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DRAFT TECHNICAL MEMORANDUM

DATE: June 4, 2021 **PROJECT #:** 9090.12

TO: Ad Hoc Sustainable Groundwater Planning Advisory Committee (GSU22 Committee)

CC: Brian Lockwood, P.G., C.Hg. and Casey Meusel
Pajaro Valley Water Management Agency

FROM: Cameron Tana, P.E., and Patrick Keicher

PROJECT: Basin Management Plan: Groundwater Sustainability Update 2022 (GSU22)

SUBJECT: Findings and Proposed Recommendation for Drought Resiliency Actions

SUMMARY OF PROPOSED RECOMMENDATION FOR DROUGHT RESILIENCY ACTIONS

Based on review of implementation of projects and management actions included in the 2014 Basin Management Plan Update, the GSU22 Committee recommends that the PV Water Board accepts the conclusion the 2014 Basin Management Plan Update includes drought resiliency actions that have provided resiliency for achieving the sustainability goal of the Pajaro Valley Subbasin.

INTRODUCTION

The Pajaro Valley Water Management Agency (PV Water) Groundwater Sustainability Plan (GSP) Alternative for the Pajaro Valley Subbasin (Basin) was submitted on December 31, 2016, and approved by the California Department of Water Resources (DWR). The submittal to DWR included an Alternative Elements Guide that describes how PV Water documents such as the 2014 Basin Management Plan (BMP) Update (PV Water, 2014) meet the applicable elements of an Alternative. PV Water's Alternative Elements Guide did not have a response to the Alternative element listed as "a description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods."

As a result, in its 2019 assessment of the Alternative, DWR concluded that PV Water's Alternative "does not address specific actions to manage groundwater extraction or recharge during periods of drought to ensure that groundwater level and storage declines are offset by

increases during other periods." Therefore, DWR recommended the following for PV Water to include in its first 5-year update to the Alternative:

> Recommended Action 10: Staff recommend that the Agency update its Plan to describe actions the Agency may take in periods of drought to ensure resiliency of the Plan to achieve the sustainability goal for the Subbasin.

This technical memorandum summarizes information from implementation of projects and management actions included in the 2014 BMP Update that addresses this recommended action. This information and description of how the recommended action is addressed will be included in the BMP: Groundwater Sustainability Update 2022 (GSU22). The GSU22 will be submitted as the 5-year update to DWR by January 1, 2022.

PV Water's annual reports submitted to DWR for its Alternative include much of the information summarized in this technical memorandum. The annual reports for Water Years 2017-2020 can be found at https://www.pvwater.org/sgm

Although not described as such in the submitted Alternative Elements Guide, projects and management actions included in the 2014 BMP Update such as conservation and increased recycled water deliveries should be considered drought resiliency actions even as they are implemented in all years. Data from implementation of these projects and management actions show that they help minimize groundwater extraction during periods of drought such that groundwater level and storage declines are limited. As a result, drought periods should not negate the benefits from recovery of groundwater levels and storage in wet periods. Therefore, the Alternative provides resiliency by reducing the annual average shortfall over the long term to meet the sustainability goal even with the inevitable occurrence of drought periods. With full implementation of Phase I of the 2014 BMP Update anticipated by 2025, this conclusion should be re-evaluated in subsequent 5-year updates of the Alternative. For the GSU22, we propose the GSU22 Committee recommends the Board accepts the conclusion that the 2014 BMP Update includes drought resiliency actions that provide resiliency for achieving the sustainability goal of the Pajaro Valley Subbasin.

DROUGHT RESILIENCY OF PROJECTS AND MANAGEMENT ACTIONS

The 2014 BMP Update, the primary document of the Alternative approved by DWR, includes the following projects and management actions:

- Conservation
- Increased Recycled Water Storage at the Recycled Water Facility (now referred to as the Recycled Water Facility Optimization Project)
- Increased Recycled Water Deliveries (including the Coastal Distribution System Expansion Project)
- Harkins Slough Recharge Facilities Upgrades & Watsonville Slough with Recharge Basins (now referred to as the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects)
- College Lake with Inland Pipeline to Coastal Distribution System (now referred to as the College Lake Integrated Resources Management Project)
- Murphy Crossing with Recharge Basins

The above projects and management actions with the highest potential for ongoing drought resiliency are conservation and increased recycled water deliveries supported by both the Recycled Water Facility Optimization Project and Coastal Distribution System Expansion Project. Both of these actions have the potential to reduce groundwater extraction during drought periods. Conservation consistently reduces irrigation demand, including during drought. Wastewater from the City of Watsonville and surrounding communities such as Pajaro and Salsipuedes Sanitary District will continue to be a drought tolerant supply of water for recycling and reuse. Summaries of these projects and management actions are provided below.

The Watsonville Slough System Managed Aquifer Recharge and Recovery Projects may have drought resiliency benefits if recharge in wet years can support recovery during drought years, but further study will likely be needed to demonstrate that the projects can be operated in this manner.

The College Lake Integrated Resources Management Project is a surface water supply project that will have reduced supply during drought periods. The project does not provide sufficient storage to store water from wet periods to meet demand during drought periods, but it will provide additional supply during drought years. Drought resiliency effects of this project should be evaluated in a 5-year update after implementation begins.

The Murphy Crossing with Recharge Basins project should provide drought resiliency if implemented by recharging water during wet periods that can support increased pumping in drought periods. However, this is a Phase 2 project that would not be implemented until after 2025 and only if Phase 1 projects are insufficient. Therefore, this project will not be described as a drought resiliency action in the GSU22.

Although not included in the 2014 BMP Update, PV Water is implementing a Recharge Net Metering Program with partners from the University of California at Santa Cruz, and the Resource Conservation District of Santa Cruz. The five-year pilot program, which began in October of 2016, has the goal of enhancing groundwater recharge by 1,000 AFY. The program incentivizes stormwater recharge projects by providing rebates based on acre-feet of water infiltrated to help offset costs incurred by landowners for the operation and maintenance of water collection and infiltration systems on their land. Recharging additional stormwater into the subsurface can support recovery even during drought years, as precipitation events can still occur even during droughts and the added recharge can benefit the Basin during droughts. After a full scale program is implemented, drought resiliency benefits should be evaluated in a 5-year update.

SUMMARY OF CONSERVATION PROGRAM

The goal of the Conservation Program is to provide a reduction of over 5,000 AFY yield or reduction in pumping from agriculture as a result of improved irrigation efficiency. Current agricultural conservation efforts include managing California Irrigation Management Information Systems (CIMIS) Station #209 Watsonville West II, CropManage Program support, On-Farm Irrigation Efficiency Support, grower educational trainings, grower irrigation equipment rebates, and incentives and outreach. CIMIS weather stations collect evapotranspiration (ET) and precipitation data and provide growers with free and independent access to the data at www.cimis.water.ca.gov. The UC Cooperative Extension (UCCE) offers the CropManage program, which uses CIMIS, and a UCCE-developed program to calculate ET and crop irrigation demand on a customized, crop-specific basis. The Resource Conservation District of Santa Cruz County (RCD) and UCCE currently have a 3-year agreement to implement the agriculture water conservation program with a rebate budget of $300,000 going through 2023. PV Water has partnered with the RCD and UCCE for approximately 10 years on agriculture conservation.

SUMMARY OF PROJECTS TO INCREASE RECYCLED WATER DELIVERIES

The 2014 BMP Update described increasing recycled water deliveries to be achieved by increasing demand for recycled water and increasing storage to supply more water during periods of high demand. The goals were to increase demand by approximately 1,000 acre-feet per year and shoulder season demand by approximately 250 acre-feet per year. As of 2020, PV Water has more than accomplished these goals through the added 1.5-million-gallon storage tank and working closely with customers to maximize deliveries.

The Recycled Water Facility Optimization Project affords storage of nighttime recycled water production and during periods of more intermittent demand to deliver water during higher

periods of demand such as the daytime. Although the project's storage is not sufficient to store supplies from wet years to meet drought year demand, this project increases recycled water deliveries to reduce groundwater pumping in all years, including non-drought years.

The Coastal Distribution System expansion project will further increase recycled water deliveries by expanding the area to which recycled water can be delivered. The 2014 BMP Update estimated the expanded area as having an average water demand of approximately 2,000 acre-feet per year. PV Water completed construction of the CDS K-1 pipeline in 2016 that added 1.3 miles of pipeline and the CDS F-Pipeline Expansion Project that added 1.9 miles of additional pipeline to begin use in 2021. Both pipelines have increased the delivered water service area by approximately 838 acres.

EVALUATION OF DROUGHT RESILIENCY OF PROJECTS AND MANAGEMENT ACTIONS DURING IMPLEMENTATION TO DATE

The drought resiliency of the projects and management actions are evaluated based on implementation of the 2014 BMP Update through Water Year 2020 as described in the Annual Reports submitted to DWR (PV Water, 2018-2021). The evaluation considers the effectiveness of conservation and recycled water deliveries in reducing groundwater pumping in dry years.

In the Annual Reports, conservation is evaluated based on total agricultural water use. Total agricultural water use is calculated as the sum of metered groundwater pumping, estimated groundwater pumping, and metered water deliveries including recycled water deliveries.

Table 1 shows annual agricultural water use during 2014 BMP Update from Water Year 2015 through 2020 along with the water year type classification identifying 2018 and 2020 as dry years. Although agricultural water use is higher in the 2 dry years than non-dry years, agricultural water use during the dry years is still lower than the baseline period of 2006-2010 identified in the 2014 BMP Update. Therefore, conservation reduces agricultural water use in dry years as well as wetter years and provides drought resiliency benefits.

Table 1 also shows annual recycled water deliveries. Recycled water deliveries are consistent between dry and non-dry years and overall are increasing. Recycled water deliveries therefore provide drought resiliency benefits by increasing supply reliability. The magnitude of these benefits should increase with the expansion of the Coastal Distribution Project coming online in 2021.

The continued benefit of the conservation program and recycled water deliveries in dry years result in reduction of total groundwater pumping compared to the baseline period in dry and non-

dry years. This results in increases of groundwater levels and change of groundwater in storage during implementation of the 2014 BMP Update.

Table 1 summarizes the Annual Reports' estimates for change of groundwater in storage for Water Years 2015 through 2020. These estimates are based on observed changes in groundwater levels where positive change of groundwater in storage occurs when groundwater levels rise overall and negative change of groundwater in storage occurs when groundwater levels decline overall. There is positive change of groundwater in storage and rising groundwater levels in all water years except the dry water year 2018. The estimated 3,300 acre-feet per year reduction of groundwater in storage during this dry water year is more than offset by the average increase of groundwater in storage during non-dry years of 5,800 acre-feet per year. This indicates that the projects and management actions of the 2014 BMP Update provide drought resiliency for the Basin to continue to make progress towards eliminating overdraft for the Basin.

In addition, the average change of groundwater in storage over the 2 dry water years, 2018 and 2020, is positive. Hydrographs in the annual reports also generally show stable or rising groundwater levels from Water Years 2018-2020. Therefore, declines of groundwater in storage and groundwater levels have not occurred over the dry years during implementation of the 2014 BMP Update. To date, increases of groundwater in storage and groundwater levels during non-dry years since 2014 have not been reduced during dry years. However, water year 2020 occurred during a global pandemic which reduced crop production and water use so 2020's observed increases of groundwater in storage and groundwater levels may not occur in future dry years.

This evaluation is based on the implementation period to date totaling 6 years with only 2 dry years with 1 of the dry years affected by the global pandemic. Therefore, the drought resiliency of the 2014 BMP Update projects and management actions should be reevaluated at the next 5- year update for the Alternative.

CONCLUSIONS

Projects and management actions included in the 2014 BMP Update such as conservation and increased recycled water are drought resiliency actions. Data from implementation of these projects and management actions show that they help manage groundwater extraction during dry periods such that groundwater level and storage declines are limited and should be more than offset during other periods. This evaluation and conclusion meet DWR Recommended Action 10 for the GSU22, but this conclusion should be revisited at the next 5-year update of the Alternative.

REFERENCES

Pajaro Valley Water Management Agency (PV Water), 2014, Basin Management Plan (BMP) Update, prepared by Carollo Engineers, February.

Pajaro Valley Water Management Agency (PV Water), 2018, Pajaro Valley Subbasin Water Year 2018 Annual Report, March, https://www.pvwater.org/images/about-pvwma/assets/annual_reports_assets/SGMA-WY/_PVWater_AR_WY2017_Submitted-web.pdf

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Table 1. Agricultural Water Use, Recycled Water Deliveries, Total Groundwater Pumping, and Change of Groundwater in Storage during Implementation of 2014 BMP Update (volumes in acre-feet per year)

Water Year	Classification Type	Agricultural Water Use	Change from 2006-2010 Baseline[1]	% Change from 2006-2010 Baseline[1]	Recycled Water Deliveries	Total Groundwater Pumping	% Change from 2006-2010 Baseline[2]	Annual Change of Groundwater in Storage
2015	Average	46,628	428	1%	2,988	50,742	-10%	266
2016	Wet	43,657	-2,543	-6%	2,904	47,584	-16%	7,086
2017	Very Wet	39,509	-6,691	-14%	2,429	43,774	-23%	13,954
2018	Dry	45,859	-341	-1%	3,274	48,729	-14%	-3,306
2019	Wet	39,021	-7,179	-16%	2,940	42,268	-25%	2,068
2020	Dry	42,404	-3,796	-18%	2,852	45,664	-19%	7,499

1 2006-2010 baseline agricultural water use is approximately 46,200 acre-feet per year
2 2006-2010 baseline total groundwater pumping is approximately 56,500 acre-feet per year