Appeal of Staff’s Revised Public Benefit Ratio for Pacheco Reservoir Expansion Project

Attachment C1: Initial Reservoir Storage at Start of Operations
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Abbreviations and Acronyms

AF acre-feet
Commission California Water Commission
CVP Central Valley Project
Project Pacheco Reservoir Expansion Project
SCVWD Santa Clara Valley Water District
TAF thousand acre-feet
TR Water Storage Investment Program Technical Reference
WEAP Water Evaluation and Planning System
WISP Water Storage Investment Program
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INITIAL RESERVOIR STORAGE AT START OF OPERATIONS

Summary

On page 4 of the “California Water Commission Public Benefit Ratio Review Summary: Pacheco Reservoir Expansion Project,” water operations reviewers identified that “the applicant assumed the reservoir would be full at the start of operations.” On pages 1 and 2 of the “California Water Commission Water Operations Review for Public Benefits Ratio: Pacheco Reservoir Expansion Project,” water operations reviewers identified concerns with two aspects of the Pacheco Reservoir Expansion Project’s (Project) assumptions:

- All of the model runs were representative of ‘long-term operations’ (i.e. Pacheco started with ‘full reservoir conditions’), and
- The applicant did not consider that “during the initial filling phase of the expanded Pacheco Reservoir, downstream river flows could be substantially reduced.”

The Santa Clara Valley Water District (SCVWD) confirms that the assumption of an initial Pacheco Reservoir storage of 60 percent of capacity was developed using the methodology described in Section 4.2.2 of the Water Storage Investment Program Technical Reference (TR), and is therefore a valid assumption. In addition, SCVWD points out that the scenario of a substantial reduction in Pacheco Creek flows downstream of the expanded reservoir before and during the ‘initial filling phase’ is not consistent with the Project’s proposed Operations Plan and proposed operation during construction. As described in the Benefit Calculation, Monetization, and Resiliency A2: Preliminary Operations Plans and as reflected in the WEAP modeling under with-Project conditions, the operations of the expanded reservoir would be prioritized to meet downstream flow targets for fisheries above both filling/increasing reservoir storage and releases for municipal and industrial needs.

An explanation of the initial storage condition assumptions for each scenario, as well as specific appeals to each of the issues raised by California Water Commission (Commission) staff, are described below.

Item 1: All Model Runs Representative of Long-term Operations

SCVWD conducted an analysis of representative conditions through model simulations over the full period of record. SCVWD found that the average and median end-of-year Pacheco Reservoir storages in December were about 60 percent, plus and minus few
percentage points, across all scenarios. As such, an initial storage of 60 percent of reservoir capacity was deemed suitable as the starting point for all Pacheco Reservoir model runs conducted for the application.

The SCVWD system and watersheds were simulated using a customized Water Evaluation and Planning System (WEAP) model, as described in Chapters 1 and 3 of *Benefit Calculation, Monetization, and Resiliency A1: Project Conditions (BCMR A1)*. Within this WEAP model, initial storage in Pacheco Reservoir was assumed to be 60 percent of its total storage capacity. This initial storage assumption was the same for both without and with-Project scenarios in all of the climate conditions (2017, 2030, 2070) and uncertainty scenarios (Dry Extremely Warming, Wet Moderate Warming, Moderate Growth, Expanded Water Supply Portfolio) simulated. For each simulation set:

- **Without-Project** runs (Pacheco Reservoir storage capacity of 5,500 acre-feet [AF]) were simulated with an assumed initial Pacheco Reservoir storage of **3,300 AF**
- **With-Project** runs (Pacheco Reservoir storage capacity of 140,000 AF) were simulated with an assumed initial Pacheco Reservoir storage of **84,000 AF**

This initial storage assumption of 60 percent of reservoir capacity is confirmed by checking the WEAP outputs for each scenario, provided in the September 15, 2017 Addendum to the August 14, 2017 application (summarized in Table 1). The first month of the WEAP simulation is January 1922. Accordingly, Pacheco Reservoir storage in January 1922 is equal to the initial storage assumption plus any inflow that month less any outflow and evaporation, or:

\[
\text{January 1922 Pacheco storage} = \text{Assumed initial storage} + \text{inflow} - \text{outflow} - \text{evaporation}
\]

Table 1 shows that this equation holds true for every scenario simulated with the initial storage assumption of 60 percent of total Pacheco Reservoir storage capacity.

Section 4.2.1.4 of the *TR* states that in determining initial conditions for analysis

> “*Applicants must also use initial conditions that represent median values that would result from the analysis of the full period of record.*”

In order to analyze the full period of hydrologic record applicable to Pacheco Reservoir (as defined by Section 4.2.2 of the *TR*), SCVWD simulated WEAP runs representative of Project conditions using the climate-adjusted hydrologic inputs described in Section 3.3 of *BCMR A1*. Analysis of these representative runs over the period of simulation found that the average and median Pacheco Reservoir December storages (model runs begin in January, so December would be initial) were approximately 60 percent of
reservoir capacity across all scenarios. As such, an initial storage of 60 percent of reservoir capacity was assumed for Pacheco Reservoir in each run used for the application. This assumption is in agreement with the directive of the TR, and appears to be in concurrence with the initial storage assumptions made by five of the Water Storage Investment Program (WSIP) applicants whose water operations modeling is publicly available, as provided in Table 2.

**Item 2: Potential Downstream Reductions in Pacheco Creek Flow during Initial Period/Start-Up Phase of Expanded Pacheco Reservoir**

**Note:** During the February 8, 2018 question and answer meeting with Commission staff, Commission staff conveyed to SCVWD that there was a typo in the Project’s Public Benefit Ratio review package. The original comment should have read: “… most or all of the water from **San Luis Reservoir Pacheco Creek** could be used to fill the **expanded Pacheco Reservoir**” (page 1 of Water Operations Review for Project, emphases added). SCVWD is presenting the appeal to this comment based on this current understanding.

Planned construction, initial filling, and long-term operation of the expanded Pacheco Reservoir focuses on creating optimum conditions to maintain flows in Pacheco Creek at all times for the benefit of the fish.

As discussed in Section 3.5 of *Feasibility and Implementation Risk A1: Feasibility Documentation (FIR A1)*, part of the Project’s construction plan is the construction of a cofferdam at the upstream toe of the new dam footprint prior to construction of the expanded dam. This cofferdam would ultimately be incorporated into the new dam and

“They sized to ensure that flows in Pacheco Creek are **maintained during construction**” (FIR A1, p.3-14).

Further, Table 5-5 of *FIR A1* shows that the average annual local inflow from the Pacheco Creek watershed is greater than the average annual volume of water needed to meet the monthly release targets for Pacheco Creek South-central California Coast steelhead. These monthly release targets are presented in *Benefit Calculation, Monetization, and Resiliency A2: Preliminary Operations Plan (BCMR A2)*.

In addition, Section 2.1.3 of *BCMR A2* states:

“To ensure that flows and water temperatures in Pacheco Creek are **maintained in consecutive dry years**, releases to Pacheco Conduit—to meet SCVWD water demands—would be discontinued in the event that reservoir storage volumes fall below 55,000 AF.”

*FIR A1* states that in addition to inflow from Pacheco Creek,
“Supplemental flows to the expanded reservoir would arrive from SCVWD’s share of contracted CVP [Central Valley Project] water from San Luis Reservoir. This would include CVP water supplies that otherwise could not be delivered or stored.” (Page 3-12)

The combination of these planned considerations makes the drying up of Pacheco Creek during initial Project operations highly unlikely. Therefore, the potential effects of the potential reduction in Pacheco Creek flow were not considered in the operations modeling.
Table 1. Initial Storage Assumptions and WEAP Model Outputs for With-Project Conditions

<table>
<thead>
<tr>
<th>WSIP Condition</th>
<th>Assumed Initial Pacheco Storage (AF)</th>
<th>WEAP model outputs - Pacheco Reservoir (January 1922)</th>
<th>Inflow (AF)</th>
<th>Outflow (AF)</th>
<th>Evaporation (AF)</th>
<th>Storage (AF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Conditions (2017)</td>
<td>With-Project</td>
<td>0.6 * 140,000 = 84,000</td>
<td>703</td>
<td>0</td>
<td>124</td>
<td>84,579</td>
</tr>
<tr>
<td>Future Conditions (2030)</td>
<td>With-Project</td>
<td>0.6 * 140,000 = 84,000</td>
<td>710</td>
<td>0</td>
<td>124</td>
<td>84,586</td>
</tr>
<tr>
<td>Future Conditions (2070)</td>
<td>With-Project</td>
<td>0.6 * 140,000 = 84,000</td>
<td>808</td>
<td>0</td>
<td>124</td>
<td>84,684</td>
</tr>
<tr>
<td>Extreme Climate (2070_DEW)</td>
<td>With-Project</td>
<td>0.6 * 140,000 = 84,000</td>
<td>694</td>
<td>0</td>
<td>124</td>
<td>84,570</td>
</tr>
<tr>
<td>Extreme Climate (2070_WMW)</td>
<td>With-Project</td>
<td>0.6 * 140,000 = 84,000</td>
<td>460</td>
<td>615</td>
<td>124</td>
<td>83,721</td>
</tr>
<tr>
<td>Moderate Growth (2070)</td>
<td>With-Project</td>
<td>0.6 * 140,000 = 84,000</td>
<td>808</td>
<td>0</td>
<td>124</td>
<td>84,684</td>
</tr>
<tr>
<td>Expanded Water Supply Portfolio (2070)</td>
<td>With-Project</td>
<td>0.6 * 140,000 = 84,000</td>
<td>808</td>
<td>3,074</td>
<td>124</td>
<td>81,610</td>
</tr>
<tr>
<td>WEAP Output line number(s)</td>
<td></td>
<td>1152</td>
<td>602 + 1153</td>
<td>1163</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Key:
AF = acre-feet
WEAP = Water Evaluation and Planning System
WSIP = Water Storage Investment Program
### Table 2. Assumed Initial Storages of Other WSIP Applicants for Provided Climate Conditions

<table>
<thead>
<tr>
<th>Application Reservoir</th>
<th>Reservoir Capacity (TAF)</th>
<th>Assumed Initial Storage (TAF) (% of capacity)</th>
<th>2017</th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacheco Reservoir¹</td>
<td>140</td>
<td>84 (60%)</td>
<td>84 (60%)</td>
<td>84 (60%)</td>
<td></td>
</tr>
<tr>
<td>Sites Reservoir²</td>
<td>1,800</td>
<td>1,220 (68%)</td>
<td>1,220 (68%)</td>
<td>1,220 (68%)</td>
<td></td>
</tr>
<tr>
<td>Los Vaqueros Reservoir³</td>
<td>275</td>
<td>N/A</td>
<td>170 (62%)</td>
<td>170 (62%)</td>
<td></td>
</tr>
<tr>
<td>Willow Springs Water Bank⁴</td>
<td>500</td>
<td>N/A</td>
<td>250 (50%)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Temperance Flat Reservoir⁵</td>
<td>1,260</td>
<td>500 (40%)</td>
<td>500 (40%)</td>
<td>500 (40%)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

¹ Initial storages from provided WEAP model
² Initial storages from provided INIT DSS files for CalSim II modeling, nodes S30 + S34
³ Initial storages from provided INIT DSS files for CalSim II modeling, node S422
⁴ Initial storages from provided INIT DSS file for CalSim II modeling, node S877
⁵ Initial storages from provided Gaming Tools

Key:

N/A = Not Applicable; This information was not located within the respective WSIP application and related responses to California Water Commission completeness and basic eligibility letters.
TAF = thousand acre-feet
WSIP = Water Storage Investment Program