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MEMORANDUM

TO: Board of Directors, Frazier Park Public Utility District and Lake of the Woods Mutual Water Company

FROM: Dee Jaspar, P.E.

SUBJECT: Estimate of Water Demands for the Study Area – Final Report

DATE: April 23, 2015

The Frazier Park Regional Pre-Planning Water Supply Study considers combining the water systems for the communities of Frazier Park and Lake of the Woods. The following report develops the estimated water system demands for the combined communities.

The two communities are roughly two miles apart. There are approximately 900 persons living in Lake of the Woods and 2,700 persons living in Frazier Park. There are 401 connections in Lake of the Woods and 1,303 in Frazier Park. These are the only two areas that have expressed a desire to look into the possibility of creating a regional water agency. It is anticipated that this would involve annexation of Lake of the Woods Mutual Water Company into Frazier Park Public Utility District.

There are other water connections in the area between the two communities. These are existing private wells and properties that are served by their own small systems. It is possible that these connections would desire to be a part of the regional system. An estimate of 300 additional connections was included in this study to reflect potential additional demands.

The following is a review of the water demands for the Frazier Park Public Utility District Regional Water Project Pre-Planning Study. Demands are developed for both communities, first as separate service areas and second, as a combined service area. The effect of an additional 300 connections is also developed.

Frazier Park Public Utility District
Lower Cuddy Creek Water Demand Study
Covering the Communities of Frazier Park and Lake of the Woods

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Executive Summary

- The County of Kern Development Standards require water demands to be calculated using a standard methodology. This methodology develops a range of water demands for metered and unmetered systems and reflects a range of water demands for the county. These demands apply to the valley, the mountains and the deserts, and represent the minimum demands with which water systems are to meet. Local information, when available, is to be compared to the standards and can be used to determine demands, but must consider the minimums developed by the county standards.
- Production information is available for both the Frazier Park Public Utility District (“Frazier Park”) and the Lake of the Woods Mutual Water Company (“Lake of the Woods”) systems. Frazier Park is a metered system and Lake of the Woods is a non-metered system. Water demands developed from this information fall within the ranges developed by the county standards. These local demands are used for the study.
- Frazier Park has 1,303 connections and Lake of the Woods has 401 connections, for a combined total of 1,704 connections.
- Annual unit water demands for Frazier Park and Lake of the Woods are very similar, and vary only 0.01 acre-foot per connection between the two systems: 0.28 acre-feet per connection for Frazier Park and 0.29 acre-feet per connection for Lake of the Woods.
- Annual water demand for the two systems is:
 - 360 acre-feet for Frazier Park
 - 117 acre-feet for Lake of the Woods
 - 477 acre-feet total for the combined systems
- It is estimated that an additional 300 connections could be added to the combined system if a regional entity were to be created. A number of wells are aging and/or running out of water. Some vacant lots are located within the service areas of the water systems. These would be likely candidates for water service.
- Total estimated water demand for the combined systems with an additional 300 connections is 561 acre-feet per year.

Water Demand Standards

County Standards

The County of Kern Water System Standards contain procedures by which municipal water demands can be calculated. These are contained in Division Two of the Kern County Development Standards. The Standards address the range of geographic areas within the county and are intended to be used as a guide. Local information, when available, can be used to develop demands specific to a water supplier's service area. This information must be compared to the county standard to develop a sense of the validity of the local information.

Demand Calculation – County Standards

Section 202-3 Required Residential Supply – General, contains the county water supply requirements. After determining the number of connections in the service area, the peak hourly demand is determined from the Water Supply Requirements Chart. From this number the maximum month daily residential flow and the average daily flow for the maximum month are calculated. This information is compared to water production information from Frazier Park and Lake of the Woods. The two systems are then combined and demands are developed for the combined systems. Further, an estimate for the combined systems with the addition of 300 residential lots is developed. Frazier Park is a metered system. Lake of the Woods is a non-metered system. The following demands reflect metered connections in both Frazier Park and Lake of the Woods. Metering would be a requirement if the systems were combined, and State law requires all services to be billed on metered rates by the year 2025. As mentioned above, the county standards present a range of demands, depending on the geographic location of the system and whether or not the system is metered. The lowest demands generally occur in the mountain communities and the highest on the valley floor.

Table 1

Peak Hour Demand

| Community | Number of Connections | Range – Minimum to Maximum Peak Hour Demand |
|-------------------|-----------------------|---|
| | | Metered Water Service |
| Lake of the Woods | 401 | 320 – 800 gpm |
| Frazier Park | 1,303 | 800 – 2,200 gpm |
| Combined | 1,704 | 1,050 – 2,800 gpm |

The Maximum Month Daily Demand is estimated in the following table. This is the average daily demand for the peak water use month in the system. Usually this month is June, July or August. Very occasionally it falls outside the summer months.

Table 2

Maximum Month Average Daily Demand

| Community | Range – Minimum to Maximum Demand |
|-------------------|--|
| | Maximum Month – Average Daily Demand (Metered) |
| Lake of the Woods | 107 - 267 gpm |
| Frazier Park | 267 - 733 gpm |
| Combined | 350 - 933 gpm |

Estimated Demands

Frazier Park

Frazier Park is a metered system. It serves 1,303 connections. Comparison of the production records with the delivery records indicates that there is a difference between the water meters on the wells and the water metered through the individual service meters. This is not unusual. The average difference is about 20%. This is based on a six-year average of District records from 2009 – 2014. Monthly variations are much higher and some data is inconsistent with comparable months. The difference in water pumped versus water delivered is factored into the quantities that appear in Table 3. The difference is likely due to a combination of losses due to pipe breaks and metering inconsistencies. The contribution from the two springs has not been factored into the calculations due to the variable nature of the resource, and the fact that spring flow is not metered. Spring flow is reported to be a maximum of 25 gpm for each spring. This has decreased due to the drought and varies seasonally.

Pumping records for the past six years for the Frazier Park system indicate that the maximum month daily pumping demand is 360 gpm. This is within the lower 1/3 of the range of demands developed by using the County standard (Table 2). The peak hour source production for Frazier Park is 1,081 gpm based on maximum month average daily demand of 360 gpm. This is met by drawing water from wells, springs, and from storage. Frazier Park has 2.1 million gallons of storage. On average, Frazier Park pumps 16,055,099 gallons (49 acre-feet) in the maximum month, which is 13.7% of its average

annual production of 117,294,982 gallons (360 acre-feet). The average annual daily demand is 223 gpm. The average annual water production is 0.28 acre-feet per connection.

Lake of the Woods

Lake of the Woods is a non-metered system. It serves 401 connections. The six-year average annual water pumped for Lake of the Woods is 38,119,900 gallons (117 acre-feet). This is 0.29 acre-feet per connection, nearly the same as that for Frazier Park (Frazier Park = 0.28 acre-feet per connection). Assuming that the maximum month is comparable to that of Frazier Park (maximum month production is 13.7% of the annual production), the maximum month daily demand for Lake of the Woods would be 117 gpm and the maximum month deliveries would be 5,222,426 gallons (16 acre-feet). This also indicates that the peak hour demand would then be 351 gpm. These values fall within the lower range that is developed by the county standard, which would be expected for a mountain community. The annual average daily demand is 73 gpm. Installation of meters would normally have the effect of reducing demands on the system, however, the effect of the extended drought has already reduced demands. Well production in Lake of the Woods has been falling off for the past several years. The water supply situation in Lake of the Woods is now critical. For purposes of this study it is assumed that demands will remain unchanged with the installation of meters in the Lake of the Woods system, as the current water demand is nearly the same as for the metered system in Frazier Park (see above).

Combined Systems

The combining of the systems results in the following demands (Table 3). The above information for the individual systems together with the information for the combined systems, is presented. Additionally, for estimation purposes, 300 more residences have been added to the combination of the two systems, bringing the total number of services to 2,004.

Table 3

Estimated Demands and Water Production

| Community | Annual Water Production | Maximum Month Water Production | Peak Hour Demand | Average Annual Demand |
|--|--------------------------------|---------------------------------------|-------------------------|------------------------------|
| Frazier Park (1,303 Connections) | 360 af | 49 af | 1,081 gpm | 223 gpm |
| Lake of the Woods (401 Connections) | 117 af | 16 af | 351 gpm | 73 gpm |
| Combined (FPPUD & LOW) (1,704 Connections) | 477 af | 65 af | 1,482 gpm | 296 gpm |
| Combined with 300 Additional Residences (2,004 Connections) | 561 af | 77 af | 1,743 gpm | 348 gpm |

Note: Peak Hour and Average Annual Demands were estimated by addition of the two entities respective demands. The County standards would generate a slightly lower value for these combined systems, therefore the direct addition is slightly more conservative.

Appendix

Map of the Area