Revised Long-Term Projections of LMWC Water Requirements

Introduction

Over the last few years, a number of things have occurred that have to potential to change the way that the La Mesa Water Cooperative (LMWC) plans for future sources of water. These events include the following:

- Reduction of the allowable arsenic levels in drinking water to concentrations below those in the water from Well #3. As a consequence, this well must eventually be retired or its water treated.
- Addition of Well #5 to the system, providing (presumably) 100 gpm of arsenic-compliant water.
- Failure of Well #4 to produce sufficient water to meet our then-current needs.
- As yet unidentified problems at Well #1
- Continued sub-division of lots in the La Mesa development.

This paper provides an estimate of future water requirements for the LMWC and suggests some considerations that may influence the steps taken to secure supply options to meet those requirements.

LMWC Water Planning

LMWC resource planning has focused on two different aspects of water usage: 1) the aggregate annual consumption of water and whether our existing water rights are sufficient to meet that consumption; and 2) the maximum use over several days and whether our pumping capacity is sufficient to provide that quantity of water. In addressing the sufficiency of our water rights, we have generally tried to include the variability in annual water use that we experience so that most, but possibly not all usage patterns can be accommodated. In assessing the pumping capacity, we have tried to include variability in usage as well as assuming the largest pump (or most productive well) is out of service for an extended period of time (such as one week or longer).

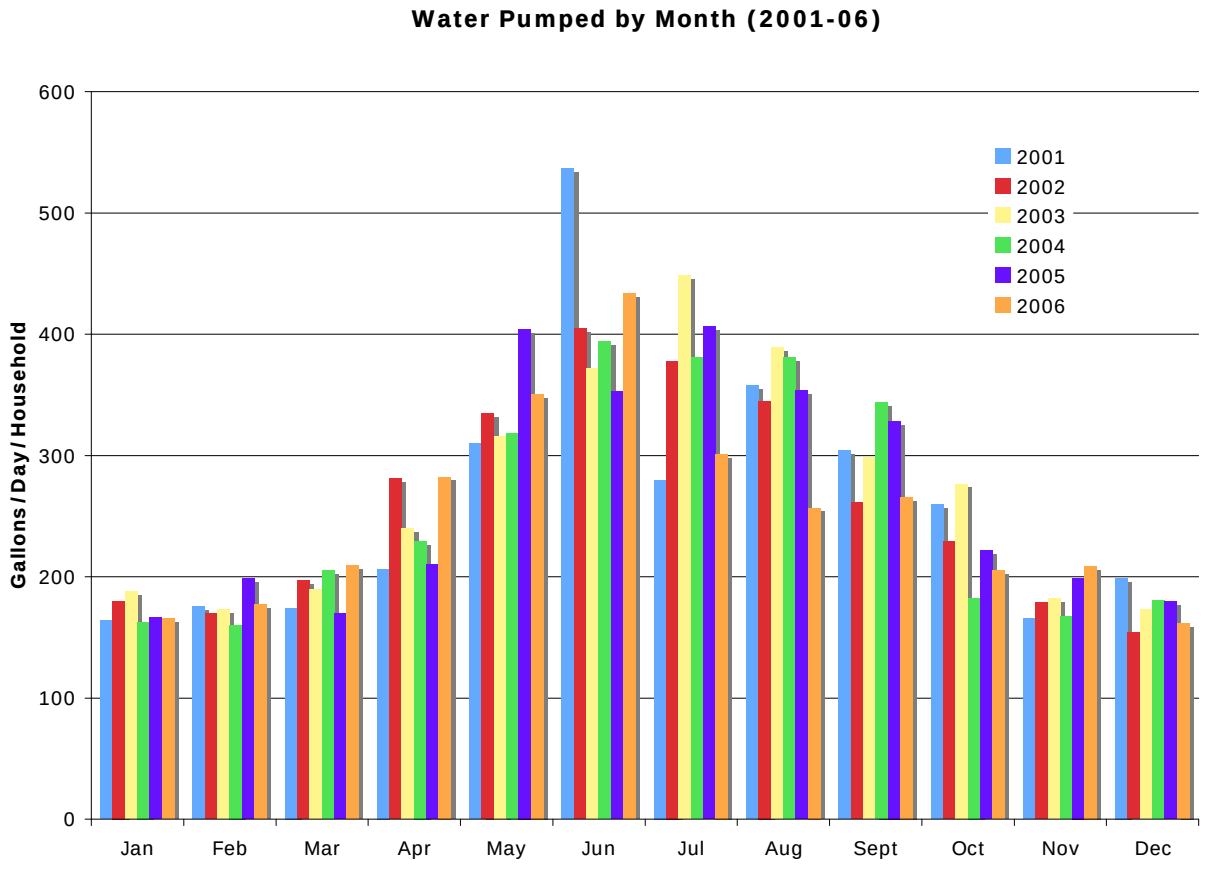
Analysis of LMWC Water Requirements

Table 1 (on the next page) shows the water pumped by month for each of the last six years. The numbers under each year are gallons per day per household. The row labeled “Annual Gallons” shows the annual amount pumped in gallons per household. The rightmost four columns provide some analysis of the six years of data. The column labeled “Average” shows the average water pumped over the six years. In the bottom row you can see that the average annual amount pumped is about 95,300 gallons per household. The column labeled “Std.Dev.” contains the standard deviation for the six years of data, expressed as a percentage of the average. The standard deviation is a measure of the variability in the data. In general terms, about two-thirds of the data will lie within one standard deviation of the average. More importantly, from our perspective, about 84% of the data will be less than the average plus one standard deviation and 90% will be less than the average plus 1.28 standard deviations. The column labeled “FBO” shows the pumping capacity in gallons per minute (gpm) needed at full buildout. And the last column, labeled “1 in 10” gives the pumping capacity that will be exceeded only one year in ten. In the last two columns, the bottom row shows the total water pumped in a year, in acre-feet, at full buildout. The “FBO” column has the average, and the “1 in 10” column shows what will be exceeded only one year in ten. For this analysis, “full buildout” is assumed to mean 378 households; 173 in La Mesa and 205 in Sundance Mesa. The chart below the table shows the month-by-month information in a more graphic form.

Table 1

Water Pumped by Month and Year
(gallons per day per household)

	2001	2002	2003	2004	2005	2006	Average	Std.Dev.	FBO gpm	1 in 10 gpm
Jan	163.7	180.0	187.9	162.8	166.2	165.3	171.0	6.10%	44.9	48.4
Feb	175.4	169.9	173.1	160.0	198.4	177.0	175.6	7.22%	46.1	50.4
Mar	173.9	196.8	189.8	205.0	169.4	209.0	190.7	8.49%	50.0	55.5
Apr	206.4	280.7	239.8	229.5	210.0	282.5	241.5	13.85%	63.4	74.6
May	309.5	334.9	316.1	318.1	404.4	350.9	339.0	10.44%	89.0	100.9
Jun	536.9	404.6	371.6	394.0	352.7	433.7	415.6	15.79%	109.1	131.1
Jul	279.8	377.9	448.4	380.8	406.4	301.0	365.7	17.48%	96.0	117.5
Aug	357.6	345.0	388.9	380.9	353.4	256.6	347.1	13.66%	91.1	107.0
Set	304.2	261.2	298.3	343.9	328.4	265.9	300.3	10.97%	78.8	89.9
Oct	259.7	228.9	276.4	182.6	221.4	204.8	229.0	15.11%	60.1	71.7
Nov	165.5	178.7	182.0	167.2	199.1	208.7	183.5	9.41%	48.2	54.0
Dec	198.9	153.9	173.1	180.2	179.6	161.8	174.6	9.03%	45.8	51.1
Annual Gallons	95249	94669	98713	94438	97012	91769	95308	2.61%	110.56 acre-ft	114.09 acre-ft



Water Rights

Our water rights are assumed to be 118 acre-feet (the State Engineer's "WATERS" database says so). This is sufficient for our needs.

An important consideration with respect to water rights is the number of lots that actually desire service. Within the La Mesa subdivision there are currently 165 lots that are eligible to be served. Four of these are served by private wells and are no longer members of the LMWC, although they could ask for reinstatement. There is one subdivided lot that will likely seek membership and, apparently, 7 more lots that could be subdivided.

When Sundance Mesa was planned, there was the possibility of some multi-family dwellings there and the LMWC is apparently obligated to serve 250 "household units in that development. At this time, 205 lots have been created and that is the number we commonly use for planning. Thus, our planning basis is 378 lots – 173 in La Mesa and 205 in Sundance Mesa. We can look at what would happen if some multi-family dwellings were created – say 10, 20, 30 or 45 additional units. We can assume that they would use only 75% of the "normal" use, and on that basis we get the information shown in the following table, where the shaded cells show the situations that are within our 118 acre-feet of water rights.

Lots Served	Water Rights Required to Avoid Over-withdrawing Water Except for …					
	5 yrs in 10	2 yrs in 10	1 yr in 10	1 yr in 20	1 yr in 50	1 yr in 100
378 Lots	110.6	112.9	114.1	115.1	116.2	117.0
388 Units	112.8	115.1	116.4	117.4	118.5	119.3
398 Units	114.9	117.4	118.6	119.7	120.8	121.6
408 Units	117.1	119.6	120.9	121.9	123.1	123.9
423 Units	120.4	123.0	124.3	125.4	126.6	127.4

It would appear that we have adequate water rights to meet the needs of our members in even the driest of years, based on the current development of Sundance Mesa. We can even accommodate a number of multi-family dwellings (about 15) with a "1-in-10" chance of exceeding our water rights. At this point, it seems extremely unlikely that there will be any multi-family dwellings in Sundance Mesa, so we seem to have adequate water supplies for our membership.

Well/Pumping Capacity

The data in Table 1 indicate that, on average, June is the month of greatest water usage. However, July is often the highest month and May, August, or September could be, also. The point of the analysis is that the highest usage requires, on average, the ability to pump 109 gpm. If we wish to meet the demand nine years out of ten, we need to be able to pump at about 131 gpm. The following table shows the needed pumping capacity for various numbers of lots served. 378 lots corresponds to full build-out, subdivision of all eligible lots and reinstatement of the 4 lots that currently have access to private wells. 374 lots corresponds to those 4 lots not being reinstated or to subdivision of only half the eligible lots. 370 lots corresponds to the 4 lots not being reinstated and subdivision of only half the eligible lots. 366 lots includes the possibility that 1% of the lots are never developed. Note that the number of lots is not as important as the degree of certainty (or risk) in meeting member needs.

Lots Served	Pumping Capacity in gpm Required to Meet Summer Water Demand Except for …					
	5 yrs in 10	2 yrs in 10	1 yr in 10	1 yr in 20	1 yr in 50	1 yr in 100
378 Lots	109	124	131	137	144	149
374 Lots	108	122	130	136	143	148
370 Lots	107	121	128	135	141	146
366 Lots	106	120	127	133	140	144

The resources available to provide this pumping capacity are: 1) Well #5 at 100 gpm – except that, as the largest well, our planning protocol requires that we discount it; 2) Well #3 at 75 gpm but the water has a high arsenic content and would require treatment at some cost; 3) Well #2 at 25 gpm, 4) Well #1 at 40-50 gpm although its future is currently uncertain; 5) Well #4 at perhaps 25-40 gpm at some cost, 6) a new well at 60-100 gpm at considerable cost, and 7) purchase of water at some cost.

In this case, the number of lots served is relatively unimportant, because their effect is small when compared to the normal year-to-year variability. This decision probably involves determining the cost of various alternatives and then deciding, based on cost, the desirability of various level of risk.

One thing to note in the information presented here: At full buildout, and with Wells #1 and #2 pumping, we will probably drain the tanks in 3-5 days under average conditions if Well #5 is lost. If we were confident that a loss of pumping capability at Well #5 could be corrected within that time, this issue might not be a serious concern.

Next Steps

Water Rights

- We seem to be in pretty good shape, so long as Sundance Mesa is not rezoned to allow multi-family dwellings.

Pumping Capacity

- We need to have a reasonable understanding of the amount of water each alternative source can provide and the cost required to achieve that.
- We need to determine the level of risk we are willing for the LMWC to accept. That involves setting the pumping capacity we need. In doing that we need to decide whether we will assume our resources will be capable of running 24/7 or whether we should include an allowance for downtime on those pumps, as well.
- In effect, we stack the alternatives up in order of increasing cost (low cost at the bottom of the stack, high cost at the top) and when the stack reaches the desired pumping capacity, we have our plan.
- Since life is never that simple, we'll need to look at some alternative plans. And we need a way to figure the cost. For example, drilling a new well has a very high "front-end" cost, but a low cost for water production. Buying water from North Ranchos involves almost no front-end cost, but a much higher cost for water purchased. We need to agree how to balance these characteristics to give a useful result.