to 1993. During this modeling sequence, only 22 years of the 72 years studied showed EBMUD water

diversion. The average amount of water was 23,000 AF with a maximum of 112,000 AF, with the maximum occurring in only three years. Therefore, a significant amount of EBMUD FRWP unused capacity currently exists and could be used in the future.

The National Oceanic and Atmospheric Administration (NOAA) fisheries and USFWS BiOps for the FRWP do not contain operational restrictions on the Freeport diversions. They both conclude that the expected “take” of listed species (i.e., fish that are attracted by flows at the screen and are subsequently injured or become easy prey because of disorientation) is low, and not likely to harm the species. This finding is significant because FRWP, like the CCWD diversions at Rock Slough, Old River, and Victoria Canal intakes, is not constrained from pumping water transfers to just three months like the SWP and CVP facilities in the southern Delta. Also, FRWP diversions of transferred water could be accomplished in wetter years when the SWP and CVP excess pumping capacity in the southern Delta is unavailable.

While EBMUD has pumping capacity at FRWP, the following constraints exist on its use:

- CEQA evaluations would be needed unless the use was for water transfers under CWC Section 1725, which are exempted from CEQA but must go through the State Board expedited approval process.
- Because the FRWP water is moved through the Folsom South Canal, BARR agencies would need a Warren Act agreement with USBR for moving non-CVP water and this transfer would have NEPA implications that BARR agencies will need to address.
- EBMUD does not currently use the conveyance facilities from FRWP to the Mokelumne Aqueducts (including the Folsom South Canal) regularly and needs up to three months of advanced notice to prepare for facilities startup.
- Putting water into the Mokelumne Aqueduct 2, which is under pressure (head) from Pardee, comes with substantial pumping costs.
- Treatment concerns related to Delta water from FRWP are more restrictive than water from Pardee; therefore, EBMUD would need to plan to have the right treatment plants and associated operational facilities available for this water, and that can take time and include logistical considerations.
- Because of the way EBMUD’s system is currently plumbed, both Aqueducts 1 and 2 are dedicated to FRWP operations, and thus use of Freeport needs to be scheduled when EBMUD’s demands can be met using only Aqueduct 3 and its allotment of FRWP water (if available).
- Costs including startup and shutdown costs, O&M (including the aforementioned power costs), capital recovery, Sacramento Municipal Utility District fees, etc. can be significant; while this fee is a negotiated value, it could be about \$400/AF, or perhaps higher.

EBMUD has agreements in place with CCWD and SCVWD for the use of the FRWP that have a small impact on capacity. EBMUD also has developed Principles for the Use of Unassigned Capacity and is in process of updating the Principles. Further, EBMUD has developed, internally, wheeling principles. Generally, EBMUD is open to the Freeport Diversions for use by others and is actively working with other water districts to expand the use of the Freeport Diversion facility.

Points of Diversion Changes

Changes to points of diversion for BARR agencies’ existing CVP/SWP water rights could increase access to the agencies’ storage facilities. Increased supply in storage could provide a mechanism for long-term regional exchanges. The BARR agencies could also take advantage of the currently permitted CVP/SWP joint point of diversion in their water-right permits when the conditions allowing its use are met.

The changes in points of diversion have the largest potential expand Bay Area water supplies. Classic water transfers are basically a change in the point of diversion and the place of use of the seller water rights to

1 those of the buyer. For water exchanges between or among BARR agencies, the agencies may need to
2 change only the points of diversion.

3 The water exchange between CCWD (CVP contractor) and ACWD (SWP contractor) in the dry year of 2014 is
4 a good example of applying a change in a point of diversion for a water exchange. ACWD purchased CCWD
5 water held in storage in LV Reservoir. Because the CCWD system does not connect physically to ACWD,
6 CCWD's CVP point of diversion was changed to the SWP Banks Pumping Plant. The State Board approved
7 this change petition under CWC Section 1725, allowing CCWD CVP water to be pumped at the SWP Banks
8 Pumping Plant for delivery to ACWD, and ACWD water held in LV was released to serve CCWD demand that
9 would have been met if it had pumped the CVP water at its own facilities. In essence, ACWD indirectly
10 leveraged another BARR agency's existing storage.

11 **Use of SWP Allocations to "Store" Water by Exchange.** In 2015, ACWD and Zone 7 attempted to place a
12 small portion of their SWP allocations into virtual storage in LV. The storage was virtual because the CCWD
13 would use the diverted water by allowing CCWD to provide ACWD and Zone 7 a virtual storage credit in LV.
14 Though DWR did not support using an SWP allocation, they allowed ACWD and Zone 7 (through exchange
15 within the SWP) to move ACWD and Zone 7 supplies stored in Semitropic to CCWD. This action required a
16 point of diversion change petition to the State Board to allow CCWD to divert SWP water at its Delta facilities.
17 The water would then return to the ACWD and Zone 7 in the same manner as in 2014 (i.e., move water from
18 LV storage to ACWD). The State Board approved the petition but time ran out before the water could be
19 physically diverted.

20 The BARR agencies could consider resolving the DWR concerns about use of SWP allocations for exchanges
21 like the type ACWD used. Exchanges between CVP and SWP contractor water allocations south of the Delta
22 occur regularly under the Consolidated Place of Use petition filed almost each year by DWR.

23 Comparing actual storage to virtual storage can be complicated. Storage from a water rights perspective is
24 carrying water over from one season to another. The water rights regulations state that for licensing
25 purposes, water held for less than 30 days is considered regulation and water held for more than 30 days is
26 considered storage. When one gets a water right, it typically states, among many other things, the amount
27 that can be diverted directly to use and the amount of water that can be stored by the water right holder. The
28 past practice by the Division of Water Rights at the State Board has been to consider storage by the water
29 right holder in its facilities. Once water is delivered to a contractor for use within the permitted place of use,
30 the Division does not track if the water was subsequently stored by the contractor in its own facilities or
31 those of other water users farther down the water delivery chain. The concern has been that taken to the
32 extreme, the Division could be responsible for tracking storage in every swimming pool in Southern
33 California. In the case of the Kern Water Bank and Diamond Valley, these local storage programs by
34 contractors of the SWP are not considered storage by DWR under the DWR water right permits for the SWP.
35 However, DWR water storage in San Luis Reservoir is covered in the water-rights permits of DWR for the
36 SWP. Conversations with the current Division Chief of the Division of Water Rights confirms that this past
37 practice still applies (Division of Water Rights on Storage 2016). Therefore, contractors of SWP water like
38 ACWD should be able to take their SWP allocation and store it into LV without the need for the virtual storage
39 in the future once an agency resolves this issue with DWR.

40 **Changes in Water Deliveries**

41 Another consideration is the concept of changing BARR agencies' water deliveries to allow for new storage
42 opportunities of CVP or SWP water locally in wetter years for use in drier years. BARR agencies with CVP or
43 SWP water supply contracts have access to water that is in excess of that needed by SWP or CVP. While the
44 SWP/CVP facilities may not have storage capacity available during these excess conditions, the SWP and
45 CVP water supply contractors can store water in their own facilities or in facilities owned by others under
46 contract arrangements.

1 For SWP water supply contractors, the use of excess water and SWP facilities to capture such supply is
2 allowed under their SWP long-term water supply contracts in Article 21 or 56. Article 21 allows a contractor
3 to use or store excess SWP water, while Article 56 allows a contractor to use SWP facilities for either
4 conveyance or storage of water south or west of the Delta, provided that conveyance or storage is not
5 needed by the SWP. The CVP water supply contracts in Articles 3 and 215 contain similar contract
6 provisions.

7 BARR agencies with CVP or SWP water supply contracts have made arrangements to use these surplus flows
8 to the extent possible considering available storage capacity (i.e., either locally or under contract for storage
9 otherwise). Most arrangements for surplus flows were made before the federal fishery agencies adopted the
10 current set of BiOps in 2008 and 2009. The BiOps required SWP/CVP to change their operations such that
11 about one million AF (about 20 percent) goes towards protection of endangered species), as well as the
12 reduced frequency of SWP/CVP excess water (i.e., beyond that capable of being used by the SWP or CVP).
13 For example, before the BiOps were adopted, San Luis Reservoir (the major off-stream reservoir south of the
14 Delta operated jointly for the SWP and CVP) filled during about four of five years and, once filled, typically
15 held excess water available to CVP or SWP contractors. However, after the BiOps were adopted, San Luis
16 Reservoir now fills only during about one of five years. Therefore, availability of excess water has been
17 greatly reduced and now occurs rarely.

18 CVP and SWP contractors often struggle to meet demands when water allocations are reduced, as in recent
19 years. When annual water allocations exceed the supply needed to meet that year's demands, agencies
20 typically store the excess water if storage capacity is available in existing local reservoirs, local groundwater
21 basins, or out-of-basin groundwater storage like that of Semitropic Water Storage District (Semitropic) or
22 Cawelo Water District. Therefore, demand reduction could provide for more storage opportunities, especially
23 in higher water allocation years. When the opportunity to acquire excess water presents itself, storing in local
24 reservoirs or groundwater basins would be beneficial. While out-of-basin groundwater storage is another
25 option, it is much more difficult, and in some years, virtually impossible, to bring water stored farther south
26 back to the BARR agencies.

27 **"Backing Up" Water in CVP or SWP Reservoirs**

28 In the Delta, the SWP and CVP typically divert water for transfers based on the pattern in which the water is
29 made available by the seller. As new water becomes available (by actions taken by the seller to reduce the
30 consumptive use of surface-applied water or released from reservoirs beyond that which would otherwise
31 accrue to the system), the water is pumped for the buyer at the SWP or CVP facilities, provided that excess
32 capacity exists for pumping and the Delta is in balanced conditions. At times, water is made available by the
33 seller, but the water cannot be pumped. This situation results in a water loss for the buyer.

34 The term "backing up" water into CVP or SWP reservoirs refers to the ability of the SWP and CVP to take
35 advantage of the "new" water in the system made available by the water transfer to meet Delta outflow or
36 water quality standards. This action reduces reservoir releases that would have been made if that "new"
37 transfer water was not in the system. In this manner, the transfer water is not exported on the pattern that it
38 is made available, but is in effect "backed up" into a CVP or SWP reservoir. This water is then released later
39 and pumped in the Delta when the water transfer window opens, typically that same year.

40 **Physical and Policy Issues.** Both physical and policy issues exist with "backing up" water by the CVP or SWP.
41 Physically, the new water made available by the water transfer activities must enter the system at a time and
42 location that allows the reservoir releases from the SWP or CVP to meet Delta standards to be reduced. Such
43 events occur only infrequently. Reservoir releases are often dictated by instream flow, temperature, or
44 navigation requirements downstream of the reservoir. When these flows enter the Delta, they may be higher
45 than that needed to meet Delta outflow or water quality requirements and instead of going out the Delta, the
46 CVP or SWP pumps such water for its own purposes. Under these conditions, adding more water to the

1 system in the form of a water transfer if that water accrues outside the water transfer window (July to
2 September) does not provide a benefit to the reservoir storage and cannot be backed up. These conditions
3 happen often.

4 However, in the past, the CVP and SWP have backed up water. The SWP does back up water when it can as
5 part of its agreement under the Yuba Accord because the Accord has the potential to benefit all its
6 contractors. Also, during the recent drought, the CVP did back up transfer water into Shasta for the CVP
7 contractors to keep Shasta higher than it would have been otherwise in the summer to assist in meeting
8 temperature requirements in the Sacramento River below Shasta. CVP then released this water for transfer
9 later in the summer and early fall during an expanded water transfer window.

10 However, both the SWP and CVP hold to a policy position that these events are exceptions and cannot be
11 relied upon in other circumstances. For the SWP, DWR does not interpret Article 56 (which allows
12 contractors use of underutilized SWP facilities) to apply to water stored in Lake Oroville. DWR does not want
13 to keep track of individual contractor water supplies in Lake Oroville. While DWR carries out such storage in
14 San Luis Reservoir, it does so after it has allocated the water to individual contractors. The CVP has a similar
15 policy opposition to backing up water into Shasta or Folsom Reservoirs for individual contractors. Therefore,
16 BARR agencies should not rely on the ability to “back up” water without a change in the policy positions of
17 both USBR and DWR.

18 **Water Quality Benefits**

19 Water quality benefits of operational flexibility by the BARR agencies is possible depending on where the
20 water can be diverted. For example, water quality benefits could accrue if water can be diverted at the FRWP
21 on the Sacramento River under the EBMUD diversion capability instead of diverting water in the southern
22 Delta. This same but more extensive water quality benefit would accrue if the California WaterFix is
23 implemented.

24 **Summary**

25 Currently water transfers pumped at the SWP or CVP facilities in the southern Delta are restricted to three
26 summer months. Capacity to move water through transfers is now physically limited to the driest one-third of
27 the water years. Using EBMUD’s dedicated capacity at the FRWP could allow more water transfers rather
28 than be limited only to use in dry years. More transfers may be enabled if the State approves and builds the
29 California WaterFix.

30 Changes in points of diversion between BARR agencies can allow for the access to storage capabilities of
31 some BARR agencies without the need to construct new facilities. However, BARR agencies would need to
32 build new physical connections to make such exchanges easier in the long term. Also, the BARR agencies
33 should take advantage of the currently permitted joint point of diversion between the SWP and CVP in their
34 water-right permits when the conditions that allow the use of the joint point of diversion are being met. The
35 BARR agencies need to evaluate the place of use boundaries of the SWP and CVP to ensure that for any
36 specific exchange, those places of use overlap; if they do not, then the BARR agencies should seek permit
37 changes to the places of use sufficient to allow such exchanges.

38 In addition, the SWP contracts do not allow SWP water to be sold except through very complex processes set
39 forth in the SWP contracts. The contracts do allow SWP water to be exchanged with others in one year so
40 long as it is returned in a future year. The return rate can vary from 1:1 to 1:2 or greater depending on the
41 agreement between the parties. The contracts do not limit the year in which the water is returned but the
42 contractors must convince DWR that the water will be returned for DWR to allow the exchange to commence.

43 The other possible flexibilities evaluated, changes in demand and “backing up water,” do not hold much
44 promise. Reductions in demand could allow for more storage opportunities in higher water allocation years.

1 However, with the water supply reductions to both the SWP and CVP resulting from the 2008 and 2009
2 BiOps, the BARR agencies with SWP and CVP water supply contracts may need to reduce demand just to
3 match this reduced water supply.

4 The potential to back water up into SWP and CVP reservoirs has two burdens. First, the physical ability to
5 back water up does not occur very often and can vary from week to week during the times when needed.
6 Second, both DWR and USBR have policies against backing up water for individual contractors into upstream
7 storage reservoirs except in limited circumstances that benefit either the ability to meet temperature
8 requirements downstream or the benefit accrues to all their contractors.

9 Water quality benefits of changing the point of diversion for water supplies to BARR agencies can accrue if
10 the revised point of diversion is farther from the influence of saltwater intrusion. A good example is the use
11 of excess FRWP capacity of EBMUD. Also, if approved and constructed, California WaterFix may benefit water
12 quality of CVP/SWP water supplies.