AGENDA
IRVINE RANCH WATER DISTRICT
SUPPLY RELIABILITY PROGRAMS COMMITTEE
FRIDAY, FEBRUARY 16, 2018

CALL TO ORDER 12:00 p.m., Committee Room, Second Floor, District Office
15600 Sand Canyon Avenue, Irvine, California

ATTENDANCE
Committee Chair: Peer Swan _____
Member: Douglas Reinhart _____

ALSO PRESENT

Paul Cook	_____	Kellie Welch	_____
Rob Jacobson	_____	Patrick Sheilds	_____
Ray Bennett	_____	Paul Weghorst	_____
Jo Ann Corey	_____	Dane Johnson	_____
Fiona Sanchez	_____	Christine Compton	_____
_____	_____	_____	_____

COMMUNICATIONS

1. Notes: Weghorst
2. Public Comments
3. Determine the need to discuss and/or take action on item(s) introduced that came to the attention of the District subsequent to the agenda being posted.
4. Determine which items may be approved without discussion.

INFORMATION

5. WATER BANKING PROJECT FACILITIES, CAPACITIES, OPERATIONS AND PROGRAMS OVERVIEW – JOHNSON/WELCH/SANCHEZ/ WEGHORST

   Recommendation: Receive and file.

6. KERN FAN GROUNDWATER STORAGE PROJECT UPDATE – SANCHEZ/ WEGHORST

   Recommendation: Receive and file.

OTHER BUSINESS

9. Directors' Comments

10. Closed Session

CONFERENCE WITH REAL PROPERTY NEGOTIATORS - Pursuant to Government Code Section 54956.8:

Property: Acquire an interest in 1,280 acres of land within Rosedale Rio Bravo Water Storage District ("Rosedale"), County of Kern, California

Agency negotiator: Paul Cook, General Manager

Negotiating parties: Irvine Ranch Water District and Rosedale as joint buyers, with sellers to be determined

Under negotiation: Price and terms for acquisition of 1,280 acres of land

11. Adjourn

****

Availability of agenda materials: Agenda exhibits and other writings that are disclosable public records distributed to all or a majority of the members of the above-named Committee in connection with a matter subject to discussion or consideration at an open meeting of the Committee are available for public inspection in the District's office, 15600 Sand Canyon Avenue, Irvine, California ("District Office"). If such writings are distributed to members of the Committee less than 72 hours prior to the meeting, they will be available from the District Secretary of the District Office at the same time as they are distributed to Committee Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available at the entrance of the meeting room at the District Office. The Irvine Ranch Water District Committee Room is wheelchair accessible. If you require any special disability-related accommodations (e.g., access to an amplified sound system, etc.), please contact the District Secretary at (949) 453-5300 during business hours at least seventy-two (72) hours prior to the scheduled meeting. This agenda can be obtained in an alternative format upon written request to the District Secretary at least seventy-two (72) hours prior to the scheduled meeting.

February 16, 2018
Prepared by: D. Johnson/K. Welch
Submitted by: F. Sanchez/P. Weghorst
Approved by: Paul A. Cook

SUPPLY RELIABILITY PROGRAMS COMMITTEE

WATER BANKING PROJECT FACILITIES, CAPACITIES, OPERATIONS AND PROGRAMS OVERVIEW

SUMMARY:

Staff has prepared information related to IRWD's water banking facilities, capacities, exchange programs and operations that may serve as reference during Committee meetings. The information is presented in a format that can be updated as necessary to reflect changes in IRWD's projects, programs and operations. At the Committee meeting, staff will review this information and provide an update on ongoing efforts to increase recharge rates and to secure additional water for recharge at IRWD's water banking projects.

BACKGROUND:

To assist with the facilitation of Committee meeting discussions, staff has prepared reference materials in tabular, map and schematic formats that describe IRWD's water banking facilities, capacities, operations and exchange programs. The reference materials will be updated, as needed, to reflect changes to the projects, programs and operations. Following is an overview of the reference materials provided. Information is also provided regarding IRWD's 2018 water banking operations and ongoing pond infiltration study.

Capacity and Operations Tables:

A table presenting storage, recharge and recovery capacities of existing and planned IRWD water banking projects, including capacities available to IRWD in the Kern Water Bank, is attached as Exhibit "A". Exhibits "B" and "C" provide an update on water banking recovery and recharge operations and the balance of the water stored in the Kern Water Bank. Exhibit "B" provides before-loss estimates of water recharged at the water banking projects, and Exhibit "C" provides after-loss estimates of water recharged at the projects. Both Exhibits "B" and "C" include a column that provides totals for each water type and storage location.

Pond Infiltration Study:

Staff has been coordinating with Rosedale-Rio Bravo Water Storage District (Rosedale) in conducting a pond infiltration study using the recharge basins on the south side of the Strand Ranch. On November 1, 2017, Rosedale initiated the study by measuring baseline recharge rates. On November 10, water deliveries were terminated into recharge basins numbered 4, 5 and 6 on the Strand Ranch. The locations of these three basins are shown on Exhibit "F". Once these three basins were sufficiently dried, Rosedale implemented various land treatments through the use of a contractor. Rosedale contracted to have approximately three inches of silt removed from one of the basins. On the second basin, Rosedale had the contractor scrape off a fine layer of silt and then rip the bottom of the basin to a depth of 30 inches. The third basin was allowed to dry and crack with no further treatment. The land treatments at the three basins were completed on December 18, 2017,

and Rosedale then began delivering water to the basins. Water deliveries to the basins continued through January and ended on February 1, 2018. Rosedale is currently performing measurement of recharge rates at all three basins. At the meeting, staff will update the Committee on recent activities related to the study. At the Committee meeting in March, staff will present the results of the Strand Recharge Pond Infiltration Study and recommendation for additional basin work.

2018 Recharge Opportunities:

Staff has been pursuing additional opportunities to secure recharge water for 2018. At the Committee meeting, staff will provide an update on efforts to secure water from:

- Antelope Valley-East Kern Water Agency;
- Dudley Ridge Water District;
- Metropolitan Water District of Southern California; and
- Other Opportunities.

Project Maps:

To support the tables provided as Exhibits "A", "B" and "C", staff has prepared maps that depict project wells and pipelines, recharge basins and CVC turnout locations, along with current recharge rates. These maps are provided as Exhibits "D", "E", and "F", respectively. The facilities shown on these maps are associated with the Strand Ranch, Stockdale West, Stockdale East and Rosedale Drought Relief Projects.

Program Agreement Diagrams:

Schematic diagrams have been prepared that depict the IRWD water banking and exchange programs with Rosedale, Buena Vista Water Storage District, DRWD and Metropolitan Water District of Southern California. These diagrams are provided as Exhibits "G", "H", "I", "J" and "K" as described in the List of Exhibits.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – Recharge, Storage and Recovery Capacities of Current and Anticipated Water Banking Projects
Exhibit "B" – Water Banking Storage, Recharge and Recovery Operations before Losses
Exhibit "C" – Water Banking Storage, Recharge and Recovery Operations after Losses
Exhibit "D" – Map of Water Banking Project Wells and Pipelines
Exhibit "E" – Map of Water Banking Recharge Basins and Cross Valley Canal Turnout Facilities
Exhibit "F" – Map of Water Banking Recharge Rates
Exhibit "G" – Diagram of IRWD-Rosedale Water Banking and Exchange Program Agreements
Exhibit "H" – Diagram of Long-Term Water Exchange Program with Buena Vista Water Storage District and Diagram of One-Year Program to Augment Recharge Using Stockdale West Recharge Facilities with Buena Vista Water Storage District
Exhibit "I" – Diagram of Unbalanced Exchange Program Diagram with DRWD
Exhibit "J" – Diagram of Coordinated Operating, Water Storage, Exchange and Delivery Agreement with Metropolitan
Exhibit "K" – Diagram of Template Wheeling Agreement with Metropolitan

Exhibit "A"

TABLE 1
Current and Anticipated Water Banking Projects
Recharge, Storage and Recovery Capacities
February 16, 2018

WATER BANKING PROJECT	OWNERSHIP AND WELL INFO			ALLOCATED CAPACITY (AF)					1st PRIORITY RECOVERY CONDITIONS (CFS)		2nd PRIORITY RECOVERY CONDITIONS (CFS)	
	IRWD OWNED	WELLS EXISTING	WELLS PROPOSED OR UNDER CONST.	TOTAL STORAGE CAPACITY	ANNUAL RECHARGE 1ST PRIORITY	ANNUAL RECHARGE 2ND PRIORITY	ANNUAL RECOVERY 1ST PRIORITY	ANNUAL RECOVERY 2ND PRIORITY	RECOVERY CAPACITY AS PLANNED[1]	ESTIMATED RECOVERY CAPACITY (DEC. 2016 CONDITIONS)[2]	RECOVERY CAPACITY AS PLANNED	RECOVERY CAPACITY CURRENT CONDITIONS
Strand Ranch	Yes	7	-	50,000	17,500	-	17,500	-	40.0	27.0	-	-
Stockdale West	Yes	3	-	26,000	27,100	-	11,250	-	15.0	-	-	-
Stockdale East	No	-	2	-	-	19,000	-	7,500	-	-	10.0	-
IRWD Acquired Storage Account[3]	No	-	-	50,000	-	-	-	-	-	-	-	-
Drought Relief Project Wells[3]	No	-	3	-	-	-	-	-	15.0	-	-	-
Kern Water Bank Storage Account[5]	No	-	-	9,495	3,200	-	6,330	-	-	-	-	-
TOTALS		**10**	**5**	126,000	44,600	19,000	28,750	7,500	70.0	27.0	10.0	0.0
Partner Capacities[4]				36,000	22,300	9,500	12,000	0	35.5	27.0	-	-
IRWD Capacities				90,000	22,300	9,500	16,750	7,500	34.5	0.0	-	-
IRWD's recovery ***during*** 6 month partner recovery period (AF)									12,420	0.0	-	-
IRWD's recovery ***after*** 6 month partner recovery period (AF)									4,330	6,733	-	-
TOTALS (AF)									16,750	6,733	-	-
Number of months needed to recover IRWD's total AF after partners' recovery (Assumes IRWD has use of total recovery capacity after partners' recovery)									8.1	14.0	-	-

[1] Based on designed Strand recovery capacity assuming 370' bgs. Assumes 5 cfs for each of the Stockdale West and Drought Relief wells in order to meet IRWD's Water Banking, Transfers, and Wheeling policy position. Assumes partners' water is recovered over 6 months.

[2] Strand Ranch wells currently idle.

[3] IRWD has use of Acquired Storage and Drought Relief Project wells until January 12, 2039, unless the term of the agreement is extended.

[4] One half of storage capacity at Stockdale West and Strand Ranch will be allocated for partners.

[5] Kern Water Bank capacities based on 6.58% of Dudley Ridge Water District's 9.62% share of the Kern Water Bank. Annual recharge amount is based on an average of recharge rates for high and low groundwater level conditions. Not included in storage capacity, recharge, and recovery totals to match IRWD's Water Banking Policy Position Paper (10/26/2015).

Exhibit "B"

TABLE 2
IRWD's Water Banking Storage, Recharge and Recovery Operations - BEFORE LOSSES
February 16, 2018

TRANSACTIONS	WATER BANKING ENTITY					TOTAL BY WATER TYPE AND STORAGE LOCATION
	IRWD		BUENA VISTA (BVWSD)	CENTRAL COAST (CCWA)	DUDLEY RIDGE WATER DISTRICT (DRWD)[3]	
	SWP[1]	NON-SWP[2]	NON-SWP	SWP	SWP	
BEGINNING WATER IN STORAGE 2017 (AF)						
Total Kern Water Bank	-	4,581	-	-	-	4,581
Total MWD System[4]	8,873	-	-	-	1,174	10,047
Total Kern County	437	10,835	-	-	-	11,272
TOTAL STORED WATER (1/1/2016)	9,310	15,416	-	-	1,174	25,900
(RECOVERY) AND RECHARGE IN 2017 (AF)						
Kern Water Bank Deliveries	-	75	-	-	-	75
2017 SWP Allocation (85%)[3]	787	-	-	-	787	1,574
2017 SWP Article 21[5]	1,744	-	-	-	1,744	3,488
SWP Table A (CCWA 2017 Exch.)	289	-		289	-	578
High Flow Kern River	-	6,827	6,827	-	-	13,654
MWD Water to Jackson Ranch[6]	-	-	-	-	(143)	(143)
TOTAL 2016 TRANSACTIONS	2,820	6,902	6,827	289	2,388	19,226
Total Kern Water Bank	-	4,656	-	-	-	4,656
Total MWD System	8,873	-	-	-	1,174	10,047
Total Kern County	3,257	17,662	6,827	289	2,388	30,423
TOTAL STORED WATER (1/1/2018)	12,130	22,318	6,827	289	3,562	45,126
(RECOVERY) AND RECHARGE IN 2018 (AF)						
Kern Water Bank Deliveries	-	-	-	-	-	-
2018 SWP Allocation (20%)[3]	175	-	-	-	175	350
TOTAL ESTIMATED 2018 TRANSACTIONS	175	-	-	-	175	350
ESTIMATED WATER IN STORAGE 2018 (AF)						
Total Kern Water Bank	-	4,656	-	-	-	4,656
Total MWD System	8,873	-	-	-	1,174	10,047
Total Kern County	3,432	17,662	6,827	289	2,563	30,773
TOTAL ESTIMATED STORED WATER TO DATE	12,305	22,318	6,827	289	3,737	45,476

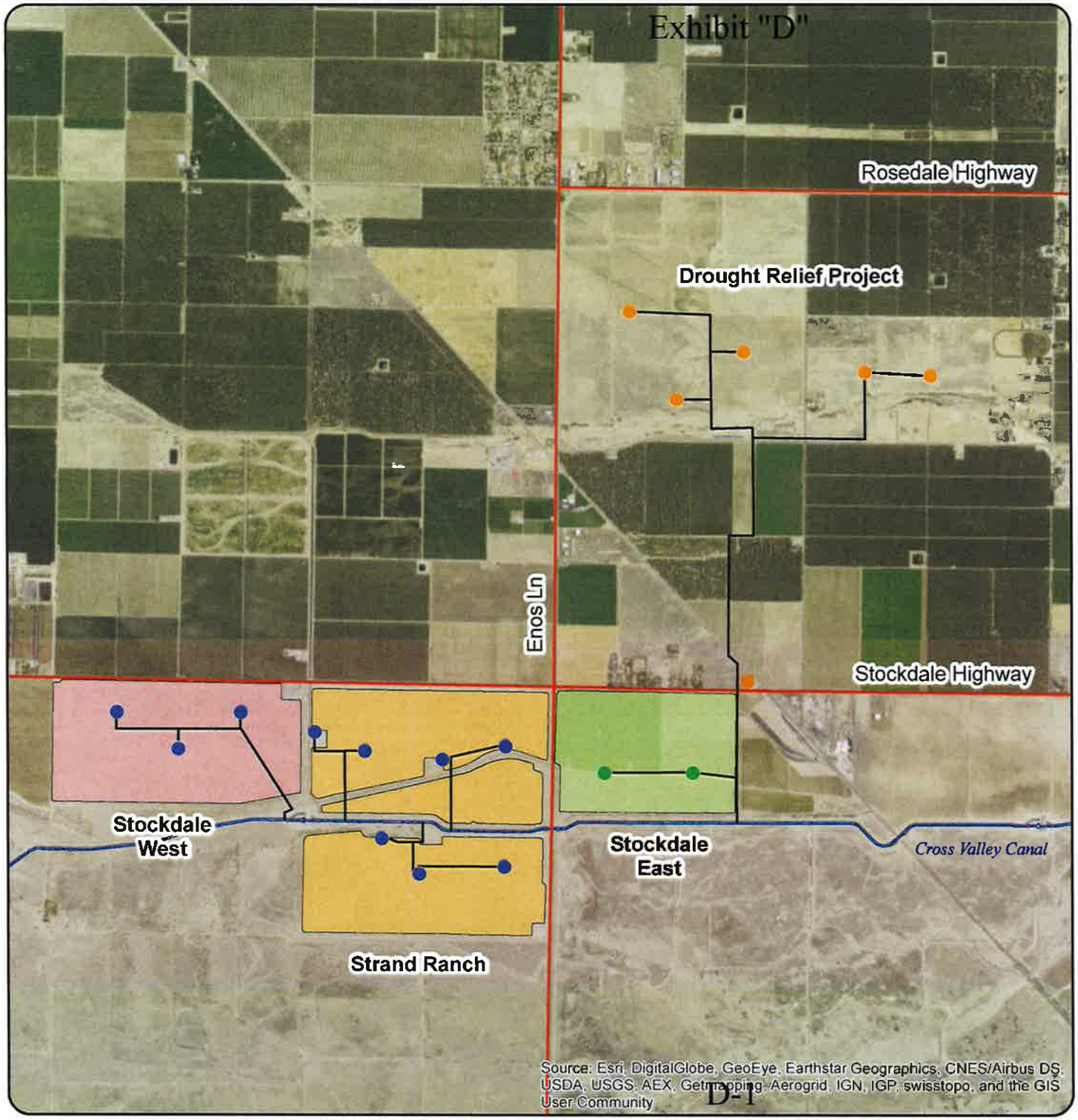
NOTES:
-MWD = Metropolitan Water District of Southern California.
[1] IRWD's SWP includes 437 AF from CVWD that stays in Kern County.
[2] IRWD's Non-SWP total includes 3,158 AF of Kern County Water Agency Article 21 Water.
[3] DRWD water supply will be returned by MWD or IRWD's Strand Ranch to IRWD's Jackson Ranch. IRWD's 2013-2016 SWP allocation amounts are stored in the MWD system. IRWD's 2017 SWP allocation water is stored in Kern County; assumes 2018 SWP water will be stored in Kern County.
[4] Beginning balance of water stored in MWD system includes 4,494 AF 2014 Exchange, 3,206 AF 2014 borrowed SWP, 649 AF IRWD's 2013-2016 SWP allocations through DRWD.
[5] Article 21 was deliverd to Strand Ranch/Stockdale West from 3/8/17 - 3/22/17. Deliveries made pursuant to the DRWD/MWD Unbalanced Exchange Program.
[6] Water returned to Kings County by MWD for use on IRWD's Jackson Ranch.

Exhibit "C"

TABLE 3
IRWD's Water Banking Storage, Recharge and Recovery Operations - AFTER LOSSES
February 16, 2018

TRANSACTIONS	WATER BANKING ENTITY					TOTAL BY WATER TYPE AND STORAGE LOCATION
	IRWD		BUENA VISTA (BVWSD)	CENTRAL COAST (CCWA)	DUDLEY RIDGE WATER DISTRICT (DRWD)[3]	
	SWP[1]	NON-SWP[2]	NON-SWP	SWP	SWP	
BEGINNING WATER IN STORAGE 2017 (AF)						
Total Kern Water Bank	-	4,165	-	-	-	4,165
Total MWD System[4]	7,917	-	-	-	1,174	9,091
Total Kern County	389	9,675	-	-	-	10,064
TOTAL STORED WATER (1/1/2016)	8,306	13,840	-	-	1,174	23,320
(RECOVERY) AND RECHARGE IN 2017 (AF)						
Kern Water Bank Deliveries	-	68	-	-	-	68
2017 SWP Allocation (85%)[3]	669	-	-	-	708	1,377
2017 SWP Article 21[5]	1,479	-	-	-	1,566	3,044
SWP Table A (CCWA 2017 Exch.)	246	-	-	246	-	491
High Flow Kern River	-	5,803	6,144	-	-	11,947
MWD Water to Jackson Ranch[6]	-	-	-	-	(143)	(143)
TOTAL 2016 TRANSACTIONS	2,393	5,871	6,144	246	2,131	16,784
Total Kern Water Bank	-	4,233	-	-	-	4,233
Total MWD System	7,917	-	-	-	1,174	9,091
Total Kern County	2,782	15,478	6,144	246	2,131	26,780
TOTAL STORED WATER (1/1/2018)	10,699	19,711	6,144	246	3,305	40,104
(RECOVERY) AND RECHARGE IN 2018 (AF)						
Kern Water Bank Deliveries	-	-	-	-	-	-
2018 SWP Allocation (20%)[3]	149	-	-	-	149	298
TOTAL ESTIMATED 2018 TRANSACTIONS[7]	149	-	-	-	149	298
ESTIMATED WATER IN STORAGE 2018 (AF)						
Total Kern Water Bank	-	4,233	-	-	-	4,233
Total MWD System	7,917	-	-	-	1,174	9,091
Total Kern County	2,931	15,478	6,144	246	2,280	27,078
TOTAL ESTIMATED STORED WATER TO DATE	10,848	19,711	6,144	246	3,454	40,402

NOTES:
-Water in storage has been adjusted to account for losses. IRWD's water stored in Kern County is adjusted 15% for losses (5% for out of county loss, 6% surface loss, and 4% reserve loss); Water stored for DRWD and BVWSD in Kern County is adjusted 10% (6% for surface loss and 4% for reserve loss); KWB losses are 10%; no losses for water directly delivered to MWD system.
-MWD = Metropolitan Water District of Southern California.
[1] IRWD's SWP includes 389 AF from CVWD that stays in Kern County.
[2] IRWD's Non-SWP total includes 2,842 AF of Kern County Water Agency Article 21 Water.
[3] DRWD water supply will be returned by MWD or IRWD's Strand Ranch to IRWD's Jackson Ranch. IRWD's 2013-2016 SWP allocation amounts are stored in the MWD system. IRWD's 2017 SWP allocation water is stored in Kern County.
[4] Beginning balance of water stored in MWD system includes (net of CVC losses) 3,920 AF 2014 Exchange, 2,824 AF 2014 borrowed SWP, 649 AF IRWD's 2013-2016 SWP allocations through DRWD.
[5]Article 21 was deliverd to Strand Ranch/Stockdale West from 3/8/17 - 3/22/17. Deliveries made pursuant to the DRWD/MWD Unbalanced Exchange Program. 9 AF of additional CVC losses, split among IRWD and DRWD, are reflected in these amounts.
[6]Water returned to Kings County by MWD for use on IRWD's Jackson Ranch.



Irvine Ranch WATER DISTRICT

Location Map: IRWD Water Banking Projects Wells and Turnin Pipelines

MAP FEATURES

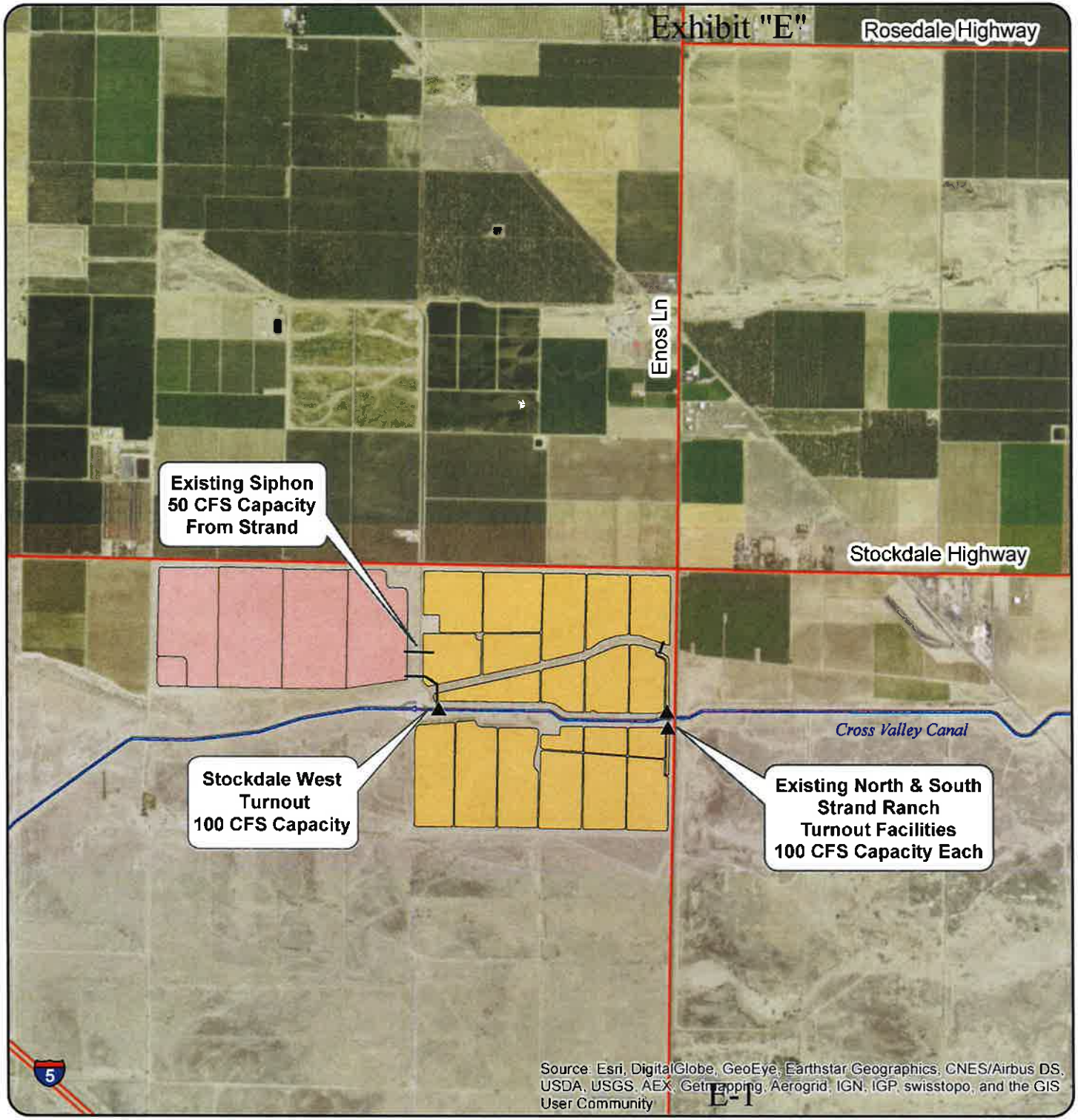
- Existing Extraction Well
- Planned Extraction Well
- Well Under Construction
- Well Discharge Pipelines
- Stockdale East
- Stockdale West
- Strand Ranch

This figure shows the location of IRWD's water banking project sites as well as existing and proposed extraction wells.

N

0 0.25 0.5 1 Miles

NAD 83 State Plane Zone 5 (feet)
Central Meridian: -118



Irvine Ranch WATER DISTRICT

Location Map: IRWD Water Banking Projects Recharge Basins &Turnout Facilities

MAP FEATURES

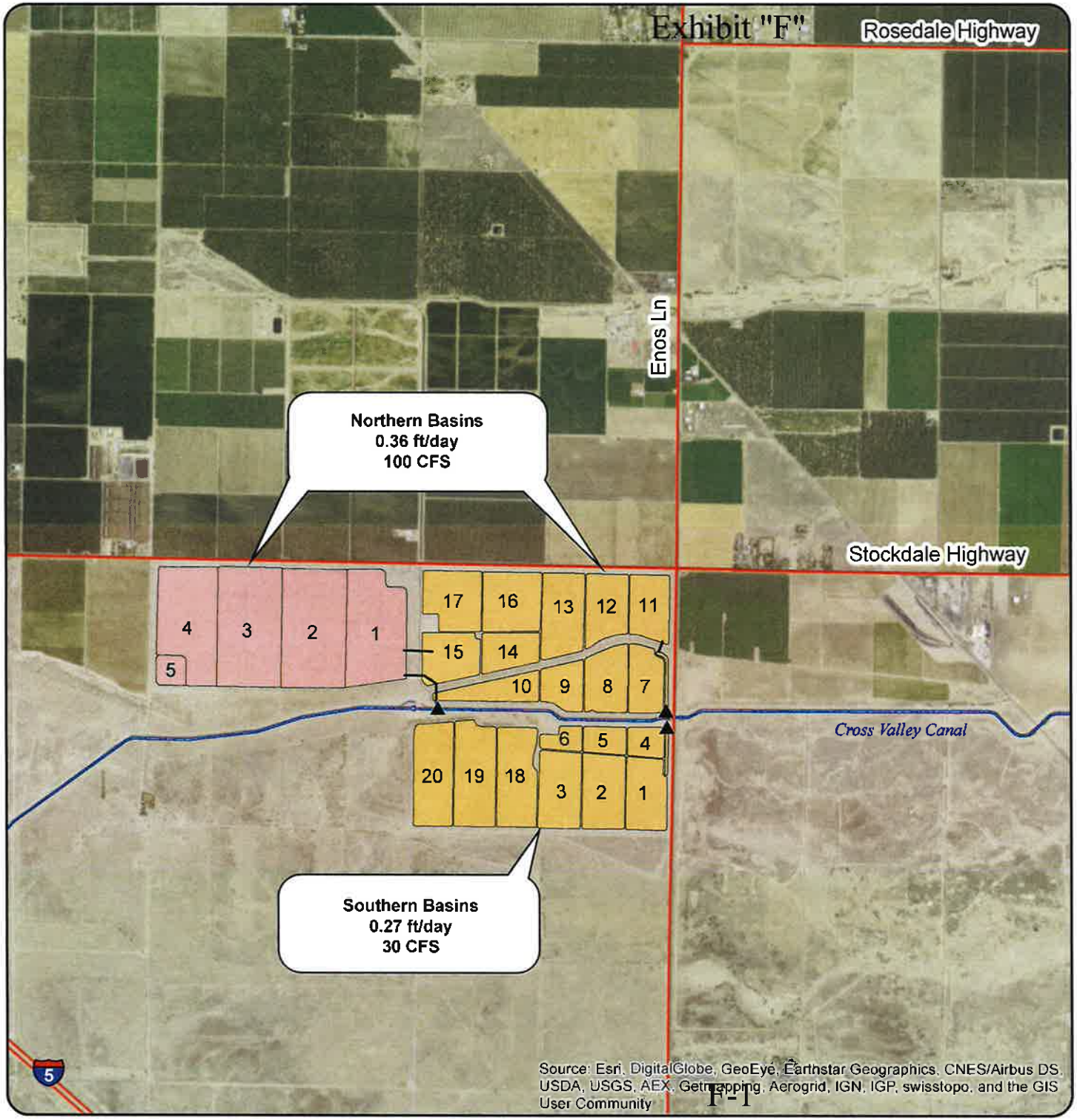
- Turnouts
- Stockdale West
- Strand Ranch

This figure shows the location of recharge basins as well as existing and anticipated pipelines and turnout facilities.

N

0 0.25 0.5 1 Miles

NAD 83 State Plane Zone 5 (feet)
Central Meridian: -118



Irvine Ranch WATER DISTRICT

Location Map: IRWD Water Banking Projects Recharge Rates

MAP FEATURES

- Turnouts
- Stockdale West
- Strand Ranch

This figure shows the location of recharge basins and their associated recharge rates as of early December 2017. Recharge rates for Basins 4, 5, and 6 will be updated at the conclusion of the Pond Infiltration Study.

N

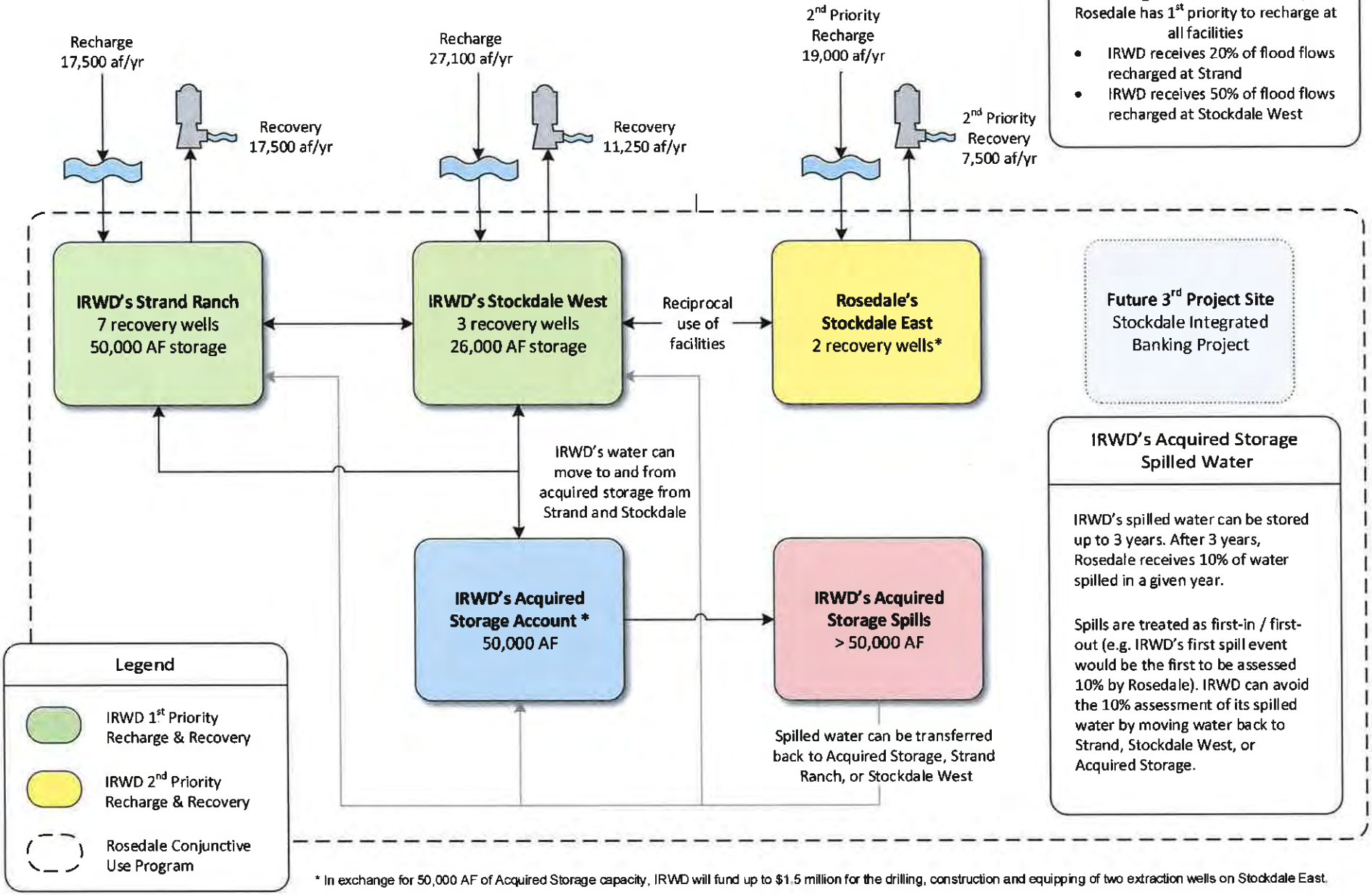
0 0.25 0.5 1 Miles

NAD 83 State Plane Zone 5 (feet)
Central Meridian: -118

Exhibit "G"

IRWD-Rosedale Water Banking and Exchange Program Agreements

Effective 1/12/2009 through 1/12/2039 (Strand Ranch)
2/4/2016 through 1/12/2039 (Stockdale West)



Recharge of Flood Flows

During Kern River flood flows, Rosedale has 1st priority to recharge at all facilities

- IRWD receives 20% of flood flows recharged at Strand
- IRWD receives 50% of flood flows recharged at Stockdale West

IRWD's Acquired Storage Spilled Water

IRWD's spilled water can be stored up to 3 years. After 3 years, Rosedale receives 10% of water spilled in a given year.

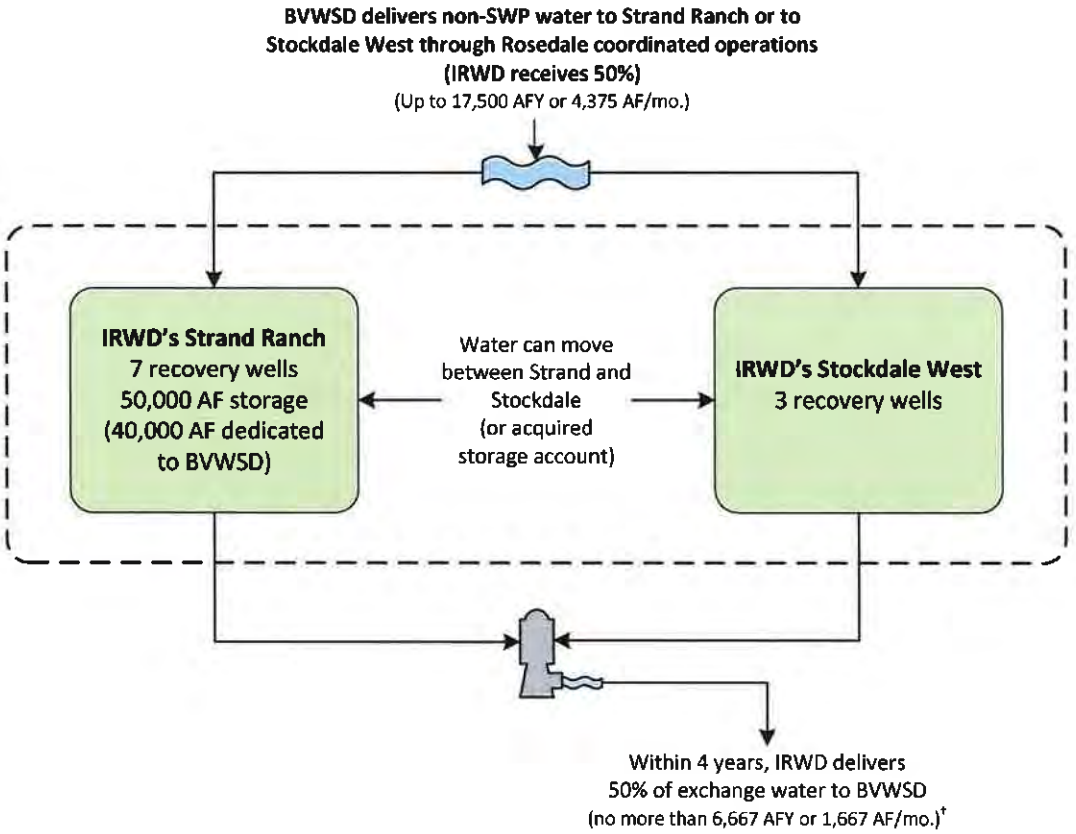
Spills are treated as first-in / first-out (e.g. IRWD's first spill event would be the first to be assessed 10% by Rosedale). IRWD can avoid the 10% assessment of its spilled water by moving water back to Strand, Stockdale West, or Acquired Storage.

* In exchange for 50,000 AF of Acquired Storage capacity, IRWD will fund up to $1.5 million for the drilling, construction and equipping of two extraction wells on Stockdale East.

Exhibit "H"

Buena Vista Water Storage District Long Term Water Exchange Program

Effective 1/1/2011 through 1/12/2039



Legend

- IRWD 1st Priority Recharge & Recovery
- Rosedale Conjunctive Use Program & Coordinated Operations

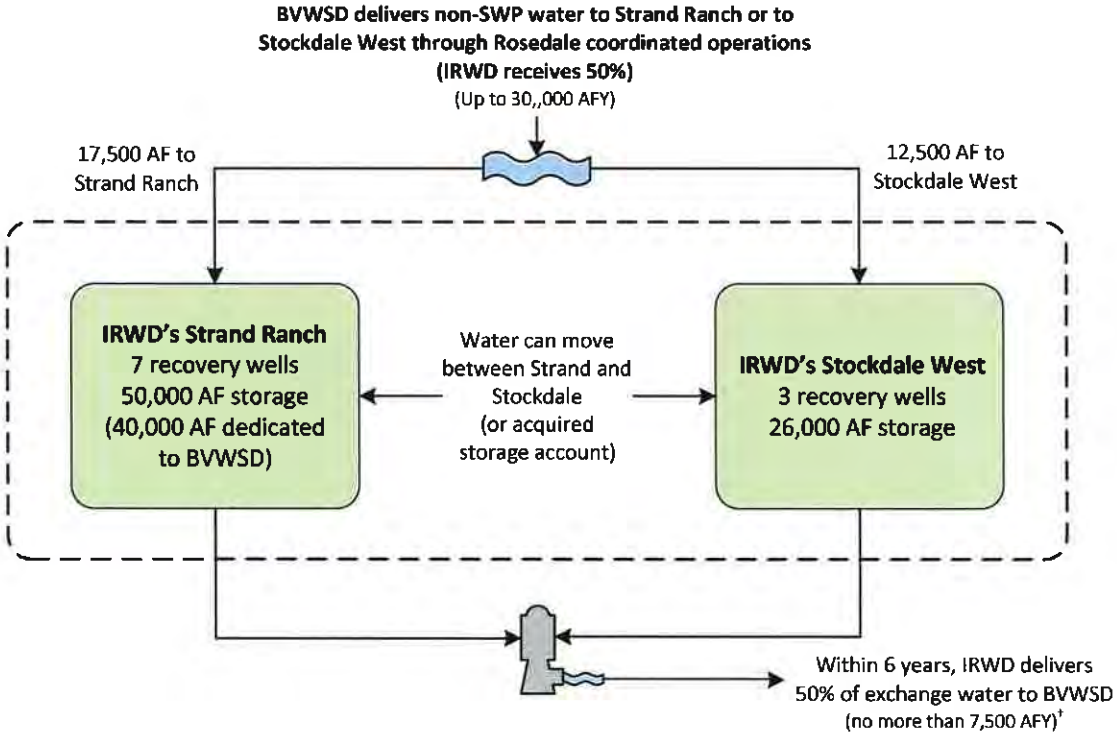
†IRWD shall remit one-half of the exchanged supply less one-half of reasonable losses back to BV no later than December 31st of the 4th year following the associated recharge event. IRWD pays for recovery of water returned to BV. Water to be remitted back to BV may remain in storage at Strand Ranch beyond the 4th year, in exchange for a greater percent being transferred to IRWD as compensation per the table shown to the right:

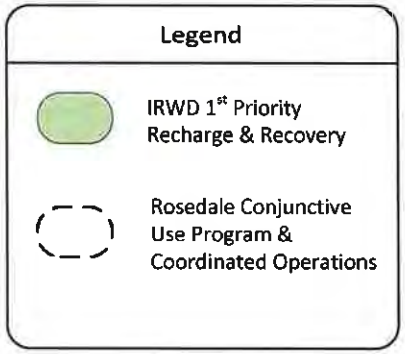
Year Following Recharge Event	Percent Transferred to IRWD	Percent Returned to BV During or Before Indicated Year
1	50%	50%
2	50%	50%
3	50%	50%
4	50%	50%
5	60%	40%
6	70%	30%
7	80%	20%
8	90%	10%
9	100%	0%

Exhibit "H"

Buena Vista Water Storage District One-Year Program to Augment Recharge Using Stockdale West Recharge Facilities

Effective 4/1/2017 through 3/20/2018





†IRWD shall remit one-half of the exchanged supply less one-half of reasonable losses back to BV no later than December 31st of the 6th year following the associated recharge event. IRWD pays for recovery of water returned to BV. Water to be remitted back to BV may remain in storage at Strand Ranch beyond the 6th year, in exchange for a greater percent being transferred to IRWD as compensation per the table shown to the right:

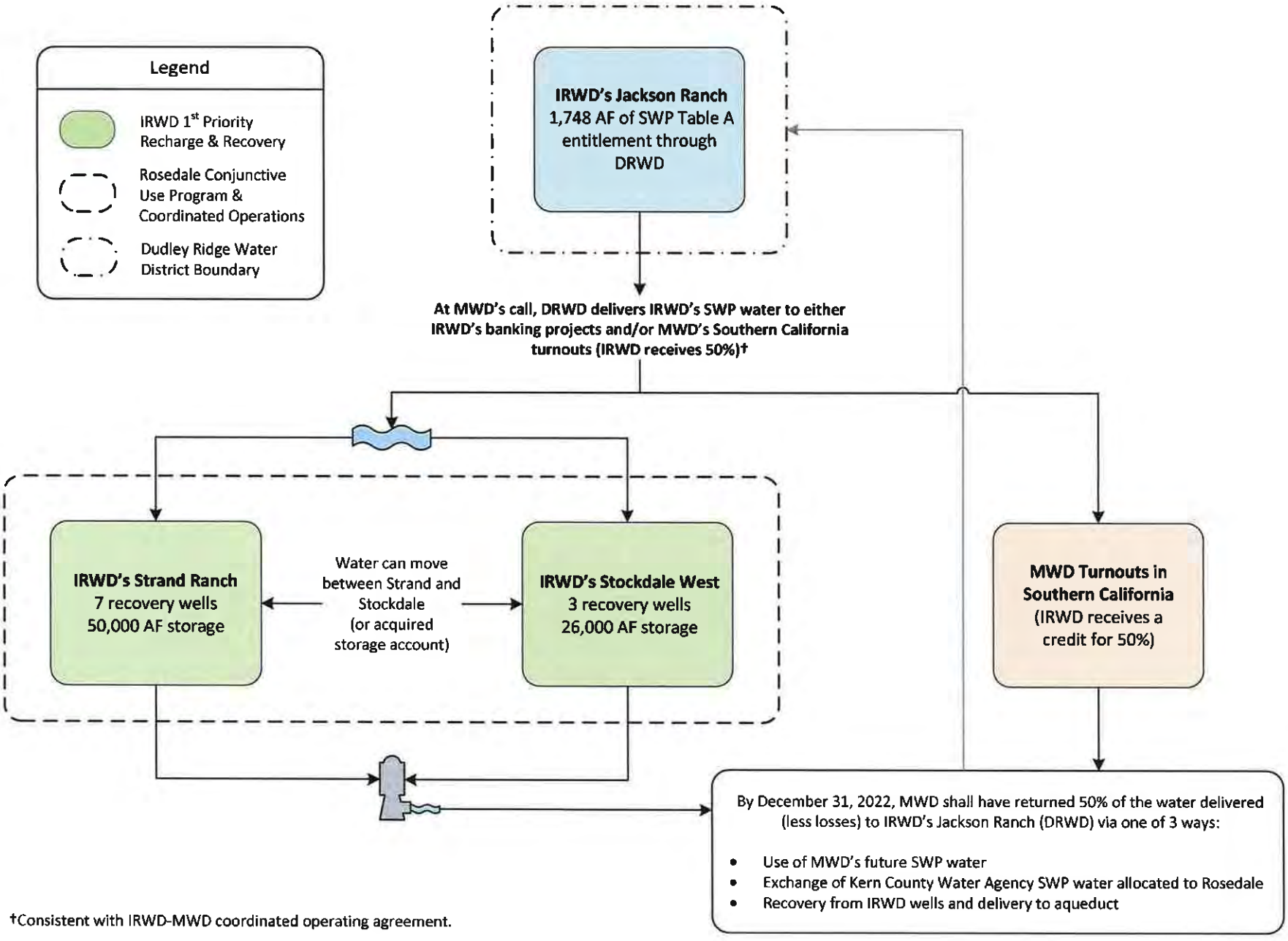
Modified for 1-Year Recharge Program Only

Year Following Recharge Event	Percent Transferred to IRWD	Percent Returned to BV During or Before Indicated Year
1	50%	50%
2	50%	50%
3	50%	50%
4	50%	50%
5	50%	50%
6	50%	50%
7	75%	25%
8	100%	0%
9	100%	0%

Exhibit "I"

Dudley Ridge Water District (DRWD) Unbalanced Exchange Program

Up to 8,700 AF delivered from 12/16/2013 through 12/31/2017



†Consistent with IRWD-MWD coordinated operating agreement.

Exhibit "J"

Coordinated Operating, Water Storage, Exchange and Delivery Agreement Between MWD, MWDOC and IRWD

Effective 5/1/2011 through 11/4/2035

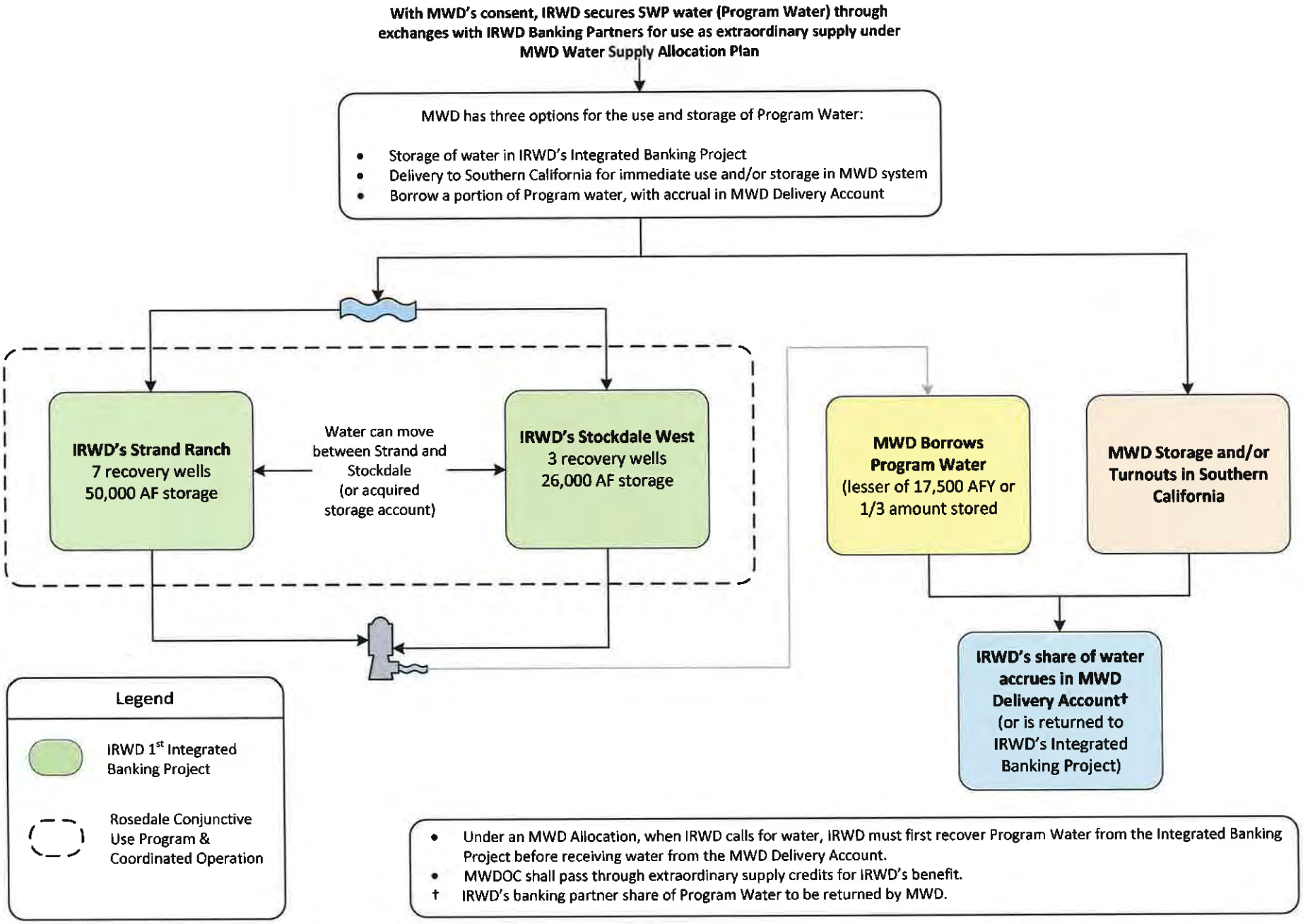
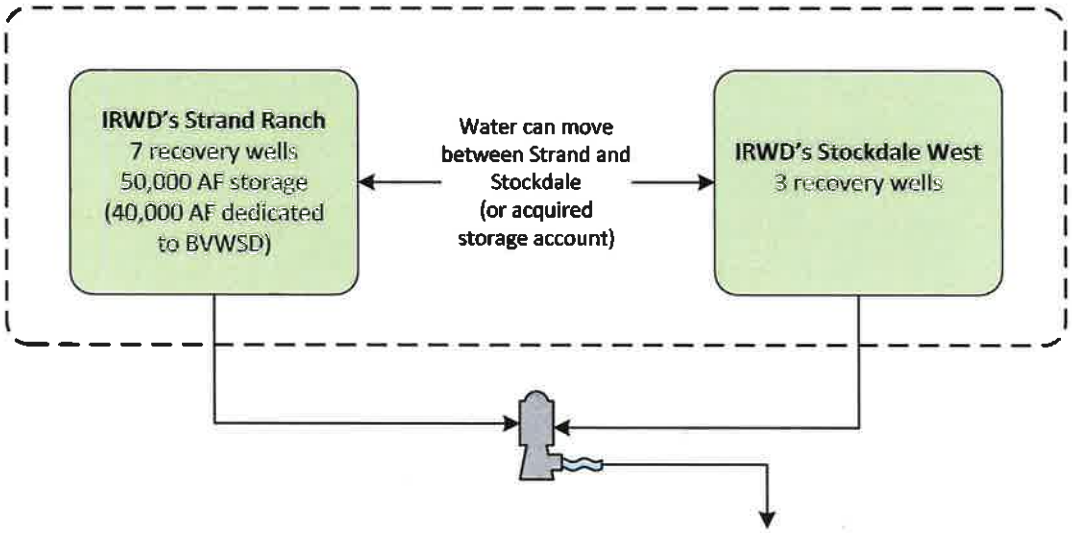


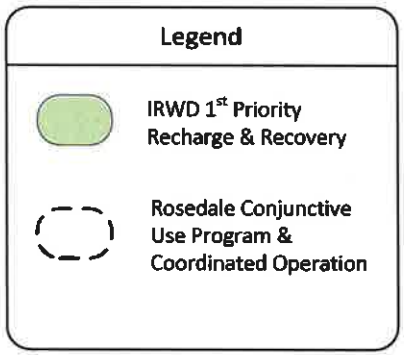
Exhibit "K"

Agreement for Conveyance of Water Between MWD, MWDOC, and IRWD (Wheeling Agreement)

Template for future agreements



IRWD recovers its share of non-SWP water from its Integrated Banking Projects for use as extraordinary supply under a declared MWD Water Supply Allocation. MWD will coordinate the conveyance and delivery of recovered water to be used within IRWD's Service Area. Delivery can also occur through an operational exchange.*



*The recovered water must be used within IRWD's service area. IRWD to pay MWD wheeling charges, including system access rate, water stewardship rate, and treatment surcharge (if applicable), for each acre foot of recovered water wheeled by MWD. IRWD will pay the actual costs of power incurred by MWD to convey recovered water in the California Aqueduct to IRWD delivery points.

February 16, 2018
Prepared by: F. Sanchez
Submitted by: P. Weghorst
Approved by: Paul A. Cook

SUPPLY RELIABILITY PROGRAMS COMMITTEE

KERN FAN GROUNDWATER STORAGE PROJECT UPDATE

SUMMARY:

On August 14, 2017, IRWD and Rosedale-Rio Bravo Water Storage District jointly submitted to the California Water Commission (CWC) a grant application for the proposed Kern Fan Groundwater Storage Project. The application seeks Proposition 1 funds that are available from the CWC through the Water Storage Investment Program (WSIP). The CWC received applications for 12 projects and has recently completed a review of 11 qualified applications for the amount of public benefits provided. At the Committee meeting, staff will present:

- The CWC's review findings related to the public benefits associated with the Kern Fan Project;
- Staff's proposed approach to appealing the CWC's findings along with the financial implications associated with potential changes to the public benefits to be provided by the project; and
- The proposed next steps in the process of the CWC awarding WSIP funding.

BACKGROUND:

The CWC is currently considering the award of WSIP grant funding for the planning, design, and construction of water storage projects that would provide specific public and ecosystem benefits. The funding source for the WSIP is Proposition 1, also known as the Water Quality, Supply and Infrastructure Improvement Act of 2014. The Act provides $2.7 billion for public benefits associated with water storage projects which will be distributed by the CWC through its WSIP. In July 2017, the CWC received 12 grant applications for WSIP funding.

IRWD and Rosedale jointly submitted a WSIP grant application for the Kern Fan Project, which was the only application received by the CWC in the groundwater storage category. The 11 other applications were submitted for five conjunctive use projects, two local surface storage projects, one regional surface storage project, and three large surface storage projects identified in the Cal Fed process. The CWC has determined that 11 of the 12 applications it received are qualified to be considered for WSIP funding.

Kern Fan Project Overview:

The proposed Kern Fan Project would develop a regional water bank in the Kern Fan area to capture, recharge, and store unallocated Article 21 water during wet hydrologic periods. The stored water would be extracted when needed to provide ecosystem, emergency supply, and water supply benefits. The project operations would be coordinated with the State Water Project through the California Department of Water Resources and could be integrated with the operations of other projects, such as Sites Reservoir.

Within the joint project grant application, IRWD and Rosedale requested $86 million in WSIP funding, which is 50% of the estimated total capital cost of $172 million for the project. If awarded grant funding for the requested amount, IRWD and Rosedale will each fund $43 million for the balance of the project's capital costs.

Project Eligibility and Public Benefits:

Pursuant to the WSIP regulations, CWC staff reviewed the 12 grant applications for completeness and initial eligibility. During this review, 11 of 12 projects were determined to meet the criteria to be considered for WSIP funding. On December 13, 2017 project applicants presented their projects to the CWC. IRWD staff co-presented the Kern Fan Project with the General Manager of Rosedale. Currently, the CWC is conducting a technical review and evaluation of the public benefits associated with each project. CWC staff is required by regulation to evaluate the basis and rationale for the claimed public benefits and the monetary value of the benefits. The ratio of the value of the public benefits to the requested funding amount is defined as the Public Benefit Ratio (PBR).

Public Benefit Ratio Evaluation:

This month, the CWC provided each project applicant with a preliminary PBR based on the review and evaluation of the expected public benefits of each project. This review was conducted by CWC staff and their technical consulting team. Exhibit "A" provides the results of the review and evaluation for the Kern Fan Project. The preliminary adjusted PBR for the Kern Fan Project is 0.58, which results in an adjusted public benefit of $49.7 million. The adjusted public benefits for the Kern Fan project as compared to the benefits included in the project grant application are summarized in the following table:

Kern Fan Project Adjusted Public Benefits

Public Benefit Ratio Summary	As Submitted in Grant Application	As Adjusted by the CWC
Total Public Benefit	$125.8 million	$49.7 million
Public Benefit Ratio	1.47	0.58
Program Funding Request	$85.7 million	

The preliminary adjusted PBRs for all of the projects are provided in Exhibit "B". None of the projects received a PBR score of 1.0 or greater.

Appeal Process:

The regulations for the implementation of the WSIP include a process for the appeal of preliminary PBR's provided by CWC staff. In the process, applicants have until February 23, 2018 to submit written appeals with clarifying information to address the comments and adjustments to PBRs made by staff at the CWC. CWC staff recommendations for project PBRs are expected to change once the appeal information has been submitted and evaluated.

As part of the appeal process, the CWC met with each applicant to provide an opportunity to ask any follow-up questions regarding the CWC's review and evaluation of public benefits for each project. On February 8, 2018, CWC staff, legal counsel, technical experts, and representatives from the California Department of Fish and Wildlife met with IRWD staff and the General Manager of Rosedale, along with IRWD's consultants, to discuss the evaluation of the public benefits associated with the Kern Fan Project. At the Committee meeting, staff will provide a presentation with an overview of the findings of the CWC's review and evaluation of the public benefits associated with the Kern Fan Project. Staff will also provide an overview of the elements of staff's proposed appeal to the CWC's findings.

Next Steps:

After appeals are submitted to the CWC on February 23, 2018, CWC staff will review the appeals and issue letter responses on April 20, 2018. These letters will include recommendations to the Commission for final PBRs for each project. The Commission will establish final PBRs for each project in early May 2018 during a three-day public meeting. The final PBRs will be used to calculate one-third of the overall application score for each project. Preliminary application scores will be released on May 25, 2018. The CWC will meet in June 2018 to determine the final application scores and rankings for each project. The CWC is expected to release the maximum conditional funding amounts for each project in July 2018.

Financial Implications:

The public benefits associated with the 11 projects being considered by the CWC will be used in part to determine the maximum conditional WSIP funding amounts for the projects. At the Committee meeting, staff will present the financial implications associated with potential adjustments to the PBR for the Kern Fan Project. This presentation will address uncertainties in WSIP funding for the project and corresponding IRWD and Rosedale funding requirements. The presentation will also address the cost-effectiveness of the Kern Fan Project to IRWD assuming different PBRs for the project.

FISCAL IMPACTS:

If the CWC awards WSIP funding to IRWD and Rosedale for the Kern Fan Project, a request for funding of the District's cost share for the project will be included in the proposed FY 2018-19 Capital Budget.

ENVIRONMENTAL COMPLIANCE:

A Final EIR for the Stockdale Integrated Banking Project was prepared, certified, and approved in compliance with California Environmental Quality Act (CEQA) of 1970 (as amended), codified at California Public Resources Code Sections 21000 et. seq., and the State CEQA Guidelines in the Code of Regulations, Title 14, Division 6, Chapter 3. Rosedale, as lead agency, filed a Notice of Determination for the Stockdale Integrated Banking Project with the County of Kern. IRWD, as a responsible agency, filed Notices of Determination with the County of Orange and with the County of Kern. The EIR includes a program-level analysis of

impacts of a third project site. When a third Stockdale project site is identified, subsequent project-level environmental review will be necessary prior to implementation of the phase one project. It is expected that a new EIR will be required for the construction and operation of the second phase facilities contemplated in the proposed Kern Fan Project.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – California Water Commission Public Benefit Ratio Review of the Kern Fan Groundwater Storage Project
Exhibit "B" – Summary of Proposition 1 WSIP Project Adjusted Benefit Ratios for All Projects

STATE OF CALIFORNIA – THE CALIFORNIA NATURAL RESOURCES AGENCY
EDMUND G. BROWN, JR., Governor

CALIFORNIA WATER COMMISSION
901 P STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 651-7501

February 1, 2018

Kellie Welch, Water Resources Manager
Kern Fan Groundwater Storage Project

VIA EMAIL
Welch@iwd.com

Subject: Public Benefit Ratio Review

Dear Ms. Welch,

As you know, the Water Storage Investment Program is an important opportunity to invest in California's water future. Staff from the California Water Commission, the California Department of Fish and Wildlife, the California Department of Water Resources and the State Water Resources Control Board are working diligently to meet the statutory requirements of Proposition 1 and move forward with funding projects that provide the best return on the public's investment.

The enclosed packet includes the results of the initial technical review of information supplied in your application to quantify the public benefits associated with your proposed project. Please note that this represents the initial reviewer assessment and does not represent a Commission decision.

In many cases, technical reviewers found that additional supporting information is needed from applicants to properly verify the Public Benefit Ratio associated with their projects. Applicants have the opportunity over the next three weeks to provide additional clarifying information and address specific comments from the review process. It is anticipated that many recommendations from the technical staff review will change once the additional information is received and evaluated. The additional information must be received by 5 p.m. February 23. Specifics on how to submit the additional information can be found in the transmittal email to this packet.

In addition, Commission staff will be scheduling individual one-hour meetings with applicants on February 7 and 8 to answer clarifying questions related to the initial technical review. This step has been added in response to feedback received from many applicants and engaged stakeholders. These meetings will be open to the public. To schedule a meeting with Commission staff and technical reviewers on February 7 or 8, please consult the information included in the transmittal email to this packet.

This program is the first of its kind in California. In many respects, Commission staff, technical reviewers and applicants are navigating the rules and regulations together. We appreciate your continued participation and consider it critical to the success of the program.

Sincerely,

Joe Yun
Executive Officer, California Water Commission

California
WATER COMMISSION

Public Benefit Ratio Review Summary: Kern Fan Groundwater Storage Project

Overview

This Public Benefit Ratio (PBR) review is the first component of the California Water Commission's (Commission's) technical assessment of applications for Water Storage Investment Program (WSIP) funding. This review serves as official notification to the applicant, and begins the appeal process. The reviewer-adjusted PBR indicates the need for additional information or clarification, which the applicant may submit in an appeal following the process described in the Commission's regulations section 6008(a)(2)[1] (also described below). The applicant may appeal any adjustments described in this review.

The reviewer-adjusted PBR does not reflect a Commission decision on this project's PBR; it is the result of the Commission's technical review team's assessment of the information provided in the application. The review team consists of Commission staff and consultants as well as agency staff from the California Department of Fish and Wildlife (CDFW), the California Department of Water Resources (DWR), and the State Water Resources Control Board (State Water Board). Commission staff ensured that reviews adhered to WSIP standards, as expressed in Proposition 1, Commission regulations, and the WSIP Technical Reference Document. Commission staff also coordinated independent agency reviews.

Applicants must submit their appeal to the Commission by 5:00 pm on February 23, 2018.

All appeals must:

- Include a written rebuttal that refers to the specific adjustments described in this PBR review; and
- Identify the PBR that the applicant believes to be correct or an alternative value or calculation with any new supporting information.

The Commission will not accept any revised or new information not directly related to the changes made by a reviewer, including changes to the project description and benefits claimed. The appeal may not exceed 20 pages in 12-point font (per regulations section 6008(a)(2)) and any referenced supporting information. The written rebuttal may refer to information that was submitted in the original application or additional information provided with the appeal. When citing information to support its rebuttal, the appeal should refer specifically to the location of the supporting information. All supporting information must be included with the appeal or in the application. If the applicant recalculates the PBR, the denominator must be the amount of funding requested in the application. Please refer to regulations section 6008 for complete details of what may be included in the appeal.

[1] Unless otherwise noted, all references to "regulation" are to the California Code of Regulations, Title 23, Section 6000 et seq.

The applicant should consult the Technical Reference (TR) for additional information regarding the reviews conducted by CDFW, DWR, and the State Water Board (as applicable) regarding the requirements to substantiate the physical changes claimed in the application or questions regarding modeling. For questions related to calculating physical changes and water operations generally, see Chapter 4 of the TR. Specifically:

Section 4.2	General Project Analysis
Section 4.3	Surface Water Operations Analysis
Section 4.4	Groundwater Analysis
Section 4.5	Riverine Hydrologic/Hydraulic Analysis
Section 4.6	Delta Hydrodynamics/Hydraulic Analysis
Section 4.7	Ecosystem Analysis
Section 4.8	Water Quality Analysis
Section 4.9	Flood Risk Reduction Analysis
Section 4.10	Recreation Analysis
Section 4.11	Emergency Response Analysis
Section 4.12	Water Supply Analysis
Section 4.13	Hydropower Analysis

Similarly, if reviewers have adjusted the monetization of public benefits, the applicant should consult the TR and sections 6000(a)(4)(F) and (G) of the regulations. The TR contains information about monetization methods in Chapter 5 and Appendices D-F. Descriptions of the three approaches to monetizing a benefit – avoided cost, alternative cost, and willingness to pay – are provided in section 5.3.1 of the TR.

The reviewers will evaluate each applicant's appeal and prepare a response. The response may include new recommendations based on the information in the appeal. The reviewers' response will include a recommended PBR for the Commission to consider at the May 1-3, 2018 Commission meeting.

Once the Commission has determined the PBR for each application, reviewers will prepare the initial application scores. Changes in the magnitude of physical public benefits or monetized value resulting from the Commission-determined PBRs will be incorporated, as applicable, into all review elements, and will be reflected in the initial application scores. Initial scores and staff comments will be released on May 25, 2018 for public review. The Commission will decide on application scores at the June 27-29, 2018 Commission meeting.

Summary

Reviewers have evaluated the WSIP application submitted by the Irvine Ranch Water District (IRWD) for the Kern Fan Groundwater Storage Project (Kern Fan), and adjusted the applicant's PBR, as shown in Table 1. This document and its attachments explain the reasons for the adjustments.

Table 1. Summary of Adjustments to Public Benefit Ratio		
PBR Summary	**As Submitted**	**As Adjusted**
Total Public Benefit ($ millions)	$125.8	$49.7
Program Funding Request ($ millions)	$85.7	
Public Benefit Ratio	1.47	0.58
Note: This table includes monetized benefits. Non-monetized benefits contained in the application were not evaluated to calculate the PBR but will be evaluated as part of the full technical review.		

This review summary incorporates the reviews conducted by the Commission's economics consultants and water operations consultants, DWR, and CDFW. DWR made no adjustments to the claimed emergency response physical benefits; therefore, no DWR review is attached. The following three reviews are attached to this summary:

- California Water Commission, Economics Review for Public Benefits Ratio (Economics Review)
- California Water Commission, Water Operations Review for Public Benefits Ratio (Water Operations Review)
- California Department Fish and Wildlife, Kern Fan Groundwater Storage Project Monetized Ecosystem Benefits (CDFW Review)

The water operations and economics evaluations were conducted by teams of subject matter experts. Each team implemented careful internal review and quality control. The reviewers used standard checklists and templates to verify assumptions and results. Teams met weekly for four months to discuss preliminary findings, assure consistency, and identify issues for further evaluation. Each individual reviewer's findings were discussed by the broader review team and specifically double-checked by a designated senior reviewer.

Some team members were excluded from reviewing certain applications due to potential conflict of interest. In these cases, review and quality control were assigned to others.

Adjustments to the PBR may have resulted from one or more of the following: adjustments to the physical benefits, adjustments to the monetization of those benefits, or adjustments to costs or a cost allocation. The attached reviews describe the specific reasons for changes to the benefits and monetized values based on the reviewers' evaluation of supporting models, data, analytical methods, and/or calculated results.

The applicant should note that more than one adjustment may have been made to the same benefit or monetized value.

Monetized Public Benefits Summary

Table 2 shows the value of the benefits as submitted by the applicant and as adjusted by reviewers.

Table 2. Summary of Adjustments to Monetized Public Benefits

Public Benefits	As Submitted ($ millions)	As Adjusted ($ millions)
Ecosystem	$60.8	$34.6
Water Quality	$0.0	$0.0
Flood Control	$0.0	$0.0
Emergency Response	$65.0	$15.1
Recreation	$0.0	$0.0
Total Public Benefits	$125.8	$49.7

Physical and Monetized Benefits

Below are some overarching water operations issues identified in the application, which are further explained in the attached water operations review:

- The applicant used the September 9, 2016 version of CalSim II, however the WSIP regulations require use of the November 2, 2016 version of CalSim II;
- Reviewers found that the availability of water in years with extremely low water conditions at Oroville was uncertain; and
- Reviewers cannot verify groundwater improvements.

Table 3 summarizes reviewers' adjustments to claimed physical benefits and/or the economic valuation of those benefits, and refers to the applicable attached review.

Table 3. Physical Benefits and Economic Issues

Benefit	Physical Benefit	Economics
Ecosystem – Spring-run and Winter-run Chinook Salmon Survival *	CDFW recommends removal from PBR calculation. See CDFW Review Pages 1-2.	Value Reduced: • Unsupported escalation of unit values. • Applicant must consider feasible least-cost alternative to calculate benefit. • Reduced using TR unit water values for Sacramento Valley. See Economics Review Page 3.
Ecosystem – Incidental Wetland Habitat	No adjustments to the physical benefit.	Value Reduced: • Land purchase not required for the least cost alternative. • Reduced using TR unit water values. See Economics Review Page 4.
Emergency Response – Drought Emergency Water Supply	No adjustments to the physical benefit.	Value Reduced: • Unsupported escalation of M&I unit value. • Unsupported unit value of water. • Reduced using TR unit water values and to remove escalation. See Economics Review Page 5.
Emergency Response – Delta Failure	No adjustments to the physical benefit.	Value Reduced: • Unsupported escalation of M&I unit value. • Unsupported unit value of water. • Reduced using TR unit water values and to remove escalation. See Economics Review Page 6.

Note: This table includes monetized benefits. Non-monetized benefits contained in the application were not evaluated to calculate the PBR but will be evaluated later as part of the full technical review that will be released on May 25.

*The applicant should note that the ecosystem benefit for spring-run and winter-run Chinook salmon survival is the project's measurable improvement to the Delta ecosystem or to a tributary to the Delta, which is required by Water Code section 79752. The remaining ecosystem benefit for incidental wetland habitat is not located in the Delta or on a Delta tributary. If the applicant does not address the removal of this benefit through the appeal, staff will recommend that the Commission make an eligibility determination at the May 1-3, 2018 meeting.

Eligible Program Funding

Per regulations section 6007(b)(1)(B), Table 4 shows eligible WSIP funding based on all adjustments to benefits and costs. Other changes affecting capital costs eligible for WSIP funding (e.g., changes to cost estimates, cost allocation, and other related calculations) are described on page 8 of the Economics Review.

Table 4. Summary of Adjustments to Eligible Program Funding

Eligible Costs ($ millions)	As Submitted ($ millions)	As Adjusted ($ millions)
Capital Cost	$90.4	$171.3
Program Funding Request	$85.7	
Adjusted Program Cost Share**		$49.7

The applicant should address both the ecosystem physical benefit and monetization issues in its appeal to change the adjusted PBR and eligible funding amounts presented in this review.

California
WATER COMMISSION

Economics Review for Public Benefit Ratio: Kern Fan Groundwater Storage Project

This technical review describes the public benefit ratio (PBR) results for the Kern Fan Groundwater Storage Project (Kern Fan Project), and adjusts the physical and monetary benefits and cost analysis. Changes to physical benefits show how all reviewer adjustments — to physical benefits, monetized benefits, and costs — affect benefits, PBR, and eligible funding.

Adjusted PBR and Eligible Funding

After review, the adjusted PBR is 0.58 and adjusted eligible funding is $49.7 million. Reviewer adjustments may be modified through the appeal process described in the review summary and in regulation section 6008(a).

Summary of Application and Reviewer Adjustments

Table 1 summarizes the applicant's cost and benefits analysis. The column titled "As Submitted" lists the applicant's benefits, costs, and PBR. The applicant estimates the present value of total benefits (in 2015 dollars) is $177.8 million, of which $125.8 million are public benefits eligible for funding and $60.8 million of the public benefits are ecosystem benefits. The present value of project costs is $119.6 million, of which $90.4 million are capital costs. The applicant requests $85.7 million in Water Storage Investment Program (WSIP) funding. The PBR, which is the ratio of public benefits to WSIP requested funds, is 1.47.

In Table 1, the column titled "As Adjusted" summarizes the results of all adjustments to physical benefits, monetized value of benefits, costs, and PBR. Economics reviewers adjusted the applicant's capital and total cost estimates to be consistent with the requirements of the regulation and the WSIP *Technical Reference Document* (TR).[1] Economics reviewers also adjusted the monetization of benefits. In addition, the California Department of Fish and Wildlife (CDFW) recommended that the physical benefits associated with spring-run and winter-run chinook salmon survival were not supported by the application, so those physical benefits were removed. Economics reviewers also reduced the incidental wetland habitat monetized benefit and emergency response benefits, for the reasons discussed below.

As a result of these adjustments, total public benefits are $49.7 million, and the PBR is 0.58.

[1] Access the TR online at https://cwc.ca.gov/Documents/2017/WSIP/TechnicalReference.pdf

Table 1. Applicant-Submitted and Reviewer-Adjusted Benefits, Costs, and PBR[a]

	As Submitted			As Adjusted		
	Benefits	Allocated Capital Cost	Summary	Benefits	Allocated Capital Cost	Summary
WSIP Eligible Capital		$90.4			$171.3	
Public Benefits						
Ecosystem	$60.8	$42.8		$34.6	$34.6	
Water Quality	$0.0	$0.0		$0.0	$0.0	
Flood Control	$0.0	$0.0		$0.0	$0.0	
Emergency Response	$65.0	$42.8		$15.1	$15.1	
Recreation	$0.0	$0.0		$0.0	$0.0	
Total Public Benefit (TPB)	$125.8	$85.7		$49.7	$49.7	
Federal and Other State		$0.0			$0.0	
Non-Public Benefits	$52.0	$4.7		$51.9	$121.6	
Total	$177.8	$90.4		$101.6	$171.3	
Total Cost			$119.6			$206.7
Applicant Request			$85.7			$85.7
PBR: TPB/Applicant Request			1.47			0.58
Adjusted Eligible Funding						$49.7

Notes:
[a]Dollar values are in millions of 2015 dollars of present value.
- Sources for applicant estimates are the files named "Tab 6-A11_IRWD_Physical and Economic Benefits Summary Tables.xlsx," "Tab 6-A9-A10_IRWD_Benefit-Cost _Analysis_Cost_Allocation.xlsx," and "IRWD_Attach 1_Combined Feasibility.pdf."
- Values are rounded to the nearest tenth of a million dollars for display purposes. Underlying calculations reflect the precision provided by the applicant, as will the final determinations of PBR and eligible funding.

Monetized Benefits

This section documents reviewer adjustments to the applicant's ecosystem, emergency response, and non-public monetized and physical benefits. The following discussion about benefits monetization provides economics reviewers' conclusions regarding monetization even if other reviewing agencies recommended removal of the physical benefits.

Ecosystem

Benefits as Provided by the Applicant

The applicant monetizes two separate ecosystem public benefits: spring-run and winter-run Chinook salmon survival, and incidental wetland habitat. Monetized benefits are documented in the applicant's submitted files named "Tab 6_A3_IRWD_MCubed_WSIP Project Economic Benefits Techmemo.pdf" and "Tab 6-A5 IRWD_WSIP_Econ Benefits_081117_FINAL.xlsx."

For spring-run and winter-run Chinook salmon survival, the applicant uses TR benefit values of $100,000 per fish for spring- and winter-run Chinook, which results in a monetized present value of $23.1 million. The applicant also uses an alternative cost method based on the cost of procuring a similar volume of water in dry and critical years for environmental flows. Consistent with the regulation, the applicant

uses the lesser-valued alternative cost method, $21 million in present value for the spring-run and winter-run Chinook salmon survival monetized benefit.

The Kern Fan Project would provide incidental wetland habitat for migratory birds during years that the applicant, Irvine Ranch Water District (IRWD), takes and stores Article 21 water. The applicant uses the alternative cost approach to monetize this benefit.

Benefits as Adjusted by Reviewers

Physical Benefits

CDFW considered the monetized ecosystem benefit for spring-run and winter-run Chinook salmon survival insufficiently supported by the information in the application (see CDFW Review, attached). Therefore, these physical benefits were removed.

CDFW did not recommend any adjustment to the physical benefit associated with incidental wetland habitat.

The discussion about benefits monetization below provides adjustments from economics reviewers regarding monetization regardless of whether CDFW recommended removal of the physical benefits associated with spring-run and winter-run Chinook salmon survival.

Monetization

Economics reviewers adjusted the monetization of the physical benefit associated with spring-run and winter-run Chinook salmon survival. The applicant monetizes spring-run and winter-run Chinook salmon survival benefits using the alternative cost approach, using a combination of TR Delta export unit values and Metropolitan Water District of Southern California (MWDSC) Tier 1 rate of $676 per acre-foot (AF) escalated at the same rate that the TR unit values increase between 2030 and 2045 (i.e., $360 per AF to $1,056 per AF). No justification is provided for why MWDSC rates would escalate in real terms at the same rate that the TR unit values escalate. The TR values escalate because of the implementation of the Sustainable Groundwater Management Act (SGMA) in the San Joaquin Valley.

Furthermore, water should be valued where it is provided for pulse flows in the Feather River. The applicant states:

> *"In order to provide similar environmental flows in the absence of the project, IRWD and Rosedale would need to purchase replacement water for urban and agricultural use, respectively, to exchange for State Water Project (SWP) Table A water."*

Economics reviewers found that voluntary water transfers in the Sacramento Valley could be used to provide the same timing and amount of water as provided by the Kern Fan Project at a lower cost. Therefore, there is no need to purchase replacement Table A water, and the average ecosystem benefits can be estimated based on the north-of-Delta alternative cost of water in the TR, the water provided by year type as shown in the application, and the frequency of water year types. Economics reviewers calculated the adjusted present value of monetized benefits using the Sacramento Valley TR unit water values. Economics reviewers concluded that purchase of water in the Sacramento Valley would likely provide the same flow (and therefore benefit) at lower alternative cost than the benefit based on unit fish values. If the physical benefit were not removed, the present value of the spring-run and winter-run

Chinook salmon survival benefit would be $8.14 million. However, CDFW's recommended removal of the physical benefit results in zero monetary benefit.

Economics reviewers adjusted the monetization of the physical benefit associated with incidental wetland habitat. The applicant includes the cost of purchasing 1,280 acres of cropland (at about $6 million) to establish the incidental wetland habitat. However, the land purchase cost is not necessary for a feasible alternative cost. The wetland benefit provided by the Kern Fan Project includes only 24 total months of inundation over the 82-year period. For only 24 months in 82 years, land could be flooded that is either already dedicated to groundwater recharge, or a limited easement could be acquired at much lower cost. The inundation would not necessarily need to occur during the same years and months as the project recharge. Therefore, an outright land purchase is not the lowest-cost feasible alternative. Economics reviewers adjusted the benefit to include only the alternative cost of water as provided by the applicant in the file named "Tab 6-A5 IRWD_WSIP_Econ Benefits_081117_FINAL.xlsx." The adjusted present value of wetland habitat benefit is $34.6 million.

Water Quality

No water quality benefits are monetized.

Flood Control

No flood control benefits are monetized.

Emergency Response: Drought Emergency Water Supply

Benefits as Provided by the Applicant

The applicant states that two-thirds of the additional water provided by the project (i.e., about 3,100 AF per year) is for water supply or groundwater recharge (see "Monetized Non-Public Benefits," below) and the remaining one-third (about 1,400 AF per year) is for emergency response. The applicant calculates that the additional water supply provided for drought emergencies equals one third of the annual expected water quantity provided by the Kern Fan Project and that this water would be used in 7 percent of years on average (i.e., the percent of critical years occurring in the third or later year of drought during the hydrologic period from 1922 to 2003).

The applicant uses unit values for municipal and industrial (M&I) supply (for 25 percent of the emergency supply) and agricultural supply (for 75 percent of the emergency supply). The applicant uses the MWDSC Tier 1 untreated rate of $676 per AF plus a penalty cost of $1,480 per AF as the value for M&I emergency supply. The penalty cost is an additional charge that could be levied by MWDSC for water use at 100 to 115 percent of a user's allocation. The applicant escalates the MWDSC Tier 1 rate at the same rate that the TR unit value for Delta export water in a critical year escalates between 2030 and 2045. The penalty cost is then added to the escalated MWDSC Tier 1 rate.

For agricultural water supplies, the applicant uses recent drought values for unspecified spot market water purchases in Kern County. The buyer, seller, transaction costs, and other details of the exchange are not documented. The applicant states that agricultural water costs equaled $800 per AF in the recent drought, and the applicant inflates these costs to future years using the increase in the 2030 and 2045 TR Delta export unit water values in critical years.

Benefits as Adjusted by Reviewers

Physical Benefits

The California Department of Water Resources (DWR) did not recommend any adjustments to the drought emergency water supply physical benefit.

Monetization

Economics reviewers adjusted the monetization of the drought emergency water supply physical benefit. For drought emergencies, the agricultural spot-market transfer price of $800 per AF cited by the applicant represents a single observation during the third year of a severe drought characterized by unusually large cutbacks of surface water supply. Economics reviewers did not accept valuing future water supplies based on a single or a few observations from an exceptional year because this observation does not represent the range of water supply conditions and other factors affecting value. The TR presents current and future unit values for water that reflect different water year conditions and the future implementation of groundwater management. Economics reviewers applied TR unit values for critical years equal to $360 AF in 2030 and $1,056 per AF in 2045. Economics reviewers also added $12.07 per AF for SWP conveyance costs to the Rosedale Rio Bravo and Dudley Ridge service areas.[2]

The TR unit values are estimates of the unit value of water in the Central Valley. The 2045 TR unit values are projections that reflect potential water market conditions once SGMA is fully implemented. The applicant provides no documentation or rationale that M&I rates in southern California will escalate in real terms at the same rate that the TR unit values escalate due to SGMA. A projected real escalation rate might be available from MWDSC or another M&I provider, but the applicant does not provide one. Without this information, economics reviewers adjusted the unit values to reflect the cost of MWDSC supply (i.e., $676 per AF) plus the applicant-provided penalty charge of $1,480 per AF. The adjusted present value of the drought emergency water supply benefit is $2.91 million.

Emergency Response: Delta Failure

Benefits as Provided by the Applicant

The applicant states that two-thirds of the additional water provided by the project (about 3,100 AF per year) is for water supply or groundwater recharge (see "Monetized Non-Public Benefits: Water Supply," below) and the remaining one-third (about 1,400 AF per year) is for emergency response. The applicant includes the value of emergency water supply (20,000 AF) that is available as a result of the Kern Fan Project for use in a Delta failure emergency, occurring once in 2056. The applicant applies a unit value of $8,410 per AF for M&I (25 percent of total supply) and agricultural water (75 percent of total supply). This is stated to be the cost of MWDSC Tier 1 water (at $676 per AF) plus the penalty cost for water use over 115 percent of allocation (i.e., $2,960 per AF), both of which are escalated to 2056 values using the TR escalation rate for Delta export water. This differs from the procedure used for drought emergencies in which only the MWDSC Tier 1 rate is escalated, and then an un-escalated penalty cost is added. The applicant sets agricultural water unit value equal to the M&I water unit value by the applicant because "...agricultural users would need to outbid urban suppliers for available agricultural water."

[2] DWR. 2016. Bulletin 132-15, *Management of the California State Water Project,* Sacramento, CA. Variable costs include costs labeled "Variable OMPR Component," and "Off-Aqueduct Component" in Table B-24.

Benefits as Adjusted by Reviewers

Physical Benefits

DWR did not recommend any adjustments to the Delta failure water supply physical benefit.

Monetization

Economics reviewers adjusted the monetization of the Delta failure physical benefit. The applicant does not show that agricultural users would be willing to pay $8,410 per AF in 2015 dollars. The unit values in the TR provide estimates of the marginal value (i.e., the unit value of a change in supply) of agricultural water supply in critical years, and include the future effect of SGMA. Economics reviewers concluded that the TR unit value of $1,056 per AF is appropriate for the Delta emergency benefits for agricultural water supply (i.e., 75 percent of supply), plus $12.07 per AF for SWP conveyance costs to the Rosedale Rio Bravo and Dudley Ridge service areas (see footnote 2).

Economics reviewers also adjusted the M&I unit values for the same reasons as described above for the drought emergency water supply benefit. Reviewers adjusted unit values to reflect the cost of MWDSC supply (i.e., $676 per AF) plus a penalty charge of $2,960 per AF. The adjusted present value of Delta failure benefit is $12.19 million.

Recreation

No recreation benefits are monetized.

Monetized Non-Public Benefits: Water Supply

Benefits as Provided by the Applicant

The applicant estimates the Kern Fan Project would provide an average of 4,500 AF per year in 2030 and 4,100 AF per year in 2070. Of these amounts, the applicant estimates that non-emergency water supply is two-thirds of the total water supply and is available in wet, above normal, below normal, dry, and critical year types. The average annual water supply is split: 75 percent for agricultural use (to Rosedale Rio Bravo Water Storage District and Dudley Ridge Water District) and 25 percent for M&I use (for IRWD).

The applicant establishes agricultural water unit values using the TR Delta export region unit values for 2030 and 2045. The unit values are weighted by the Kern Fan Project water supply that would be available under each water year type under 2030, 2045, and 2070 conditions. The applicant generates unit values for all years by interpolating between 2030 and 2045, and holds the unit value constant thereafter.

The applicant establishes M&I water unit values using an alternative cost approach. The applicant sets M&I water supply unit values equal to the Tier 1 untreated water cost from MWDSC in 2015, which was $676 per AF. The applicant then escalates the M&I rate at the same implied rate that TR Delta export unit values escalate between 2030 and 2045.

Benefits as Adjusted by Reviewers

Physical Benefits

Water operations reviewers did not recommend any adjustments to the water supply physical benefit.

Monetization

Economics reviewers adjusted monetization of the M&I water supply physical benefit for the same reasons as described above for the drought emergency water supply benefit. Reviewers adjusted the M&I unit values to reflect the MWDSC rate of $676 per AF to IRWD, but removed the escalation factor. After these adjustments, the present value of non-public water supply benefit is $46.56 million.

Monetized Non-Public Benefits: Groundwater Level Improvement

Benefits as Provided by the Applicant

To evaluate the groundwater benefit, the applicant uses the alternative cost approach to estimate how much it would cost to purchase the same volume of water for groundwater recharge in Kern County as that provided by the Kern Fan Project. The applicant states that, according to groundwater policy in Kern County, a portion of banked groundwater is not recovered by the banking entity, but remains in the ground and bolsters local groundwater levels. In Kern County, 12.5 percent of groundwater stored is not recovered, and 60 percent of that amount is estimated to be net recharge after accounting for evaporative losses (see page 2 of the file named "Tab 6-A3_IRWD_MCubed_WSIP Project Economic Benefits Techmemo.pdf"). For the alternative cost of water for recharging groundwater, the applicant uses Delta export unit values provided in the TR. The applicant weights those costs according to water year type frequency using to the San Joaquin River Water Year Index to calculate 2030 and 2070 future condition values. The applicant estimates a net present value of $4.3 million in 2015 dollars.

Benefits as Adjusted by Reviewers

Physical Benefits

Water operations reviewers did not recommend any adjustments to the physical benefit associated with groundwater level improvement.

Monetization

Economics reviewers adjusted the monetization of the groundwater level improvement physical benefit. For agricultural water supply and groundwater recharge unit values, reviewers have added $12.07 per AF for SWP conveyance costs to the Rosedale Rio Bravo Water Storage District and Dudley Ridge Water District service areas (see footnote 2). The adjusted present value of groundwater level improvement benefit is $5.35 million.

Project Costs

Costs as Provided by Applicant

Detailed costs are provided in the applicant's file named "Tab 6-A9-A10_IRWD_Benefit-Cost Analysis_Cost-Allocation.xlsx." Costs include about $171.3 million of eligible capital costs to be incurred from 2019 through 2025, $18.8 million of future operation and maintenance (O&M) based on 2030 conditions, and $10.6 million of future replacement costs, for a total of about $206.7 million in present value. Future O&M costs include DWR conveyance costs of $24 per AF for Article 21 supplies.

The applicant reduces capital costs for purposes of the benefit-cost analysis as follows:

- The applicant states: "Since the capital costs would occur over a 6-year construction period, a present value of capital at year one was calculated. This was incorporated into the benefit-cost ratio calculation to accurately reflect the time value of capital costs incurred" (see the file named

"Capital_Cost_PV tab in file "Tab 6-A9-A10_IRWD_Benefit-Cost_Analysis_Cost_Allocation.xlsx"). Reviewers noted two effects of this present value calculation: it lowers capital costs from $171.3 to $152.9 million, and it excludes interest during construction.

- The applicant further reduces the present value of capital costs by subtracting the present value of residual value of land and facilities at the end of the 50-year operating horizon. The applicant states: "IRWD and Rosedale believe these adjustments are justified due to the high potential for land appreciation in the Kern County-Bakersfield area and the value of site improvements at the end of project operations" (see the file named "Benefit_Ratios tab in file "Tab 6-A9-A10_IRWD_Benefit-Cost_Analysis_Cost_Allocation.xlsx"). The effects of this residual land value adjustment are to lower applicant-submitted capital costs further to $90.4 million, the value shown in Table 1.

Although the applicant reduces capital costs for the purposes of the benefit-cost analysis, it uses the full $171.3 million capital cost estimate for cost allocation and funding request purposes. For example, the $85.7 million applicant public funding request in Table 1 is 50 percent of the total $171.3 million capital cost estimate, which is the maximum allowable share permitted by the statute for a groundwater storage project.

Costs as Adjusted by Reviewers

Economics reviewers adjusted capital costs. Section 7.1 of the TR states "The applicant shall display and compare the present value of monetized benefits and total discounted project costs of the proposed project, all shown in 2015 dollars as of the start of project operations." The applicant provided information (see the file named "Tab 6-A9-A10_IRWD_Benefit-Cost Analysis_Cost_Allocation/ Dashboard.xls") that 2025 is the final year of construction with Phase 2 online in 2025 (Phase 1 is online in 2024). Thus, economics reviewers used 2025 as the basis for the present value calculations and adjusted costs accordingly.

Concerning the residual value of land and facilities after the 50-year operation period, the regulation and TR do not provide for subtracting future residual values in this way. Regulation section 6001(a)(11) and Section 6.0 of the TR define the components and calculation of costs eligible for WSIP funding. Economics reviewers removed the residual value of Kern Fan Project land and facilities from the calculation of eligible capital costs. The adjusted total capital cost is $171.3 million as shown in Table 1.

Other Monetization Assumptions

As Provided by Applicant

Other than the specific capital cost adjustments and monetization adjustments described above, the applicant has generally monetized costs, discounted costs and benefits, and conducted cost allocation consistently as per the direction of both the regulation and TR.

California
WATER COMMISSION

Water Operations Review for Public Benefits Ratio: Kern Fan Groundwater Storage Project

Applicant: Irvine Ranch Water District (IRWD)

Review of Water Operations Analysis Methodology

The Kern Fan Groundwater Storage Project (Kern Fan Project) would recharge and store up to 100 thousand acre-feet (TAF) of unallocated Article 21 water in the Kern County Groundwater Sub-basin of the San Joaquin Valley Groundwater Basin for subsequent recovery and use for public and non-public benefits.

The applicant uses a spreadsheet model (see file named "IRWD_Attach 1_MBK_Model_KernFan.xlsm") that post-processes without-project 2030 and 2070 condition CalSim II model results as provided by the Water Storage Investment Program (WSIP). The spreadsheet calculates surplus Delta outflow available for diversion and simulates Kern Fan Project operations.

Based on information included in the application, reviewers have identified the following limitations of the applicant's analysis.

CalSim II Model Version

CalSim II models and results used in the spreadsheet model are the September 9, 2016 versions provided by WSIP. Updated CalSim II models were provided by WSIP on November 2, 2016. Section 6004(a)(1) of the regulations requires applicants to "use the CalSim II and DSM2 model products provided by the Program on November 2, 2016."

Recharge Losses

The applicant states (see file named "Tab3- A3 IRWD_Project Description_FINAL.pdf") that evaporation losses during recharge are estimated to be 6 percent. The spreadsheet model does not include this loss rate.

Availability of Lake Oroville Pulse Flows

The application and the spreadsheet model show that IRWD and Dudley Ridge Water District could have access to 17.9 TAF of water during dry and critical years. During water years with extremely low State Water Project (SWP) Table A allocations, this water supply may not be available.

Water Operations Review Conclusions Related to Benefits

Spring-Run and Winter-Run Chinook Salmon Survival

The applicant states the Kern Fan Project will provide ecosystem benefits in dry and critical years by releasing pulses of water from Lake Oroville for Delta outflow. The applicant's spreadsheet model results show that pulse flows, with a magnitude of 17.9 TAF each, occur in 5 of the 18 dry years and 1 of the 12 critical years under the 2030 conditions, and 5 of the 18 dry years under the 2070 conditions.

Groundwater Level Improvement

The applicant relies on inferred qualitative assessments of the benefits to the groundwater system that would result from implementation of the Kern Fan Project. The applicant does not provide the groundwater model used to assess groundwater level changes. The reviewers were not able to verify groundwater level improvements resulting from the Kern Fan Project.

Water Supply

The application and the spreadsheet model are consistent in showing that the Kern Fan Project will provide an average of 4.5 TAF per year of additional water supply under the 2030 conditions, and 4.1 TAF under the 2070 conditions.

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Director's Office
1416 Ninth Street, 12th Floor
Sacramento, CA 95814
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

January 29, 2018

Joseph Yun
Executive Officer
California Water Commission
P.O. Box 942836
Sacramento, CA 94236-0001

Dear Mr. Yun:

ANALYSIS OF MONETIZED ECOSYSTEM BENEFITS IN WATER STORAGE INVESTMENT PROGRAM PROJECTS' PUBLIC BENEFIT RATIOS

The California Department of Fish and Wildlife (Department) acknowledges the complexity of the task before the California Water Commission (Commission). The Department also appreciates that applicants to the Water Storage Investment Program (WSIP) are navigating rules and regulations for the evaluation of unique program aspects such as ecosystem benefits and public benefit ratios. The same is true for our Department.

Commission staff requested recommendations from the Department as to whether ecosystem benefits are sufficiently supported to factor into public benefit ratios calculated by applicants. (Cal. Code Regs., tit. 23, § 6007, subd. (b)(1)). Attached to this letter are concise summaries of the Department's analysis for monetized ecosystem benefits per proposed project. In addition, this cover letter provides: (a) a description of applicant responsibilities; (b) a summary of the analysis; (c) an acknowledgment of the iterative nature of this effort; and, (d) a commitment for next steps.

This cover letter is longer than a typical one because it is important to identify precisely what the Department is and is not doing at this moment in time pursuant to the Commission's WSIP process. First, the Department is not denying or rejecting any project. That is not the Department's role. Nor should anyone conflate the Department's analysis of benefits at this stage of your process with a denial or rejection of a project. It is simply not the case.

Instead, the Department conducted a technical review of the ecosystem benefits proposed by applicants requesting funding under the WSIP. Proposition 1, as set out in the Water Code, and the Commission's regulations require the Department to provide this review.

Applicant Responsibilities:
The WSIP regulations set forth the requirements for the quantification of physical changes and resulting ecosystem benefits of proposed projects. (Cal. Code Regs. tit. 23, § 6000 to 6015.) The Department reviewed the applicants' analyses using the standards established in the WSIP regulations. Section 6004, subdivision (a) requires an applicant to quantify the magnitude of the net public benefit using either an appropriate method identified in the Technical Reference, or an alternative method that is scientifically sound, appropriate for the project, and adequately documented. Further, Section 6004, subdivision (a)(3)(B) requires that an applicant shall disclose and quantify, where possible, any impacts or negative effects the proposed project would impose on the ecosystem to the extent that those impacts are less than fully mitigated.

Under Section 6007, staff shall rely on information supplied by the applicant. If an applicant claimed a benefit but did not supply information in the application to support the claim, then the Department's analysis was hindered. The application information controlled the Department's analysis related to reasonableness of assumptions, completeness and quality of analysis, and appropriate use of data and analytical methods to calculate public benefits.

Summary of Analysis:
The Department took each application and completed technical review under Section 6007. The Department identified the following general areas of concern across the applications: potentially unmitigated environmental impacts that were not disclosed or quantified in the "net benefit" determination; missing quantification or analysis of the proposed ecosystem benefits; and absence of supporting documentation.

Based on the information provided as well as separate independent calculations from the Commission's Water Operations Review, the attached project-specific summaries identify two basic results. The first basic result occurs where the application provided insufficient information or the supporting documentation is absent to support a claimed benefit at all at this time.

This outcome of absent supporting documentation is most pronounced where the Department received detailed input from the Water Operations Review, which is an expert modeling review facilitated by the Commission staff. In some instances, the Water Operations Review could not verify modeling results. As an example, if an application claimed to increase coldwater in a reservoir, but the water model experts could not identify any support in the application for that increase, the Department was simply unable to make assessments about ecosystem benefits.

In this situation, the WSIP regulations state that where staff could not adjust the public benefit ratio because of a lack of support, it must remove the benefit at this moment in the process. This occurred nine times across five of the eleven projects. The

Department believes the applicants may be able to cure these defects. For example, proposed delivery of wildlife refuge water could provide ecosystem benefit. However, failure of the application information to establish that water deliveries can and would occur as proposed means the Department cannot verify the refuge benefit. The Department points out that the appeals process can facilitate such corrections.

The other major result from the analysis is the possible overestimation of a claimed benefit. In most of the Department's analysis, this is more the situation than the scenario described above. Here, for example, an application's information may utilize models with a population figure for salmon that is many fold higher than actual data indicate is accurate. There are other examples of model discrepancies, data input inconsistencies, and other information in applications that create uncertainty about claimed benefits and possible overstatement of such benefits. However, there is not information in the application with which the Department could identify a recommended adjustment to the public benefit ratio. The Department's response to this situation is to acknowledge for Commission staff and the applicants those concerns that may cause a need for a benefit to be adjusted downwards but not removed. This second category is the majority of the Department's assessments.

Iterative Nature of Process:
Over a two-year period with extensive input from stakeholders and a broad spectrum of water interests, the Commission developed this process and these regulations to implement a voter-approved statute. All of this effort directs the Department to look closely at the information submitted by applicants. Ecosystem improvements are a key component of project applications because of statutory requirements that projects must provide ecosystem benefits. At the subsequent "additional eligibility" phase, the projects must also measurably improve the ecosystem of the Delta or its tributaries.

The Department's analytical summaries are the first step in the initial technical review of the applications, focused on quantifying the public benefits associated with proposed projects. No projects are out of the running because of this step. The Commission's frequently asked questions' document indicates they anticipate public benefit ratios will change based on the additional information. The appeals process provides the opportunity for applicants to underscore or add to the information in their applications, with another round of staff review and recommendations. The next step includes the opportunity for reinstatement or adjustment of public benefit values. The Commission anticipates holding hearings to consider revisions to the public benefit ratios in May.

In recognition of the iterative nature for the WSIP process, Commission staff scheduled a two-hour meeting with each project applicant and Department staff before the release of the full analysis so that no applicant team would be surprised by the Department's preliminary conclusions. Now with the submission of this cover letter and the release of the summaries, each applicant will have the opportunity over the following weeks to

provide additional supporting information and address specific comments from the review process. The Department could only judge the information submitted previously in the applications. With additional information, the Department may be able to confirm a benefit should be added or that a benefit's value be increased.

Commitment for Next Steps:
The Department understands that some parties and the general public may be quick to judge this analysis as too focused on technical details at the expense of the bigger policy objective of improved storage in California. The Department knows that the WSIP represents an important opportunity to invest in California's water future.

The Department recognizes the value and importance of additional surface water and groundwater storage in California. As called for in the California Water Action Plan, water storage is needed for environmental benefits as well as water supply. The Department is hopeful that the explanations contained in the enclosed assessments will assist applicants in providing the necessary information to demonstrate to that the proposed projects will provide net ecosystem improvements.

The WSIP is complex and unique in that it is an investment program wherein, early in the application review process, the Department shares its assessments and uncertainties about anticipated ecosystem outcomes with the applicants. The Department is hopeful that sharing this information will ultimately resolve those uncertainties during the appeal process. With that in mind, the Department looks forward to continuing to work with the Commission in the evaluation of projects applying for funding under the WSIP.

Sincerely,

Charlton H. Bonham
Director

Enclosures: Public Benefit Ratio Assessments

ec: California Department of Fish and Wildlife

Kevin Hunting, Chief Deputy Director
Kevin.Hunting@wildlife.ca.gov

Tina Bartlett, Acting Deputy Director
Ecosystem Conservation Division
Tina.Bartlett@wildlife.ca.gov

Scott Cantrell, Water Branch Chief
Scott.Cantrell@wildlife.ca.gov

Kern Fan Groundwater Storage Project Monetized Ecosystem Benefits

In conducting the review as required by California Code of Regulations, title 23, section 6007, subdivision (b)(1), the California Department of Fish and Wildlife (Department) was unable to identify sufficient support in the methods used or values supplied in the application for certain monetized ecosystem benefits as discussed below. (Cal. Code Regs., tit. 23, § 6007, subd. (b)(1)(B).)

The discussion below identifies areas of concern regarding the application and information that was either not found in the application or did not have sufficient support.

The Department finds the monetized ecosystem benefit for spring-run and winter-run Chinook salmon survival insufficiently supported by the information in the application to establish this benefit for the Kern Fan Groundwater Storage Project. Additional or modified information may enable the Department to recommend accepting or adjusting the magnitude of an ecosystem benefit.

Areas of concern regarding the application are as follows:

Spring-run and Winter-run Chinook Salmon Survival Monetized Ecosystem Benefit

- Pulse flows are a commonly utilized tool for fishery management. The applicant provided an analysis to quantify the magnitude of pulse flow benefits to salmonid survival. However, conclusions presented from the analysis are beyond the level of precision that the methods are capable of delivering. Table 4-10 in the Technical Reference provides examples of commonly used metrics for quantifying the ecosystem improvement from flows to improve conditions for downstream migration of juvenile salmonids.
- The following are concerns regarding the application of the Delta Passage Model (DPM):
    - The DPM is not intended to be used to predict survival to adulthood. A 2011 DPM model description states, "Survival estimates generated by the DPM are not intended to predict future outcomes or to predict actual survival. Rather, DPM provides an estimate of relative survival (or survival index) which is useful for making comparisons between proposed operation alternatives." The analysis generated adult survival estimates using the model despite this limitation and presented results as a single point estimate. As seen in other project planning documents, typical outputs from a DPM analysis present juvenile survival (total or route specific) for different project alternatives and also include a range of survival estimates as opposed to a point estimate.

    - Figure 1 of the Cramer Fish Sciences Technical Memorandum was used to estimate the fraction of natural origin spring-run smolts entering the Sacramento River from the Feather River. The source of the figure notes the curves are Delta entry distribution of Chinook salmon smolts applied in the DPM. These curves were developed using USFWS trawl data from a Sacramento River location that is downstream of the Feather River. It may not be appropriate to use these Delta entry distributions to calculate a number of spring-run smolts entering the Sacramento River from the Feather River, as this increases uncertainty in the conclusions of the analysis. No justification was provided for utilizing the Delta entry distribution of Chinook salmon smolts as a proxy for distribution in the Feather River, nor was the increased uncertainty from this assumption discussed.

- The derivation of the model parameter for smolt survival in the Feather River is unclear. The application did not include a description of how the survival values identified in the reference led to the model input. Because there are different release locations on the Feather River with different associated survival rates, using a constant value for survival may not be representative of actual population dynamics.

- The derivation and justification of model inputs for the annual number of winter-run and spring-run smolts is unclear. The references cited for calculating Sacramento River basin smolt abundance are inconsistent between the application documents: *IRWD_Tab 4-A2-Ecosystem_CFS_TechMemo_FINAL.pdf* and *Smolt_Surv_to_Bay.xlsx*. In addition, the applicant did not describe how the value for natural origin spring-run smolt production from the Feather River was derived from the cited references. The Department is unable to verify model inputs, which increases uncertainty in the conclusions about the change in adult abundance.

Therefore, the information in the application insufficiently supports establishing this benefit at this time.

Incidental Wetland Habitat Monetized Ecosystem Benefit

The Department did not identify significant areas of concern for the incidental wetland habitat monetized ecosystem benefit.

EXHIBIT "B"

Summary of Proposition 1 WSIP Project Adjusted Project Benefit Ratios

Applicant	Project	Submitted PBR	Adjusted PBR
City of San Diego	Pure Water San Diego North City Phase 1	6.10	0.00
Contra Costa Water District	Los Vaqueros Reservoir Expansion Project	3.60	0.46
Inland Empire Utilities Agency	Chino Basin Conjunctive Use Environmental Water Storage/Exchange Program	1.72	0.71
IRWD/Rosedale	Kern Fan Project	1.47	0.58
Nevada Irrigation District	Centennial Water Supply Project	4.20	0.00
Sacramento Regional County Sanitation District	South Sacramento County Agriculture & Habitat Lands Recycled Water, Groundwater Storage, and Conjunctive Use Program	2.95	0.75
San Joaquin Valley Water Infrastructure Authority	Temperance Flat Reservoir Project	2.86	0.10
Santa Clara Valley Water District	Pacheco Reservoir Expansion project	2.43	0.36
Semitropic Water Storage District	Tulare Lake Storage and Floodwater Protection Project	1.63	0.01
Sites Project Authority	Sites Project	2.11	0.40
Southern California Water Bank Authority	Willow Springs Water Bank Conjunctive Use Project	2.60	0.00