

AGENDA
IRVINE RANCH WATER DISTRICT
SUPPLY RELIABILITY PROGRAMS COMMITTEE
TUESDAY, JUNE 14, 2022

This meeting will be held in-person at the District’s headquarters located at 15600 Sand Canyon Avenue, Irvine, California. The meeting will also be broadcasted via Webex for those wanting to observe the meeting virtually.

To observe this meeting virtually, please join online using the link and information below:

Via Web: <https://irwd.webex.com/irwd/j.php?MTID=m38ac44e1fa5f530fbe4d8d1ab01030e7>
Meeting Number (Access Code): 2493 460 9321
Meeting Password: YWuKgpPA438

As courtesy to the other participants, please mute your phone when you are not speaking.

PLEASE NOTE: Participants joining the meeting will be placed into the Webex lobby when the Committee enters closed session. Participants who remain in the “lobby” will automatically be returned to the open session of the Committee once the closed session has concluded. Participants who join the meeting while the Committee is in closed session will receive a notice that the meeting has been locked. They will be able to join the meeting once the closed session has concluded.

CALL TO ORDER 2:30 p.m.

<u>ATTENDANCE</u>	Committee Chair: Douglas Reinhart	_____
	Member: Peer Swan	_____

<u>ALSO PRESENT</u>	Paul Cook	_____	Paul Weghorst	_____
	Rob Jacobson	_____	Fiona Sanchez	_____
	Kellie Welch	_____	Christine Compton	_____
	Natalie Palacio	_____	Marina Lindsay	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

PUBLIC COMMENT NOTICE

If you wish to address the Committee on any item, please submit a request to speak via the “chat” feature available when joining the meeting virtually. Remarks are limited to three minutes per speaker on each subject. Public comments are limited to three minutes per speaker on each subject. You may also submit a public comment in advance of the meeting by emailing comments@irwd.com before 9:00 a.m. on Tuesday, June 14, 2022.

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 – PALACIO / WELCH / SANCHEZ / WEGHORST

Recommendation: Receive and file.

6. OPTIONS FOR KERN FAN GROUNDWATER STORAGE PROJECT DELIVERIES TO DUDLY RIDGE WATER DISTRICT – SANCHEZ / WEGHORST

Recommendation: Receive and file.

7. OPTIONS FOR USE OF WATER SUPPLIES IN KERN WATER BANK – PALACIO / WELCH / SANCHEZ / WEGHORST

Recommendation: Receive and file.

ACTION

8. SCOPE OF WORK TO STUDY OPTIONS FOR ENHANCED RECHARGE – WELCH / SANCHEZ / WEGHORST

Recommendation: That the Committee provide input of Thomas Harder's scope of work, schedule, and cost estimate.

OTHER BUSINESS

9. Directors' Comments
10. 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 electronically via the Webex meeting noted. Upon request, the District will provide for written agenda materials in appropriate alternative formats, and reasonable disability-related modification or accommodation to enable individuals with disabilities to participate in and provide comments at public meetings. Please submit a request, including your name, phone number and/or email address, and a description of the modification, accommodation, or alternative format requested at least two days before the meeting. Requests should be emailed to comments@irwd.com. Requests made by mail must be received at least two days before the meeting. Requests will be granted whenever possible and resolved in favor of accessibility.

June 14, 2022

Prepared by: N. Palacio / 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

SUMMARY:

Staff has prepared information related to IRWD's water banking facilities, capacities, operations, and exchange programs. The information is regularly updated to reflect changes in the status of IRWD's projects, programs, and operations. At the Committee meeting, staff will review this information and provide an update on efforts to secure additional water for recharge at IRWD's water banking projects.

BACKGROUND:

To facilitate discussion with the Committee, staff has prepared reference materials in tabular, map, and schematic formats to describe IRWD's water banking facilities, capacities, operations, storage, and exchange programs. The reference materials are updated regularly to reflect changes in the status of the projects, programs, and operations. The following is an overview of the reference materials.

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 provided as Exhibit "A".

Exhibits "B" and "C" provide an update on water banking recovery and recharge operations, as well as 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 columns that provide totals for each water type and storage location. Changes to Exhibits "B" and "C" this month, include an updated beginning balance of 5,015 acre-feet for water stored in IRWD's Kern Water Bank account for 2021. The update reflects an increase made by the Kern Water Bank Authority in the amount of 332 AF over what was reported at the last Committee meeting. Other changes include the estimated Kern Water Bank recovery of 235 acre-feet for use on Jackson Ranch and an estimated recovery of 900 acre-feet of Kern River Water for Dudley Ridge under the Long-Term 1-for-1 Exchange Agreement.

Summary of Programs:

A table presenting a summary of IRWD's water purchase and exchange programs is presented as Exhibit "D". The table lists each purchase and exchange program that IRWD has entered into and presents information related to the type of exchange, year executed, agreement type and

water type. IRWD and partner shares are listed and show the total amount of water included in each program. The balances listed for IRWD and its partners show the amount of water remaining in storage, with IRWD's balances specifying whether the water is stored in Metropolitan's system, Kern County or owed to IRWD by Dudley Ridge. The table also provides details related to the exportability of IRWD's supplies. Changes in Exhibit "D" correspond with changes made to Exhibits "B" and "C". Exhibit "E" graphically depicts how storage of SWP and non-SWP water has changed in the Strand and Stockdale Integrated Banking Projects through time. The table provided as Exhibit "F" shows how capacities in the water banking projects have been dedicated to IRWD's existing and proposed exchange programs.

Project Maps:

To support the tables provided as Exhibits "A", "B", "C", "D" and "F", as well as the figure provided as Exhibit "E", staff has prepared maps that depict project wells and pipelines, recharge basins, and Cross Valley Canal turnout locations, along with the most current recharge rates. These maps are provided as Exhibits "G", "H" and "I", respectively. The facilities shown on the maps are associated with the Strand Ranch, Stockdale West, Stockdale East, and Drought Relief Projects.

Program Agreement Diagrams:

Schematic diagrams have been prepared that depict IRWD water banking and exchange programs with Rosedale-Rio Bravo Water Storage District, Buena Vista Water Storage District, Dudley Ridge and Metropolitan. These diagrams are provided as Exhibits "J", "K", "L", "M", "N" and "O", as described in the List of Exhibits.

Cost of Water Table:

A table presenting a summary of the costs of water from each of IRWD's unbalanced exchange partnerships is provided as Exhibit "P". The table lists each of IRWD's unbalanced exchange partnerships and presents information related to the period over which water was acquired, water type, IRWD's share of water, various cost components as well as the total cost of water delivered to IRWD's service area. Cost components include fixed and variable operating costs, estimated future IRWD recovery costs, the 2022 Metropolitan Full Service Untreated Tier-1 Rate and a capital cost of water. The costs of water are presented on a dollar per acre-foot basis. The cost of water will be updated periodically and presented to the Committee.

Other Program Opportunities:

IRWD has been pursuing additional opportunities to secure water for recharge. At the Committee meeting, staff will provide an update on efforts to enter into water banking partnerships with Mojave Water Agency and Santa Clarita Valley Water Agency.

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” – Status of IRWD Purchase and Exchange Programs
- Exhibit “E” – Historic Water Storage in Strand and Stockdale Projects
- Exhibit “F” – Dedicated Capacities of Current Water Banking Projects
- Exhibit “G” – Map of Water Banking Project Wells and Pipelines
- Exhibit “H” – Map of Water Banking Recharge Basins and Cross Valley Canal Turnout Facilities
- Exhibit “I” – Map of Water Banking Recharge Rates
- Exhibit “J” – Diagram of IRWD-Rosedale Water Banking and Exchange Program Agreements
- Exhibit “K” – 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 “L” – Diagram of Unbalanced Exchange Program Diagram with Dudley Ridge
- Exhibit “M” – Diagram of Coordinated Operating, Water Storage, Exchange, and Delivery Agreement with Metropolitan
- Exhibit “N” – Diagram of Template Wheeling Agreement with Metropolitan
- Exhibit “O” – Diagram of Dudley Ridge One-for-One Exchange
- Exhibit “P” – Cost of Water Table

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Exhibit "A"

TABLE 1
Current and Anticipated Water Banking Projects
Recharge, Storage and Recovery Capacities
 June 14, 2022

WATER BANKING PROJECT	OWNERSHIP AND WELL INFO		ALLOCATED CAPACITY (AF)					1 st PRIORITY RECOVERY CONDITIONS (CFS)		2 nd PRIORITY RECOVERY CONDITIONS (CFS)	
	IRWD OWNED	WELLS EXISTING	TOTAL STORAGE CAPACITY	ANNUAL RECHARGE 1 ST PRIORITY	ANNUAL RECHARGE 2 ND PRIORITY	ANNUAL RECOVERY 1 ST PRIORITY	ANNUAL RECOVERY 2 ND PRIORITY	RECOVERY CAPACITY AS PLANNED ¹	RECOVERY CAPACITY (Average Daily Production 1/1/2021 - 4/30/2022)	RECOVERY CAPACITY AS PLANNED	RECOVERY CAPACITY CURRENT CONDITIONS
Strand Ranch	Yes	7	50,000	17,500	-	17,500	-	40.0	21.4	-	-
Stockdale West	Yes	3	26,000	27,100	-	11,250	-	15.0	11.7	-	-
Stockdale East	No	2	-	-	19,000	-	7,500	-	-	10.0	9.0
IRWD Acquired Storage Account ²	No	-	50,000	-	-	-	-	-	-	-	-
Drought Relief Project Wells ²	No	3	-	-	-	-	-	15.0	16.7	-	-
Kern Water Bank Storage Account ⁴	No	-	9,495	3,200	-	1,520	<5,000	-	-	-	-
TOTALS		15	135,495	47,800	19,000	30,270	12,500	70.0	49.8	10.0	9.0
Partner Capacities ³			38,000	22,300	9,500	10,850	0	35.5	25.0	-	-
IRWD Capacities (does not include Kern Water Bank capacities)			88,000	22,300	9,500	17,900	7,500	34.5	25.0	-	-
IRWD's recovery <i>during</i> 6 month partner recovery period (AF)								12,420	9,000	-	-
IRWD's recovery <i>after</i> 6 month partner recovery period (AF)								5,480	6,733	-	-
TOTALS (AF)								17,900	15,733	-	-
Number of months needed to recover IRWD's total AF after partners' recovery (Assumes IRWD has use of total recovery capacity after partners' recovery)								8.6	10.2	-	-
Strand Ranch monthly recharge amount assuming 0.3 ft/day average recharge rate (AF)										4,518	
Stockdale West monthly recharge amount assuming 0.3 ft/day average recharge rate (AF)										2,331	

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

³ One half of storage capacity at Stockdale West and Strand Ranch will be allocated for partners.

⁴ 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. 5,000 AF of recovery capacity may be available for second priority use.

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Exhibit "B"

TABLE 2

IRWD's Water Banking Storage, Recharge and Recovery Operations - BEFORE LOSSES

June 14, 2022

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 2021 (AF)						
Total Kern Water Bank ⁹	-	5,015	-	-	-	5,015
Total MWD System ⁴	8,027	-	-	-	200	8,227
Total Kern County	5,210	24,855	3,935	647	3,761	38,408
TOTAL STORED WATER (1/1/2021)	13,237	29,870	3,935	647	3,961	51,650
(RECOVERY) AND RECHARGE IN 2021 (AF)						
KWB Recovery for use on Jackson Ranch ⁵	-	(388)	-	-	-	(388)
SWP Table A	-	-	-	(556)	-	(556)
2021 SWP Allocation (5 %) ^{3, 6}	35	-	-	-	35	70
Kern River Water	-	(10,000)	(2,681)	-	-	(12,681)
SWP Water Sale to DRWD Landowners ⁷	-	(439)	-	-	(3,468)	(3,907)
2018 Reserve Water	12				12	24
DRWD 1-for-1 Long Term Exchange Credit ⁸	10,000	-	-	-	-	10,000
TOTAL 2021 TRANSACTIONS	10,047	(10,827)	(2,681)	(556)	(3,421)	(7,438)
Total Kern Water Bank ⁹	-	4,627	-	-	-	4,627
Total MWD System	8,062	-	-	-	-	8,062
Total Kern County	5,222	14,416	-	-	12	19,650
Total DRWD 1-for-1 Long Term Exchange Credit	10,000	-	-	-	-	10,000
TOTAL STORED WATER (1/1/2022)	23,284	19,043	-	-	12	42,339
(RECOVERY) AND RECHARGE IN 2022 (AF)						
KWB Recovery for use on Jackson Ranch ⁵ (estimated)	-	(235)	-	-	-	(235)
2022 SWP Allocation (5 %)	44	-	-	-	44	87
Kern River Water (estimated)		(900)				(900)
DRWD 1-for-1 Long Term Exchange Credit	900					900
Recovery of Banked SWP Water for MWD	(3,927)	-	-	-	-	(3,927)
MWD Credit for SWP Water	3,927	-	-	-	-	3,927
TOTAL ESTIMATED 2022 TRANSACTIONS	944	(1,135)	-	-	44	(148)
ESTIMATED WATER IN STORAGE 2022 (AF)						
Total Kern Water Bank ⁹	-	4,392	-	-	-	4,392
Total MWD System	12,032	-	-	-	44	12,076
Total Kern County	1,295	13,516	-	-	12	14,823
Total DRWD 1-for-1 Long Term Exchange Credit	10,900	-	-	-	-	10,900
TOTAL ESTIMATED STORED WATER TO DATE	24,227	17,908	-	-	56	42,191

NOTES:

-MWD = Metropolitan Water District of Southern California.

¹ IRWD's SWP includes 295 AF from CVWD that stays in Kern County.

² IRWD's Non-SWP total includes 2,842 AF, net of losses, 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 through 2020 SWP allocation water is stored in Kern County. Half of IRWD's 2021 SWP allocation is stored in the MWD system, the other half was delivered to DRWD as part of the SWP Water Sale to DRWD landowners

⁴ Beginning balance of water stored in MWD system includes: 4,000 AF from 2014 Exchange, 2,853 AF of 2014 borrowed SWP, 1,186 AF of IRWD's 2013-2016 SWP allocations through DRWD.

⁵ Water recovered from IRWD's Kern Water Bank account for use on Jackson Ranch.

⁶ 17 AF of IRWD's 2021 SWP Allocation was used to fulfill an obligation to Pastoria.

⁷ Kern County Water Agency approved the recovery of 3,672 AF for the SWP Water Sale to DRWD landowners. In order to make up the difference between the approved amount of 3,672 AF and the amount after losses (3,233 AF), IRWD was able to use 439 AF from its Article 21 water acquired from Semitropic as part of the sale.

⁸ Per the DRWD Long-Term 1-for-1 Exchange Program, Non-SWP water delivered to DRWD landowners will be returned to IRWD as SWP water at a later date. To account for the SWP water that will be returned at a later date, the amount of water owed will be shown as a credit.

⁹ IRWD's KWB Account balance includes SWP, Friant, and Kern River water. The KWB account balance is included in the Non-SWP column because it is not exportable to IRWD's service area.

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Exhibit "C"

TABLE 3

IRWD's Water Banking Storage, Recharge and Recovery Operations - AFTER LOSSES

June 14, 2022

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 2021 (AF)						
Total Kern Water Bank ⁹	-	5,015	-	-	-	5,015
Total MWD System ⁴	8,027	-	-	-	200	8,227
Total Kern County	4,177	20,931	2,681	556	3,233	31,578
TOTAL STORED WATER (1/1/2021)	12,204	25,946	2,681	556	3,433	44,820
(RECOVERY) AND RECHARGE IN 2021 (AF)						
KWB Recovery for use on Jackson Ranch ⁵	-	(388)	-	-	-	(388)
SWP Table A	-	-	-	(556)	-	(556)
2021 SWP Allocation (5%) ^{3, 6}	35	-	-	-	35	70
Kern River Water	-	(10,000)	(2,681)	-	-	(12,681)
SWP Water Sale to DRWD Landowners ⁷	-	(439)	-	-	(3,468)	(3,907)
2018 Reserve Water	11	-	-	-	11	22
DRWD 1-for-1 Long Term Exchange Credit ⁸	10,000	-	-	-	-	10,000
TOTAL 2021 TRANSACTIONS	10,046	(10,827)	(2,681)	(556)	(3,422)	(7,440)
Total Kern Water Bank ⁹	-	4,627	-	-	-	4,627
Total MWD System	8,062	-	-	-	-	8,062
Total Kern County	4,188	10,492	-	-	11	14,691
Total DRWD 1-for-1 Long Term Exchange Credit	10,000	-	-	-	-	10,000
TOTAL STORED WATER (1/1/2022)	22,250	15,119	-	-	11	37,380
(RECOVERY) AND RECHARGE IN 2022 (AF)						
KWB Recovery for use on Jackson Ranch ⁵ (estimated)	-	(235)	-	-	-	(235)
2022 SWP Allocation (5 %)	44	-	-	-	44	87
Kern River Water (estimated)	-	(900)	-	-	-	(900)
DRWD 1-for-1 Long Term Exchange Credit	900	-	-	-	-	900
Recovery of Banked SWP Water for MWD	(3,927)	-	-	-	-	(3,927)
MWD Credit for SWP Water	3,927	-	-	-	-	3,927
TOTAL ESTIMATED 2022 TRANSACTIONS	944	(1,135)	-	-	44	(148)
ESTIMATED WATER IN STORAGE 2022 (AF)						
Total Kern Water Bank ⁹	-	4,392	-	-	-	4,392
Total MWD System	12,032	-	-	-	44	12,076
Total Kern County	261	9,592	-	-	11	9,864
Total DRWD 1-for-1 Long Term Exchange Credit	10,900	-	-	-	-	10,900
TOTAL ESTIMATED STORED WATER TO DATE	23,193	13,984	-	-	55	37,232

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 BVWSD in Kern County is adjusted 10% (6% for surface loss and 4% for reserve loss); no losses for water directly delivered to MWD system.

-MWD = Metropolitan Water District of Southern California.

¹ IRWD's SWP includes 251 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 through 2020 SWP allocation water is stored in Kern County. Half of IRWD's 2021 SWP allocation is stored in the MWD system, the other half was delivered to DRWD as part of the SWP Water Sale to DRWD landowners, therefore no losses are taken on the water.

⁴ Beginning balance of water stored in MWD system includes 4,000 AF of 2014 Exchange, 2,853 AF of 2014 borrowed SWP, 1,186 AF of IRWD's 2013-2016 SWP allocations through DRWD.

⁵ Water recovered from IRWD's Kern Water Bank account for use on Jackson Ranch.

⁶ 17 AF of IRWD's 2021 SWP Allocation was used to fulfill an obligation to Pastoria.

⁷ Kern County Water Agency approved the recovery of 3,672 AF for the SWP Water Sale to DRWD landowners. In order to make up the difference between the approved amount of 3,672 AF and the amount after losses (3,233 AF), IRWD was able to use 439 AF from its Article 21 water acquired from Semitropic as part of the sale.

⁸ Per the DRWD Long-Term 1-for-1 Exchange Program, Non-SWP water delivered to DRWD landowners will be returned to IRWD as SWP water at a later date. To account for the SWP water that will be returned at a later date, the amount of water owed will be shown as a credit.

⁹ IRWD's KWB Account balance includes SWP, Friant, and Kern River water. The KWB account balance is included in the Non-SWP column because it is not exportable to IRWD's service area.

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Exhibit "D"

TABLE 4

Status of IRWD Purchase and Exchange Programs (AFTER LOSSES)

June 14, 2022

PARTNER	EXCHANGE RATIO	YEAR EXECUTED	AGREEMENT TYPE	WATER TYPE	PARTNER WATER		IRWD WATER								
					PARTNER SHARE (AF)	PARTNER BALANCE (AF)	IRWD SHARE (AF)	IRWD BALANCE				EXPORTABILITY			SELLABLE (Y/N)
								IN MWD SYSTEM (AF)	STORED IN KERN (AF)	OWED BY DUDLEY RIDGE WD	TOTAL (AF)	EXPORTABLE TO IRWD (AF)	NON-EXPORTABLE (AF)	FOR USE ON JACKSON RANCH (DRWD)	
Semitropic Water Storage District	NA	2008	Purchase	SWP Article 21	NA	NA	2,842		2,403		2,403		2,403		Yes
Carpinteria Valley Water District	2-for-1	2008	Short-Term	SWP Table A	277		250		250		250		250		Yes
Buena Vista Water Storage District ¹	2-for-1	2010	Pilot	Kern River	4,108		3,903								Yes
	2-for-1	2011	Long-Term	Kern River	21,248		20,186		7,189		7,189		7,189		
Antelope Valley East Kern Water Agency	2-for-1	2011	Pilot	SWP Table A	2,229		2,337	2,337	-		2,337	2,337			No
Carpinteria Valley Water District	2-for-1	2011	Pilot	SWP Table A	624		655	655	-		655	655			No
Dudley Ridge Water District ² (SWPAO #13012)	2-for-1	2013	SWPAO	SWP Table A	1,876	-	1,876	1,876	-		1,876	1,876		-	Yes
				SWP Article 21	1,553	-	1,554	1,554	-		1,554	1,554		-	Yes
Metropolitan Water District ³	1-for-1	2014	Short-Term	SWP Table A	NA	NA	4,000	4,000			4,000	4,000			No
Dudley Ridge Water District ⁴ (SWPAO #17030)	2-for-1	2018	SWPAO	SWP Table A	1,066	55	1,066	1,055	11		1,066	1,066		55	Yes
Central Coast Water Agency	2-for-1	2017	Short-Term	SWP Table A	258	-	258	258			258	258			No
Dudley Ridge Water District ⁵	1-for-1	2017	Long-Term	SWP Table A						10,900	10,900	10,900			No
Central Coast Water Agency	2-for-1	2019	Short-Term	SWP Table A	298	-	298	298	-		298	298			No
Total:					33,537	55	39,225	12,033	9,853	10,900	32,786	22,944	9,842	55	

¹ Water acquired through BVWSD will be exportable after it is exchanged for SWP Table A through 1-for-1 exchange with Dudley Ridge Water District.

² Only the portion of water stored for use on Jackson Ranch in DRWD is sellable.

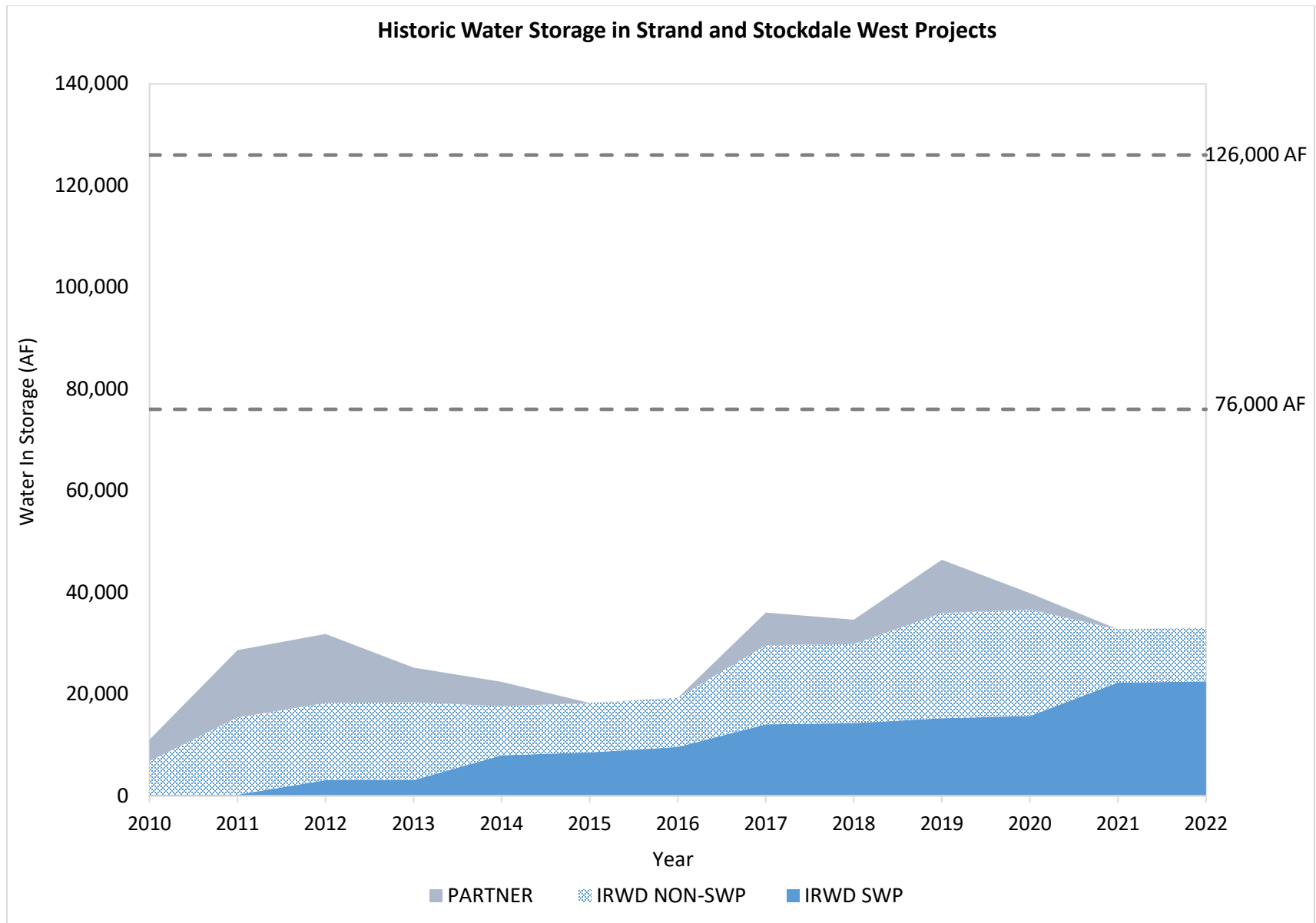
³ Source of water was Buena Vista Water Storage District Kern River high flow water.

⁴ Assumes MWD will take delivery of 2022 SWP Table A Allocation.

⁵ Estimated amount of Table A to be returned to IRWD from Dudley Ridge Water District under the 1-for-1 exchange program.

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Exhibit “E”



*After losses

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Exhibit "F"

TABLE 5

IRWD Dedicated Water Banking Capacities for Existing and Proposed Exchange Programs

June 14, 2022

STORAGE CAPACITY

Program	Dedicated Storage Capacity Strand Ranch (AF)	Dedicated Storage Capacity Stockdale West (AF)	Dedicated Storage Capacity Leased Storage Account (AF)	Kern Water Bank Storage Capacity (AF)
Total Capacity	50,000	26,000	50,000	9,495
BVWSD	40,000	-	-	-
DRWD	10,000	-	-	-
AVEK	-	20,000	-	-
Total Dedicated	50,000	20,000	-	-
Total Remaining	-	6,000	50,000	9,495

RECHARGE CAPACITY

Program	Dedicated Recharge Capacity Strand Ranch (AF)	Dedicated Recharge Capacity Stockdale West (AF)	Dedicated Recharge Capacity Leased Storage Account (AF)	Kern Water Bank Recharge Capacity (AF)
Total Capacity	17,500	27,100	-	3,200
BVWSD	17,500	-	-	-
DRWD	-	-	-	-
AVEK	-	20,000	-	-
Total Dedicated	17,500	20,000	-	-
Total Remaining	-	7,100	-	3,200

RECOVERY CAPACITY

Program Partner	Dedicated Recovery Capacity Strand Ranch (AF)	Dedicated Recovery Capacity Stockdale West (AF)	Dedicated Recovery Capacity Leased Storage Account (AF)	Kern Water Bank Recovery Capacity (AF)
Total Capacity	17,500	11,250	-	1,520
BVWSD	6,667	-	-	-
DRWD	-	-	-	-
AVEK	-	3,333	-	-
IRWD	10,833	7,084	-	1,520
Total Dedicated	17,500	10,417	-	1,520
Total Remaining	-	833	-	-

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Exhibit "G"



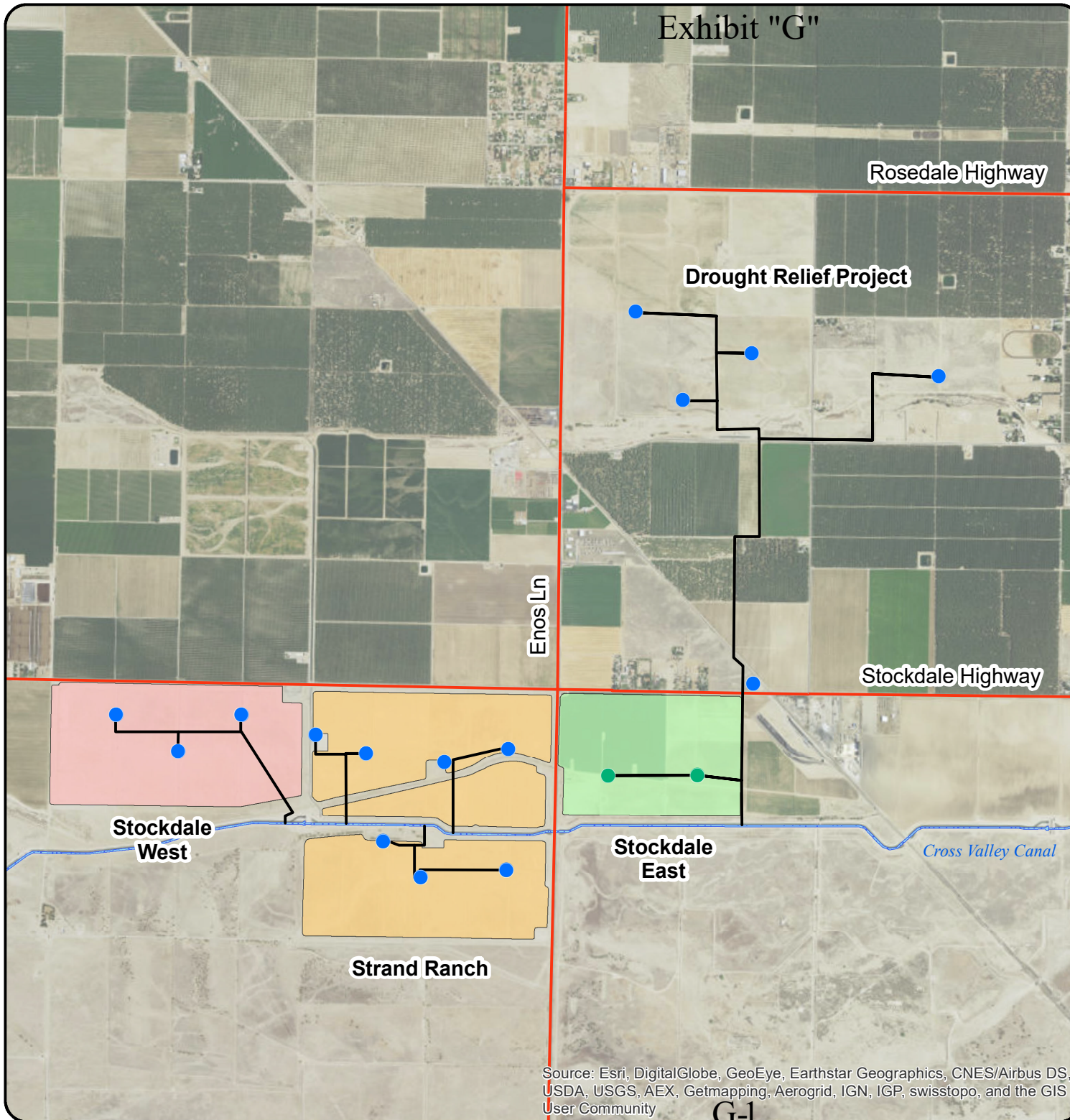
Irvine Ranch
WATER DISTRICT

Location Map: IRWD Water Banking Projects Wells and Turnin Pipelines

MAP FEATURES

- Extraction Well
- Extraction Well
- Well Discharge Pipelines
- Stockdale East
- Stockdale West
- Strand Ranch

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



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

G-1



0 0.25 0.5 1 Miles

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

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Exhibit "H"

Rosedale Highway



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, pipelines and
turnout facilities.

Existing Siphon
50 CFS Capacity
From Strand

Stockdale West
Turnout
100 CFS Capacity

Existing North & South
Strand Ranch
Turnout Facilities
100 CFS Capacity Each

Cross Valley Canal

Enos Ln

Stockdale Highway

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS,
USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS
USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS

User Community



0 0.25 0.5 1
Miles

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

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Exhibit "I"

Rosedale Highway



Location Map: IRWD Water Banking Projects Recharge Rates

MAP FEATURES

- ▲ Turnouts
- Stockdale West
- Strand Ranch

Stockdale West
0.11 feet/day
15 CFS

Strand Ranch North
0.29 feet/day
40 CFS

Stockdale Highway

Cross Valley Canal

Strand Ranch South
0.13 feet/day
15 CFS

This figure shows the location of recharge basins and their associated recharge rates as of June 18, 2019.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



0 0.25 0.5 1
Miles

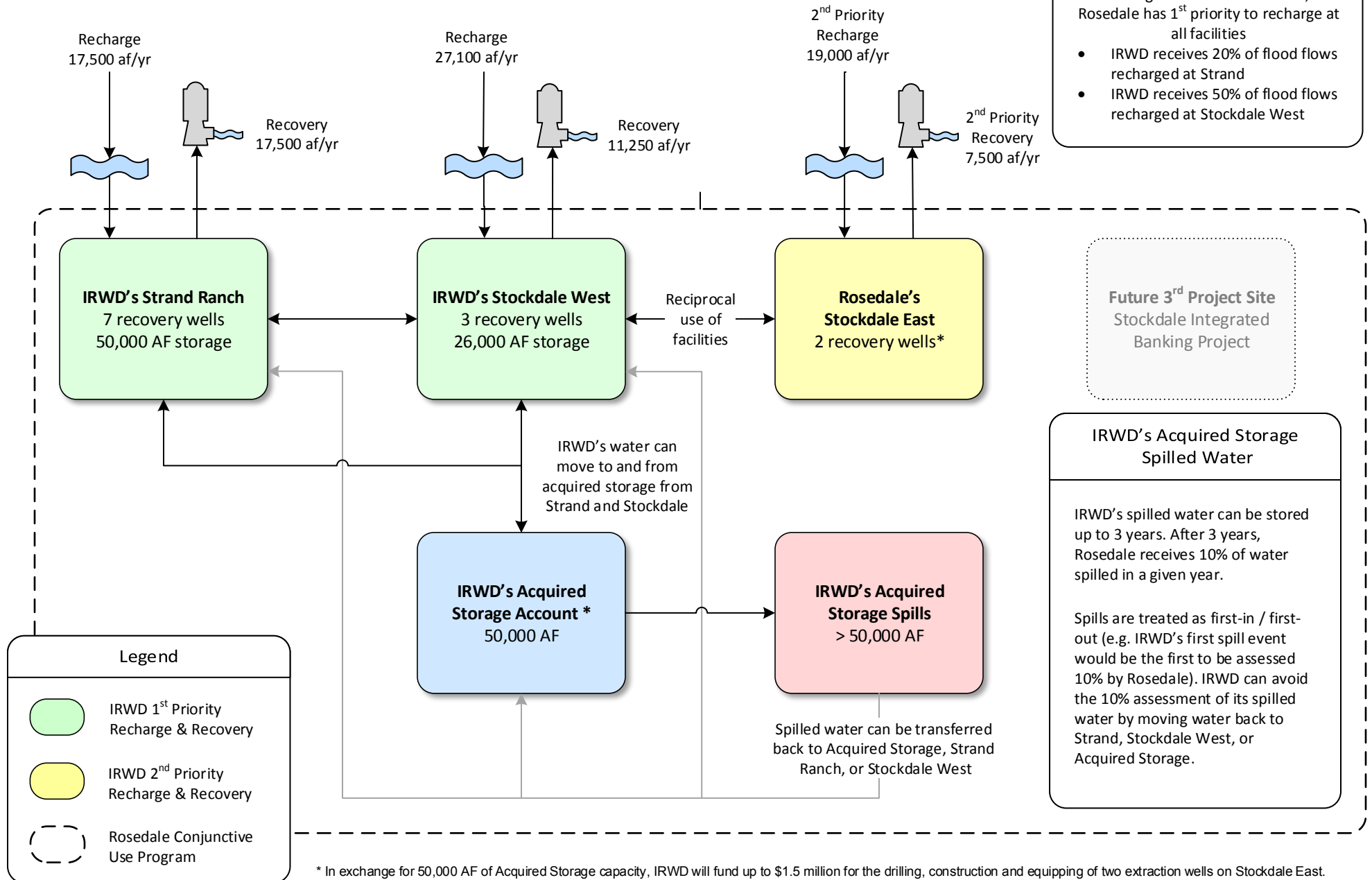
NAD 83 State Plane Zone 5 (feet)
Central Meridian: -118

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Exhibit "J"

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)



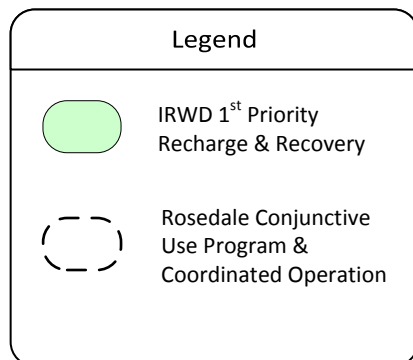
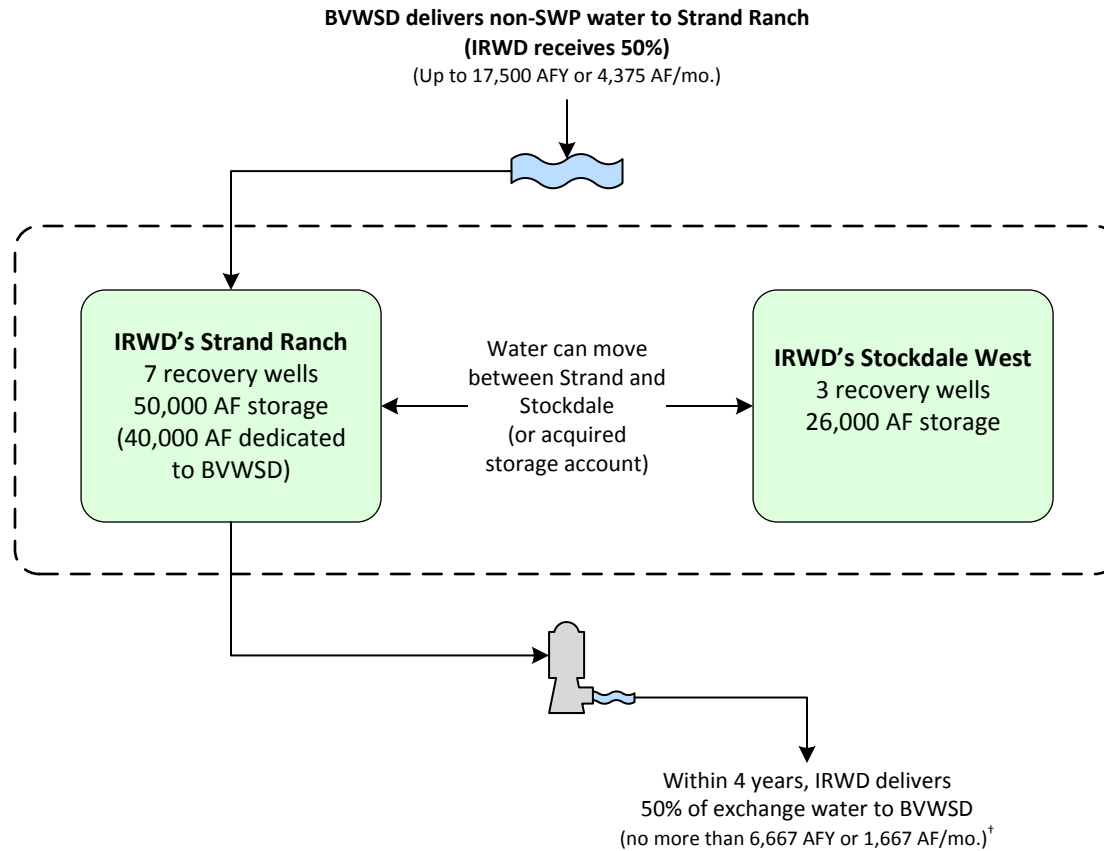
* In exchange for 50,000 AF of Acquired Storage capacity, IRWD will fund up to \$1.5 million for the drilling, construction and equipping of two extraction wells on Stockdale East.

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Exhibit "K"

Buena Vista Water Storage District Long Term Water Exchange Program

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

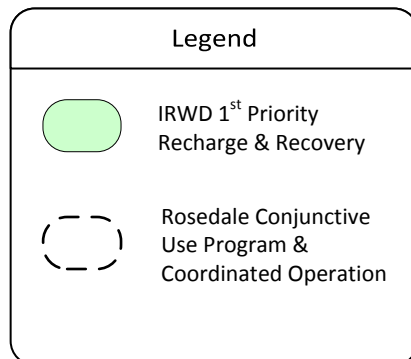
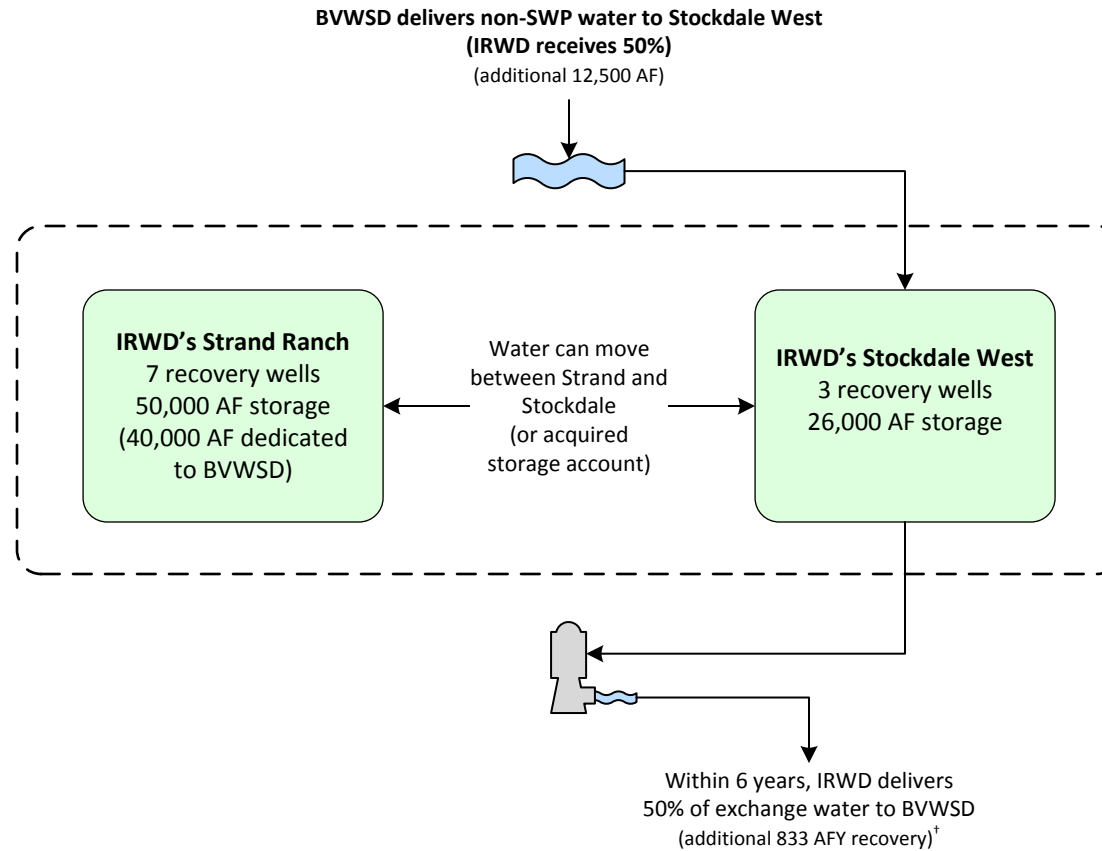


[†]IRWD shall remit one-half of the exchanged supply less one-half of reasonable losses back to BV no later than December 31st of the 4th year following the associated recharge event. IRWD pays for recovery of water returned to BV. Water to be remitted back to BV may remain in storage at Strand Ranch 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%

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

Effective 4/1/2017 through 3/30/2018



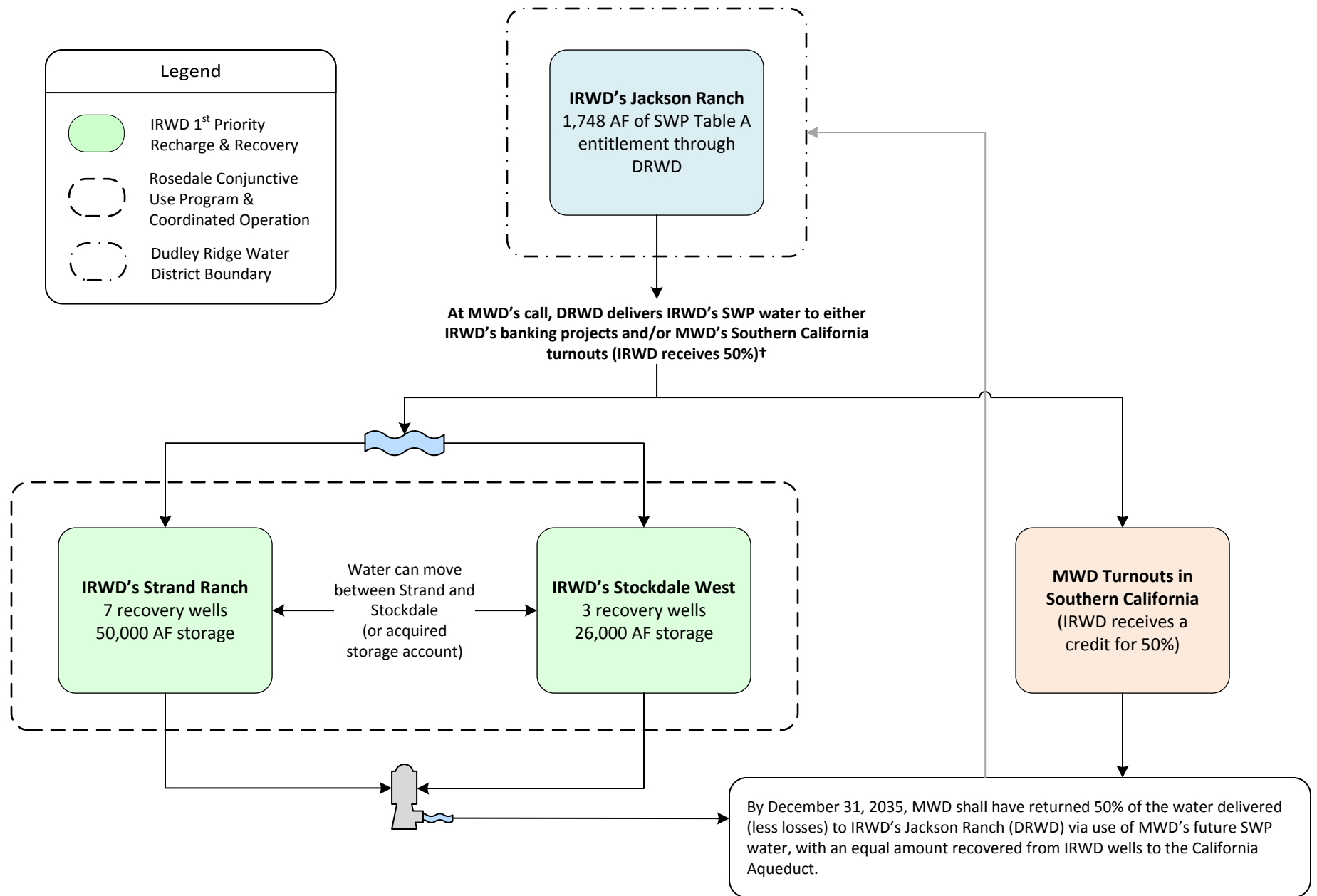
[†]IRWD shall remit one-half of the exchanged supply less one-half of reasonable losses back to BV no later than December 31st of the 6th year following the associated recharge event. IRWD pays for recovery of water returned to BV. Water to be remitted back to BV may remain in storage at Strand Ranch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

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 "L"

Dudley Ridge Water District (DRWD) Unbalanced Exchange Program

Up to 12,240 AF delivered from 6/7/2018 through 12/31/2027



†Consistent with IRWD-MWD coordinated operating agreement.

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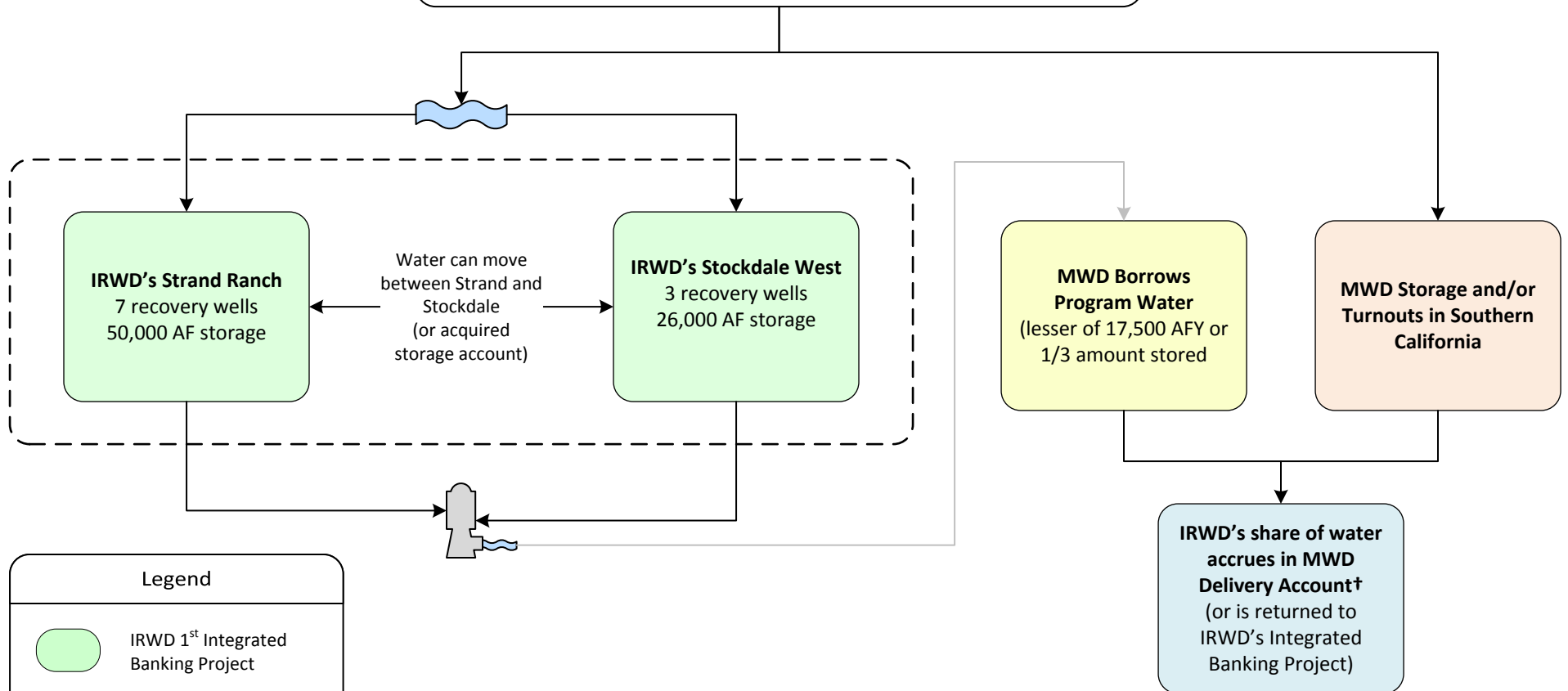
Exhibit "M"

Coordinated Operating, Water Storage, Exchange and Delivery Agreement Between MWD, MWDOC and IRWD Effective 5/1/2011 through 11/4/2035

With MWD's consent, IRWD secures SWP water (Program Water) through exchanges with IRWD Banking Partners for use as extraordinary supply under MWD Water Supply Allocation Plan

MWD has three options for the use and storage of Program Water:

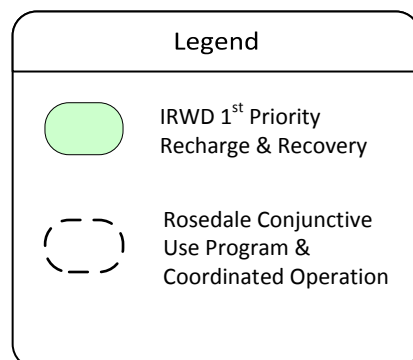
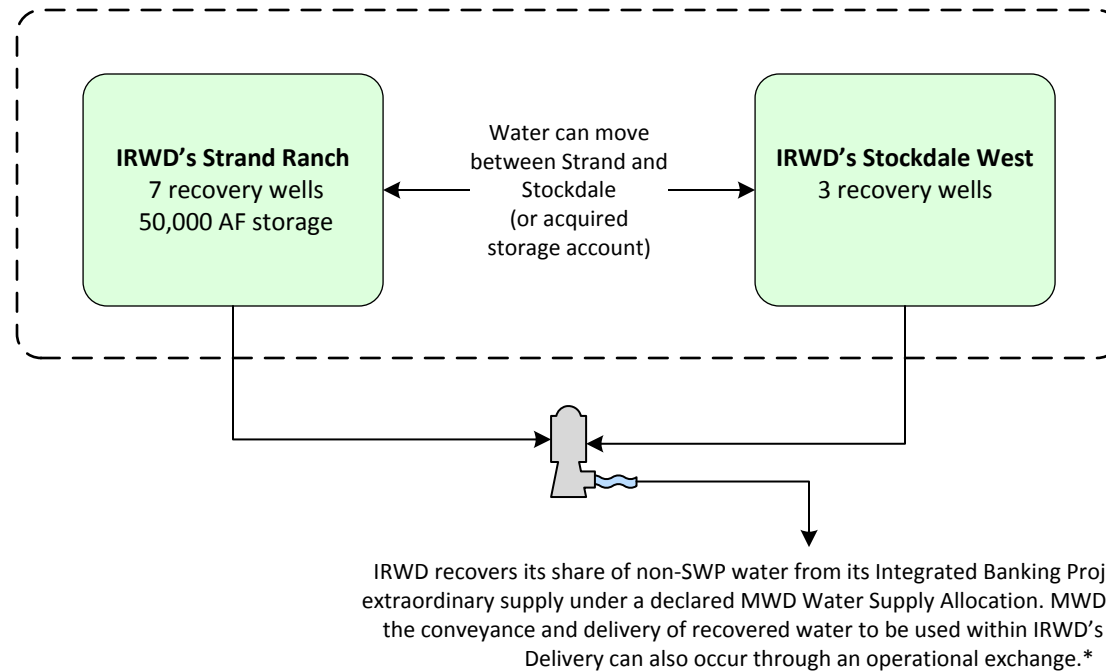
- Storage of water in IRWD's Integrated Banking Project
- Delivery to Southern California for immediate use and/or storage in MWD system
- Borrow a portion of Program water, with accrual in MWD Delivery Account



- Under an MWD Allocation, when IRWD calls for water, IRWD must first recover Program Water from the Integrated Banking Project before receiving water from the MWD Delivery Account.
- MWDOC shall pass through extraordinary supply credits for IRWD's benefit.
- † IRWD's banking partner share of Program Water to be returned by MWD.

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Exhibit "N"
Agreement for Conveyance of Water Between MWD, MWDOC, and IRWD (Wheeling Agreement)
Template for future agreements



*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.

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Exhibit "O"

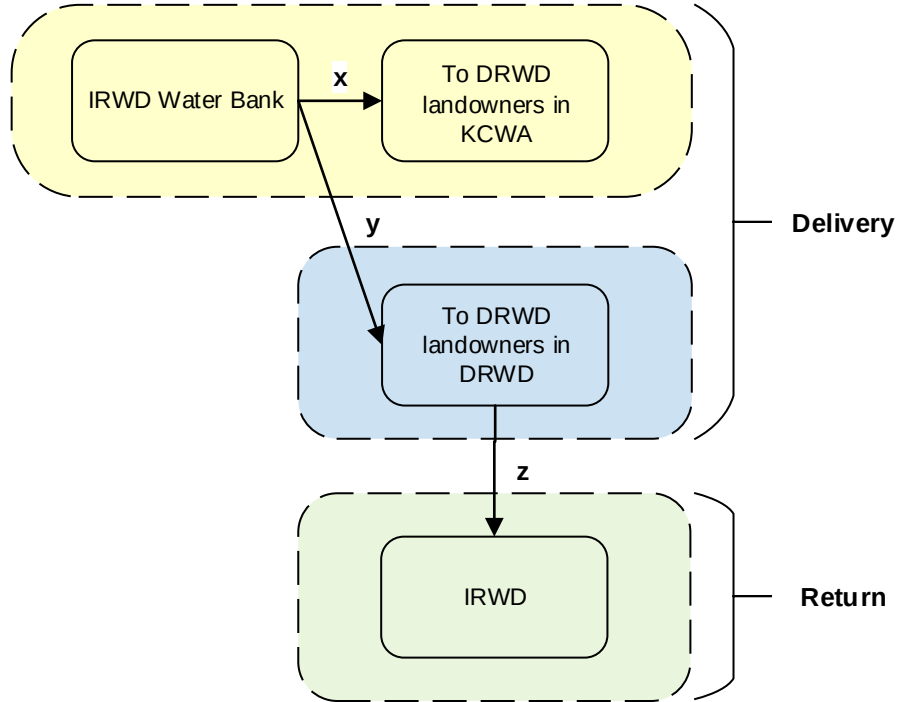
Dudley Ridge Water District Long Term 1-for-1 Water Exchange Program Effective 5/31/2017 through 11/4/2035

Scenario A

(Per Sections 2, 3, 4.1.1, and 4.1.3)

x= Non-Project Water required to stay in Kern County
y= Non-Project Water allowed to leave Kern County
z= DRWD Table A Water equal to x+y less applicable losses, if any

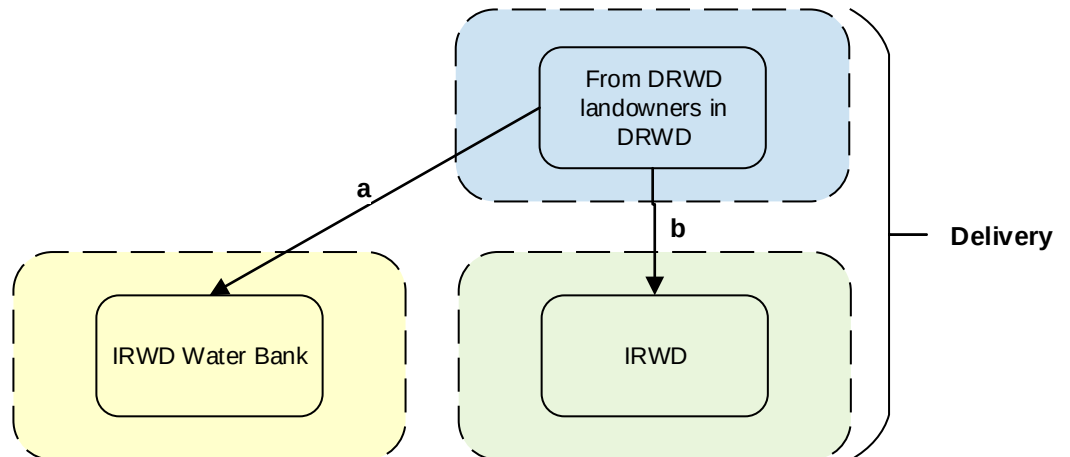
Per Section 4.1.3, z can be delivered to IRWD via in-ground transfer to IRWD, SWP delivery to IRWD banking facilities, or SWP delivery to MWDSC



Scenario B

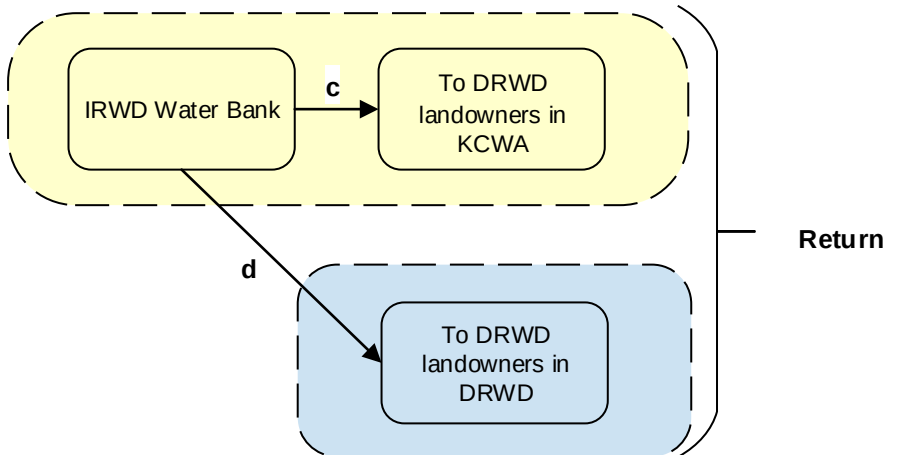
(Per Sections 2, 3, and 4.1.2)

$a + b = c + d$
(less applicable losses, if any)



Legend

	KCWA Service Area
	DRWD Service Area
	IRWD Service Area



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Exhibit "P"

TABLE 6

IRWD Water Banking Program Costs of Water Summary

June 14, 2022

Program Partner	Time Period	Water Type	IRWD Amount (AF)	Variable costs ² (\$/AF) (A)	Fixed Cost Component ³ (\$/AF) (B)	Fixed & Variable (\$/AF) (C)	Capital Component ⁴ (\$/AF) (D)	Cost of Water (\$/AF) (E)	Estimated Recovery of Water (\$/AF) (F)	2022 MWD Tier 1 Untreated Rate + SAC Surcharge ⁵ (\$/AF) (G)	Cost of Water in IRWD Service Area (\$/AF) (H)
						A+B		C+D			E+F+G
Buena Vista	2010-2015	Kern River	12,832	\$ 75.98	\$ 48.36	\$124.34	\$ 190.00	\$ 314.34	\$ 100.00	\$ 799.97	\$ 1,214.31
Buena Vista ¹	2017-2021	Kern River	11,256	\$158.77	\$ 48.36	\$207.13	\$ 190.00	\$ 397.13	\$ 100.00	\$ 799.97	\$ 1,297.10
AVEK	2012-2014	SWP Table A	2,229	\$ 11.70	\$ 48.36	\$ 60.06	\$ 190.00	\$ 250.06	\$ 100.00	\$ 799.97	\$ 1,150.03
AVEK ⁶	2012-2014	SWP Table A	108	\$ 11.70	\$ 48.36	\$ 60.06	\$ 190.00	\$ 250.06	\$ -	\$ 799.97	\$ 1,050.03
Carpinteria	2010-2015	SWP Table A	874	\$ 27.04	\$ 48.36	\$ 75.40	\$ 190.00	\$ 265.40	\$ 100.00	\$ 799.97	\$ 1,165.37
Carpinteria ⁶	2010-2015	SWP Table A	31	\$ 27.04	\$ 48.36	\$ 75.40	\$ 190.00	\$ 265.40	\$ -	\$ 799.97	\$ 1,065.37
Central Coast ⁶	2017-2021	SWP Table A	556	\$ 30.34	\$ 48.36	\$ 78.70	\$ 190.00	\$ 268.70	\$ -	\$ 799.97	\$ 1,068.67
DRWD ⁶	2014-2021	SWP Table A /Article 21	4,452	\$373.81	\$ 48.36	\$422.17	\$ 190.00	\$ 612.17	\$ -	\$ 799.97	\$ 1,412.14
			32,338								

¹ Water purchased in 2019 includes commodity charge of \$110/AF

² Variable Costs include Rosedale variable operating costs, Rosedale administration fees, CVC pumping, operating and stand-by fees, and KCWA fees. (Net of partner payments to IRWD for their share of water)

³ Fixed costs include Rosedale fixed operating costs, property taxes, PG&E standby costs, GSP fees, CVC expansion costs and other minor fix costs

⁴ Capital component does not include land costs.

⁵ Assumes IRWD would take delivery as extraordinary supply through Irvine Lake to the Baker Water Treatment Plant.

⁶ No recovery costs for DRWD water delivered in 2014-2016 and water recovered in 2022 as part of MWD borrowing.

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June 14, 2022

Prepared by: F. Sanchez

Submitted by: P. Weghorst

Approved by: Paul A. Cook



SUPPLY RELIABILITY PROGRAMS COMMITTEE

OPTIONS FOR KERN FAN GROUNDWATER STORAGE PROJECT DELIVERIES TO DUDLEY RIDGE WATER DISTRICT

SUMMARY:

IRWD and Rosedale-Rio Bravo Water Storage District formed the Groundwater Banking Joint Powers Authority (GBJPA) to plan, design, construct, and operate the Kern Fan Groundwater Storage Project (Kern Fan Project). The project will capture, recharge, and store State Water Project (SWP) Article 21 water to provide ecosystem and water reliability benefits. Ecosystem benefits would be provided through exchanges of water that result in pulse flows from Lake Oroville. IRWD has access to SWP Article 21 water through Dudley Ridge Water District. At the Committee meeting, staff will present options to ensure that Dudley Ridge is not impacted by Kern Fan Project pulse flow exchanges by extracting water from the Kern Fan Project ecosystem account and delivering it to DRWD. Staff will also present options for returning 50% of IRWD's Article 21 water stored in the Kern Fan Project to the Dudley Ridge service area.

BACKGROUND:

The Water Quality, Supply and Infrastructure Improvement Act of 2014, also known as Proposition 1, provides \$2.7 billion for public benefits associated with water storage projects that will provide specific public and ecosystem benefits. The California Water Commission (CWC) is administering Prop 1 grant funding for the planning, design, and construction of water storage projects through the Water Storage Investment Program. CWC has conditionally awarded \$89.1 million in grant funding to the Kern Fan Project.

Overview of Kern Fan Project:

The Kern Fan Project will develop a regional water bank in the Kern Fan area to capture, recharge, and store Article 21 water from the SWP during wet hydrologic periods. Rosedale has access to SWP supplies as a member unit of the Kern County Water Agency, and IRWD has access to SWP supplies through Dudley Ridge. The preliminary Kern Fan Project location map is provided as Exhibit "A".

The stored water would be recovered when needed to provide ecosystem, emergency, and water supply benefits to the State of California, IRWD, and Rosedale. Ecosystem benefits would be provided through pulse flows facilitated by one-for-one exchanges of SWP Table A water in Lake Oroville for water stored in the Kern Fan Project ecosystem account. The water stored in the ecosystem account is referred to as "exchange water" by the California Department of Water Resources (DWR). Water supply benefits would accrue to the project partners through SWP water stored in the respective project partner accounts. Project operations would be coordinated with the SWP through an exchange agreement with DWR and participating SWP contractors. A schematic of the Kern Fan Project is provided as Exhibit "B".

IRWD's Jackson Ranch Supplies:

In 2010, IRWD purchased the 883-acre Jackson Ranch to provide a SWP water supply to IRWD's existing Water Bank. Jackson Ranch is in Kings County and is within the service area of Dudley Ridge – an SWP contractor. Through Dudley Ridge, IRWD has the right to receive delivery of up to 1,749 acre-feet per year of SWP Table A water and to receive Article 21 water when it is available.

IRWD is currently able to make use of up to 50% of its SWP water supplies received from Dudley Ridge in IRWD's service area. These deliveries are facilitated through unbalanced exchange agreements implemented between DWR, Metropolitan Water District, Dudley Ridge, and the Kern County Water Agency. Per Dudley Ridge regulations, the other 50% of the water must be returned for use in Dudley Ridge on the Jackson Ranch or other lands in Dudley Ridge.

Kern Fan Project Deliveries to Dudley Ridge:

At the meeting staff will provide a presentation on options that will be available to ensure that Dudley Ridge is not impacted by the pulse flow exchanges, by extracting water from the Kern Fan Project ecosystem account and delivering it to DRWD. Staff will also present options for returning the 50% of the Article 21 water stored in IRWD's Kern Fan Project account that must be returned to the Dudley Ridge service area in accordance with Dudley Ridge regulations.

FISCAL IMPACTS:

CWC has awarded conditional funding to the Kern Fan Project in the amount of \$89.1 million. IRWD and Rosedale will fund the remaining cost directly and through other funding sources.

ENVIRONMENTAL COMPLIANCE:

An Environmental Impact Report for the Kern Fan Groundwater Storage 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. The Groundwater Banking Joint Powers Authority, as lead agency, filed a Notice of Determination for the Kern Fan Groundwater Storage Project with the County of Kern. Rosedale, as a responsible agency, filed a Notice of Determination with the County of Kern. IRWD, as a responsible agency, filed Notices of Determination with the counties of Orange and Kern.

RECOMMENDATION:

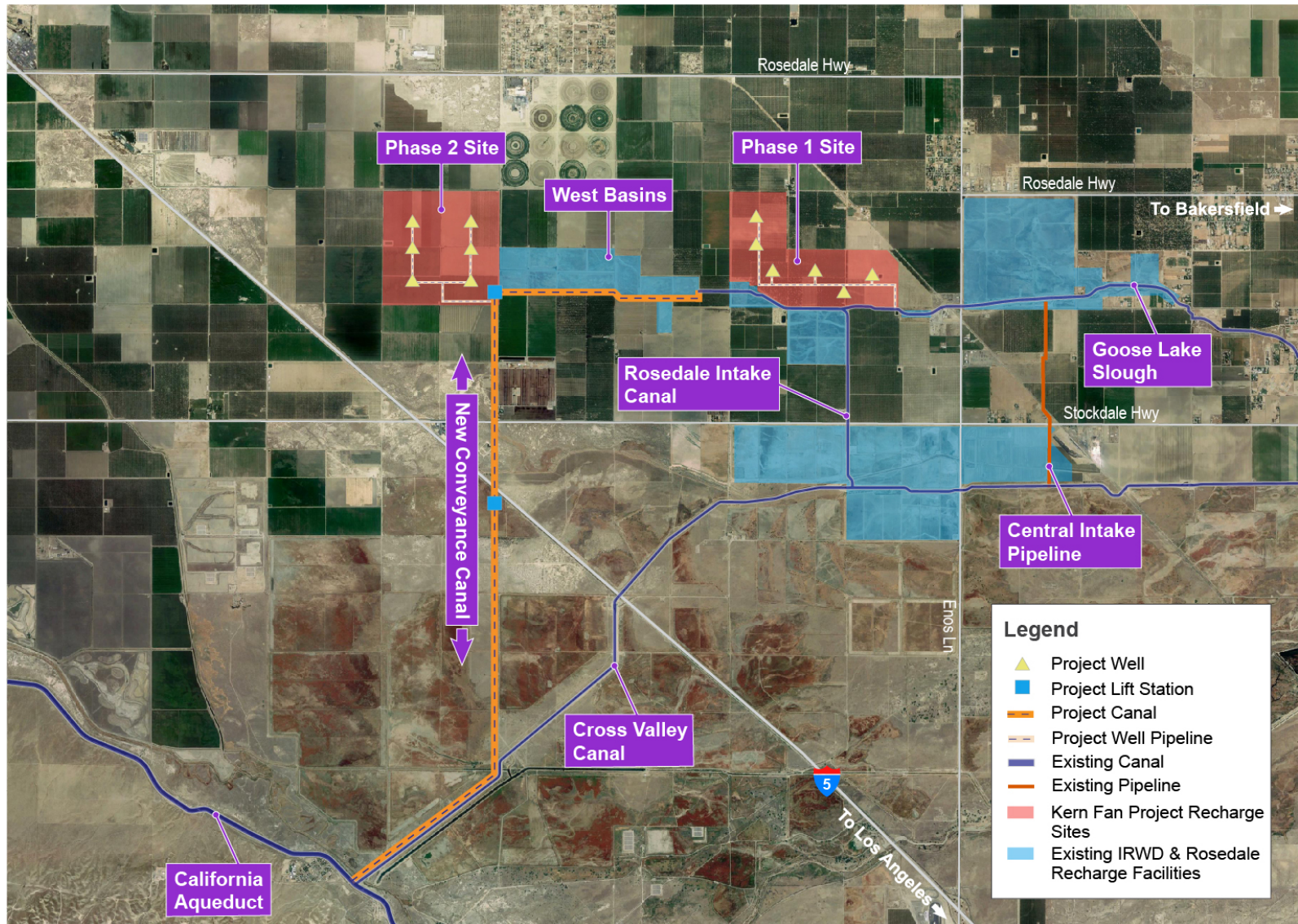
Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – Preliminary Kern Fan Project Location Map
Exhibit "B" – Kern Fan Project Overview Schematic

Exhibit "A"

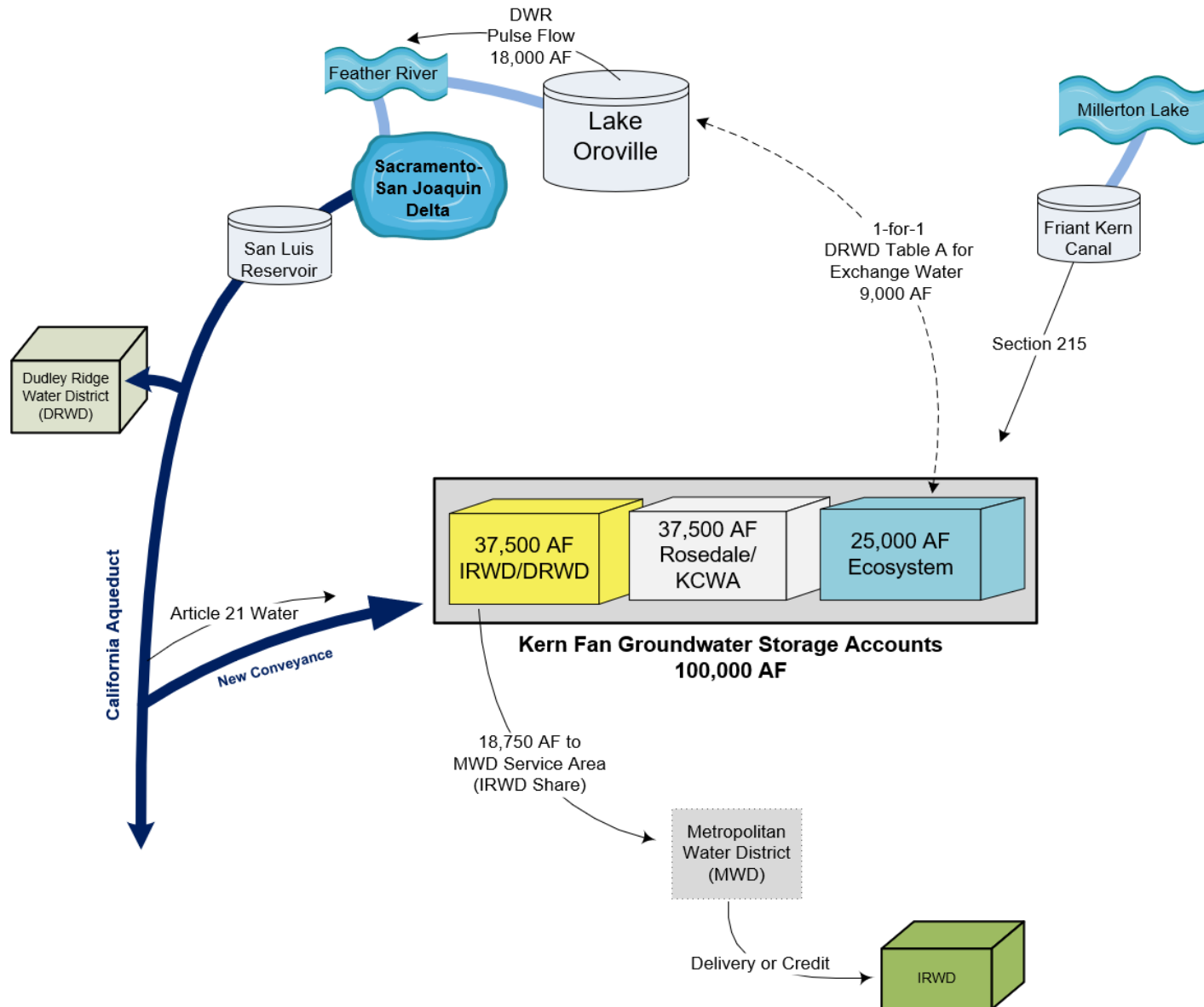
Preliminary Kern Fan Project Location Map



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Exhibit “B”

Kern Fan Groundwater Storage Project Overview



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June 14, 2022

Prepared by: N. Palacio / K. Welch

Submitted by: F. Sanchez / P. Weghorst

Approved by: Paul A. Cook 

SUPPLY RELIABILITY PROGRAMS COMMITTEE

OPTIONS FOR USE OF WATER SUPPLIES STORED IN KERN WATER BANK

SUMMARY:

IRWD receives an allocation of State Water Project (SWP) water supplies through its ownership of the Jackson Ranch, located within Dudley Ridge Water District. When it acquired the Jackson Ranch, IRWD received participation rights in the Kern Water Bank (KWB) and approximately 1,400 acre-feet (AF) of water held in storage. At the Committee meeting, staff will review IRWD's capacities in the KWB, the rules associated with participation in the KWB, IRWD's stored water supplies in the KWB, and options for use of the stored water. Staff recommends that the Committee provide input on the options for the use of IRWD supplies stored in the KWB.

BACKGROUND:

In 2010, IRWD purchased the 883-acre Jackson Ranch for the purpose of providing SWP water supplies to IRWD's Strand and Stockdale Integrated Banking Projects (IRWD Water Bank) located in Kern County. Jackson Ranch is located in Kings County within the service area of Dudley Ridge, which is a SWP contractor. Through Dudley Ridge, IRWD has the right to receive delivery of up to 1,749 AF per year of SWP Table A water and to receive Article 21 water when it is available. When IRWD purchased the Jackson Ranch, it received 6.58% of Dudley Ridge's 9.62% participation interests in the KWB, which provides additional water banking storage and capacities for IRWD. IRWD is obligated to pay 6.58% of the costs Dudley Ridge incurs through participation in the KWB.

IRWD's Capacities in KWB:

Through IRWD's participation in the KWB, IRWD has been allocated a storage capacity of 9,495 AF and a minimum first-priority recovery capacity of 1.78 cubic feet per second (up to 1,300 AF per year), which is based on the current KWB overall recovery capacity. IRWD also holds 3,200 AF per year of first-priority recharge capacity in the KWB. Furthermore, IRWD has second priority to other Dudley Ridge recharge and recovery capacities that are not being utilized.

Rules Associated with Participation in KWB:

Water stored and recovered from the KWB is subject to Dudley Ridge's KWB Participation and Exchange Agreement, to which IRWD is not signatory. A portion of Dudley's participation through this agreement was assigned to IRWD in the purchase of the Jackson Ranch. This agreement specifies that Dudley Ridge's participation in the KWB is primarily for the benefit of the lands within Dudley Ridge and it specifies that at least a majority of the water (50% plus one AF) extracted from the KWB be returned to lands within Dudley Ridge. It also requires that

100% of all SWP water stored in the KWB must be returned to Dudley Ridge. Participation in the KWB provides IRWD access to proportional shares of non-SWP water such as Friant 215 water and Kern River flood water when available to the KWB. Non-SWP water that is not returned to Dudley Ridge can be used outside the Dudley Ridge service area, subject to place-of-use restrictions.

Options for Use of IRWD's Stored KWB Supplies:

Currently, IRWD has 4,392 AF of water stored in its KWB account. This water is made up of high-flow Kern River water, Friant 215 water, Article 21 water, and SWP Table A water. When IRWD acquired the Jackson Ranch and the associated participation in the KWB, IRWD received 1,408 AF of stored water in the KWB. Of this amount, 801 AF is high-flow Kern River water, and 607 AF is Friant 215 water. Since the Jackson Ranch acquisition, IRWD has accrued an additional 1,803 AF of SWP water and 1,181 AF of high flow Kern River water in its KWB account.

Based on the Dudley Ridge Rules and Regulations, 100% of SWP supplies held in storage in the KWB must be returned to Dudley Ridge and 50% plus one AF of non-SWP water must be returned to Dudley Ridge. Therefore, of IRWD's 4,392 AF of water stored in the KWB, 2,197 AF must be returned to Dudley Ridge and 2,195 AF can be used outside of Dudley Ridge's service area subject to place-of-use restrictions. Exhibit "A" is a summary table of IRWD's stored water in the KWB. Staff has evaluated options for the use of IRWD's water stored in the KWB. The following options are available to IRWD for the use of the supplies.

Use of Water on Jackson Ranch:

The current lessee of the Jackson Ranch utilizes an average of 250 AF per year for crop irrigation related to its apiary (beekeeping) operations. IRWD currently recovers water for the lessee's use from its KWB account. IRWD should continue recovering water from the KWB for the lessee's use. The lessee's apiary use of the Jackson Ranch is not water intensive and only involves growing bee forage crops on a small acreage and for a short period of time each year. IRWD does not have enough water in storage in the KWB to support a large farming operation.

Sales of Water to Dudley Ridge Landowners:

Under this option, the SWP water that must be returned to Dudley Ridge could be sold to other Dudley Ridge landowners. Like the action taken by IRWD in 2021 when it sold Table A water to Dudley Ridge landowners, the proceeds could offset IRWD's capital investment in its water banking projects.

The 2,195 AF of stored Kern River and Friant 215 water in IRWD's KWB account, which can be used outside of Dudley Ridge service area, is restricted by place-of-use requirements. The Kern River water could potentially be sold inside Kern County and the Friant 215 water could potentially be sold for use in the Central Valley Project place-of-use.

Exchanges with Other Dudley Ridge Landowners:

Exchange opportunities currently exist for IRWD with respect to its water stored in the KWB. An example of such opportunities includes implementing exchanges of stored Table A and Article 21 water for Table A water (or non-SWP water) with other Dudley Ridge landowners. Under this option, the Table A and Article 21 water that must be returned to Dudley Ridge could be used by other Dudley Ridge landowners in return for an equal amount of future Dudley Ridge Table A water delivered to IRWD. Under the current dry year conditions, this option would be mutually beneficial by providing dry year supplies to Dudley Ridge while also providing a future water supply for the IRWD Water Bank that could be used in IRWD's service area. It is expected that the future Table A water could be transferred to IRWD through Metropolitan Water District of Southern California via the recently approved SWP Contract Amendment. Such transfers would require an agreement with the California Department of Water Resources (DWR).

The 2,195 AF of stored Kern River and Friant 215 in IRWD's KWB could potentially be exchanged for Table A water with a Dudley Ridge landowner for use within Kern County or Central Valley Project (CVP) place-of-use. Similarly, the future Table A water could be transferred to IRWD through the recently approved SWP Contract Amendment.

Temporary Borrowing of Supplies:

All the SWP water stored in IRWD's KWB account must be returned to Dudley Ridge. It might be possible for IRWD to borrow these supplies for use in IRWD's service area (through Metropolitan) during an emergency. This water would need to be returned to Dudley Ridge. Such a transaction would need the approval of Metropolitan and DWR.

Options for the Other Water Supplies:

IRWD currently has 482 AF of water available to it from other Dudley Ridge programs that are not related to the KWB. These other programs involve the Westside 5, San Gabriel Valley Municipal Water District, and Cawelo Water District. Water available to IRWD from these programs can either be used on IRWD's Jackson Ranch or sold to a Dudley Ridge landowner in Dudley Ridge service area. Dudley Ridge has indicated that IRWD's 62 AF in the San Gabriel Water District program could be exchanged for other Dudley Ridge Table A water and then delivered to IRWD's Water Bank for use in IRWD's service area through Metropolitan.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

The Jackson Ranch Water Allocation Project Negative Declaration was prepared and circulated for public review in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended), codified at California Public Resources Code Section 21000 et. seq. and the state

CEQA guidelines in the Code of Regulations, Title 14, Division 6, Chapter 3. A Notice of Determination for the final Negative Declaration for the purchase of the property was filed with Kings County on January 14, 2010.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit “A” – IRWD’s Stored Water Supplies in Kern Water Bank

Exhibit "A"

TABLE 1
IRWD's Water Supplies Stored in Kern Water Bank
June 14, 2022

Water Type¹	Water In Storage (AF)	Water that must be returned for use in DRWD (AF)	Water that can leave DRWD ² (AF)
State Water Project Water	1,803	1,803	-
Friant Water	607	394	2,195
Kern River Water	1,982		
Kern Water Bank Total:	4,392	2,197	2,195

NOTES:

¹ Per Dudley Ridge Water District Rules, 100% of SWP supplies stored in the KWB must be returned for use in Dudley Ridge's service area, and at least 50% + 1 AF of all water stored in KWB must be returned for use in Dudley Ridge's service area. The remaining Non-SWP water stored in KWB may be used outside of Dudley Ridge's service area.

² The water that can be used outside of Dudley Ridge's service area has other restrictions. For example, Friant water can only be used in a Federal place of use and Kern River water cannot leave Kern County.

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June 14, 2022

Prepared by: K. Welch

Submitted by: F. Sanchez / P. Weghorst

Approved by: Paul A. Cook 

SUPPLY RELIABILITY PROGRAMS COMMITTEE

SCOPE OF WORK TO STUDY OPTIONS FOR ENHANCED RECHARGE

SUMMARY:

Recharge facilities at the IRWD Water Bank include basins of varying sizes, shapes, and depths formed behind small earthen embankments. Historically, the recharge basins have had relatively high initial infiltration rates which tend to decline after the first few months of recharge. At IRWD's request, consultants at Thomas Harder & Co. have prepared a proposal to evaluate various options to enhance recharge rates at the Water Bank and to identify concepts for further pilot testing. At the Committee meeting, staff will review Harder's negotiated scope of work, schedule, and cost estimate. Staff recommends that the Committee provide input on the consultant's proposal.

BACKGROUND:

IRWD's Water Bank includes recharge basins of varying sizes, shapes and depths formed by small earthen embankments. During past recharge events, the basins have exhibited high initial infiltration rates, which then decline after the first few months of inundation. Infiltration at the recharge basins is a complex process that appears to be controlled by several factors including surface soil types, subsurface geology, suspended sediment concentrations, and nutrient loading in the source water. Of these factors, highly variable subsurface geology appears to account for most reductions, uncertainties, and inconsistencies in recharge rates.

Scope of Work to Enhance Recharge:

At staff's request, consultants at Thomas Harder & Co. have prepared a scope of work, schedule, and cost estimate to evaluate options that could potentially enhance infiltration and recharge rates at the IRWD Water Bank. These consultants are uniquely qualified to perform the work based on their involvement with complex geohydrologic modeling and well design in the area of IRWD's Water Bank. The negotiated scope of work calls for the consultants to investigate the relative costs and effectiveness of several recharge enhancement options, evaluate their applicability to the IRWD Water Bank and identify two cost-effective pilot project designs. Harder's proposal is included as Exhibit "A". At the Committee meeting, staff will review with the Committee the consultant's proposal.

FISCAL IMPACTS:

Funds for this work are available and included in the FY 2022-23 Capital Budget under Project 11799. Execution of a Professional Services Agreement with Thomas Harder & Co. to perform the work would be within the limits of staff authorities.

ENVIRONMENTAL COMPLIANCE:

The evaluation of options for increasing recharge the IRWD Water Bank is not subject to the California Environmental Quality Act. The implementation of a pilot project at the Water Bank would be subject to environmental review. The appropriate type of environmental review would be identified further once additional information is available.

RECOMMENDATION:

That the Committee provide input on Thomas Harder's scope of work, schedule, and cost estimate.

LIST OF EXHIBITS:

Exhibit "A" – Thomas Harder & Co. Scope of Work and Cost Estimate to Conduct Review Options to Enhance Infiltration and Recharge Rates at the Strand Ranch and Stockdale West Recharge Basins

May 20, 2022

Ms. Kellie Welch
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92619

Re: Scope of Work and Cost Estimate to Conduct Review Options to Enhance Infiltration and Recharge Rates at the Strand Ranch and Stockdale West Recharge Basins

Dear Ms. Welch,

As per your request, Thomas Harder & Co. (TH&Co) has prepared this letter to describe our proposed scope of work and cost estimate to assess the feasibility of different methods to enhance recharge rates at Irvine Ranch Water District's (IRWD's) Strand Ranch and Stockdale West recharge basins, located west of Bakersfield, California. Water has periodically been delivered to the Strand Ranch since September 2010. Infiltration testing conducted in 2012, after water had been delivered to the basins for approximately two years, recorded infiltration rates ranging from 0.02 to 0.31 feet per day (ft/day)¹. In January 2017, IRWD began delivering water to the Strand Ranch basins following a 4-yr hiatus when the basins were dry. Initial infiltration rates were relatively high, ranging from 0.68 to 0.76 ft/day in the north basins and 0.61 ft/day in the south basins. However, infiltration rates in the south basins dropped to 0.25 ft/day by March 2017. Recent recharge rates in the Strand Ranch and Stockdale West basins have been on the order of 0.5 to 0.6 ft/day but vary across subbasins (personal communication with Zach Smith of Rosedale-Rio Bravo Water Storage District).

Given the relatively low historical infiltration rates and the rapid decline in infiltration rates observed in the first months after water is delivered, it is our understanding that IRWD would like to investigate methods to enhance the infiltration/recharge rate in order to maximize the volume of water that can be banked during periods when water is available. Various recharge

¹ TH&Co., 2017. Technical Memorandum - Strand Ranch Infiltration Rate Analysis. Prepared for IRWD. Dated July 31, 2017.

enhancement concepts have been implemented at recharge basins in the southwestern United States, including the Kern Fan Area. The purpose of this scope of work is to investigate the relative cost and effectiveness of these recharge enhancement projects and assess their applicability to the Strand Ranch and Stockdale West basins specifically. Our proposed detailed scope of work is as follows:

Scope of Work

Task 1 – Review Hydrogeological Data for Strand Ranch and Stockdale West

Before assessing the feasibility of different methods to enhance recharge rates at Strand Ranch and Stockdale West, it will be necessary to review available hydrogeological data and basin recharge operational data to identify the potential cause(s) of the low infiltration rates. Among these include low permeability subsurface sediments, clay layers that extend beneath the recharge areas and can cause perched groundwater, basin clogging, and basin maintenance methods. Our proposed review will include analysis of the following:

- Existing borehole lithologic logs from the sites (SREX wells, SROW wells, and SWEX wells),
- Borehole logs from other nearby boreholes and/or wells,
- Surface geophysical surveys that have been conducted for the area,
- Downhole geophysical logs,
- Pond drop data and other infiltration test data,
- Basin operational data including inflow data and staff gage readings,
- Groundwater level data, and
- Basin maintenance records.

It is also our understanding that some surface ponding of water has been noted in the northern part of the Stockdale West site. Our work will include an investigation of potential causes for this ponding.

As part of this task, TH&Co will:

- Update existing cross sections with new data showing potential clay layers that could result in perched water and reduced infiltration rates.
- Prepare graphs showing infiltration rates over time at the Strand Ranch and Stockdale West basins.
- Prepare hydrographs showing groundwater level response to recharge events, based on existing data.



Task 2 – Review Methods to Enhance Recharge Rates

IRWD has already commissioned a study of potential recharge methods. This study was conducted in 2009 by HDR Consulting² and included a review of five different concepts for managed aquifer recharge:

- Surface recharge basins
- Subsurface recharge galleries
- Shallow injection wells
- CULTEC engineered systems
- Subsurface conveyance concept

As surface recharge basins have already been implemented at Strand Ranch and Stockdale West, we will review the other four concepts to assess their applicability to the Kern Fan Area considering the data collected at the sites since 2009 and the potential that their implementation would result in higher infiltration rates than measured using basins. Further, as the HDR report is now 12 years old, we will review any recent advancements in the concepts considered in the report to see if that has a bearing on their applicability to the Strand Ranch and Stockdale West.

In addition to the concepts considered in the HDR report, other agencies in the Kern Fan Area (West Kern Water District and Buena Vista Water District) have implemented recharge basin enhancements including deep excavations and “dry wells.” These enhancements have been reported to improve recharge rates. We will contact the agencies and their consultants that have implemented these enhancements and request the supporting information for the designs, their cost, and the operational data demonstrating their effectiveness. Although not commonly implemented in the Kern Fan Area, TH&Co will also review any basin maintenance practices (e.g. scraping, furrowing, discing, etc.) that are being implemented and their relative effectiveness at maintaining recharge rates.

As part of this review, TH&Co will:

- Evaluate the HDR recharge concepts to assess their applicability to Strand Ranch and Stockdale West in the context of data reviewed in Task 1.
- Evaluate any recent advances in the HDR concepts that would have a bearing on their applicability to Strand Ranch and Stockdale West
- Evaluate other recharge enhancement concepts currently being implemented in the Kern Fan Area

² HDR, 2009. Kern Fan Groundwater Recharge Evaluation. Prepared for the IRWD. Dated October 2009.



- Plot recharge rate data at other area recharge basins, as available, that demonstrate the effectiveness of implemented enhancement concepts at increasing infiltration and recharge rates.
- Evaluate the implemented enhancement concept designs to assess potential improvements or variations in the context of implementation of these concepts in other areas outside the Kern Fan (e.g. Arizona Salt River and Pinal Valley Projects).
- Identify recharge concepts for further pilot testing.

Task 3 – Prepare a Report Summarizing Findings and Recommendations

TH&Co will prepare a report that summarizes the findings of our investigation of potential recharge enhancement concepts for Strand Ranch and Stockdale West. The report will include:

- A background
- A purpose and scope of the investigation
- Any cross sections, infiltration rate graphs, and hydrographs for the Strand Ranch and Stockdale West basins that were used in assessing the current conditions at these basins.
- A description of the infiltration/recharge enhancement concepts evaluated for this study.
- Develop a preliminary design for pilot testing of two design concepts at Strand Ranch and Stockdale West. The preliminary design will include the design drawings and layouts of the pilot testing facilities, a description of the testing methodology, and a data collection schedule.
- Cost estimates for pilot testing of two design concepts based on the preliminary design.

TH&Co will prepare one draft version of the report for review and comment by IRWD. Upon incorporation of comments, we will prepare one final version of the report.

Task 4 – Coordination and Meetings

It is anticipated that periodic correspondence and meetings will be necessary during the study. The budget for this task assumes preparation for, and attendance at, the following:

- One remote (i.e. Zoom or MS Teams) meeting upon completion of Task 3 to present the preliminary findings and present recommended alternatives for pilot testing;
- One meeting upon completion of the draft report (Task 4) to present the results of the investigation, and preliminary design of pilot testing alternatives.
- One meeting with the Supply Reliability Programs Committee to present the results of the investigation.



Task 5 – Conduct a Cone Penetrometer Test Investigation (Optional Task)

To provide additional detail regarding the soil profile in the upper 100 feet beneath the Strand Ranch site, we are recommending collecting additional soil profile information using a Cone Penetrometer Test. Cone Penetrometer Testing (CPT) provides a continuous subsurface soil profile (similar to a geophysical log) based on the pressure and resistance observed from pushing an instrumented steel rod into the ground. The advantage of this method over drilled boreholes is that it can be conducted more rapidly and does not generate drill cuttings. Thus, more spatially distributed data (i.e. more CPT drill locations) can be obtained for less cost than drilling boreholes.

We are recommending obtaining detailed profiles at up to eight CPT locations across the Strand Ranch property. Each CPT will be advanced to 100 feet or until it cannot be advanced anymore due to subsurface conditions. TH&Co will provide onsite inspection of data collection during the CPT work. During inspection, we will verify that the locations are correct and the data are collected in accordance with the scope of work. For cost estimating purposes, it is assumed that the CPT work can be completed in two days.

Cost Estimate

The total estimated cost to perform Tasks 1 through 4 of the scope of work described above is \$67,820, as detailed in Table 1. The estimated cost to perform the optional Task 5 is \$14,045.

Schedule

We are prepared to begin this work immediately upon your authorization to proceed. Our estimated schedule to complete this work is as follows:

- Task 1 – 5/31/22 – 6/24/22
- Task 2 – 6/27/22 – 8/5/22
- Task 3 –
 - Draft Report Preparation 8/8/22 – 8/26/22
 - IRWD Review of Draft Report 8/29/22 – 9/9/22
 - Final Report Preparation 9/12/22 – 9/24/22

CPT would be incorporated between Tasks 1 and 2 and would add approximately one week to the schedule.



I appreciate the opportunity to provide hydrogeological consulting services for IRWD. If you have any questions, don't hesitate to contact me at (714) 394-4449.

Sincerely,

A handwritten signature in blue ink that reads "Thomas Harder". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Thomas Harder, P.G., C.HG.
Principal Hydrogeologist



Cost Estimate for Hydrogeological Services
Conduct Review of Options to Enhance Recharge Rates at the Strand Ranch and Stockdale West Facilities

Task	Description	Principal Hydro- Geologist \$210/hr	Associate Hydro- Geologist \$180/hr	Project Hydro- Geologist \$120/hr	Staff Hydro- Geologist \$105/hr	Graphics \$95/hr	Clerical \$75/hr	Total Labor	Outside Direct Costs	Total Cost
1	Review Hydrogeological Data for Strand Ranch and Stockdale West	4	8	36	32	8		\$10,720		\$10,720
2	Review Methods to Enhance Recharge Rates	44	64	32	8			\$25,440		\$25,440
3	Preparation of a Report Summarizing the Findings and Recommendations with Preliminary Design for Piloting Recharge Concepts	28	76	0	28	20		\$24,400		\$24,400
4	Coordination and Meetings (Assume 3 Meetings at IRWD)	16	20				4	\$7,260		\$7,260
Total Tasks 1 through 4								\$67,820	\$0	\$67,820
Optional Task										
5	CPT Testing Field Observation		2		16			\$2,040	\$ 500	\$2,540
	CPT Contractor (Assume 8 Probes to 100 ft Each)							\$0	\$ 11,505	\$11,505
Total Task 5								\$2,040	\$12,005	\$14,045

¹ Reimbursable expenses include driving mileage.

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