

BOLINAS COMMUNITY PUBLIC UTILITY DISTRICT

BCPUD

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415 868 1224



MEMORANDUM

TO: Board of Directors

FROM: Jennifer Blackman

RE: Update on District Water Supply, Recent Consumption and Rain Data and Recommendation for Mandatory Rationing

DATE: January 18, 2021

First, a brief summary of the status of the District's water supply and current consumption data as of today's date.

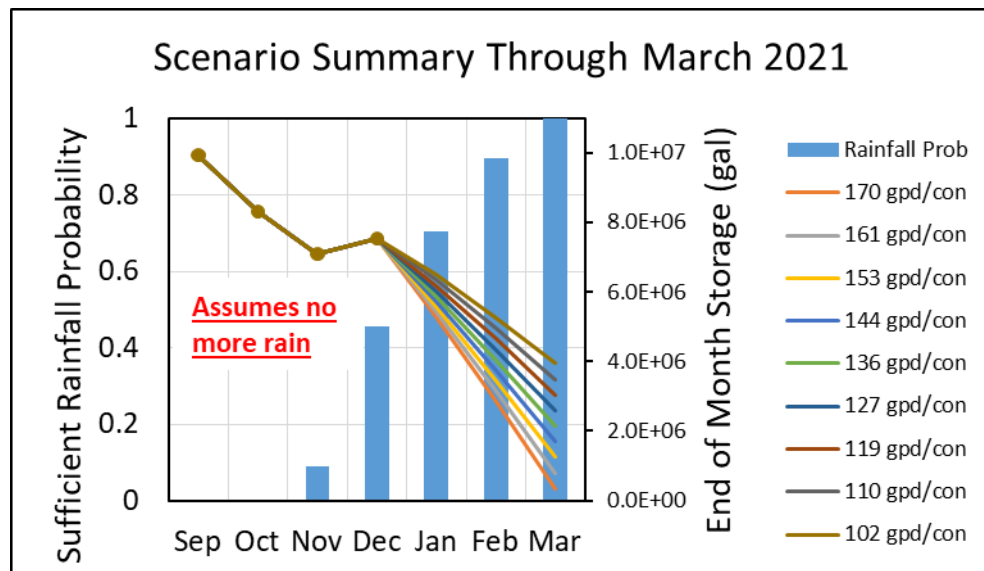
1. Water Supply: From December 1 – 31, our diversions from the Arroyo Hondo Creek and from the Woodrat 1 Reservoir averaged 65,227 gallons per day (Arroyo Hondo) and 18,385 gallons per day (Woodrat 1). Interestingly, our diversions from Arroyo Hondo averaged 82,505 gallons per day from December 16 – December 31, and virtually no water was diverted from Woodrat 1 reservoir during this time, demonstrating the beneficial impact of the 4.2 inches of rain received between December 12 – 14, 2020.
2. Rainfall: Rainfall received through December 2020 was 5.7 inches (as of January 15, 2021, rainfall received is 8.3 inches). As a reminder, we received a total of 22.7 inches of rain last year. Average annual rainfall received in Bolinas is 32.5 inches.
3. Woodrat 1 and Woodrat 2: Our stored usable water supply in the Woodrat reservoirs as of December 31, 2020 (combined) is approximately 6,821,384 gallons, an increase of 341,784 gallons in reservoir storage as compared to the 6,479,600 gallons on November 30, 2020, again demonstrating the beneficial impact of the 4.2 inches of rain in December.
4. Water Consumption. In December, water production averaged 64,472 GPD or 109 GPD per connection (a 10 gallon per day per connection decline as compared to the November data). Water consumption in December (as measured at the meter) averaged 60,109 GPD, or 102 GPD per connection. (The difference in these numbers represents the district's "unaccounted for water loss"; at less than 7% this rate of loss is quite low.)

Individual water consumption remains uneven; we continue to measure a wide range in individual water consumption. In December, the highest 19 water users (10 of which are single family residences, 2 with major leaks) logged average consumption of 300 to 1,665 gallons of water per day, and 46 customers (including the 19 just referenced) used an average of more than 200 gallons of water per day. (Note: this data is very similar to that reported for November, with 15 customers using more than 300 GPD and 45 customers using more than 200 GPD). Of the 46 customers using more than 200 GPD, 32 of them *increased* their water use in December as compared to November, in a few cases by several *hundreds* of gallons of water per day. Overall, in December, 92 customers used more than the requested 150 GPD. In comparison,

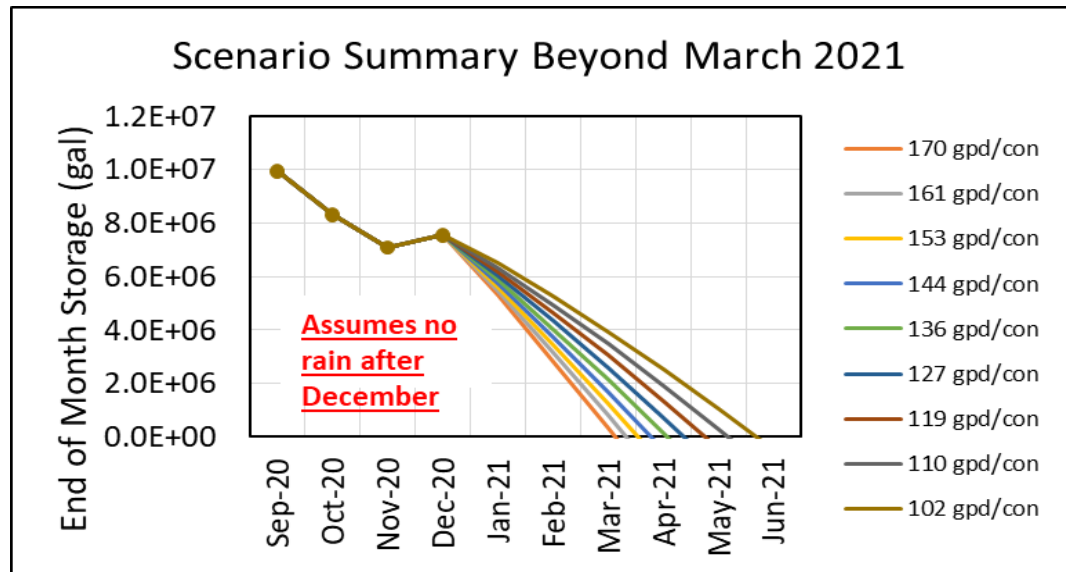
the data indicate that 99 customers used more than 150 GPD in November, 149 customers used more than 150 GPD in October, and 233 customers used more than 150 GPD in September. This welcome decline in the number of customers using more than the requested 150 GPD (and the overall decline in average daily water consumption generally) appears to be strongly correlated to a decline in landscape irrigation. That said, some of this water consumption may simply have been transferred: water use at the laundry mat downtown doubled in November and December, reaching 1500-1665 GPD, on average, as compared to 700-850 GPD (May – October 2020).

5. Updated Models:

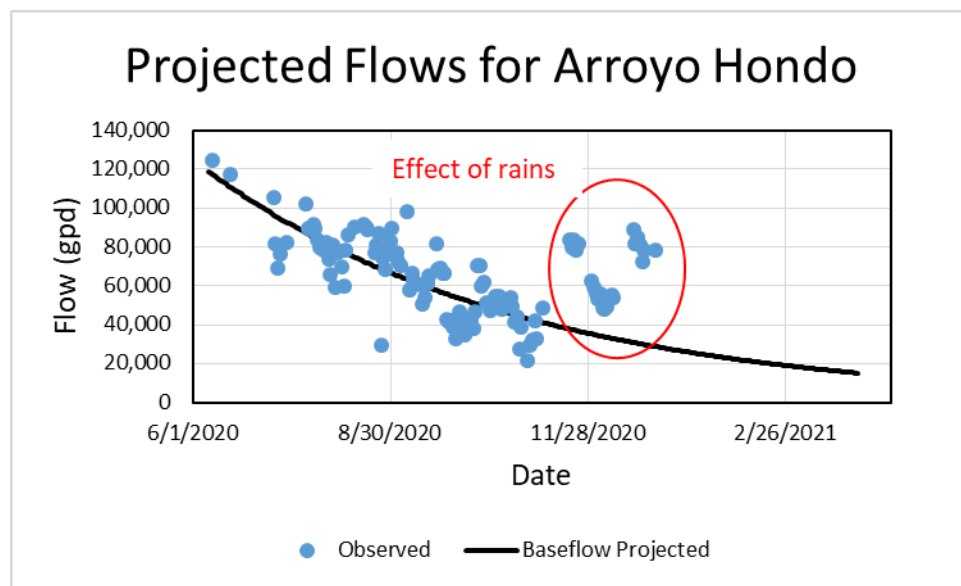
The first graph below is an updated Scenario Summary reflecting the actual data recorded (brown line in upper left area of graph with the four small dots) and the “fork” of projections as to how much stored water the district will have available as of the end of March 2021 based on differing rates of consumption. Current consumption (including unaccounted water loss) places us along the grey line (110 gpd/con), which corresponds to a projection of approximately 3.5 million gallons of water remaining in storage as of March 31, 2021 if there is no more rain. Note: the slope of the recorded storage (brown line with dots) inclined upward as compared to previous months. This reflects the beneficial effects on our stored water supply of 1) the decrease in water consumption and 2) rain received in December.



The next graph provides a scenario summary that looks forward beyond March 31, 2021, again assuming no rain after December (which is a pessimistically conservative assumption as we have received 2.6 inches of rain thus far in January). This graph predicts that, if current consumption levels stay the same (102-110 GPD/con) *and* we receive no more rain, the district essentially will run out of stored water by approximately late May to mid-June 2021.

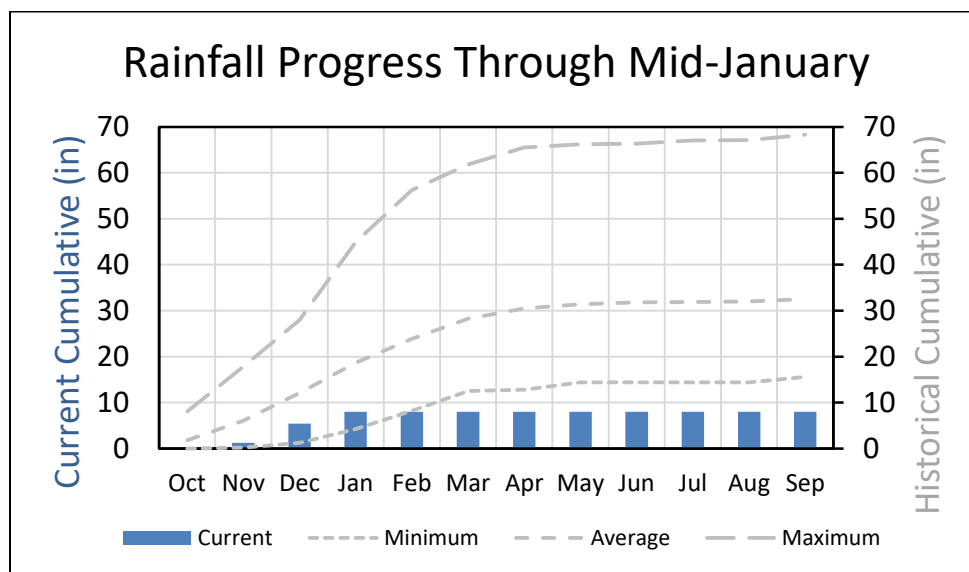


The third graph updates the district's estimated flow model for the Arroyo Hondo creek with data through December 31st and reflects the effect of rain on creek flows. This model, created by the district's consulting hydrogeologist (Rob Gailey), is based on dry season conditions when only groundwater seepage (baseflow) creates flow in the creek. The term baseflow recession curve is typically used to describe such a model because the flow decreases, or recedes, with time since the last rainfall event. The effects of recent rains and surface flows to the creek, which are not modeled, are indicated.



It is important to note that the baseflow recession curve itself has not yet been updated from the curve originally calculated and presented to the Board and public at the November 18, 2020 Board meeting to reflect the rain received since that time. We have seen much higher than predicted flows in the Arroyo Hondo in the latter halves of November and December 2020 as well as the first half of January 2021. The reason for this is that the district has not yet received sufficient rain to affect the modeled baseflow of the creek. Rather, the increased flows are “flashy” and reflect the more immediate surface flow impact of the rain (along with the shorter days, cooler weather, and less “demand” from the plants and trees). Staff does not believe there has been sufficient rain to increase base groundwater flows on a sustained basis in the creek and therefore has not attempted to remodel the projections at this time.

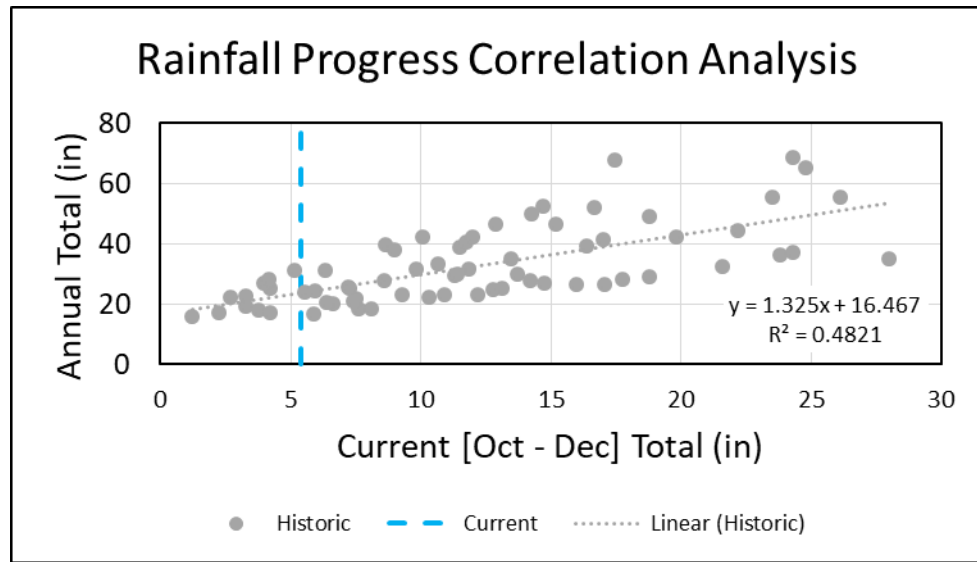
The next graph depicts where the district was as of January 15, 2021 in terms of rainfall received (8.0 inches from October 1, 2020 – January 15, 2021)¹ relative to historic minimum, average and maximum rainfall (68 years of BCPUD rainfall data); as this graph shows, while the district is above the minimum recorded rainfall for this time of year, it remains well below average.



The fourth graph correlates the rainfall progress as of December 31st with total annual rainfall for the available historical record (preceding 68 years). During that time, the district has experienced only 11 other years where the rainfall received was 5.4 inches or less as of the end of December. Those rain years generally turned out to be drier than normal years with a minimum total rainfall received of 15.6 inches, a maximum of 30.8 inches and an average of 21.9 inches. These statistics

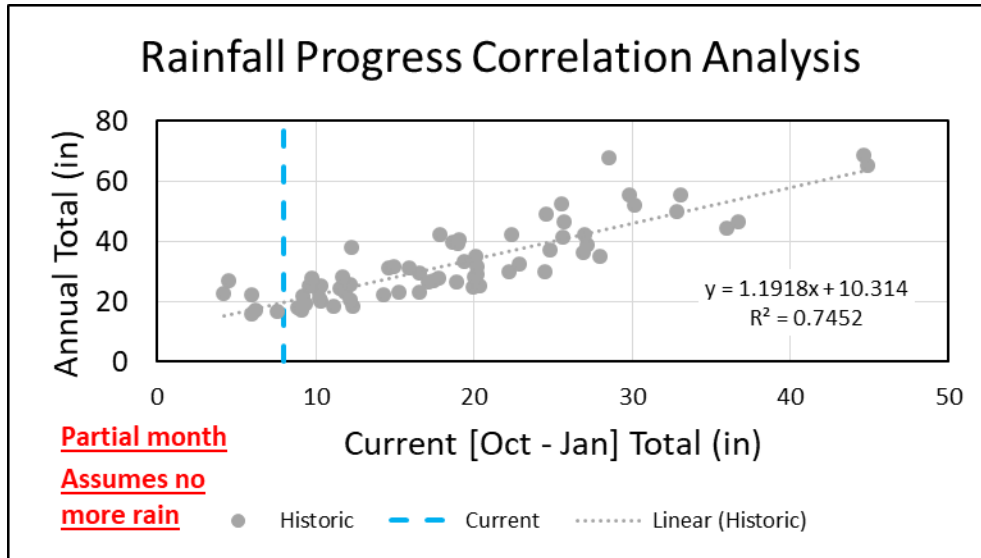
¹ Note: the BCPUD measures rainfall as of July 1 for each rain year; the models in this memorandum utilize the October 1 start date for the rainy season. The difference is a negligible 0.3 inches as the district received 0.3 inches of rain in August 2020.

suggest that there is a reasonably high potential for the 2020-21 year to be another below average rainfall year.



Current	5.40
	5.40
# Records	11
Min	15.6
Max	30.8
Avg	21.9

The fifth graph on the next page is an updated version of the prior graph, with the 2.6 additional inches of rain received through January 15, 2021 included. The updated data did not alter the expectation that the 2020-21 rain year is more likely than not to be another dry year. Assuming no more rainfall in January, the analysis is even more pessimistic, with only 6 years in which the district received less rainfall in January, a minimum total rainfall of 15.6 inches, a maximum of 26.8 inches, and an average of 20.1 inches.

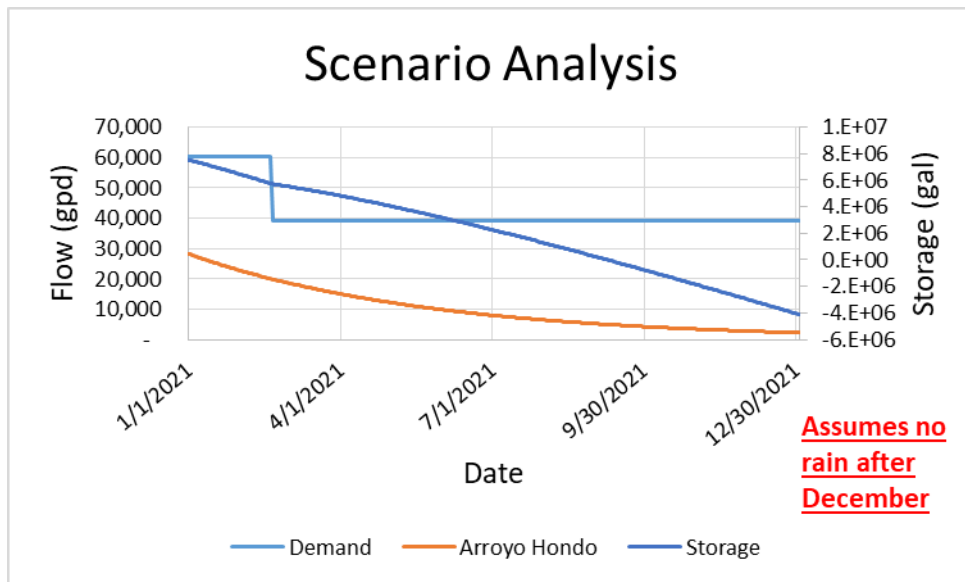


Current	8.00
	8.00
# Records	6
Min	15.6
Max	26.8
Avg	20.1

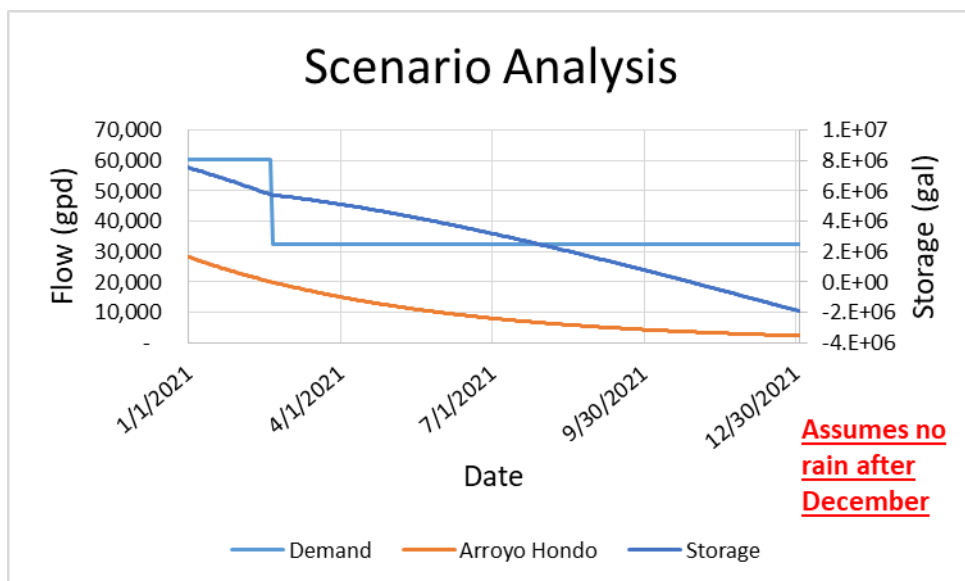
6. Recommendation to Implement Mandatory Rationing.

Given the meager rainfall received to date (January 15, 2021) following a much drier than average rain year last year (2019-2020), the likelihood that the current year (2020-21) will be a drier than average year, the pessimistic predictions of our baseflow recession model for flows in the Arroyo Hondo creek, and the status of our stored water supply, staff believes it is necessary to begin the mandatory rationing of water as soon as possible (within the next 30 days) to enable the community to have sufficient water during 2021 until the approximate start of the next rainy season. **Staff, therefore, requests that the Board hold a special meeting during the first week of February 2021 to enact a specific mandatory rationing resolution.** Staff currently is working on a variety of scenarios to present for the Board's consideration, drafts of which are presented in the following graphs.

The graph below depicts a scenario in which the district receives no more rain at all this rain year and rations all connections to a maximum of 100 gallons per day within the next 30 days. Note: at present, 213 of the district's customers are using more than 100 gallons of water per day at their property, so they are the customers who will be directly impacted by this ration amount *and it will be critical that customers currently using less than 100 GPD do NOT increase their current water use (see concluding section)*. At this ration amount, the district essentially will be out of water by early September 2021 rather than late May or mid-June 2021. Stored water available from the treated water tanks and Woodrat reservoirs will be depleted and only an extremely low baseflow to the Arroyo Hondo will remain.



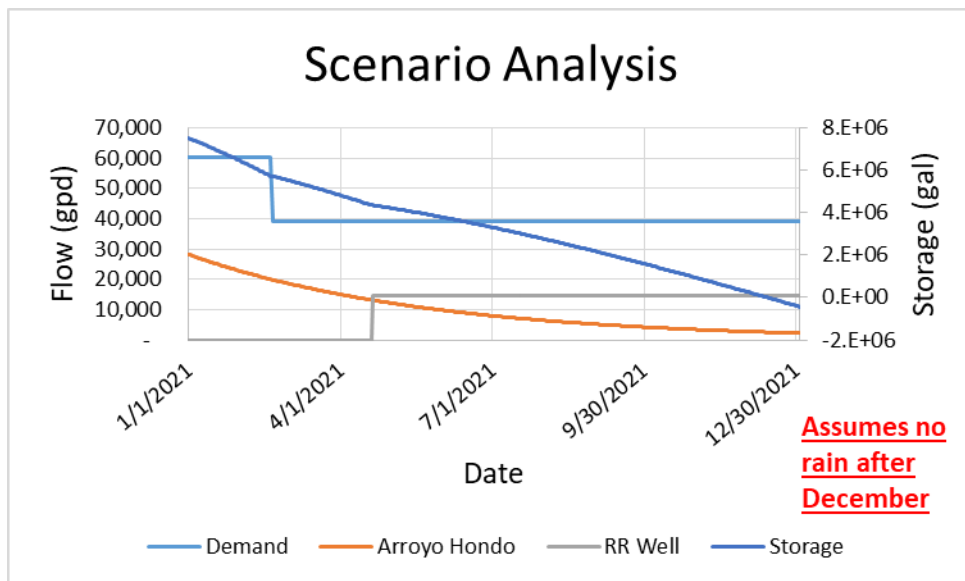
By way of comparison, if the ration amount is set at 75 GPD per property rather than 100 GPD (within the next 30 days), the district's current water supply would be extended until late October 2021. At the present time, 288 of the district's customers are using more than 75 GPD at their property.



7. Recommendations to Augment Supply.

At the present time, the district’s sole water supplies are surface water sources: the Arroyo Hondo Creek and Woodrat Reservoirs 1 and 2. However, staff believes there are possibilities to augment the district’s water supplies on at least an emergency basis. Staff recommends as the first option that the district expedite a regulatory and engineering process to divert and treat groundwater from the irrigation well on BCPUD lands at the Resource Recovery Project (“RRP”) and connect that water into the district’s water system. Staff believes this may be achieved by making use of the existing tanks at Mesa Park (well water currently is pumped from the RRP site to the tanks at Mesa Park to irrigate the ballfields) and constructing a tie-in to the hydrant at the Firehouse. This is preferable than trying to install tanks at the RRP well site because of details related to distribution system’s pressure zones. Regulatory approval would be needed because the annular seal for the irrigation well does not meet State requirements for a Community Water Supply. Therefore, an additional disinfection/detention requirement likely will be imposed. It is important to note that regulatory response to this concept for emergency use of the irrigation well to address the current drinking water shortage is unknown as regulatory contact is yet to be made.

The following graph depicts a scenario under which the district implements rationing of 100 GPD per property within 30 days (and customers currently using less than 100 GPD do not increase their use), and also pursues and achieves use of the RRP well within the next 90 days. The sustained flow rate of the RRP well is not precisely known, but if we assume 10 gallons per minute (14,400 gallons per day if the well is operated continuously), the date by which the district would be out of water is pushed back from early September or late October (preceding scenarios) to mid-December 2021. The 10 gallon per minute production rate is on the low end of the range for sustainable yield from this well as approximated in a letter by the district’s consulting hydrogeologist prepared in 2015. Consideration of more recent data may provide additional insight as far as the supply that might be reasonably expected.



Staff also intends to analyze the potential for supplementing the district's water supply on an emergency basis with surplus groundwater from other, privately-owned, wells located within the district, assuming cooperation from the well owner(s). However, the known potential options are significantly more complicated from an engineering standpoint and would not be available until further out in time as possibilities. As such, staff does not have any details to report on these other potential well options at this time.

8. Conclusion.

Staff recognizes that the mandatory rationing of water will require significant lifestyle changes from some of our customers on a temporary basis that are neither easy nor pleasant; however, for all of the reasons stated above, we believe that mandatory rationing is needed at this time. Please note that staff's analysis as to the specific ration amount is on-going and further work will be done prior to the requested early February special Board meeting to refine our recommendation. In addition, the Board should be prepared that it may need to revise the ration amount from time-to-time during 2021, depending on circumstances and until the rains sufficiently replenish supplies.

Finally, it is important to be aware of some specific assumptions underlying the scenarios presented in this memorandum. For example, the above scenarios assume that customers currently using less than 100 (or 75) GPD will NOT increase their water use. As such, by setting the ration amount at 100 GPD per property, for example, as long as customers already below this level do not increase their use, the district actually will achieve an overall consumption rate of 66 GPD per connection district-wide.²

Staff also anticipates that there will be requests by customers for "exemptions" from the 100 GPD per property ration amount and we are working on modeling the likely consequences of granting such exemptions. Staff acknowledges that some exemptions will be inevitable, but the Board should be aware that *every* exemption shortens the projected timeframe of our available water supply. For example, if the Board grants exemptions from rationing to just the ten highest water users in town, the available water supply would be depleted more than one month earlier (early August 2021) than it would be if those exemptions were not granted (early September 2021).

² More specifically, the current district-wide average daily consumption of 60,109 gallons is projected to drop to 39,241 gallons under the 100 GPD ration scenario.