DATE: June 11, 2020
TO: Ron Duncan and Leslie Strohm, Soquel Creek Water District
FROM: Cameron Tana
SUBJECT: Review of Groundwater Modeling Analysis for 2018 Rate Study

INTRODUCTION

In November 2018, Montgomery & Associates (M&A) provided the attached groundwater modeling results to support Soquel Creek Water District’s (SqCWD’s) rate study. The results confirmed that SqCWD’s net pumping goal of 2,300 acre-feet per year (AF/yr) was a reasonable estimate for recovering the District’s area of the Santa Cruz Mid-County Groundwater Basin (Basin) to prevent additional seawater intrusion. This is consistent with the estimate of the net average groundwater pumping necessary to contribute to basin recovery, as discussed in the June 2018 Draft EIR for the Pure Water Soquel Project (Draft EIR page 3-2).

In the rate study, Raftelis recommended using this goal of 2,300 AF/yr as the basis for the Tier 1 definition in the rate structure.

This technical memorandum provides additional explanation of the groundwater modeling used for the rate study. The Groundwater Sustainability Plan (GSP) for the Basin submitted by the Santa Cruz Mid-County Groundwater Agency (MGA) to the California Department of Water Resources (DWR) in January 2020 provides updated context for the groundwater modeling.

MODEL SIMULATION FOR RATE STUDY

The latest available version of the Santa Cruz Mid-County Groundwater Basin GSFLOW model (Basin Model) was used for the rate study model simulation. The model simulation evaluated 2,300 AF/yr total pumping by SqCWD from its wells that extract from the Purisima Formation, Aromas Red Sands, and Tu aquifer unit. This model simulation of reduced SqCWD pumping was compared to a model simulation with SqCWD pumping simulated as 3,000 to 3,700 AF/yr based on SqCWD 2015 UWMP projections. Other municipal and non-municipal pumping amounts were based on existing projections for both simulations. Both simulations were run under the future climate scenario referred to as the Catalog Climate used for the GSP.
The attached groundwater modeling results provided for the rate study show hydrographs of groundwater elevations at monitoring wells for the two simulations. The blue lines labeled “Redist2-SqCWD2300afy” are the results for the simulation of SqCWD pumping of 2,300 AF/yr. The green line labeled “Proj Demand” are the results for the simulation based on SqCWD 2015 UWMP projections. Simulated water levels in coastal monitoring wells were used to evaluate risk of seawater intrusion for which dotted black lines labeled “Meas Obj” represent proposed measurable objectives to prevent seawater intrusion.

The results show that reducing SqCWD pumping to 2,300 AF/yr helps groundwater elevations rise to measurable objectives at a number of monitoring wells such as SC-3A, SC-5A, SC-9C, and SC-A1B (blue lines rise to dotted black lines while green lines do not). There are some monitoring wells where reducing SqCWD pumping does not raise groundwater elevations to measurable objectives but others where groundwater elevations are above measurable objectives. This indicated that further pumping distribution of the 2,300 AF/yr SqCWD pumping total could help meet measurable objectives throughout the District. Therefore, we concluded that 2,300 AF/yr was a reasonable pumping goal for recovering the Basin and preventing additional seawater intrusion.

This result was also consistent with a model simulation presented at the October 2018 GSP Advisory Committee meeting. This simulation included a reduction of municipal pumping to 3,450 AF/yr including reductions by SqCWD and the two other municipal agencies in the Basin. The results indicated that additional reduction of municipal pumping below 3,450 AF/yr appeared necessary to achieve sustainable management criteria. Reducing only SqCWD pumping to 2,300 AF/yr results in total municipal pumping below 3,450 AF/yr.

**MEASURABLE OBJECTIVE DEVELOPMENT AND USE**

The measurable objectives used to evaluate the model simulation for the rate study were based on groundwater elevation proxies for seawater intrusion sustainable management criteria (GSP Section 3.6) proposed for and later adopted for the GSP. The measurable objectives for SqCWD monitoring wells shown on the hydrographs are based on being greater than 99% protective against seawater intrusion. These measurable objectives are more protective against seawater intrusion than the minimum thresholds that define undesirable results in the GSP. The minimum thresholds are based on being 70% protective. It is appropriate that pumping goals for recovering the Basin be based on the more protective measurable objectives that provide operational flexibility to prevent undesirable results for seawater intrusion from occurring.

To evaluate whether model simulated groundwater levels achieve measurable objectives, simulated sea level rise is added to the measurable objective groundwater elevation proxies for both the rate study analysis and the GSP. The rise in groundwater levels achieved by reducing
pumping must counteract the sea level rise to achieve the amount of protection against seawater intrusion that is intended by the measurable objective. The GSP assumed a higher magnitude of sea level rise than the analysis for the rate study, but that change would not be expected to substantially change the conclusions of the analysis for the rate study.

Another subsequent development for the GSP was to evaluate five-year running averages of simulated groundwater levels against measurable objectives. Visual examination of the hydrographs of the model simulation of 2,300 AF/yr pumping by SqCWD indicates using a five-year running average would not change the conclusions of the analysis for the rate study.

The use of measurable objectives for the rate study analysis is consistent with GSP development and is therefore more protective than the prior model evaluation of the Pure Water Soquel project for the Pure Water Soquel EIR. In the model evaluation for Pure Water Soquel EIR, simulated results were compared against protective elevations based on being 70% protective against seawater intrusion without adjusting for sea level rise. Subsequent simulations of the Pure Water Soquel project included in the GSP show that the project has expected benefits of achieving sustainable management criteria for the Basin (GSP Section 4.2.1.8). It is also noted that the results of simulations of the Pure Water Soquel project for the GSP do not change significance determinations for groundwater hydrology impacts in the EIR (EIR Section 4.10); which were based on the volume, rate, quality, and retention time of recharged purified water, and potential groundwater extraction scenarios.

CONCLUSION

The model evaluation of SqCWD’s pumping goal for the rate study is substantially consistent with the GSP. Therefore, 2,300 AF/yr is a reasonable estimate for SqCWD’s pumping goal to recover groundwater elevations in the Basin and prevent additional seawater intrusion into the SqCWD area.
Pleasure Point Deep
AA Unit

Groundwater Elevations (feet MSL)

Proj Demand
Redist2-SqCWD2300afy

2021 2031 2041 2051 2061
0 5 10 15 20 25

SC-1A AA
AA Unit (below SC-1A wells)

Groundwater Elevations (feet MSL)

Proj Demand
Redist2-SqCWD2300afy

2021 2031 2041 2051 2061
0 5 10 15 20 25

Pleasure Point TU
Tu Unit (below Pleasure Point wells)

Groundwater Elevations (feet MSL)

Proj Demand
Redist2-SqCWD2300afy

2021 2031 2041 2051 2061
0 5 10 15 20 25

SC-13A
Tu Unit (near Garnet)

Groundwater Elevations (feet MSL)

Proj Demand
Redist2-SqCWD2300afy

2021 2031 2041 2051 2061
0 5 10 15 20 25

Catalog Climate Run - SqCWD Pumping Goal
November 5, 2018
A-11