Appendix 6A

Surface Water Available for Recharge and Financial Incentives in the Colusa Subbasin

Technical Memorandum

To: Glenn and Colusa Groundwater Authorities

From: Davids Engineering and ERA Economics

Date: July 1, 2021

Subject: **Surface Water Available for Recharge and Financial Incentives**

Purpose

A total of 33 projects and management actions (PMAs) are included in the Colusa Subbasin GSP to achieve and maintain sustainable groundwater management. Five of the PMAs are on track for implementation, six are ongoing, with the remaining 22 PMAs being in various stages of investigation and evaluation. The five projects on track for implementation are all groundwater recharge projects involving the use of surface water for direct or in-lieu recharge. Three of the five projects are substantial in-lieu recharge projects, meaning that they will require regulated surface water sources available on an irrigation demand schedule. All three projects are planning to acquire all or most of the required surface water through transfers of Central Valley Project (CVP) water supplies that are surplus to the needs of other CVP water supply or Sacramento River Settlement Contractors (Settlement Contractors).

All three in-lieu recharge projects on track for implementation include incentivizing landowners to utilize existing CVP supplies. CVP supplies in some years are surplus to CVP contractor needs in some cases because contractors are still building out their systems and acreage over time to use the CVP water, but in other cases the cost of CVP supply is too high to be competitive with groundwater pumping or other local transfers. Growers currently using groundwater also benefit from the convenience of having a clean, reliable, on-demand supply from their pumps and not having to order water for delivery through district conveyance.

This appendix serves two purposes. First, it summarizes the three in-lieu recharge projects and the potential sources of surface water available for irrigation use to enable reduction of groundwater pumping. Second, it provides an overview of the current costs of CVP water, how those are changing, and provides a discussion of financial incentives to increase use of those supplies for some contractors in some years. The description uses information for two districts, Orland-Artois Water District and Colusa County Water District, but the concept could be applied to other districts as well.

Colusa Subbasin In-Lieu Recharge Projects On-track for Implementation

The three substantial in-lieu groundwater recharge projects that are on track for implementation are described below.

Colusa County Water District In-Lieu Groundwater Recharge

Colusa County Water District (CCWD) has a total service area of approximately 46,000 acres of which 39,875 are currently irrigable with existing district infrastructure. This area is planted to predominantly permanent crops. The district delivers surface water to approximately 35,000 acres, with the remaining acres being idle or

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irrigated with privately pumped groundwater. CCWD has a CVP water supply contract that provides a maximum of 62,200 acre-feet (AF) annually. The district also holds a CVP contract water supply for 5,666 AF that was part of a Colusa County subcontract assigned to CCWD in 2006. Both contracts are subject to curtailments determined by the Bureau of Reclamation (Reclamation) each year based on Shasta watershed hydrologic conditions and planned CVP operations.

Additionally, CCWD typically transfers in additional CVP water supplies to augment water available under its CVP contract. Historical transfers have been primarily from Westside Water District and, more recently, from Reclamation District 108 (RD108) under a five-year pilot transfer agreement that ends in 2022. Despite the availability of district surface water, some CCWD growers choose to pump groundwater because is it less expensive than surface water (and because groundwater requires less screening and filtering compared to district surface water).

Under the CCWD In-Lieu Groundwater Recharge project, the district will acquire additional surface water and incentives will be put in place to make the cost of surface water the same or less expensive than pumped groundwater, thereby incentivizing growers who would otherwise use groundwater to use surface water. The additional surface water is expected to be acquired under long-term water transfer agreements with other CVP contractors, including Settlement Contractors, and potentially other sources. The plan is to acquire and deliver 30,000 acre-feet per year (AF/yr) except in Shasta critical years[1] when groundwater banked through in-lieu recharge in prior years would be used. It is estimated that the average additional surface water use over the long term would be approximately 27,000 AF/yr.

Colusa Drain MWC In-Lieu Groundwater Recharge

The Colusa Drain Mutual Water Company (CDMWC) encompasses approximately 46,000 acres of agricultural land and environmental habitat located adjacent to the Colusa Basin Drain (Drain) in the Colusa Subbasin. Shareholders in CDMWC divert water for summer irrigation from the Drain under a combination of appropriative water rights held individually by the shareholders, a long-term water supply agreement with Reclamation, and annual and multi-year transfer agreements with neighboring Settlement Contractors. Historically, many CDMWC diverters use both groundwater and surface water for irrigation because flow in the Drain is often insufficient and unreliable to fully satisfy all irrigation requirements.

For the period 1990 through 2015, average surface water diversions from the Drain were estimated to be 48,000 AF/yr while groundwater pumping during the same period was estimated to be 40,000 AF/yr. It is estimated that approximately 70 percent of the historical groundwater pumping can be eliminated through the provision of additional surface water, provided that the surface water cost is approximately equal to the cost of groundwater. The cost comparison of surface and groundwater would include the full cost of each source (e.g., filtering, system costs, and other on-farm costs in addition to the delivery charge per AF of surface water and variable cost to pump groundwater). The potential in-lieu recharge is estimated to be 28,000 AF/yr on average across all years, and 31,000 AF in Shasta Non-Critical years. The planned source of additional surface water is primarily upstream Settlement Contractors that can discharge water into the Drain for use downstream by CDMWC shareholders.

[1] In general, Shasta critical conditions are declared when the forecast inflow to Lake Shasta for a particular water year is equal to or less than 3.2 million acre-feet.

Orland-Artois Water District Land Annexation and Groundwater Recharge

Orland-Artois WD (OAWD) has an existing service area of about 29,000 acres and delivers water to district landowners through 110 miles of pipelines and 300 metered deliveries. Surface water delivered by the district is available under a CVP water supply contract with Reclamation and through short- and long-term transfer agreements with other CVP water contractors and Settlement Contractors. The district's water supply contract provides a maximum of 53,000 AF/yr, subject to curtailments determined by Reclamation each year based on Shasta watershed hydrologic conditions and planned CVP operations. Historically, water transfers have been from Maxwell Irrigation District, Princeton-Codora-Glenn Irrigation District, and others.

The district is working with a group of neighboring non-district landowners to annex approximately 12,000 acres of groundwater-dependent agriculture into the district. Additional surface water for the annexed lands would be secured through multi-year purchase or transfer agreements with willing sellers, conveyed through the existing Tehama-Colusa Canal (TCC), and distributed to the annexed lands through new distribution facilities. Potential transferors include CVP water supply contractors and Settlement Contractors. The plan is to acquire and deliver 25,000 AF/yr of surface water to the annexed lands except in Shasta critical years when groundwater banked through in-lieu recharge in prior years would be used. It is estimated that the average additional surface water use, and thus in-lieu groundwater recharge, over the long term would be about 23,000 AF/yr.

Sources of Surface Water for In-Lieu Recharge

The aggregate volume of water needed for the three in-lieu recharge projects described above is 86,000 AF/yr, in Shasta Non-Critical years, as summarized in Table 1.

Table 1. Proponents and Water Needs Associated with Colusa Subbasin In-Lieu Groundwater Recharge Projects on Track for Implementation

Project	Average Additional Surface Water Needed in Shasta Non-Critical Years (acre-feet)
Colusa County Water District	30,000
Colusa Basin Drain Mutual Water Company	31,000
Orland Artois Water District	25,000
Total	86,000

Potential surface water sources to meet these requirements are discussed below:

Full use of Available CVP Contract Water

In recent years, both CCWD and OAWD have not used all the water available under their respective CVP water supply contracts, due primarily to the high cost of the upper two price tiers according to Reclamation pricing policy. The cost of CVP water is determined by CVP pricing policy and cost allocation. Up until recently, all CVP water contracts in the Tehama-Colusa Service Area were Water Service Contracts, and the water price was calculated using three2 components: The O&M (operations and maintenance) charge, the capital component

[2] Contractors also pay for power use and a restoration charge, which is currently about $11 per AF.

(paid back without interest), and the full cost rate that includes O&M and capital plus interest. The sum of the O&M and capital components is called the cost of service rate. Some or all of the rate's capital component could be removed as "ability-to-pay" relief, and many of the area contractors have received this in the past. The resulting contract rate (cost of service potentially reduced by ability-to-pay relief) applies to the first 80 percent of the contract maximum. The full cost rate includes cost of service plus interest on the capital component and is generally substantially greater than the cost of service rate. In 2020 for example, OAWD's contract rate (cost of service) was about $60 per AF and its full cost rate was about $218 per AF, calculated according to section 205(a)(3) of the Reclamation Reform Act. According to federal law (the CVP Improvement Act of 1992), CVP irrigation (and M&I) water supply contracts required payment of tiered water rates for contractual water entitlements, which are summarized as follows:

- Tier 1 - Tier 1 is the Cost of Service water rate developed through the federal water rate setting process. The Tier 1 rate applies to the first 80% of the delivered contractual water entitlement.
- Tier 2 - The Tier 2 rate is the numerical average of the Tier 1 rate and the Tier 3 rate. The Tier 2 rate applies to the next 10% of the delivered contractual water entitlement.
- Tier 3 - This rate is the full cost rate developed through the federal water rates setting process. Tier 3 applies to the last 10% of the delivered contractual water entitlement.

Even when blended with Tier 1 water, using Tier 2 and Tier 3 water resulted in excessive water cost, and so some or all of the Tier 2 and Tier 3 water went unused.

Incentivizing Utilization of CVP Supplies

As of 2021, Tehama-Colusa Canal (TCC) CVP water service contractors have converted their contracts to repayment contracts, thus paying off and removing the capital component from their CVP water rates. The new repayment rates (not including restoration charges and other power charges) are $23.43 per AF for CCWD and $26.67 per AF for OAWD. Under the revised rates, these contractors intend to use all of their CVP contract water. The additional CVP water (the difference between what OAWD and CCWD would have used under their old rate structure versus under their new repayment rate) can fulfill a portion of the in-lieu recharge quantities shown.

Repayment of CVP capital required the contractors to borrow money that they will be paying off over the next 15 years or more. Contractors vary in how they recover that fixed cost. Some, like OAWD, have acreage assessments on lands in the district. Others, like CCWD, include more fixed costs in their water rate, so when CVP delivery goes down, the water rates must go up to cover the fixed costs. Due to critical drought conditions, the CVP has announced no contract deliveries to the Tehama Colusa Service Area in 2021. As a result, CCWD's announced water rate for 2021 is currently estimated to be $288 per AF, though this may change as conditions and availability of water transfers change.

OAWD has estimated that its water rate after conversion to the repayment contract would be about $42 per AF under conditions of full CVP supply and $62 per AF with a 50% supply.[3] CCWD has estimated that its water rate after conversion to the repayment contract would be in the range of $70 per AF under conditions of full CVP supply.[4]

Depending on the relative costs of district supply versus groundwater, under the repayment contracts, the districts' rates may be low enough already to encourage full use of CVP supply. However, if groundwater pumping remains a lower cost alternative to CVP water for some growers, incentivizing their use of CVP water in

[3] According to a Proposition 218 informational presentation to the OAWD Board in August 2020.

[4] This is a rough estimate based on personal communication with Shelly Murphy, June 30, 2021.

lieu of pumping would require paying at least the difference between district surface supply and the variable cost of pumping groundwater. Other advantages of groundwater over delivered surface water include the growers' convenience of having a clean, reliable, on-demand supply from their pumps. Some groundwater users also may need to incur some on-farm water distribution costs to take surface water.

A program to incentivize CVP use would be specific to individual districts. Therefore, a full evaluation was not developed for the GSP. It is anticipated that an economic analysis to establish incentives and program design would be completed as part of GSP implementation activities. The economic analysis would generally include the following components:

- The initial evaluation would include estimating the incentive payments needed to achieve greater or full use of CVP contract water. The payments should compensate for the difference between CVP water cost (full cost as delivered by the district) and variable cost of groundwater pumping in areas receiving the in-lieu recharge, plus the value of any additional advantages or cost savings of groundwater over surface water.
- Estimate the projected total annual cost of the incentive payments, considering the payments per AF (which may vary by area) and the expected additional amounts of CVP water purchased and used in lieu of pumping. The estimate should account for variability in CVP supply by year and the costs of other supplies or activities related to that variability. In addition, economic benefits should be quantified and assigned to project beneficiaries.
- Estimate the recharge benefits to the GSA or to subareas within the GSA, considering avoided pumping costs and/or cost of other PMAs that could be avoided by this action. This would include an assessment and assignment of economic benefits that accrue to different parties and over time.
- Consider and evaluate other policies that may be used to assure that increased use of CVP water is effective as in-lieu groundwater recharge and does not simply enable expansion of irrigated area with little or no effect on groundwater recharge.
- Using the results of the cost and benefits calculations developed in the economic analysis described above, develop a method for assigning (if necessary) project costs in proportion to benefits received.

It is important to note that the switch to repayment contracts could provide alternative ways to incentivize use of CVP supplies with districts. An economic analysis could develop strategies to shift and restructure district charges to lower the effective cost of CVP water. This would generally include recovering a greater proportion of fixed costs as land-based charges rather than through variable water rates. For example, OAWD's recent approval of an acreage assessment to recover costs of its CVP capital conversion loan effectively reduces the per AF cost of CVP water. As a result, its water rate is substantially lower than before it converted to a repayment contract. This approach could be explored by other districts if they find that their water rate discourages full use of available CVP supply.

Transfers of Other Unused CVP Contract Project Water

Other CVP water contractors (not Settlement Contractors) within and outside the Colusa Subbasin, including members of the Tehama Colusa Canal Association served by the TCC, also have contract water available for transfer in some years. Historically, some but not all this water has been transferred under the provisions of Section 3405(a) of the Central Valley Project Improvement Act (CVPIA) (Title 34 of Public Law 102-575).

Transfers of Available Settlement Contract Water

There are 127 Sacramento Valley Settlement Contractors. The total surface water supply quantities associated with each settlement contract have a "base supply" component and a "project water" component[5]. In general, project water can be transferred in-basin under the provisions of CVPIA Section 3405(a) and base supply cannot[6].

There are 17 Settlement Contractors with total contract supplies of 10,000 AF or more (Table 2). The aggregate base supply for these entities is approximately 1.7 million AF, and the project water supply is about 296,000 AF. The 110 remaining, smaller Settlement Contractors, have aggregate base supplies of about 92,000 AF and project water supplies of about 34,000 AF. Thus, the total quantity of project water under the settlement contracts is about 330,000 AF.

[5] Base supply is intended to replace water that could have been diverted under each entity's underlying, senior water right(s), while project water is an additional amount negotiated as part of the settlement to supply supplemental water during the summer that might not have been available under the underlying rights. All settlement contracts have a base supply component and most but not all also have a project water component.

[6] Base supply can be transferred to the extent its use is reduced by land fallowing, groundwater substitution, or conservation.

Table 2. Sacramento River Settlement Contractors with Total Supplies of 10,000 AF or More

Name	Contract Number	Base Supply	Project Supply	Total Supply
Glenn-Colusa Irrigation District	14-06-200-855A-R-1	720,000	105,000	825,000
Sutter Mutual Water Company	14-06-200-815A-R-1	169,500	56,500	226,000
Reclamation District No. 108	14-06-200-876A-R-1	199,000	33,000	232,000
Natomas Central Mutual Water Company	14-06-200-885A-R-1	98,200	22,000	120,200
Reclamation District No. 1004	14-06-200-890A-R-1	56,400	15,000	71,400
Princeton-Codora-Glenn Irrigation District	14-06-200-849A-R-1	52,810	15,000	67,810
Meridian Farms Water Company	14-06-200-838A-R-1	23,000	12,000	35,000
Sycamore Family Trust	14-06-200-2146A-R-1	22,000	9,800	31,800
Anderson-Cottonwood Irrigation District	14-06-200-3346A-R-1	121,000	7,000	128,000
Maxwell Irrigation District	14-06-200-6078A-R-1	11,980	6,000	17,980
Provident Irrigation District	14-06-200-856A-R-1	49,730	5,000	54,730
Redding, City of	14-06-200-2871A-R-1	17,850	3,150	21,000
Pleasant Grove-Verona Mutual Water Company	14-06-200-5520A-R-1	23,790	2,500	26,290
Bardis, Christo D., et al. (Broomieside Farms)	14-06-200-1286A-R-1	8,070	2,000	10,070
Pacific Realty Associates, L.P. (M&T Chico Ranch)	14-06-200-940A-R-1	16,980	976	17,956
Conaway Preservation Group, LLC	14-06-200-7422A-R-1	50,190	672	50,862
River Garden Farms Company	14-06-200-878A-R-1	29,300	500	29,800
	Total	1,669,800	296,098	1,965,898

It is estimated that in non-Shasta critical years about 25 percent of this volume, or approximately 83,000 AF, is available for transfer. Glenn Colusa ID and RD108, the two largest Settlement Contractors, estimate that they could provide approximately 40,000 AF and 14,000 AF of project water for transfer in non-Shasta critical years, respectively. The combined quantity of 54,000 AF constitutes roughly two-thirds of the estimated 83,000 AF of project water available for transfer.

Summary

There are three in-lieu groundwater recharge projects on track for implementation in the Colusa Subbasin with a combined surface water requirement of approximately 86,000 AF in non-Shasta critical years. Each project intends to acquire the necessary surface water primarily via water transfers from other entities with available CVP contract supplies and CVP Settlement Contract project water under the provisions of CVPIA Section 3405(a). Transfer of base supplies under settlement contracts alone would nearly meet these needs, with full use of existing contract supplies (CCWD and OAWD only) and potential transfers of surplus CVP contract supplies adding to that amount.

It is recognized that the actual feasibility of acquiring the water is subject to the willingness of both buyers and sellers, and the negotiation of mutually acceptable contract terms. These negotiations have been initiated informally and will be continued as the projects move toward implementation.

A key element of all three projects will be creating incentives for growers to use the surface water made available rather than pumping groundwater. The preliminary analysis presented in this appendix suggests that variable cost to pump groundwater may already be greater than the district rate under the new repayment contracts in some districts. In other districts, the water rate is around $10 to $25 per AF greater than the variable cost to pump groundwater. These are just the variable costs of water supply, and do not include additional on-farm costs associated with each source. As described above, incentivizing use of surface water can be accomplished by developing an incentive program funded by the beneficiaries of such a program, or through adjustments to the district water rate structure. It is anticipated that these specific incentive structures would be evaluated and developed as part of project implementation.

It is also noted that the in-lieu recharge volumes referred to above are maximum quantities. Based on monitoring of project performance and groundwater conditions, it may be possible to operate the Subbasin within its sustainable yield with less than the maximum recharge quantities described above.