ACTON – AGUA DULCE
CONCEPTUAL MASTER PLAN
FOR WATER FACILITIES

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Prepared by

PSOMAS

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This report includes numerous assumptions (described herein) and was prepared for the purpose of determining the interest in proceeding with implementation of a community water system. Costs contained herein are subject to change based on more detailed analysis.

EXECUTIVE SUMMARY

The purpose of this study is to develop a conceptual plan for providing water service to Agua Dulce and portions of Acton in order to assess the feasibility and interest in connecting these areas into the existing distribution system of Waterworks District No. 37 (District 37).

Study Area

The study area includes 1,786 improved and 1,921 unimproved parcels for a total of 3,707 parcels, of which 1,918 are in Acton and 1,789 are in Agua Dulce. It excludes the area currently within the boundaries of District 37.

Water Demands

Current water use in District 37 averages 1,641 gallons per dwelling unit per day for a total existing demand of 2.01 million gallons per day (mgd). Using this rate, the demand for the existing developed parcels in Agua Dulce calculates at 1.62 mgd and for Acton at 1.31 mgd for a total of 2.93 mgd. Adding the existing demand for these two areas to the current District 37 demand results in a total demand of 4.94 mgd. Extrapolating these demands to build out, assuming that each unimproved parcel averages one dwelling unit, yields a total average demand of 2.94 mgd for Agua Dulce and 3.15 mgd for Acton. Taking into account the additional demand for build out of District 37 and adding the three areas together gives a total build out demand of 10.04 mgd for the entire study area.

Maximum day demands during the summer need to be accounted for in order to size water supply, treatment, and transmission facilities, which run approximately two times average day demands. Therefore the demands above need to be doubled requiring a total supply of just less than 10 mgd for existing demands and just over 20 mgd for the entire study area at build out.

Water Sources

Existing sources for District 37 consist of three wells capable of delivering about 3.17 mgd and the Antelope Valley-East Kern Water Agency (AVEK) treatment plant that can deliver up to 4.00 mgd of imported State Water Project water for a total of 7.17 mgd. Assuming that three

new wells capable of supplying a reliable summer demand of 1.29 mgd can be constructed within the Agua Dulce area, the existing demands for the entire study area would require an additional 4.57 mgd of supply from AVEK. Build out demands for the entire study area plus build out of District 37 would require an additional supply of 11.61 mgd from AVEK. The existing AVEK supply facilities could be increased from 4.0 to 8.0 mgd by expanding the treatment plant only. However, further expansion to the required nearly 16 mgd (existing 4.00 plus required 11.61) would require expansion of AVEK's State Water Project turnout, the transmission line to the plant, a parallel 8 mgd treatment plant, and a new 2 million gallon reservoir at the plant.

Transmission, Distribution and Storage Facility Requirements

Expanding the existing water system to serve the entire study area will require additional facilities both within District 37 and out into the unserved areas of Acton and Agua Dulce. Serving the existing demands will require an additional 5.34 million gallons of reservoir storage and a total of 10.88 million gallons of storage for build out. Additionally, the current District 37 area will require 3.5 million gallons of new storage. Over 31 miles of transmission pipelines would be required to serve build out demands in addition to distribution lines totaling over 126 miles. Additionally, two pressure regulating stations and increasing the capacity of the Vincent Pump Station would be needed to serve build out demands.

Costs

The capital cost for these required facilities is estimated at over $160 million including nearly $35 million in fees for annexation to AVEK. Of the annexation fee amount, approximately $20 million is to pay back taxes and the remainder is to purchase water supply capacity.

Average costs per parcel can be broken down depending on the location of the parcel. In the Acton area the average cost would be approximately $31,000 per parcel.

In the Agua Dulce area there is an additional class of parcel since only a portion of the area is within AVEK and much of it would have to annex. For parcels already in AVEK the average cost would be approximately $37,000 per parcel. For the areas outside of AVEK the average cost would be $63,000 per parcel.

It should be noted that these are average figures only, based on the assumptions detailed in this report and also assume only one dwelling unit per parcel, on average, with no subdivision of land. Subdividing a parcel and constructing additional units would require additional fees.

INTRODUCTION

The purpose of this study is to develop a conceptual Master Plan of Water Facilities for Agua Dulce and portions of Acton in order to provide information regarding the feasibility of connecting these areas into the current distribution system of Waterworks District No. 37 (District 37). These areas are currently obtaining their water from local wells and, in some cases, hauled water.

STUDY AREA

The study area covers areas of both Agua Dulce and Acton (excluding areas currently within the District 37 boundary) and includes 1,921 unimproved parcels and 1,786 improved parcels. A breakdown of the parcels in the study area is included in Table 1. These areas are depicted in Figure 1 on the following page. Development in the area is similar to that within the existing District 37 in Acton.

Table 1 Parcels within Study Area

Area	Improved	Unimproved	Total
Acton	800	1,118	1,918
Agua Dulce	986	803	1,789
Totals	1,786	1,921	3,707

WATER DEMANDS

In order to establish water demands for the area, water use records for District 37 were reviewed. A summary of this data is included in Appendix A to this report. The past three years of water use records indicate that each existing service connection was using 1,641 gallons per day. This number was used as the basis for extrapolating existing water use within the entire study area as shown in Table 2.

Table 2 Existing Water Use

Area	Dwelling Units	Per Unit Use (gpd/du)	Average Demand (mgd)	Average Demand (AFY)
District 37	1,225	1,641	2.01	2,252
Study Area				
Acton	800	1,641	1.31	1,470
Agua Dulce	986	1,641	1.62	1,812
Subtotal	1,786	1,641	2.93	3,283
Totals	3,011	NA	4.94	5,534

Peak demands within the existing areas were determined by reviewing historical records to determine peak months. The maximum day factor used in this report was 2.0. This factor is based on industry standards for peaking and in line with District 37 water use records. Table 3 shows the peaked demands for the existing areas.

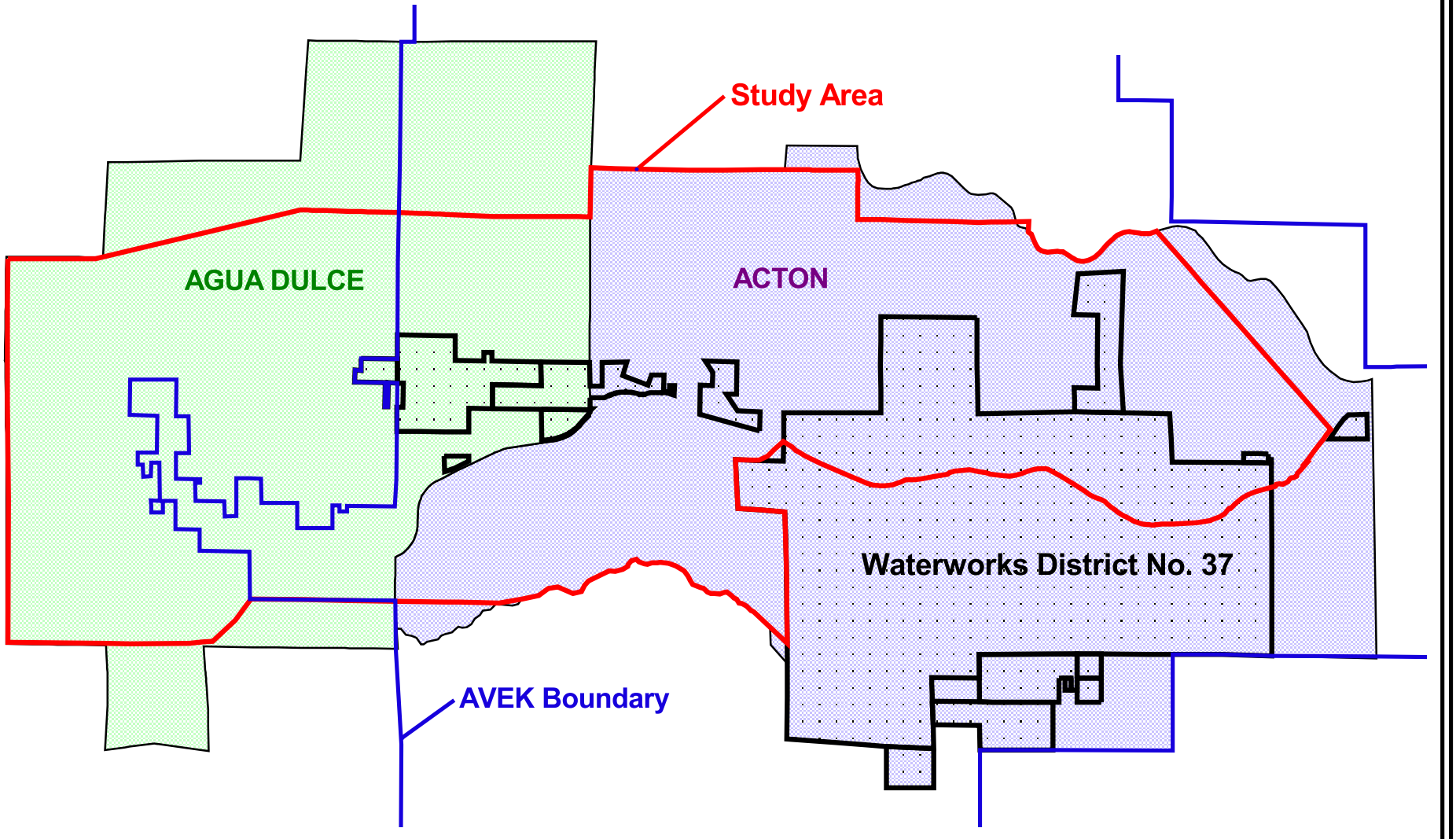

FIGURE 1 - STUDY AREA

Table 3 Existing Peak Demands		
Area	Max Day	
	(mgd)	(gpm)
District 37	4.02	2,792
Study Area	5.86	4,070
Totals	9.88	6,861

Several assumptions were made in developing the build out system demands for both the study area and District 37. It was assumed that every undeveloped parcel will, at build out, have one dwelling unit, regardless of parcel size. While it is possible that some parcels may never develop and others might be subdivided, this assumption was necessary to complete the conceptual master plan. Per unit use was assumed to remain constant under build out conditions. Utilizing these assumptions, Table 4 was developed to show the projected build out water demand in the area.

Table 4 Build Out Water Demand				
Area	Dwelling Units	Per Unit Use (gpd/du)	Average Demand	
			(mgd)	(AFY)
District 37	2,411	1,641	3.96	4,431
Study Area				
Acton	1,918	1,641	3.15	3,525
Agua Dulce	1,789	1,641	2.94	3,288
Subtotal	3,707	1,641	6.08	6,813
Totals	6,118	NA	10.04	11,245

The same peaking factors used to generate peak usages of existing demands were used to estimate peak build out system demands in Table 5.

Table 5 Build Out Peak Demand		
Area	Max Day	
	(mgd)	(gpm)
District 37	7.91	5,494
Study Area	12.16	8,447
Totals	20.08	13,942

WATER SOURCES

The existing sources currently being utilized for District 37 include both wells and imported water from the Antelope Valley-East Kern Water Agency (AVEK) water treatment plant (WTP). A summary of these sources and their current maximum day capacity is listed in Table 6.

Table 6 Existing Supply Sources		
Source	Max Day Capacity	
	(gpm)	(mgd)
Well 37-1	1,000	1.44
Well 37-3	800	1.15
Well 37-4	400	0.58
AVEK WTP	2,780	4.00
Totals	4,980	7.17

In order to determine what new supplies will be needed, a review of the maximum day demands for the area under both existing and build out conditions is necessary. Table 7 represents a summation of the supply requirements.

Table 7 Supply Requirements				
Description	Max Day (mgd)			
	Demand	Supply		Needed
Existing				
District 37	4.02	7.17		-3.15
Study Area	5.86	1.29	*	4.57
Subtotal	9.88	8.46		1.42
Buildout				
District 37	7.91	7.17		0.74
Study Area	12.16	1.29	*	10.87
Subtotal	20.08	8.46		11.61

*Study area existing source of 1.29 mgd reflects an assumption of 3 new wells in study area producing 300 gpm each.

Since the existing study area is being served by numerous private wells, an assumption was made that if the majority of these existing wells were abandoned and the area is served by the County, three new wells could be sited in the study area. These wells would replace the no longer needed private wells and were assumed to produce a total of 1.29 mgd (300 gpm each). The existing study area would then require an additional supply of 4.57 mgd to adequately serve its demands. Under build out demands the study area would need an additional 10.87 mgd of supply. District 37 currently has more supply (7.17 mgd) than demand (4.02 mgd) but under build out conditions would need an additional 0.74 mgd.

Several options are available to meet the additional demands. Expansion of the AVEK WTP to meet these needs is perhaps the most obvious option. This would require additional infrastructure costs as well as annexation of the study area into AVEK. Other options available to reduce the need for additional imported supply would be drilling additional wells (beyond the three assumed), water conservation (reducing projected demands), and water reclamation, or a combination of these. Finally, participation in a regional groundwater banking program could be initiated to increase the reliability of imported water supply during drought periods.

For purposes of this analysis, it was assumed that the needed supply would all be obtained from the AVEK WTP. The original plant was designed with a capacity of 4.0 mgd and allowed for an expansion of 4.0 mgd for a total of 8.0 mgd. In order to meet the existing demands of the study area (9.88 mgd), this expansion would be needed. Furthermore, under build out conditions, the treatment plant would need to have a capacity of approximately 16 mgd (4 mgd plus the 11.61 mgd of needed capacity from Table 7), which would require a new, completely separate, parallel treatment plant.

HYDRAULIC ANALYSIS

Expanding the existing water system in District 37 to serve the study area will require additional facilities. In order to review the system's hydraulic capabilities, a computerized water system network model was created. The network model included the existing system in District 37 and the backbone system necessary to serve the study area. Preliminary locations for facilities and pipeline alignments were determined based on these analyses.

Elevations within the study area dictated a system with three pressure zones. The highest zone would be at a hydraulic grade of 3,100 feet served from a storage tank at that elevation. The next zone would be at a grade of 2,800 feet and would also float off a storage reservoir. A final zone would be a much smaller, closed zone fed off a pressure reducing station and be at a hydraulic grade of 2,400 feet.

Reservoir sizing was based on the current storage to demand ratio in District 37, which is approximately 1.8 in terms of average days of storage. Using this criteria, the study area system requires 5.34 million gallons of storage for existing demands and the build out of the study area requires 10.88 million gallons of storage. Additionally, there would be a requirement for an additional 3.5 million gallons for build out of the existing District 37 area. The storage in the Agua Dulce area was split between the proposed 2800 zone and the 3100 zone. These new reservoirs would likely be phased such that one two and one three million gallon reservoir is constructed at each site initially and then a second three million gallon tank could be constructed at each site for a total of 11 million gallons. The required 3.5 million gallons of storage for build out within District 37 could be constructed anywhere with a matching hydraulic gradient to an existing zone but for purposes of the hdraulic model, the 3483' zone was picked. Feasible locations were picked for the storage in each zone.

Based on the demands developed for both the existing and buildout conditions, several network model runs were made. Facilities were sized based on maximum day demands and peak hour demands using a peak hour to average day ratio of 4.0 or 2.0 times maximum day, which is an industry standard. Pipes were sized keeping the peak hour velocities below 7 feet per second. Transmission lines were sized to meet the build out condition.

A summary of the network model output and a system schematic are included in Appendix B, bound separately.

COSTS

The costs associated with serving the study area from District 37 involve both infrastructure costs within the study area as well as costs to deliver water into the area. Infrastructure costs include pipelines, storage tanks, pressure reducing stations, and wells. The cost to deliver water to the study area includes expansion of AVEK's treatment plant, supply pipeline system and storage within the AVEK system, annexation fees, paralleling transmission lines in District 37 and expansion of the Vincent Pump Station in District 37. Table 8 summarizes the costs associated with incorporating the study area into District 37. It was assumed that all land required for the new facilities and any land needed for expansion of existing facilities will be made available to the County at no cost.

Table 8 Study Area Costs

Item	Quantity	Units	Cost, $
Infrastructure			
Within Study Area			
Trans. Pipelines	31.6	miles	24,429,000
Distr. Pipelines	126.7	miles	60,203,000
Storage*	10.9	mg	10,880,000
PR Stations	2	each	150,000
Wells	3	each	2,250,000
			0
Within District 37			0
Vincent PS	1	L.S.	3,000,000
			0
Supply (AVEK)			0
WTP Expansion	1	L.S.	20,000,000
Pipes	3	miles	2,851,000
Storage	2	mg	2,000,000
Annexation	1	L.S.	34,763,000
Total			160,526,000

*Does not include 3.4 mg of storage req'd for build out of existing District 37 area

Infrastructure Costs

All improvements within the study area are infrastructure costs. Pipe lengths for the transmission pipelines came from the network model of the backbone system. Appropriate unit cost factors for pipelines were applied to determine the overall costs, to include all project related costs including design, administration, and construction management, but do not include any financing costs.

The distribution pipelines in the study area, shown in Table 8, were calculated assuming 3 miles of 8" pipe would be needed to serve a mile square area. This is based on the backbone system providing service to a given square mile and 3 miles of 8" pipe would then distribute the water within that square mile. Therefore, the farthest a parcel would be from a water main would be one-quarter mile. Obviously, this is a rough approximation of the distribution system costs, but will suffice for this conceptual-level study. The total square miles to be added to District 37 were used to determine the overall costs. Then overall costs were prorated based on the system demands of the existing and build out conditions. The resulting costs for distribution pipes for each condition were included in Table 8.

The remainder of infrastructure costs within the study area was based on a few assumptions. Cost for storage tanks were estimated based on $1.00 per gallon of storage. An assumption was made that each of the three new wells would cost $750,000 to include siting, drilling and equipping the well. Finally, an assumed cost for pressure reducing stations of $75,000 apiece was utilized.

As shown in Table 8, some improvements would be necessary within District 37 to serve the new demands. Pumping capacity would have to be increased at the Vincent Pump Station to meet the new demands. In addition, some transmission lines through District 37 will need to be paralleled to meet the build out system demands.

Supply (AVEK)

The supply improvements shown in Table 8 include expansion of AVEK's water treatment plant. Expansion costs to increase plant size from 4.0 mgd to 8.0 mgd to meet the existing system needs were assumed to be $1.50 per gallon per day. Expansion costs to increase plant size from 8.0 mgd to 16.0 mgd to meet the build out system needs were assumed to be $2.00 per gallon per day since this would be an entirely new treatment train. The build out expansion would also require an increase in storage capacity of the AVEK forebay at the Vincent Pump Station by 2 million gallons and the addition of approximately 3 miles of 24" transmission lines from the AVEK treatment plant to District 37.

Of the $35 million in annexation fees, approximately $20 million is to pay back taxes. The back taxes amount to approximately $7.50 per $100 of assessed value. Values for the parcels within the study area were provided by the County and are summarized in Table 9 following.

Table 9 Valuation of Acton-Agua Dulce Area						
	Improved		Unimproved		Total	
Area	Parcels	Value	Parcels	Value	Parcels	Value
Study Area						
Acton	800	$198,000,000	1118	$38,000,000	1918	$236,000,000
Agua Dulce	986	$314,000,000	803	$46,000,000	1789	$360,000,000
Subtotal	1786	$512,000,000	1921	$84,000,000	3707	$596,000,000

In order to calculate the back taxes for the 1,352 parcels to be annexed, which is an AVEK requirement for annexation, it was assumed that this area has the same ratio of improved to unimproved parcels as the overall community of Agua Dulce and the same average value per parcel.

The remaining $15 million in annexation fees is to secure two times the build out average day supply of the area to be annexed to AVEK. This amounts to approximately 4,800 acre-feet per year. Based on discussions with AVEK staff, an assumption was made that this 4,800 acre-feet of water could be purchased for $3,000 per acre-foot. Participation in a program such as groundwater banking that increases the reliability of imported water during drought periods could result in a reduction of required supply to the build out average day supply of approximately 2,400 acre-feet per year. Table 10 below provides a breakdown of the costs associated with annexation to AVEK. All of the 1,352 parcels that require annexation are within Agua Dulce.

Table 10 Fees for Annexation to AVEK					
Parcel Description	Parcels	Total Value	Back Taxes	Supply Costs	Total Fees
Improved	730	$232,412,000	$17,431,000	$7,750,000	$25,181,000
Unimproved	622	$35,643,000	$2,673,000	$6,607,000	$9,280,000
Total	1352	$268,055,000	$20,104,000	$14,357,000	$34,461,000

A summary of the annexation fees per parcel is included in Table 11.

Table 11 Fees for Annexation to AVEK				
Parcel Description	Parcels	Back Tax Per Parcel	Supply per Parcel	Fees Per Parcel
Improved	730	$24,000	$10,600	$34,600
Unimproved	622	$4,000	$10,600	$14,600

FINANCING

An estimated allocation of the project costs was undertaken in order to determine the fees required for serving the study area. Table 12 was developed in order to summarize each area's financial responsibility.

Table 12 Approximate Costs Per Parcel within the Study Area

Item Description	Acton	Agua Dulce	
	Within AVEK	Within AVEK	Outside AVEK
Number of Parcels	1,918	437	1,352
Total Cost per Area	$59,041,000	$16,353,000	$84,828,000
Average Cost Per Parcel*	$31,000	$37,000	$63,000

*Regardless of size, one dwelling unit and one meter per parcel

Each cost was distributed among the areas that required the improvement. For most items, this was simply a prorated share of the item based on the number of parcels served in each area. One exception is the costs associated with annexation to AVEK. Those costs are allocated only to the area that is currently not within the AVEK boundary. It should be understood that these average costs per parcel were based on one dwelling unit per parcel assuming no subdivision of the parcels.

An assessment or community facilities district could be formed over the study area to finance these costs. However, the assessed value of each individual parcel and the district on the whole would impact the amount that could be levied through such a financing district. This is due to the fact that most agencies feel that total tax rates in excess of 2% of property values are not desirable and there will also be value-to-lien limits that the bond underwriters will be looking for on the order 4 to 1 that could come into play with undeveloped land. Additionally, the portion of the project costs financed through such a district would have to be increased by 20 to 25% to account for financing/bonding costs. Therefore some up-front connection fee could also be required to raise the required funds and meet the above criteria, depending on individual circumstances.

As mentioned the assessments and fees could vary greatly depending on individual lot circumstances; however, order-of-magnitude numbers would be annual assessments of around $2,500 to $4,000 per year and connection fees of from zero to up to as high as $40,000 per parcel for lots within Agua Dulce and outside of AVEK.

APPENDIX A

DISTRICT No. 37 WATER USE

APPENDIX A

Los Angeles County Waterworks District 37, Acton
Historical Water Use

Period	Water Produced	Water Purchased	Water Consumed	Active
	(AF)	(AF)	(AF)	Accounts
Jan-Feb 01	174.88	2	222.17	1094
Mar-Apr 01	294.04	2	111.05	1090
May-Jun 01	522.02	14.75	297.18	1094
Jul-Aug 01	567.61	50.45	502.54	1098
Sep-Oct 01	436.86	49.41	534.15	1111
Nov-Dec 01	123.34	138.52	356.26	1118
Jan-Feb 02	93.24	137.22	172.64	1127
Mar-Apr 02	147.68	217.64	197.88	1134
May-Jun 02	227.93	367.66	333.74	1143
Jul-Aug 02	274.86	454.72	553.53	1144
Sep-Oct 02	248.11	299.28	557.97	1149
Nov-Dec 02	188.34	116.92	405.08	1155
Jan-Feb 03	114.82	109.65	190.94	1160
Mar-Apr 03	157.96	112.4	158.43	1165
May-Jun 03	274.72	195.4	266.38	1166
Jul-Aug 03	210.28	404.22	492.89	1222
Sep-Oct 03	146.07	260.91	558.00	1222
Nov-Dec 03	73.31	206.08	390.18	1225

APPENDIX A

Los Angeles County Waterworks District 37, Acton
Monthly Peaks

Period	Water Consumed (AF)	Bi-Monthly (AFD)	Peak Factor
Jan-Feb 01	222.17	3.70	0.64
Mar-Apr 01	111.05	1.85	0.32
May-Jun 01	297.18	4.95	0.86
Jul-Aug 01	502.54	8.38	1.46
Sep-Oct 01	534.15	8.90	1.55
Nov-Dec 01	356.26	5.94	1.03
Jan-Feb 02	172.64	2.88	0.50
Mar-Apr 02	197.88	3.30	0.57
May-Jun 02	333.74	5.56	0.97
Jul-Aug 02	553.53	9.23	1.60
Sep-Oct 02	557.97	9.30	1.62
Nov-Dec 02	405.08	6.75	1.17
Jan-Feb 03	190.94	3.18	0.55
Mar-Apr 03	158.43	2.64	0.46
May-Jun 03	266.38	4.44	0.77
Jul-Aug 03	492.89	8.21	1.43
Sep-Oct 03	558.00	9.30	1.62
Nov-Dec 03	390.18	6.50	1.13