

KINNELOA IRRIGATION DISTRICT
REGULAR MEETING – BOARD OF DIRECTORS
1999 KINCLAIR DRIVE, PASADENA, CA 91107
TUESDAY – MAY 20, 2014
7:30 P.M.

AGENDA

1. **CALL TO ORDER**
 - A. Declaration of a Quorum
 - B. Review of Agenda
2. **PUBLIC COMMENT** – Comments from the public regarding items on the Agenda or other items within the jurisdiction of the District.
3. **DISCUSSION OF COST OF LIVING ADJUSTMENT**
4. **REVIEW OF VOSBURG RESERVOIR PROJECT**
5. **REPORT ON METROPOLITAN WATER DISTRICT** – Director Johnson
6. **REPORT ON WATER SUPPLY ALTERNATES** – General Manager
7. **REVIEW AND APPROVAL OF REVISED MASTER PLAN**
8. **REVIEW AND APPROVAL OF A RESOLUTION URGING HEIGHTENED WATER CONSERVATION BY CUSTOMERS IN RESPONSE TO DROUGHT**
9. **BROWN WELL LANDSCAPING** – Director Griffith
10. **GENERAL MANAGER’S REPORT**
11. **REVIEW MINUTES** – April 22, 2014
12. **REVIEW FINANCIAL REPORTS** – April 30, 2014
13. **ITEMS FOR NEXT AGENDA**
14. **CALENDAR** – June 17, 2014
July 15, 2014
August 19, 2014
15. **ADJOURNMENT**

Each item on the Agenda, no matter how described, shall be deemed to include any appropriate motion, whether to adopt a minute motion, resolution, payment of any bill, approval of any matter or action, or any other action. Material related to an item on this agenda submitted after distribution of the Agenda Packet is available for public review at the District Office or online at the District’s website <http://www.kinneloairrigationdistrict.info>.



Water Supply Issues and Plan of Action

February 28, 2014

Melvin L. Matthews, General Manager

Introduction

The periodic droughts and the voluntary reduction in adjudicated pumping rights by the Kinneloa Irrigation District (KID) and other Raymond Basin aquifer members have made it necessary for the KID to lease additional water pumping rights from other Raymond Basin members to meet our customer demands. Although this continuing need for additional supply has been reduced by the extraordinary voluntary conservation effort by our customers, there has been no long-term solution implemented since my last report to the Board in 2004. Our adjudicated pumping rights, spreading credit and tunnel water are still not adequate to meet customer demand in most years. Although the KID has a storage account with credit for approximately one year of customer demand, this is considered an emergency supply and cannot be replenished under the current rules of the Raymond Basin Management Board.

Issues

The drought has been a major contributor to the District supply problems. The combined production from our tunnels and the credit for spreading surface water is less than half of what it has been in years with normal or heavy rainfall. On the demand side, larger homes built since the 1993 fire generally have caused water sales to increase despite water use efficiency efforts. Since our adjudicated pumping rights are not adequate to meet customer demand and our other sources of supply are not reliable, it is imperative that the KID develop both a short and long term plan of action.

Possible Solutions

1. Continue to lease pumping rights from other agencies that are not using all of their pumping rights.

Potential challenges:

- a. *There is no guarantee that rights will be available on a continuing basis and/or at a price that is economically feasible.*

- b. Problems with our wells, either mechanically or due to groundwater levels, or lack of available pumping time could make it difficult to get the additional water into our system.*
2. Investigate purchasing unused water rights from other agencies.
Potential challenges:
 - a. Water supply shortages are a challenge to all water agencies in our area.*
 - b. Reduction in the availability of imported water and the cost of that water make local supplies much more valuable now than it was in the past.*
 - c. The KID would need to find financing for the purchase of water rights.*
3. Purchase water from the City of Pasadena.
Potential challenges:
 - a. The rate charged by Pasadena would most likely be their retail rate.*
 - b. Water quality/taste issues could come from our customers.*
 - c. Differing water treatment methods could cause operational problems and additional expense.*
4. Purchase water from Foothill Municipal Water District (FMWD)/Metropolitan Water District (MWD).
Potential challenges:
 - a. No physical pipeline exists to directly deliver the water to our system.*
 - b. Constructing a pipeline and other required facilities such as additional storage reservoirs would require a large capital expenditure.*
 - c. Wheeling water through Pasadena's system would require negotiating a contract and would add expense.*
 - d. Water quality/taste issues could come from our customers.*
 - e. Differing water treatment methods could cause operational problems and additional expense.*
 - f. Cost of FMWD/MWD water is ten times greater than locally-produced water.*
5. Continue to encourage voluntary or impose mandatory conservation measures.
Potential challenges:
 - a. Our prior conservation efforts have been successful so that the most effective methods to change consumption have already been done.*
 - b. Even if conservation efforts continue to succeed, there is a negative financial consequence to the District due to reduced sales.*
6. Participate with Foothill Municipal Water District or other agency in the construction of a local water recycling plant.
Potential challenges:
 - a. Preliminary feasibility studies indicated that the output would be limited to about 300 acre-feet/year.*
 - b. Output of the plant would need to be spread and/or injected into the basin if no direct-use customers were available.*

- c. *Cost was estimated to be about \$3 million with about 50% of that cost funded by local, federal and state grants. In spite of receiving a \$1.5 million grant and a favorable cost for the water that would be produced, the FMWD Board suspended design work on a proposed plant in the La Cañada area due to lack of support by the member agencies.*
- d. *Net capital cost and operating cost would be shared by the agencies receiving pumping credit for the water produced and spread or injected into the Raymond Basin.*
- e. *Raymond Basin Management Board (the Watermaster) and the Regional Water Quality Board would need to approve the introduction of the water into the basin from an operational and water quality standpoint.*

Recommended Plan of Action

The best possible short and medium term solution continues to be leasing pumping rights from other water agencies. The most recent lease negotiated was \$305 per acre-foot which is very reasonable as compared to alternate sources of water even after considering the additional cost of about \$100 per acre-foot to pump it using our own facilities. While this source and its current price are not guaranteed, it appears that we can continue to depend on this source for at least five years.

Beyond this immediate recommendation, we will pursue the following additional long term supply alternatives and provide information and recommendations to the Board for consideration:

1. Investigate the possibility of purchasing (rather than leasing) additional ground water pumping rights from other agencies.
2. Support any future effort to build a recycled water plant in our area.
3. Support the continuing effort of the Raymond Basin Management Board to build a pipeline for replenishing the basin with untreated imported water.
4. Support the projects being undertaken by the County of Los Angeles to capture a greater quantity of storm water to help recharge the basin.
5. Continue to encourage water use efficiency through education and rebates for water efficient devices and landscaping alternatives.
6. Negotiate an agreement with Foothill Municipal Water District for delivery of imported water from the Metropolitan Water District of Southern California via our interconnection with the City of Pasadena or from a new direct connection with the existing MWD pipeline that runs near our system.

Supplemental Information

1. Production and Sales Data:

The production from the Kinneloa Irrigation District's sources of supply vary from year to year based on customer demand, available sources of supply and operational considerations. I have been accumulating data for the watermaster year that runs from July 1 through June 30 since 1994 to summarize the annual production and sales. This data is show on the following pages.

2. Metropolitan Water District of Southern California Treated Water Rates:

The following historical and forecasted rates do not include the FMWD charges nor potential wheeling charges for delivering imported treated water to the KID.

<u>Year</u>	<u>Cost per Acre-Foot (\$)</u>
2003	408
2004	418
2005	443
2006	453
2007	478
2008	508
2009	579
2010	701
2011	744
2012	794
2013	847
2014	890
2015 (forecasted)	917
2016 (forecasted)	945

Figure 1
Data for Watermaster Year (July through June)

Production in Acre-Feet Source	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Wilcox Well	93.2	119.6	170.2	165.4	209.6	272.4	216.9	203.7	213.7	148.9
K-3 Well	285.3	238.3	263.8	330.9	567.3	562.5	425.2	514.3	457.1	551.0
Total Well	378.5	357.9	434.0	496.3	776.9	834.9	642.1	718.0	670.8	699.9
Holly Tunnel	71.3	217.0	177.2	146.6	143.1	132.6	111.1	86.0	57.6	59.8
House Tunnel	37.8	43.9	35.4	33.1	41.1	31.5	26.2	21.5	16.7	12.7
Eucalyptus Tunnel	56.5	64.9	62.6	58.7	62.4	54.0	44.3	38.6	29.5	41.5
Delores Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4
Far Mesa Tunnel	73.6	69.1	67.7	68.3	78.9	74.1	56.7	52.0	47.7	45.6
Total Tunnel	239.2	394.9	342.9	306.7	325.5	292.2	238.3	198.1	151.5	162.0
Total Production	617.7	752.8	776.9	803.0	1102.4	1127.1	880.4	916.1	822.3	861.9
Deliveries from Pasadena	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.5	0.0
Deliveries to Pasadena	0.0	0.0	0.0	-139.5	-325.8	-222.9	-64.1	-87.3	-61.7	0.0
Net Import/Export	0.0	0.0	0.0	-139.5	-325.8	-222.9	-64.1	-87.3	-30.2	0.0
Total Production for Retail Customers	617.7	752.8	776.9	663.5	776.6	904.2	816.3	828.8	792.1	861.9
Diversions in Acre-Feet Source	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Holly Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.3	0.0
House Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0
Kinneloa Canyon	140.7	50.2	54.3	56.8	48.6	52.1	33.4	28.9	12.2	9.5
Eucalyptus Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	0.0
Brown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eaton Wash Sub Total	140.7	50.2	54.3	56.8	48.6	52.1	33.4	28.9	38.0	9.5
Delores Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.4	31.1	21.5
Long Tunnel	35.8	37.2	39.2	39.2	38.9	37.7	38.1	38.0	36.0	35.3
Far Mesa Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0
Glen Wash	429.3	396.3	262.5	321.3	359.1	174.8	156.7	52.7	26.7	28.1
Tent Tunnel	5.1	5.5	5.4	5.3	5.8	3.4	2.4	2.3	2.1	2.0
Pasadena Glen Sub Total	470.2	439.0	307.1	365.8	403.8	215.9	201.8	134.4	95.9	86.9
Sierra Madre Villa DB Outflow	-256.7	-32.8	-7.2	-33.7	0.0	0.0	0.0	0.0	0.0	0.0
Net Pasadena Glen Sub Total	213.5	406.2	299.9	332.1	403.8	215.9	201.8	134.4	95.9	86.9
Total Diverted	354.2	456.4	354.2	388.9	452.4	268.0	235.2	163.3	133.9	96.4
Other Data	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Rainfall (inches)	43.61	22.64	22.80	52.29	14.46	18.82	20.04	7.86	24.48	10.12
Water Sales (Acre-Feet)	584.3	668.8	679.9	600.4	666.3	782.9	710.9	739.1	717.7	772.6
Water Loss (Acre-Feet)	33.4	84.0	97.0	63.1	110.3	121.3	105.4	89.7	74.4	89.3
Water Loss (%)	5.4	11.2	12.5	9.5	14.2	13.4	12.9	10.8	9.4	10.4
RBMB Storage Account (Acre-Feet)										
Power (\$)	71,086	55,137	68,132	57,193	86,488	97,064	77,780	111,676	111,062	100,410
Power (\$ per AF of Total Production)	115	73	88	71	78	86	88	122	135	116

Figure 1
Data for Watermaster Year (July through June)

Production in Acre-Feet Source	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Wilcox Well	60.2	37.2	70.2	5.6	5.6	7.3	7.1	9.5	57.6
K-3 Well	319.3	423.5	860.1	543.9	611.2	610.6	580.2	708.0	584.2
Total Well	379.5	460.7	930.3	549.5	616.7	617.8	587.3	717.5	641.9
Holly Tunnel	125.6	171.9	131.0	107.6	89.2	80.1	98.8	94.3	53.5
House Tunnel	12.6	44.9	26.5	20.6	12.8	13.8	14.5	15.7	14.3
Eucalyptus Tunnel	50.0	50.4	44.6	43.2	39.1	37.4	39.8	40.5	40.7
Delores Tunnel	126.5	223.3	83.6	63.7	40.2	44.8	98.5	57.7	17.4
Far Mesa Tunnel	68.2	39.6	13.1	48.6	42.9	38.9	41.2	41.2	39.3
Total Tunnel	382.9	530.1	298.8	283.7	224.2	215.0	292.8	249.3	165.2
Total Production	762.5	990.8	1229.0	833.2	840.9	832.9	880.0	966.8	807.0
Deliveries from Pasadena	0.0	18.8	0.0	0.0	1.5	0.0	0.0	1.2	0.0
Deliveries to Pasadena	0.0	-160.6	-321.8	0.0	-42.4	-105.1	-217.4	-239.0	-47.8
Net Import/Export	0.0	-141.8	-321.8	0.0	-40.9	-105.1	-217.4	-237.8	-47.8
Total Production for Retail Customers	762.5	849.0	907.2	833.2	800.0	727.8	662.7	729.1	759.3
Diversions in Acre-Feet Source	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Holly Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
House Tunnel	25.6	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0
Kinneloa Canyon	31.2	40.4	45.4	27.2	21.4	21.2	37.8	37.8	35.6
Eucalyptus Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown	24.9	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eaton Wash Sub Total	81.7	57.2	45.4	27.2	25.6	21.2	37.8	37.8	35.6
Delores Tunnel	44.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long Tunnel	46.8	44.7	37.4	36.0	34.3	33.8	39.8	38.4	34.4
Far Mesa Tunnel	0.0	30.2	42.5	0.0	0.0	0.0	0.0	0.0	0.0
Glen Wash	933.9	161.4	74.0	56.7	59.0	45.1	188.0	88.7	89.2
Tent Tunnel	3.2	3.5	2.9	2.5	2.1	2.0	1.8	2.8	2.3
Pasadena Glen Sub Total	1028.5	239.8	156.7	95.2	95.4	80.8	229.6	129.9	125.9
Sierra Madre Villa DB Outflow	-459.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Pasadena Glen Sub Total	568.8	239.8	156.7	95.2	95.4	80.8	229.6	129.9	125.9
Total Diverted	650.5	297.0	202.1	122.4	121.0	102.1	267.4	167.7	161.4
Other Data	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Rainfall (inches)	58.00	21.79	5.81	24.61	16.10	23.63	31.34	11.77	8.32
Water Sales (Acre-Feet)	672.6	785.8	847.3	754.1	729.7	771.0	590.8	654.9	696.2
Water Loss (Acre-Feet)	89.8	63.2	59.9	79.0	70.3	61.9	71.8	74.2	63.1
Water Loss (%)	11.8	7.4	6.6	9.5	8.8	8.5	10.8	10.2	8.3
RBMB Storage Account (Acre-Feet)	326.9	847.9	728.6	797.9	790.0	790.0	790.0	790.0	790.0
Power (\$)	87,537	82,476	112,924	89,011	92,204	92,700	92,700	93,964	105,248
Power (\$ per AF of Total Production)	115	83	92	107	110	111	105	97	130



WATER MASTER PLAN

FOR

THE KINNELOA IRRIGATION DISTRICT

Adopted by the Board of Directors on June 20, 2000

Revision 1 dated June 20, 2005
Adopted September 20, 2005

Revision 2 dated October 21, 2007
Adopted January 15, 2008

Revision 3 dated January 2, 2014
Adopted April 22, 2014

Melvin L. Matthews
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WATER MASTER PLAN EXECUTIVE SUMMARY

The KID Water Master Plan provides a description of the Kinneloa Irrigation District's (KID) domestic water distribution system. It describes present, historical, and future water demands and potential future changes in the source of water supply. The Master Plan identifies and prioritizes necessary improvements and sets out cost estimates for implementing the improvements.

Since its formation in 1953, the KID has made minor renovations or upgrades to its system, based on a policy only to repair or replace facilities and pipelines as needed. However, by the mid 1990s a number of factors convinced the Board and many residents that significant upgrades to the system were needed.

Originally in 1953, the KID's parent systems' minimum fire flow standard was 750 gallons per minute (gpm) for 2 hours. This means that a fire truck could pump 750 gpm for up to 2 hours for a fire and all other homes in the same pressure zone would have enough residual pressure for basic domestic needs. Then in 1973 the Improvement District No. 1 (formerly Mira Loma Mutual Water Company) was designed for an average fire flow of 1000 gpm with 20 pounds per square inch (psi) residual. However, average means not every fire hydrant would meet this current standard. Currently, the County of Los Angeles Fire Department has a minimum standard of 1250 gpm to be pumped for 2 hours. Today, in 2014, approximately 25% of the current system does not meet the new standard for fire flow and fire hydrant location. The firestorm of October 1993 exposed weaknesses in the KID's pipeline delivery capacities. The Fire Preparedness Policy (FPP) was developed in February 1997 and revised in April 2005. The intent of the FPP was to set goals to be achieved to prepare for future multiple structure fires within the KID community. As a result, the KID Fire Preparedness Policy now requires that all new facilities, including pipe, be sized to support a fire flow of 1250 gpm with 20 psi minimum residual for 4 hours. The FPP is included as Exhibit III in the Appendix.

The information and data used in the Water Master Plan were developed from a number of sources:

- Discussions with the KID staff.
- A review of KID files dating back to 1953 was used for a baseline to build the initial data.
- Hydraulic studies completed for the Kinneloa Ridge Development and the Doyne Road Development contributed important information to the plan.
- The average day and maximum day demands were developed during the 1990-1991 droughts.

In April of 1996, ASL Consulting Engineers conducted a study of the KID to identify water main and reservoir improvements required to increase water system capabilities to deliver domestic demands plus 1,250 gpm fire flows. As a part of this plan ASL Consulting Engineers prepared cost estimates in April 1996, with updates in February of 2000. Staff reviewed these estimates and made adjustments for inflation and other factors to update the plan for 2005, 2007 and again for this update in 2014.

After significant discussions and review of the original plan the Board determined that modification of the existing KID reservoirs was too expensive and would involve costly environmental studies. The Board determined that pump station improvements would better serve the District by concentrating on providing booster station flow capacities to achieve the desired fire flows of 1250 gpm. Cost estimates for KID funded improvements to reservoirs are in Exhibit I of the Appendix, but are not implemented in the Water Master Plan. However, should outside sources of funding become available consideration of these projects will be re-evaluated since increased reservoir storage capability is still an important objective of the District in order to prepare for all types of emergencies and to provide operational flexibility.

In addition to implementing pump station improvements the preparation of the Water Master Plan has revealed the following conclusions:

- All pipes that develop chronic leaks should be replaced to achieve overall lower operational cost.
- All pipes which have exceeded their useful life should be replaced. For the purpose of this plan, the useful service life of these facilities is set at 50 years.
- Pipelines, which have become inaccessible due to development or are traversing private property in easements, should be relocated.
- Pipelines should be upsized where required to meet the Fire Preparedness Policy goals.
- The KID presently has sufficient booster pump capacity to provide for domestic demands. The 1,250 gpm fire flow requires supplementing booster station flow with gravity flow from reservoirs.
- Preferred installation for booster pumps would be high efficiency vertical turbine units.
- High Pressure Tunnel should have a permanent replacement pipeline.
- Low Pressure Tunnel should have a permanent replacement pipeline.
- The KID should provide radio telemetry at all facilities.
- All reservoirs should have earthquake sensors and automatic shutoff valves.
- The KID should continue to fund planned maintenance on all facilities.

The total estimated costs of all necessary improvements as identified in the Water Master Plan adopted in 2000 were:

1. Pipeline Improvements	\$1,192,600
2. Pump Station Improvements	\$ 108,200
3. Tunnels	\$ 421,900
4. Other Improvements	<u>\$ 395,500</u>
Total	\$2,118,200

The total estimated costs as revised and updated in 2005 were:

1. Pipeline Improvements	\$1,899,600
2. Pump Station Improvements	\$ 3,600
3. Tunnels	\$ 321,000
4. Other Improvements	\$ 271,000
5. Planned Maintenance	<u>\$ 687,400</u>
Total	\$3,182,600

The difference between the 2000 costs and 2005 costs was an increase of \$1,064,400. The net increase was attributed to the following factors:

- Inclusion of planned maintenance items in the amount of \$687,400 that are expected over the next ten years.
- The estimated cost of remaining projects after removing completed projects and adding new projects identified since the master plan was adopted.
- Adjustment of previous costs to reflect inflationary and other factors in current project costs.
- Exclusion of projects paid by developers.

The following projects were completed between the 2005 and 2007 revisions:

- East Tank was refurbished.
- K-3 Well pump and motor were rebuilt.
- One of the Holly booster pumps was rebuilt.
- Safety upgrades were completed at Holly Tanks.
- Maintenance agreement with tank maintenance company was established for all five steel tanks.
- Earthquake-sensing valves were installed as part of our emergency preparedness program at all tank and reservoir facilities except for the Brown Reservoir.
- Continuous chlorine analyzers were installed at all production sources.
- Major upgrades to our SCADA system were completed to allow continuous monitoring and alarms on additional components of our production and distribution system.
- Permanent repairs and pipeline replacement were completed on the House Tunnel and the High/Low Pressure Tunnel production sources.
- The Vosburg booster pump was replaced with a new 25 HP submersible unit.

The total estimated costs for remaining projects as revised and updated in the 2007 Revision using our engineers' estimates and our internal estimates were:

1. Pipeline Improvements	\$3,128,000
2. Pump Station Improvements	\$ 190,000
3. Tunnels	\$ 321,000
4. Other Improvements	\$ 189,000
5. Planned Maintenance	<u>\$ 542,000</u>
Total	\$4,370,000

The difference between the 2005 costs and 2007 costs is an increase of \$1,187,400. The net increase was attributed to the following factors:

- Adjustment of previous costs to reflect inflationary and other factors in current project costs.
- A significant increase in pipeline construction costs based on bids for current projects.
- The estimated cost of remaining projects after removing completed projects and adding new projects identified since the master plan was adopted.

The following projects have been completed since the 2007 revision:

- All five steel tanks have been refurbished as necessary to maintain “as-new” condition.
- K-3 Well pump inspected and lowered 20 feet.
- New main installed connecting K-3 Well with the Wilcox Reservoir.
- Installed replacement mains in Kinneloa Mesa area.
- Replaced chlorine generators at two sites with Chlortec® units.
- Installed earthquake-sensing valve at the Brown Reservoir as part of our emergency preparedness program.
- Replaced pipeline in a portion of Villa Knolls Drive.
- Continuing upgrades to our SCADA system were completed to allow continuous monitoring and alarms on additional components of our production and distribution system.
- Solar power and SCADA installed at Brown Reservoir.
- Completed joint emergency interconnect project with Pasadena at two locations.
- Purchased additional emergency generators for three facilities.
- Installed utility electrical service at the East Tank to supplement existing solar power supply.
- Rebuilt Wilcox Reservoir 75 HP booster pump and motor.
- Rebuilt Pasadena Glen booster pump and motor.
- Installed replacement mains in Windover Road and portions of Sierra Madre Villa Avenue.
- Installed replacement connection and valves at the Vosburg Reservoir.
- Installed Variable Frequency Motor Control on K-3 Well pump.
- Replaced and added valves on main line on Villa Heights Road in East Tank pressure zone.
- Upgraded Chlorine analyzer at K-3 Well to include pH measurement.
- Replaced water depth measuring tube at Wilcox Well.
- Converted PCIC Interconnection facility to radio-based telemetry system.
- Rebuilt two of the Eucalyptus booster pumps.
- Installed transponders for radio reading of customer water meters.

The total estimated costs for remaining projects as revised and updated in this 2014 Revision using our engineers’ estimates and our internal estimates are:

1. Pipeline Improvements	\$2,564,000
2. Pump Station Improvements	\$ 520,000
3. Tunnels	\$ 361,000
4. Other Improvements	\$ 105,000
5. Planned Maintenance	<u>\$ 397,000</u>
Total	\$3,947,000

The difference between the 2007 costs and 2014 costs is a decrease of \$423,000. The net decrease is primarily attributed to the completion of many master plan projects during the past seven years offset by the higher costs of some of the remaining projects. The overall cost of completing the master plan as compared to the original 2000 master plan is subject to the following factors:

- Adjustment of the previous costs of uncompleted projects to reflect inflationary and other factors.
- Adjustment of the previous costs based on the bidding results of similar projects.
- The estimated cost of remaining projects after removing completed projects and adding new projects identified since the master plan was adopted.

In conclusion, many of the distribution and transmission facilities predate 1953, and are nearing the end of their useful service life. Originally, water facilities in the KID provided domestic supply, plus a fire flow of 750 gpm. As the population of the KID has grown over the years, the demand placed upon the entire system, including distribution and transmission mains, water sources, reservoirs, and pump stations have encroached upon the ability of the system to meet the required demands. The need for increased fire flow to meet the minimum Fire Department requirements for every fire hydrant will require the KID to construct improvements to the water system in the years ahead. Although many projects identified in the Water Master Plan adopted in 2000 and subsequent revisions have been completed, failure to continue to undertake the expenditures for the remaining projects leaves the KID vulnerable to serious and sustained service failure in the event of natural disaster or unanticipated breakage. Moreover, the cost to replace facilities and pipelines under non-optimal emergency conditions is likely to be much higher than if done under a planned program.

As a footnote to this 2014 Revision, it should be noted once again that this Master Plan was primarily developed to address fire flow issues and general emergency preparedness issues that were raised after the 1993 firestorm. Although many operational improvements are gained through completion of recommended projects, this Master Plan does not address many worthwhile projects that would improve the operational efficiency and reliability of the production and distribution system. For example, the Wilcox Well is no longer a major production facility due to declining pumping levels in the Raymond Basin and production level from the tunnels has also been declining due to lower average rainfall. That has made the KID increasingly dependent on a single production source – the K-3 Well. If the current conditions continue or worsen in the years ahead, the K-3 Well may not be able to meet our production demands for normal or emergency conditions. Therefore, the KID staff will continue to examine possible new production sources such as drilling a new well and/or constructing a connection with Foothill Municipal Water District in order to receive imported water from the Metropolitan Water District. However, the cost of developing new production sources is not currently reflected in this Master Plan. Therefore, unless additional funding sources are identified, voluntary or mandatory conservation programs may continue to be necessary in the future to avoid major additional capital expenditures not included in this revision of the Master Plan.

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KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

1.0 INTRODUCTION, PURPOSE, AND HISTORY

1.1 *Introduction*

The Kinneloa Irrigation District (KID) is a State irrigation district which owns and operates a water system in the north-central part of the Los Angeles County with the city limits of Pasadena on the west, south, and east sides and the Angeles National Forest to the north. The service area of the District covers an area of approximately 500 acres. The District additionally encompasses a watershed area north of the District. The KID serves a population of approximately 1,450 and there are 600 active metered services in the District's service area as of this revision. Additionally, it is the KID's responsibility to provide fire protection water to its customers. The District maintains 100 fire hydrants.

Revenue for the KID is derived almost exclusively from the sale of water.

1.2 *Purpose*

The purpose of this Master Plan is to describe the existing water system facilities within the KID, identify weaknesses within the system, recommend improvements, prioritize the necessary improvements, and determine cost estimates for implementing the improvements. This plan will also identify undeveloped land within the KID and assess potential for future development of that land.

1.3 *History*

The Kinneloa Irrigation District, originally formed in 1953, is a state irrigation district established pursuant to Division 11 of the California Water Code. A five member publicly elected Board of Directors governs it. The District water system presently serves about 600 households as well as a school, nursery, church, and fire station. In 1974, the KID had 190 services.

In 1974 an improvement district was formed with the addition of the Mira Loma, Canyon Mutual, and Osborn Water Companies to the Kinneloa Irrigation District. The facilities in this area were replaced or upgraded to the current standards using funds from a bond issue. This added additional 225 services to the KID.

In 1978, the Wilcox Well was upgraded to provide additional production capacity for homes on the east side of the district.

In 1979, 24 homes were added on Villa Highlands Drive and Villa Knolls Drive by Falzone Development.

In 1983, Nordberg and Neimeyer developed the area known as Hastings Heights and provided lots for 27 homes.

In 1990, town homes were built by Dove Creek Development at a site near New York Drive and Altadena Drive which added 50 services.

In 2003, 21 building sites were completed in the Kinneloa Canyon area known as Kinneloa Ridge by Diamond-Segundo Development and 23 services are now active including two for watering common areas. Additional pumping and storage facilities were added to accommodate this development and to provide a benefit for the District as a whole.

Additionally, several individual lots have been developed to account for the 600 present metered services.

KINNELOA IRRIGATION DISTRICT
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2.0 SYSTEM DESCRIPTION

2.1 *General*

The Kinneloa Irrigation District is divided into two distinct geographic areas. They are the east service area and the west service area, which are generally, divided by the Wilcox Canyon watercourse. Presently, the east and west service zones are connected by pipelines consisting of 6-inch and 8-inch pipe connecting the Holly Booster Pump Station, the East Tank, and the Vosburg Booster Station.

Almost all of the services in the KID are residential services for single family homes. The need for irrigating hillsides on relatively large lots creates much of the demand. Services and meters range from 3/4" to 2" in size.

Within each service area are several pressure zones which are serviced by a piping network, reservoirs, booster pump stations, wells, and horizontal water tunnels. See Exhibit II for a schematic drawing of the existing KID system.

2.2 *Water Sources*

2.2.1 Water Wells

The KID owns five water wells. Two of these wells are operational and are the primary source of water for the District. Those wells are the Wilcox Well which supplies the Wilcox Reservoir and the K-3 Well which supplies the Eucalyptus Reservoir. Both wells pump from the Raymond Basin. The District's adjudicated pumping allowance is 516 acre-feet per year plus an allowance for spreading. The current pumping allowance has been reduced by 30% to 361 acre-feet by informal agreement among water agencies to help maintain basin water levels. Both wells are equipped with deep-well, oil-lubricated, vertical turbine pumps and on-site generated sodium hypochlorite (0.8%) chlorinators with metering pumps for disinfection. Well status signals are received via radio telemetry and start-stop commands are based on reservoir levels and time-of-use schedules to take advantage of off-peak electricity rates. See Table 2.2A for a summary of well data.

**TABLE 2.2A
WELL DATA**

Well Name	Year Drilled & Depth	Casing Size (inches)	Motor Horsepower	2012-2013 Production
Wilcox Well	1924 500'	14"	100	58 acre-feet
K-3 Well	1965 700'	14" I.D.	125	584 acre-feet*

* Includes production of wholesale water sold to the City of Pasadena.

2.2.2 Tunnels

The KID owns and operates 15 water supply tunnels. The tunnels were originally constructed by hand in the 1800's and, in recent times, have supplied groundwater to the KID system and for spreading. Tunnel flow rate varies continuously according to the time of year. Tunnel water is delivered via gravity. Table 2.2B summarizes the tunnels, their status, and production.

**TABLE 2.2B
TUNNEL SUPPLIES**

Tunnel Name	Current Status	2012-2013 Production
High & Low Pressure Tunnels (4)	Currently in Service – feeds the Holly Tanks	54 acre-feet
House Tunnel	In service – feeds the Holly Tanks	14 acre-feet
Eucalyptus Tunnel	In service – feeds the Eucalyptus Reservoir	41 acre-feet
Long Tunnel	In service for spreading	34 acre-feet
Delores Tunnel	In service – feeds the Vosburg Reservoir or used for spreading	17 acre-feet
Far Mesa Tunnels (2)	In service – feed the Glen Reservoir	39 acre-feet
Tent Tunnel	In service for spreading	2 acre-feet
Falls Tunnel	In service for spreading	Measured for spreading credit only
Diversion Tunnel	In service for spreading	Measured for spreading credit only
Winifred Tunnels (2)	Not in service	Not measured

Depending on the season of the year, the tunnels are each capable of supplying anywhere from a few gallons per minute up to a hundred gallons per minute or more.

The tunnels have traditionally been a low cost source of water for the KID. However, the firestorm of October 1993 damaged the High and Low-Pressure Tunnel delivery pipelines. The rainstorms of the winter of 1993-94 further damaged the High and Low Pressure Tunnel pipelines. The High and Low Pressure Tunnel pipelines were further damaged in the winter storms of 1994-95. As a result of the aforementioned natural disasters, temporary repairs were made to return these sources to service and permanent repairs were made in 2006. Old age, rockslide damage, and rain storm runoff washed out the Delores Tunnel delivery pipeline. This pipeline was replaced in 2001 after being out of service since 1979.

Because of the age of the tunnels and their vulnerability to damage from natural causes, the tunnel supply is not considered as a reliable source of supply for the purpose of calculating available water source supply. In this respect, the tunnel supply should be thought of as a reserve or "back-up" supply.

2.2.3 Spreading Credit and Leased Water Rights

The KID receives spreading credit for surface water diversion to the Sierra Madre Villa and the Kinneloa Canyon Debris Basins. Total credit from these sources for 2012-2013 was 161 acre-feet. Leased Water Rights are available in some years from other water agencies to supplement our adjudicated pumping rights. Water from these sources is produced by the K-3 and Wilcox Well pumps and is included in the totals for those production sources.

2.2.4 Imported Water

The Kinneloa Irrigation District is a member of the Foothill Municipal Water District (FMWD) which supplies imported water from the Metropolitan Water District of Southern California (MWD) to eight member agencies in the area. Although there is no physical pipeline connection from FMWD to the KID, arrangements could be made to deliver the water through the distribution systems of an adjacent water agency if supplemental water is ever needed.

2.2.5 Interconnections with the City of Pasadena

The KID has six interconnections with the City of Pasadena to deliver excess KID water and/or to receive water in the event of an emergency. These interconnections are shown in Table 2.2C. The capacity of interconnections 3 and 5 was increased in 2008 as a joint project with the City of Pasadena.

TABLE 2.2C
INTERCONNECTIONS WITH CITY OF PASADENA

ID	Location	Description	Size	Capacity	Purpose
1	1776 Kinneloa Canyon Road	KID-Eucalyptus (1125 HWL) to Pasadena-Sheldon (1050 HWL)	4"	800 gpm	Deliver excess KID water to City of Pasadena
2	1727 Kinneloa Canyon Road	Pasadena-Calaveras (1209 HWL) to KID-Eucalyptus (1125 HWL)	4"	650 gpm	Emergency interconnection to KID-Eucalyptus (K-3 Well System)
3	3560 Ranch Top Road	Pasadena-Don Benito (1432 HWL) to KID-Vosburg (1430 HWL)	8"	800 gpm	Emergency interconnection to KID-Vosburg & Brown/Glen System and to deliver excess KID water to Pasadena
4	2999 New York Drive	Pasadena-Sheldon (1050 HWL) to KID-Wilcox Reservoir (944 HWL)	6"	1200 gpm	Emergency interconnection to KID-Wilcox Well/Wilcox Reservoir
5	3410 Fairpoint Street	KID-Vosburg (1430 HWL) to Pasadena-Murray System (1176 HWL)	8"	400 gpm	Emergency interconnection to Pasadena-Murray/Calaveras System and to deliver excess KID water to Pasadena
6	2650 New York Drive	Pasadena-Calaveras (1209 HWL) to KID-Eucalyptus (1125 HWL)	8"	1500 gpm	Emergency interconnection to KID to provide additional fire protection for Dove Creek Town Homes

2.2.6 Portable Booster Pumps and Generators

The KID currently has two (2) trailer mounted portable boosters available for emergency operations and to supplement fire flows in some or all pressure zones. These pumps are capable of 1050 gallons per minute (gpm) at 360 feet Total Dynamic Head (TDH). The KID also has four diesel-powered trailer mounted portable generators to supply emergency power to any of the KID facilities.

2.3 Reservoirs

The KID operates and maintains ten (10) water storage tanks and reservoirs. Overflow elevations range from 940 feet to 1,637 feet. Reservoir data is shown in Table 2.3A.

**TABLE 2.3A
STORAGE RESERVOIR DATA**

Reservoir Name	Number & Capacity	Zone Served	High Water Line	Construction
Eucalyptus	1 - 0.180 MG	Eucalyptus	1,125'	Partially Buried Reinforced Concrete
Wilcox	1 - 1.125 MG	N/A	940'	Partially Buried Concrete
Holly Tanks	2 - 0.150 MG	Holly/Sage	1,460'	Circular, Welded Steel Aboveground
Vosburg	1 - 1.250 MG	Vosburg	1,430'	Partially Buried Reinforced Concrete
Glen	1 - 0.125 MG	Glen/Brown	1,265'	Buried Reinforced Concrete
Brown	1 - 0.125 MG	Glen/Brown	1265'	Buried Reinforced Concrete
East Tank	1 - 0.150 MG	East	1,637'	Circular Welded Steel, Aboveground
Sage Tank	1 - 0.225 MG	Holly/Sage	1,457'	Circular Welded Steel, Aboveground
West Tank	1 - 0.500 MG	West	1,634'	Circular Welded Steel, Aboveground
Total Storage	3.980 MG			

MG = Million Gallons

Existing storage capacity by zone is shown in Table 2.3B.

**TABLE 2.3B
STORAGE CAPACITY BY SERVICE ZONE**

Zone	Storage Capacity
Eucalyptus	0.180 MG
Holly/Sage	0.525 MG
Glen/Brown	0.250 MG
East Tank	0.150 MG
Vosburg	1.250 MG
West Tank	0.500 MG

2.4 *Booster Pumping Facilities*

The KID operates and maintains five (5) separate booster-pumping facilities. All booster pumps are operated via telemetry and based upon reservoir levels. Booster pump facility data is shown in Table 2.4.

**TABLE 2.4
BOOSTER PUMPING FACILITIES**

Facility Name	No. of Pumps	Horsepower	Head (feet)	Approx. Capacity (gpm)	Service
Eucalyptus	3	50 HP each	346'	400 each	Eucalyptus Reservoir to the Holly/Sage Tanks
Holly	2	20 HP each	205'	200 each	Holly Tanks to East Tank
Vosburg	1	25 HP	195'	280	Vosburg Reservoir to East Tank
Glen	1	25 HP	165'	345	Glen Reservoir to Vosburg Reservoir
Sage	2	25 HP each	205'	400 each	Sage Tank to West Tank
Wilcox Reservoir	1*	75 HP	325'	515	Wilcox Reservoir to Brown/Glen Reservoirs
		75 HP	490'	360	Wilcox Reservoir to Vosburg Reservoir
	2**	50 HP & 75 HP	325'	650	Wilcox Reservoir to Brown/Glen Reservoirs
		50 HP & 75 HP	490'	433	Wilcox Reservoir to Vosburg Reservoir

* Condition when pumping to either Brown/Glen Reservoirs or Vosburg Reservoir with just the 75 HP pump.

** Condition when pumping to either Brown/Glen Reservoirs or Vosburg Reservoir with both pumps.

2.5 *Piping*

2.5.1 Existing Piping

There are approximately 66,000 Linear Feet of transmission and distribution mains in the KID service area. The pipes range in size from 1" to 12-inch in diameter. Piping materials include galvanized steel, CML and CMC steel, asbestos cement (AC), ductile iron (DI) and AWWA C-900 PVC. There are approximately 90 fire hydrants in the system ranging in size from 2 ½" to 6" x 4" x 2 ½". All of the galvanized steel piping is old and obsolete. Some of the existing pipe is old and inadequate to provide current revised requirements for fire service.

2.5.2 Future Piping

Traditionally, piping in the KID was sized to provide for fire flows of 750 gpm. The firestorm of October 1993 exposed this pipeline delivery capacity weakness. As a result, the KID Fire Preparedness Policy now requires that all new facilities, including pipe, be sized to support a fire flow of 1,250 gpm with a 20 psi minimum residual. This represents a 500 gpm increase to the original system

design capacity of 750 gpm fire flow at 20 psi minimum residual pressure. Some areas of the existing system meet the new requirements; however, portions of the distribution system will provide only the minimum original system design fire flows. Additionally, the County of Los Angeles has required 2000 gpm or more fire flow for some of the new larger homes currently being built where fire sprinklers are required. Future pipeline projects may need to be sized to support this flow.

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3.0 EXISTING SERVICE DEMANDS

The KID services approximately 600 customers with a population of approximately 1,500. Service sizes range from 3/4" to 2". All services within the District are residential with the following exceptions:

- High Point Academy
- Magic Growers
- Los Angeles County Fire Station No. 66
- Pasadena Church of Christ
- Equestrian Center

The KID produces water from two wells and several tunnels. The 2012-2013 production from those sources is shown in Table 3.0.

TABLE 3.0
TUNNEL AND WELL PRODUCTION
DELIVERED TO DISTRIBUTION SYSTEM 2012-2013

Source	2012-2013 Production
K-3 Well	584.2 acre-feet*
Wilcox Well	57.6 acre-feet
High and Low Pressure Tunnels	53.5 acre-feet
Far Mesa Tunnel	39.3 acre-feet
House Tunnel	14.3 acre-feet
Eucalyptus Tunnel	40.7 acre-feet
Delores Tunnel	17.4 acre-feet
TOTAL	807.0 acre-feet

* Includes production of wholesale water sold to the City of Pasadena.

Additional production from tunnels is delivered for spreading in the Raymond Basin. Water delivered for spreading can be recovered by the District by increased pumping allotments or can be sold to other water purveyors. In 2012-2013, water delivered for spreading by the KID amounted to 161 acre-feet. The sources of this water in a particular year can include the High and Low Pressure Tunnels, the Long Tunnel, Delores Tunnel, Diversion Tunnel, Falls Tunnel, Winifred Tunnels, Tent Tunnel, and surface runoff from watershed owned by the District into the Glen Wash, Kinneloa Canyon and the Sierra Madre Villa Debris Basins.

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4.0 FUTURE DEVELOPMENT

4.1 *General*

A report dated July 2, 1990, prepared for the KID by ASL Consulting Engineers identified a potential for 95 new dwelling units within the KID boundaries. The report identified 57 potential units which would be built by developers and another 38 units which would most probably be constructed as single units and not part of a development project. Since that time all major development work has been completed except for a potential development in the Doyne Road area as described below and the building or re-building of approximately 25 homes on individual vacant lots.

4.2 *Doyne Road Development*

Hydraulic studies were completed for a potential development (Tract no. 44323) that was planned to be constructed in the south central area of the KID. The new tract was to be served from the existing Holly/Sage Zone. The development required the grading of 8 undeveloped lots ranging in size from 0.60 acres to 3.0 acres. Total area was approximately 13 acres in the final development plan. Water system improvements for this tract were to include new distribution and transmission mains and a new booster pump station at the Wilcox Reservoir. However, after grading was completed for 8 lots, the property was purchased from the developer by an individual who subsequently abandoned plans for the tract and combined the lots into two separate parcels. As of January 2014, the status for building homes on these parcels is not known. There is also an adjacent two acre parcel under separate ownership on which the home was not rebuilt after it was destroyed in the 1993 Kinneloa-Altadena firestorm.

4.3 *Potential Future Well Sites*

The KID has a few potential future water source well sites within the District boundaries. The Equestrian Center north of New York Drive was acquired by Los Angeles County and incorporated into the Eaton Canyon Natural Area. The park status will allow for a well site for the District. The area of Wilcox Canyon, north or south of the Wilcox Reservoir also offers potential for a future well site.

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5.0 CAPACITY CHARGE IMPROVEMENT FEE

Improvements were made to the KID water system during the Dove Creek Development in 1987-1990. These improvements included improvements to the K-3 Well, Eucalyptus Reservoir, and piping in New York Drive. At the time of these improvements, the KID decided to build in reserve system capacity and redundancy beyond that required by the Dove Creek Development. Because the cost of the improvements was beyond what was required by the Dove Creek Development, the KID funded the marginal increase of the cost of the improvements beyond the Dove Creek Development requirements.

To recover the cost of the reserve capacity, the Board of Directors of the KID in 1990 instituted a Capacity Charge Improvement Fee on all future development in the District. The fee is \$3,000.00 per lot and is only charged for existing or newly created lots that do not have an existing water service. This fee is in addition to reimbursement for the cost of installing the new water service and required system improvements.

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6.0 SERVICE DEMANDS

6.1 *Existing Service Demands*

Average day and maximum day service demands are based on water delivery records for the drought year (September 1990 – September 1991). Average day demand is the total annual water delivered as recorded by the individual customer water meters averaged over 365 days per year. Maximum day demand is the maximum day total water delivered, averaged over 24 hours. Maximum day delivery data is not available for individual customer water meters. Customer water meter demand is only recorded monthly. Individual pumping facility production and reservoir levels are recorded daily at roughly the same time each day. Individual facility records are used to determine maximum day total water delivery. To establish a comparison between average day and maximum day demands it is necessary to compare average day and maximum day demands of the same representative service area. Average day and maximum day data is available for the total Holly and East Tank service area.

The record data for this service area indicates the following:

- 237 services
- 189 total acres
- Annual delivery of 134,990 billing units (B.U.)
- Maximum day delivery (7/29/1990) of 1,029 billing units

Average Day Demand

$$\frac{134,990 \text{ B.U.}}{189 \text{ Acre/Year}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Year}}{365 \text{ Days}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{1.02 \text{ Gal/Min}}{\text{Acre}}$$

OR:

$$\frac{134,990 \text{ B.U.}}{237 \text{ Services}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Year}}{365 \text{ Days}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{0.81 \text{ Gal/Min}}{\text{Service}}$$

Maximum Day Demand

$$\frac{1,029 \text{ B.U.}}{189 \text{ Acre/Day}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{2.83 \text{ Gal/Min}}{\text{Acre}}$$

OR:

$$\frac{1,029 \text{ B.U.}}{237 \text{ Services}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{2.26 \text{ Gal/Min}}{\text{Service}}$$

The ratio of the maximum day demand over the average day demand is the maximum day factor. For the existing Holly and East Tank Zone, the maximum day factor is as follows:

$$\frac{2.83}{1.02} = 2.77$$

Existing service demands for the number of services in 2007 for each zone were based on the calculated average day and maximum day demand factors for the Holly and East Tank Zone and are shown in Table 6.1.

TABLE 6.1
SERVICE DEMANDS BY ZONE IN THE
KINNELOA IRRIGATION DISTRICT

Service Zone	No. of Services	Average Day Demand 0.81 gpm/service (gpm)	Maximum Day Demand 2.26 gpm/service (gpm)
Eucalyptus	62	51	141
Holly/Sage	190	154	430
East	61	50	138
West*	25	47	119
Brown/Glen	70	57	159
Vosburg	192	156	434

* West Tank service demand based on 1.85 gpm/acre average day and 5.12 gpm/acre maximum day demands and a 23.3 acre service area.

6.2 *Future Service Demands*

Future service demands for various zones in the KID system were calculated based on the number of existing services, the planned additional services and the estimated future customer service demands. Planned additional services in the KID service area have a higher potential for water use than the existing customer services. Planned additional services are estimated to be comparable to the Shaw Ranch Estate type properties. Shaw Ranch record data indicates the September 1990 – September 1991 annual demand for 24 active services, serving 16.94 acres was a total of 21,984 billing units. Average day demand for planned future services is calculated as follows:

$$\frac{21,984 \text{ B.U.}}{16.94 \text{ Acre/Yr}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Year}}{365 \text{ Days}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{1.85 \text{ gpm}}{\text{Acre}}$$

OR:

$$\frac{21,984 \text{ B.U.}}{24 \text{ Services}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Year}}{365 \text{ Days}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{1.30 \text{ gpm}}{\text{Service}}$$

Maximum day demand for planned future services is the average day demand multiplied by the developed maximum day factor as follows:

$$1.85 \text{ gpm/acre} \times 2.77 = 5.12 \text{ gpm/acre}$$

OR:

$$1.30 \text{ gpm/service} \times 2.77 = 3.60 \text{ gpm/service}$$

For master planning and calculation of future system demands, 5.12 gpm/acre or 3.60 gpm/service will be used to calculate future service demands per zone. Table 6.2A shows the future service demand of the potential new services by zone.

TABLE 6.2A
FUTURE SERVICE DEMANDS BY ZONE IN THE
KINNELOA IRRIGATION DISTRICT

Service Zone	No. of Future Services	Average Day Demand 1.3 gpm/service (gpm)	Maximum Day Demand 3.6 gpm/service (gpm)
Eucalyptus	1	1.3	3.6
Holly/Sage	16	21.0	57.6
East	1	1.3	3.6
West	0	0.0	0.0
Brown/Glen	8	11.0	28.8
Vosburg	5	7.0	18.0

Table 6.2B shows the sum of the water demand for existing services in Table 6.1 and the potential new services in Table 6.2A.

TABLE 6.2B
TOTAL FUTURE SERVICE DEMANDS BY ZONE
IN THE KINNELOA IRRIGATION DISTRICT

Service Zone	Total Services	Average Day Demand (gpm)	Maximum Day Demand (gpm)
Eucalyptus	63	52	145
Holly/Sage	206	175	488
East	62	51	142
West*	25	47	119
Brown/Glen	78	68	188
Vosburg	197	163	452

* West Tank service demand based on 1.85 gpm/acre average day and 5.12 gpm/acre maximum day demands and a 23.3 acre service area.

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7.0 SYSTEM IMPROVEMENTS

7.1 *General*

The KID was formed in 1953. Many of the distribution and transmission pipelines predate 1953 and are nearing the end of their useful service life. For the purposes of this plan, the useful service life of the pipelines is set at 50 years. Development of excessive numbers of leaks and/or reduced pipeline capacity are two of the indications of pipelines at the end of their useful service life.

Originally, water mains in the KID provided domestic supply plus a fire flow of 750 gpm. The existing distribution system meets the original fire flow design criteria. The firestorms of October 1993 exposed the KID pipeline delivery capacity weakness. As a result, the KID adopted a Fire Preparedness Policy which requires new water mains to be sized to provide 20 gpm per service, plus a fire flow of 1,250 gpm each at two fire hydrants simultaneously.

As the population of the KID has grown over the years, the demands placed upon the entire system, including distribution and transmission mains, water sources, reservoirs, and pump stations have encroached upon the ability of the system to meet the required demands. Population growth, plus the need for increased fire flow to provide adequate fire protection will require the KID to construct improvements to the KID water system.

7.2 *Piping*

In April 1996, ASL Consulting Engineers conducted a study for the KID to identify water main improvements required to increase water system capabilities to deliver domestic demands plus 1,250 gpm fire flows.

All pipes that develop chronic leaks should be replaced to decrease waste of water and to achieve overall lower operational costs.

In addition, pipes which have exceeded their useful life should be replaced. It can be shown that replacing older pipelines will result in lower long-term operational costs. Pipelines which have become inaccessible due to development or are traversing private property in easements should also be replaced if practical and/or possible. Pipelines should be upsized where required to meet the fire preparedness goals. Upsizing is to be determined by hydraulic modeling and verified by field-testing.

Many projects have been completed since the original master plan. The remaining projects that are listed in Table 7.2 provide a remedy for the following conditions:

- Chronically leaking pipes.
- Pipe requiring upgrade to meet domestic demand and fire preparedness goals.
- Piping which has exceeded its useful service life of 50 years.
- Piping which has become inaccessible due to development or traverses private property in easements.

TABLE 7.2
REQUIRED WATER MAIN REPLACEMENTS
TO MEET 1,250 GPM FIRE FLOW AND
450 FEET VEHICULAR DISTANCE

Main Size	Description	
	From	To
8"	Sierra Madre Villa at Windover Rd.	Corner of 2090 & 2060 Villa Heights Rd..
8"	Country Lane	Southeast Corner of 1747 Country Lane
12"	Glen Reservoir	Intersection Villa Highlands & Sierra Madre Villa Includes Slope from Pasadena Glen to Barhite
8"	Kinclair Dr.	Behind 2150 Kinclair Dr.
8"	Kinclair Dr.	#4 Cricklewood Path
8"	Kinneloa Canyon Rd.	Behind 2044 Piccadilly Ln.
8"	Intersection of Vosburg St. & Lower Pasadena Glen Rd.	In front of 1658 Pasadena Glen Rd.

7.3 *Booster Pump Stations*

7.3.1 Existing Booster Pump Stations

The KID presently has sufficient booster pump capacity to provide for domestic demands. The 1,250 gpm fire flow requires supplementing booster station flow with gravity flow from reservoirs.

There are booster pump facilities located at the Eucalyptus Reservoir, Holly Tanks, Sage Tank, Wilcox Reservoir, Glen Reservoir and at the Vosburg Reservoir. The booster pumps at the Eucalyptus Reservoir were replaced with high efficiency vertical turbine units in 2002 as part of the system improvements needed for the Kinneloa Ridge Development.

The booster pump at the Holly Tank is a horizontal, split case pump. A preferred installation would be high efficiency vertical turbine units set in cans.

The booster pump at the Vosburg Reservoir is a submersible, centrifugal pump. A preferred installation would be a high efficiency vertical turbine unit, but a replacement 25 HP submersible pump that was installed in 2006 is providing increased flow and efficiency as compared to the previous 20 HP unit. A permanent three-booster pump station is currently in the design process and is expected to be constructed in 2015 or 2016 if the project is approved by the KID Board.

Table 7.3A compares the required booster pump station capabilities with existing booster pump station capabilities. Required booster pump station capabilities will supply maximum day demand with an off-peak 16-hour maximum pumping period.

Required Booster Pump Capacity Calculations: Each booster facility must provide capacity to serve all zones in the system above the booster station.

- Eucalyptus Booster Station must provide capacity to serve Holly/Sage Zone, West Zone, and ½ of the East Zone. Flow rates required are from Table 6.2B.

$$\text{Eucalyptus Booster Capacity} = \frac{24}{16} (488+119+\frac{142}{2}) = 1017 \text{ gpm}$$

- Holly Booster Station must provide ½ of the East Zone.

$$\text{Holly Booster Capacity} = \frac{24}{16} \cdot \frac{142}{2} = 107 \text{ gpm}$$

- Vosburg Booster capacity is 285 gpm.
- Glen Booster must supply Vosburg Zone and ½ of East Zone.

$$\text{Glen Booster Capacity} = \frac{24}{16} (452+\frac{142}{2}) = 785 \text{ gpm}$$

- Sage Booster supplies the West Zone only.

$$\text{Sage Booster Capacity} = \frac{24}{16} (119) = 179 \text{ gpm}$$

- Wilcox Booster must supply Vosburg Zone, Brown/Glen Zone and ½ of East Tank Zone.

$$\text{Wilcox Booster Capacity} = \frac{24}{16} (452+188+\frac{142}{2}) = 1067 \text{ gpm}$$

TABLE 7.3A
COMPARISON OF REQUIRED BOOSTER PUMP CAPACITIES

Booster Station	Required Future Pump Capacities (gpm)	Existing Capacity (gpm)**	Additional Capacity Required (gpm)
Eucalyptus	1,017	800	0
Holly	107	200	0
Vosburg*	107	285	0
Glen	785	345	440
Sage	179	400	0
Wilcox Reservoir	1,067	650	417

* Additional capacity and redundancy will be provided with the proposed construction of a permanent booster station at the Vosburg Reservoir in conjunction with the proposed East-West Tank connector pipeline project.

** Existing capacity reflects normal operation. Some sites have additional capacity if all boosters are used simultaneously.

Table 7.3B shows the proposed booster pump improvements to increase efficiencies and/or capacities and provide improved redundancy.

TABLE 7.3B
PROPOSED BOOSTER IMPROVEMENTS

Booster Station	Description
Glen	Increase booster pump capacity.
Holly*	Replace existing pumps with two vertical turbine pumps in cans.
Vosburg	Replace existing submersible pump with three vertical turbine pumps in cans.
Wilcox Reservoir**	Increase booster pump capacity.

* Not needed if East-West Tank Connector Pipeline project is completed.

** Pipeline upgrades also required to reduce pumping head.

7.3.2 Proposed Booster Pump Stations

Although the plan for an eight-home tract on Doyne Road has been abandoned, the building of two or more homes on Doyne Road may require additional booster pump capacity at the Wilcox Reservoir and other pipeline upgrades. The necessary improvements have already been made at the Eucalyptus Booster Pump Station in conjunction with the Kinneloa Ridge Development and the main on Doyne Road was replaced as part of the Kinneloa Mesa pipeline improvement project.

7.4 *Tunnels*

7.4.1 High Pressure Tunnel

The High Pressure Tunnel pipeline is currently in service and supplies water to the Holly Tanks or the West Tank. The High Pressure Tunnel pipeline was damaged during the firestorms of October 1993. Additional damage occurred from mudslides during the rainy season of subsequent years. In 1994, the High Pressure Tunnel pipeline was repaired with FEMA funding. In the winters of 1994-95 and 2004-05, the High Pressure Tunnel pipeline was again damaged by mudslides. The KID applied for FEMA funding as a result of the disaster declaration after the 2004-2005 storms and permanent repairs were completed in 2006 using a combination FEMA funds and KID funds.

7.4.2 Low Pressure Tunnels

Pipelines delivering water from the Low Pressure Tunnels to the Holly Tanks have been out of service at various times since 1993. Both low pressure tunnel pipelines were damaged during the fire storms of October 1993. Further damages occurred from mudslides during the rainy seasons of subsequent years. In 1994, the lower Low Pressure Tunnel pipeline was replaced using FEMA funding. In subsequent rainy seasons, the tunnel has since been buried by mudslides. The storms of 2004-2005 further damaged the lines. The KID applied for FEMA funding to repair the lines in order to take advantage of the low cost water supply. The upper low pressure tunnel pipeline was replaced and put back in service in 2006. The lower low pressure tunnel was excavated to the tunnel face, but further work has been suspended due to lack of funding and safety concerns.

7.4.3 House Tunnel

The House Tunnel pipeline was also damaged in the 2004-2005 storms. The damaged section was replaced with flexible hose suspended from a cable and the rest of the pipeline was inspected and repaired at two locations. Since the majority of the pipeline is galvanized steel and was installed decades ago, it is expected that the pipeline will need to be replaced within the next 20 years even if there is no further storm damage.

7.4.4 Delores Tunnel

The Delores Tunnel was out of service between 1979 and 2001 due to rockslide and rain storm damage to the delivery pipeline. Although this pipeline was replaced in 2001 with flexible hose suspended from a cable for much of its length, it is still vulnerable to damage in the future. Therefore, it is expected that portions will need to be repaired or replaced within the time frame of this master plan.

The required tunnel maintenance and improvements are listed in Table 7.4.

TABLE 7.4
REQUIRED TUNNEL MAINTENANCE AND IMPROVEMENTS

Tunnel	Description
High Pressure	Periodically inspect pipeline for potential damage from landslides. Inspect for leaks and repair or replace pipeline as needed.
Low Pressure	Periodically inspect pipeline for potential damage from landslides. Continue excavation of lower tunnel and complete new tunnel face and pipeline between the tunnel and the injector if tunnel flow is significant.
House	Periodically inspect pipeline for potential damage from landslides. Inspect for leaks and repair or replace pipeline as needed.
Delores	Periodically inspect pipeline for potential damage from landslides. Inspect for leaks and repair or replace pipeline as needed.

7.5 *Other Improvements*

7.5.1 General

Within Section 7 of this master plan, necessary improvements have been identified which would connect tunnel water supplies to the system and improve system hydraulics in order to meet a 1,250 gpm fire flow for two hours. Also, improvements to reservoirs have been identified which are necessary to meet a minimum 1,250 gpm fire flow for two hours plus domestic demands. This section will examine other necessary system improvements.

7.5.2 Additional Improvements

The KID has identified other capital improvements necessary to upgrade existing facilities to provide increased operational efficiency, greater margins of safety, address emergency preparedness issues and to decrease maintenance costs. Additional capital improvements are shown in Table 7.5.

TABLE 7.5
ADDITIONAL IMPROVEMENTS AS IDENTIFIED BY THE
KINNELOA IRRIGATION DISTRICT

Description
Upgrade SCADA hardware, software and communications radios to prevent obsolescence (OPS)
Replace obsolete on-site chlorine generators. (OPS)
Purchase 250 kw trailer-mounted generator to be used and Wilcox and K-3 (EP)
EP= Emergency Preparedness OPS= Operations Improvement

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

8.0 PLANNED MAINTENANCE PROGRAM

The KID has developed a Planned Maintenance Program for the KID’s water distribution system which extends the life of existing capital improvements. These items of work include pump overhauls, motor overhauls and replacements, reservoir recoating, reservoir roof repairs, upgrade interconnections with other agencies, purchase of small tools, upgrading various facilities, and office improvements. The items of work identified in this section are typically referred to as operations and maintenance items but due to relatively high cost they need to be budgeted in the same manner as capital improvements. Planned maintenance items identified by the staff are listed in Table 8.0 and are not in priority order.

TABLE 8.0
PLANNED MAINTENANCE PROGRAM ITEMS

Item	Description	Est. Cost
1	Glen Reservoir - Install Polypropylene Liner	\$ 30,000
2	Upgrading of Fire Hydrant Heads (\$ 500.00 to \$2,500 ea.)	\$34,000
3	Tunnel Maintenance (avg. \$ 7,000 per year for a 10 year period)	\$70,000
4	Valve Maintenance (replacement cost averages \$2,500 per valve)	\$25,000
5	Office Maintenance & Improvements: 1. Replace carpet and do interior painting; 2. Add storage shed to exiting concrete pad	\$40,000
6	Brown Reservoir - Install liner	\$30,000
7	Holly Tanks Erosion Control (All Phases)	\$140,000
8	Holly Boosters - Paint Booster Station	\$1,000
9	Wilcox Reservoir - Pump stand/other repairs	\$25,000
10	Service Area - Emergency prep. - install or replace “Blue Dot” Markers for Fire Hydrants	\$1,000
11	Wilcox Well - Modify dump line to dispose of water on site	\$1,000
	Total	\$397,000

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

9.0 PROJECT PRIORITIES

Project priorities are based upon cost-benefit considerations. Projects that will realize higher revenues per unit cost are given a higher priority than projects that will realize lower revenue, or no revenue, per unit dollar spent. Priorities are also based upon increased fire protection, increased operational efficiencies and lower maintenance costs. Projects are listed in Table 9.0 in order of decreasing priority in each project category.

TABLE 9.0
CAPITAL IMPROVEMENT PROJECTS LISTED BY PRIORITY

Priority	Project	Description
1	Pipeline	West Tank to East Tank (including portion of High/Low Pressure Tunnel line listed below).
2	Pipeline	Sierra Madre Villa from Windover Road to Corner of 2090 and 2060 Villa Heights Road
3	Pipeline	Replace service main in portion of Fairpoint Street from 3410 to last service at 3500 Fairpoint
4	Pipeline	Country Lane to Southeast Corner of 1747 Country Lane
5	Pipeline	Kinclair Drive to rear of 2150 Kinclair Drive
6	Pipeline	Kinclair Drive to #4 Cricklewood Path
7	Pipeline	Kinneloa Canyon Road to rear of 2044 Piccadilly Lane
8	Pipeline	Intersection of Vosburg St. and lower Pasadena Glen Rd. to front of 1658 Pasadena Glen Rd.
9	Pipeline	Replace service main in Edgecliff Lane from Villa Knolls Drive to cul-de-sac
10	Pipeline	1908 N. Kinneloa Cyn. Rd. to intersection of Larmona Drive & Kinneloa Mesa Road (Doyne Road project)
11	Pipeline	Replace service main from Villa Knolls Drive to end of Hartwood Point Drive
12	Pipeline	Replace service main in Villa Mesa Dr. from Sierra Madre Villa Ave. to 3336 Villa Mesa Dr.
13	Pipeline	From Glen Reservoir to intersection of Villa Highlands and Sierra Madre Villa. Includes slope from Pasadena Glen to Barbite
14	Pipeline	Replace water main from Wilcox Well to Wilcox Reservoir
1	Tunnel	Construct permanent replacement pipeline section from High Pressure Tunnel to Holly and/or Sage Reservoir
2	Tunnel	Construct pipeline from lower Low Pressure Tunnel to junction with High Pressure Tunnel Pipeline north of Kinneloa Debris Basin
3	Tunnel	Replace other tunnel pipelines as required
1	Booster	Replace the existing 50 HP oil lubricated booster pump at Wilcox Reservoir with a water lubricated pump
2	Booster	Install additional booster pump and new electrical at Wilcox Reservoir if needed
3	Booster	Replace existing booster pump at Glen Reservoir with a higher capacity unit
4	Booster	Replace existing booster pumps at Holly Tank with vertical turbine pumps in a can (Not needed if West Tank to East Tank pipeline is constructed)
1	Other (Emergency Preparedness)	Purchase 250 kw trailer-mounted generator for Wilcox and K-3
2	Other (Preventative Maintenance)	Upgrade SCADA hardware, software and communications radios to prevent obsolescence
3	Other (Preventative Maintenance)	Replace Uniclor with Chlortec chlorine generators to prevent obsolescence

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

10.0 COST ESTIMATES FOR REQUIRED IMPROVEMENTS

10.1 *Pipelines*

Cost estimates for pipeline replacements as described in Section 7.1, are taken from a study prepared by ASL Consulting Engineers for the KID in April 1996. Cost estimates were up-dated in July 2002 and adjusted for inflation and current construction costs in 2014. Nearly all of the replacement pipelines are needed to meet 1,250 gpm fire flow and 450 feet vehicular distance requirements. Category definitions are as follows: EP-Emergency Preparedness; PM-Preventive Maintenance; OPS- Operational Improvement. The estimated costs are shown in Table 10.1. In order for the district to get the best prices for these projects, the smaller projects should be bundled in dollar amounts not less than \$150,000.

TABLE 10.1
PIPING IMPROVEMENTS COST ESTIMATES

Priority	Main Size	Description		Category	Cost
		From	To		
1	12"	West Tank	East Tank	EP/OPS 5000 ft.	\$1,150,000
2	8"	Sierra Madre Villa at Windover Rd.	Corner of 2090 and 2060 Villa Heights Road	EP 1840 ft.	\$188,000
3	4"	Eastern portion of Fairpoint St.	Last service on Fairpoint St.	EP/PM 950 ft.	\$84,000
4	8"	Country Lane	Southeast Corner of 1747 Country Lane	EP 270 ft.	\$28,000
5	8"	Kinclair Dr.	Rear of 2150 Kinclair Dr.	EP 250 ft.	\$38,000
6	8"	Kinclair Dr.	#4 Cricklewood Path	EP 400 ft.	\$50,000
7	8"	Kinneloa Canyon Rd.	Rear of 2044 Piccadilly Ln.	EP 250 ft.	\$38,000
8	8"	Intersection of Vosburg St. & Lower Pasadena Glen Rd.	Front of 1658 Pasadena Glen Rd.	EP/PM 350 ft.	\$48,000
9	8"	Edgecliff Lane from Villa Knolls	End of Cul-de-sac	EP/PM 700 ft.	\$80,000
10	8"	Larmona Drive & Kinneloa Mesa Road	1908 N. Kinneloa Canyon Rd.(Doyne Rd. Project)	EP	\$204,000
11	8"	Villa Knolls Drive	End of Harwood Point	EP/PM 1960 ft.	\$204,000
12	8"	Sierra Madre Villa	3336 Villa Mesa	EP/PM 300 ft.	\$42,000

Priority	Main Size	Description		Category	Cost
		From	To		
13	12"	Glen Reservoir	Intersection Villa Highlands & Sierra Madre Villa Includes Slope from Pasadena Glen to Barhite	EP/OPS 3100 ft.	\$442,000
14	10"	Wilcox Well	Wilcox Reservoir Line	EP/OPS/PM 500 ft.	\$60,000
SUBTOTAL					\$2,656,000
Engineering, Design, and Planning					\$200,000
Construction Management and Inspection					\$150,000
SUBTOTAL					\$350,000
TOTAL PIPELINE PROJECTS					\$3,006,000

10.2 *Booster Pump Station Improvements*

Cost estimates for installation of some of the booster pump improvements at the Wilcox Reservoir that were required for the Doyme Road Development (Tract 44323) were developed in a report prepared by ASL Consulting Engineers for the KID and dated June 3, 1996. Cost estimates were up-dated in February 2002 but were not included in the KID capital project budget because it was expected that these improvements would be constructed at the developer's expense. However, since the development as originally planned has been abandoned by a new owner of the property, the cost of an additional booster at the Wilcox Reservoir is not included.

Cost estimates for installation of other booster pump improvements were developed in a report prepared by ASL Consulting Engineers for the KID and dated November 3, 1995. Cost estimates were up-dated in February 2002. Although some of these projects are being deferred because of the purchase of portable pumps, they are listed for planning purposes in the event that the portable pumps are used for other purposes. Costs for improvements to the booster pumps at the Wilcox Reservoir, Glen Reservoir, Holly Tank and the Vosburg Reservoir are included in the KID capital project budget. Costs include engineering, inspection, management and contingency. All costs were updated in 2002 and have been adjusted for inflation to 2014 dollars.

Booster Pump Station Improvements are shown in Table 10.2.

TABLE 10.2
BOOSTER PUMP STATION IMPROVEMENTS

Priority	Description	Estimated Costs
1	Replace the existing 50 HP oil lubricated booster pump at Wilcox Reservoir with a water-lubricated pump.	\$10,000.00
2	Construct improvements to the Booster Pump at Glen Reservoir	\$60,000.00*
3	Construct new Booster Pump Station at Vosburg Reservoir	\$390,000.00*
4	Construct improvements to the Booster Pumps at Holly Tanks (Not needed if East-West Tank connector pipeline is constructed)	\$60,000.00*

*Previously deferred by purchase of portable pumps. Needed to maximize benefit if East-West Tank connector pipeline is constructed.

10.3 *Tunnel Improvements*

The pipeline from the upper Low Pressure Tunnel face to the new High/Low combiner was replaced in 2006. The existing High Pressure pipeline was not replaced but the line was suspended from a new cable to the combiner to protect it from landslides. The lower Low Pressure Tunnel pipeline was not replaced since there was no water exiting that tunnel at the time of the construction work in 2006. The combined High/Low Pressure pipeline from the combiner to the Kinneloa Canyon West Debris Basin may also need to be replaced in future years. The cost estimates for the remaining pipelines are shown in Table 10.3.

TABLE 10.3
TUNNEL IMPROVEMENTS

Priority	Description	Cost Estimate
1	Replace the combined High/Low Pressure Tunnel Pipeline from combiner to Kinneloa Canyon West Debris Basin	\$200,000.00
2	Replace the lower Low Pressure Tunnel Pipeline	\$ 61,000.00
3	Replace other tunnel pipelines as required	\$100,000.00

10.4 *Costs of Other Improvements*

Cost estimates for the construction or purchase of other improvements are based upon estimates by KID staff and are shown in Table 10.4.

TABLE 10.4
OTHER IMPROVEMENTS

Priority	Description	Estimated Cost
1	Purchase 250 kw portable generator for Wilcox and K-3	\$40,000
2	Upgrade SCADA hardware, software and communications radios to prevent obsolescence	\$50,000
3	Replace Uniclор with Chortec chlorine generators	\$13,000

10.5 *Total Costs*

Table 10.5 shows total estimated costs for all necessary improvements as identified in this master plan. Cost estimates include design, inspection, construction management and contingency costs. Improvements identified to be installed and financed by developers are not included. Costs for the items identified as other work were developed for this master plan from cost estimates by the KID staff.

TABLE 10.5
TOTAL ESTIMATED COSTS

No.	Description	Cost Estimate
1	Pipeline Improvements	\$2,564,000
2	Pump Station Improvements	\$520,000
3	Tunnels	\$361,000
4	Other Improvements	\$103,000
5	Planned Maintenance (from Section 8)	\$397,000
	TOTAL	\$3,945,000

APPENDIX

EXHIBIT I
RESERVOIR IMPROVEMENTS

RESERVOIR IMPROVEMENTS

Cost estimates for District funded improvements to reservoirs are not included in the Water Master Plan. Since these costs were estimated in 1996, these projects will need to be re-evaluated if they are pursued in the future.

Existing Reservoirs

In April 1996, ASL Consulting Engineers conducted a study for the KID to identify reservoir improvements, which would have to be made to comply with the KID Fire Preparedness Policy. The results of that study indicate that additional capacity is required at the Holly Tanks, Glen Reservoir and East Tank.

Table I compares the required future reservoir storage capacity with the existing reservoir capacity for each service zone. Wilcox Reservoir is a forebay for the Wilcox Well and is not included. Required capacity is the sum of maximum day demand, operational capacity, and fire flow.

TABLE I
REQUIRED RESERVOIR CAPACITY

Reservoir	Maximum Day Demand (Gal.) *	Operational Capacity (Gal.) *****	Fire Flow (Gal.) **	Required Capacity (Gal.)	Existing Capacity (Gal.)	Additional Capacity Required (Gal.)
Eucalyptus Reservoir	308,160	77,000	300,000	685,160	180,000	505,160
Holly/Sage Tanks	702,720	176,000	300,000	1,178,720	525,000	653,720
East Tank	230,400	58,000	300,000	588,400	150,000	438,400
West Tank****	135,360	0***	300,000	435,360	500,000	0
Brown/Glen Reservoir	298,080	75,000	300,000	670,080	250,000	420,080
Vosburg Reservoir	643,680	161,000	300,000	1,104,680	1,250,000	0

* Maximum Day Demand = 60 min. x 24 hours x max day demand (gpm/service).

** Fire Flow = 1,250 gpm for 4 hours.

*** Operational storage not required.

**** West Tank Maximum Day Demand based on (gpm/acre).

***** 25% of maximum day demand.

The proposed reservoir improvements are shown in Table II.

TABLE II
PROPOSED RESERVOIR IMPROVEMENTS

Tank	Description
Holly Tanks	Remove both existing reservoir in two stages. Construct new concrete reservoir in two stages and miscellaneous site improvements. Increase existing Holly Tanks to provide total 1-MG storage.
East Tank*	Site has 1 existing 0.15 MG reservoir. Add two additional 0.15 MG steel reservoirs and miscellaneous site improvements. Site limitations prevent construction of total required storage. Maximum day operation will require careful management of operational levels with potential of encroaching on peak pumping Edison rate.
Glen Reservoir**	Demolish existing 0.15 MG reservoir. Construct new 0.5 MG concrete reservoir and miscellaneous site improvements.
Eucalyptus Reservoir	Emergency connections, portable pumps and tunnel supply are considered to make up storage deficit.

* Low priority if East-West Tank connector pipeline is constructed.

** Low priority because Glen Reservoir has back up storage in Vosburg Reservoir.

Cost estimates for District funded improvements to reservoirs were developed in a study by ASL Consulting Engineers for the KID and dated April 1996. The Estimated cost for improvements to Holly Tanks, East Tanks, and Glen Reservoir are shown in Tables III, IV, and V respectively. All costs are in 1996 dollars.

TOTAL ESTIMATED COSTS

No.	Description	Cost Estimate
1	Holly Reservoir Improvements	\$612,000
2	East Tank Improvements	\$422,000
3	Glen Reservoir Improvements	\$624,000
	Total Reservoir Improvements	\$1,658,000

TABLE III
HOLLY RESERVOIR IMPROVEMENTS COST ESTIMATE

Item	Quantity	Unit	Description	Unit Price	Total Price
PHASE I					
1	1	L.S.	Mobilization/Demobilization	\$6,750.00	\$6,750.00
2	1	L.S.	Modify Existing Inlet/Outlet and Tunnel Well Piping	\$5,000.00	\$5,000.00
3	1	L.S.	Demolish and Remove West Reservoir	\$25,000.00	\$25,000.00
4	275	L.F.	Install Excavation Shoring, Entire Site	\$30.00	\$8,250.00
5	900	C.Y.	Excavate Entire Site	\$30.00	\$27,000.00
6	1	L.S.	Install Sub drain System	\$4,000.00	\$4,000.00
7	1	L.S.	Install Inlet/Outlet Piping	\$3,000.00	\$3,000.00
8	1	L.S.	Construct West Half of New Reservoir	\$200,000.00	\$200,000.00
9	1	L.S.	Test, Disinfect, and Place West Half of Reservoir in Service	\$2,000.00	\$2,000.00
PHASE II					
1	1	L.S.	Demolish and Remove East Reservoir	\$25,000.00	\$25,000.00
2	1	L.S.	Install Sub drain System	\$4,000.00	\$4,000.00
3	1	L.S.	Install Inlet/Outlet Piping	\$5,000.00	\$5,000.00
4	1	L.S.	Construct East Half of New Reservoir	\$200,000.00	\$200,000.00
5	1	L.S.	Test, Disinfect, and Place East Half of Reservoir in Service	\$2,000.00	\$2,000.00
6	200	C.Y.	Backfill and Remove Shoring	\$50.00	\$10,000.00
7	1	L.S.	Construct Site Improvements, A.C. Pavement, Landscaping and Irrigation, and Site Drainage Facilities	\$15,000.00	\$15,000.00
SUBTOTAL					\$542,000.00
Engineering Design and Planning					\$30,000.00
Soils Investigation					\$10,000.00
Environmental Documents					\$10,000.00
Construction Administration and Inspection					\$20,000.00
SUBTOTAL					\$70,000.00
TOTAL PROJECT					\$612,000.00

TABLE IV
EAST TANK IMPROVEMENTS COST ESTIMATE

Item	Quantity	Unit	Description	Unit Price	Total Price
1	---	L.S.	Mobilization/Demobilization	\$5,000.00	\$5,000.00
2	1,300	C.Y.	Excavation / Grading	\$50.00	\$65,000.00
3	---	L.S.	Access Road – Grading and Paving	\$22,000.00	\$22,000.00
4	2	EA.	Tank Footing and Oil Sand	\$15,000.00	\$30,000.00
5	---	L.S.	Sub drain System	\$10,000.00	\$10,000.00
6	---	L.S.	Slope Treatment	\$15,000.00	\$15,000.00
7	---	L.S.	Site Drainage	\$30,000.00	\$30,000.00
8	2	EA.	Tank Material and Construction	\$75,000.00	\$150,000.00
SUBTOTAL					\$327,000.00
Engineering Design and Planning					\$25,000.00
Soils Investigation					\$15,000.00
Environmental Documents					\$15,000.00
Construction Management and Inspection					\$40,000.00
SUBTOTAL					\$95,000.00
TOTAL PROJECT					\$422,000.00

TABLE V
GLEN RESERVOIR IMPROVEMENTS COST ESTIMATE

Item	Quantity	Unit	Description	Unit Price	Total Price
1	1	L.S.	Mobilization/Demobilization	\$6,000.00	\$6,000.00
2	1	L.S.	Temporary Relocation of Long Tunnel Pipeline	\$2,000.00	\$2,000.00
3	1	L.S.	Salvage Pump, Electrical, and Chlorination Equipment	\$6,000.00	\$6,000.00
4	1	L.S.	Demolish A.C. Pavement	\$2,000.00	\$2,000.00
5	1	L.S.	Demolish and Remove Existing Reservoir Structure and Appurtenances	\$35,000.00	\$35,000.00
6	300	L.F.	Install Excavation Shoring	\$30.00	\$9,000.00
7	1,900	C.Y.	Excavate Reservoir Pad	\$35.00	\$66,500.00
8	1	L.S.	Install Sub drain System	\$8,000.00	\$8,000.00
9	1	L.S.	Install Reservoir Inlet/Outlet and Drain Piping	\$5,000.00	\$5,000.00
10	1	L.S.	Construct Reservoir	\$350,000.00	\$350,000.00
11	1	L.S.	Test, Disinfect, and Place Reservoir in Service	\$3,000.00	\$3,000.00
12	1	L.S.	Backfill and Grade Site	\$7,000.00	\$7,000.00
13	1	L.S.	Install Chlorination, Pump, and Electrical Equipment	\$15,000.00	\$15,000.00
14	1	L.S.	Construct Site Improvements, A.C. Pavement, Landscaping, and Irrigation	\$10,000.00	\$10,000.00
SUBTOTAL					\$524,500.00
Engineering Design and Planning					\$45,000.00
Soils Investigation					\$10,000.00
Environmental Documents					\$15,000.00
Construction Management and Inspection					\$30,000.00
SUBTOTAL					\$100,000.00
TOTAL PROJECT					\$624,500.00

EXHIBIT II
SCHEMATIC OF WATER SYSTEM

KINNELOA IRRIGATION DISTRICT HYDRAULIC SCHEMATIC

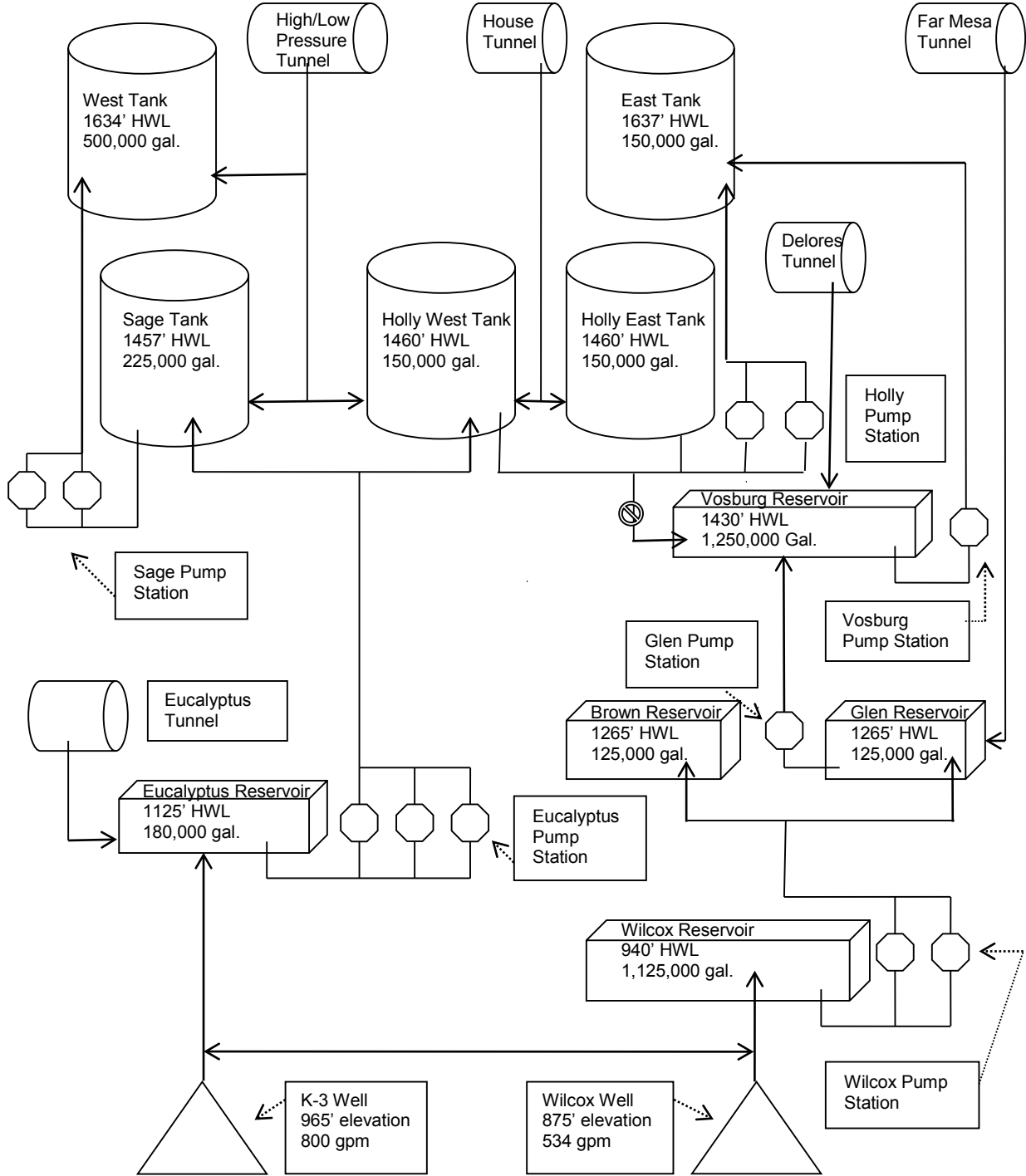


EXHIBIT III
FIRE PREPAREDNESS POLICY

FIRE PREPAREDNESS POLICY
FOR
THE KINNELOA IRRIGATION DISTRICT

Prepared for

The Kinneloa Irrigation District
1999 Kinclair Drive
Pasadena, CA 91107
(626) 797-6295

Prepared by:

ASL Consulting Engineers
3280 East Foothill Boulevard
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February 1997

Revised by:

Melvin L. Matthews
General Manager

April 2005

KINNELOA IRRIGATION DISTRICT

FIRE PREPAREDNESS POLICY

INTRODUCTION

The Kinneloa Irrigation District (KID) provides water service to approximately 500 acres of hillside customers in northeast Pasadena. The Angeles National Forest borders the District on the north. Under certain weather conditions, wild fire danger is extremely high. Santa Ana winds have the capability to drive wild fires into the District with potential to cause major damage. The 1993 Altadena wild fire was the latest example of the potential fire danger. There are many factors that contributed to the Altadena wildfire damage. These factors are as follows:

- The availability of water for fire protection.
- Fuel source availability.
- Coordination of manpower.
- Equipment deployment.
- Limited ingress and egress.
- Fire preparedness.

Complete protection from major natural disasters such as wild fires is extremely difficult to provide. Preparation for all possible contingencies is impossible. The KID has determined that there are some water issues that exceed standard fire protection measures that may reduce wild fire damage to the community. These measures as applicable to the KID are identified in the KID Fire Preparedness Policy (FPP). The FPP issues identified are not necessarily immediately achievable. The FPP measures identified are a goal to be achieved to minimize future wild fire damage to the KID community.

The existing District facilities provide the level of structure fire protection originally intended. Recent wild fire events have identified several areas where water system performance above original design standards and in some cases additional capacities above current standards would be prudent. The FPP is an attempt to identify these areas and set goals to achieve reasonable standards.

The FPP identifies goals in four areas. These areas are as follows:

- Reservoir storage to maintain gravity supply to the distribution system for each pressure zone.
- Distribution piping to deliver the water supply to all areas of the District.
- Pumping capacity to supplement reservoir storage and transfer water to higher zones when necessary.
- Operational guidelines necessary to maximize system performance and minimize water loss during a wild fire event.

Following is a detailed discussion of each goal:

1. Reservoir Storage

The FPP reservoir storage goal is to provide storage in each zone to supply fire flow to multiple fire hydrants simultaneously in addition to customer demand. Fire flow storage goal is to provide 1,250 gpm at two locations for duration of two hours (300,000 gallons) plus 20 gpm for each customer for two hours (2,400 gallons per customer). The following table identifies the reservoir fire flow storage goals for each zone. Total services include planned developments.

Service Zone	Total Services	Customer Demand (gallons)	Fire Storage (gallons)	FPP Goal (gallons)	Existing Storage (gallons)
Eucalyptus Zone	62	148,800	300,000	448,800	180,000
Holly/Sage Zone	205	492,600	300,000	792,600	525,000
East Tank Zone	61	146,800	300,000	446,800	150,000
West Tank Zone	25	60,000	300,000	360,000	500,000
Brown/Glen Zone	77	184,800	300,000	484,800	250,000
Vosburg Zone	195	468,000	300,000	768,000	1,250,000

Note: FPP storage goal does not include reservoir operational storage. The FPP reservoir storage goal will be accomplished through new reservoir construction resulting from development and/or replacement or reconstruction of existing reservoir facilities.

2. Distribution Piping

The FPP distribution piping goal is to improve the distribution piping network to increase the delivery capability to all fire hydrants and customer services. The original system design required capability of delivering 750 gallons per minute of water to a single fire hydrant. The current distribution piping has the capability to meet this requirement. Flow requirements have been increased by revisions to the County Fire Department regulations. New construction within the District requires a minimum of 1,250 gpm flow for 2 hour duration.

The FPP goal is to improve the distribution system piping within each service zone to provide 1,250 gpm flows to two fire hydrants flowing simultaneously, plus a flow of 20 gpm for each customer service within the service zone. This goal is not immediately achievable. The goal will be accomplished by adequately sizing new water mains and replacing existing mains as required due to system modifications and pipe deterioration due to age. Additional fire hydrants will be added where required to meet the revised Los Angeles County requirement of 450 feet maximum vehicular distance to structures.

3. Pumping Capacity

The FPP pumping capacity goal is to improve the reliability, efficiency, and capacity of the District's pumping facilities. The existing pumping facilities have adequate capacity to provide maximum day domestic demands. Tunnel well water is required to meet maximum day domestic demand for some zones. Development of additional customer services will increase demand above current pumping capacities. Additional pumping capacity is required to meet the additional demands.

The FPP pumping capacity goal is to improve pumping facilities to the following standards:

- A. Pumping capacity for each zone will be sufficient to pump maximum day demand during Edison Company off-peak demand 16-hour daily pumping period.
- B. Pumping capacity will be sufficient to replace fire flow storage within a minimum of one 24-hour period.
- C. Pump facilities for each zone will include a minimum of two pumps:
 - One (1) Duty
 - One (1) Standby

There will be an alternative for larger capacity facilities having three pumps:

- Two (2) Duty
- One (1) Standby

Pumps will be high efficiency vertical turbine pumps, with pump can manifold, aboveground discharge, and pump control valve check valves to minimize system pressure surges. Each facility will include provisions for emergency generator lug connections. Emergency generator shall provide power to a minimum of one Duty pump. Pump station piping shall include provisions for bypass valve and bypass connections for fire engine pumping equipment or portable emergency pumping equipment.

The FPP goal will be accomplished by applying the above standards to all new pumping facility designs and upgrading existing facilities to above standards when capacity modifications are required or when pumping equipment is replaced.

4. System Operational Guidelines

The FPP guidelines were developed from discussions with KID staff focusing on the 1993 wild fire incident. The goal of the operational guidelines is to make efficient use of the water supply to protect the KID customers and maximize fire department suppression capabilities. In the event of wild fire danger, the KID staff will attempt to implement the following guidelines:

- A. General Manager or Facilities Supervisor will coordinate water system operation with fire department deployment of manpower and equipment.
- B. Whenever possible, KID staff will attempt to minimize water waste by stopping visible leaks from damaged structures and/or irrigation systems. Water service to damaged structures and/or irrigation system may be turned off.
- C. Fire department pumping equipment may be deployed and connected to inter zone transfer facilities.
- D. Bypass valves or pumping facilities may be operated as required to make up reservoir storage losses. Transfers between zones will be made only when necessary and only when transfer will not deplete zone storage below levels required to provide adequate fire protection. Transfer of water between zones will be at the discretion of the General Manager or Facilities Supervisor.

- E. District emergency portable generator will be maintained and tested monthly and placed in service when required to provide emergency power for pumping when anticipated power failure is expected for a duration of more than 2 hours. Additional emergency generators will be provided at the discretion of the General Manager or Facilities Supervisor.
- F. District's two portable pumps will be maintained and tested monthly and placed in service when prolonged power outages and/or failure of booster pumps require the use of the pumps to maintain adequate reservoir storage levels.



WATER MASTER PLAN
FOR
THE KINNELOA IRRIGATION DISTRICT

Adopted by the Board of Directors on June 20, 2000

Revision 1 dated June 20, 2005
Adopted September 20, 2005

Revision 2 dated October 21, 2007
Adopted January 15, 2008

Revision 3 dated January 2, 2014
Adopted ~~January 21~~ April 22, 2014

Melvin L. Matthews
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WATER MASTER PLAN EXECUTIVE SUMMARY

The KID Water Master Plan provides a description of the Kinneloa Irrigation District's (KID) domestic water distribution system. It describes present, historical, and future water demands and potential future changes in the source of water supply. The Master Plan identifies and prioritizes necessary improvements and sets out cost estimates for implementing the improvements.

Since its formation in 1953, the KID has made minor renovations or upgrades to its system, based on a policy only to repair or replace facilities and pipelines as needed. However, by the mid 1990s a number of factors convinced the Board and many residents that significant upgrades to the system were needed.

Originally in 1953, the KID's parent systems' minimum fire flow standard was 750 gallons per minute (gpm) for 2 hours. This means that a fire truck could pump 750 gpm for up to 2 hours for a fire and all others homes in the same pressure zone would have enough residual pressure for basic domestic needs. Then in 1973 the Improvement District No. 1 (formerly Mira Loma Mutual Water Company) was designed for an average fire flow of 1000 gpm with 20 pounds per square inch (psi) residual. However, average means not every fire hydrant would meet this current standard. Currently, the County of Los Angeles Fire Department has a minimum standard of 1250 gpm to be pumped for 2 hours. Today, in ~~2007~~14, approximately ~~40~~25% of the current system ~~doesn't~~does not meet the new standard for fire flow and fire hydrant location. The firestorm of October 1993 exposed weaknesses in the KID's pipeline delivery capacities. The Fire Preparedness Policy (FPP) was developed in February 1997 and revised in April 2005. The intent of the FPP was to set goals to be achieved to prepare for future multiple structure fires within the KID community. As a result, the KID Fire Preparedness Policy now requires that all new facilities, including pipe, be sized to support a fire flow of 1250 gpm with 20 psi minimum residual for 4 hours. The FPP is included as Exhibit III in the Appendix.

The information and data used in the Water Master Plan were developed from a number of sources:

- Discussions with the KID staff.
- A review of KID files dating back to 1953 was used for a baseline to build the initial data.
- Hydraulic studies completed for the Kinneloa Ridge Development and the Doyne Road Development contributed important information to the plan.
- The average day and maximum day demands were developed during the 1990-1991 droughts.

In April of 1996, ASL Consulting Engineers conducted a study of the KID to identify water main and reservoir improvements required to increase water system capabilities to deliver domestic demands plus 1,250 gpm- fire flows. As a part of this plan ASL Consulting Engineers prepared cost estimates in April 1996, with updates in February of 2000. Staff reviewed these estimates and made adjustments for inflation and other factors to update the plan for 2005, ~~2007~~2014 and again for this update in ~~2007~~14.

The difference between the 2000 costs and 2005 costs was an increase of \$1,064,400. The net increase was attributed to the following factors:

- Inclusion of planned maintenance items in the amount of \$687,400 that are expected over the next ten years.
- The estimated cost of remaining projects after removing completed projects and adding new projects identified since the master plan was adopted.
- Adjustment of previous costs to reflect inflationary and other factors in current project costs.
- Exclusion of projects paid by developers.

The following projects ~~were have been~~ completed ~~between the 2005 and since the 2005~~ revisions:

- East Tank ~~was has been~~ refurbished.
- K-3 Well pump and motor ~~have been were~~ rebuilt.
- One of the Holly booster pumps ~~has been was~~ rebuilt.
- Safety upgrades were completed at Holly Tanks.
- Maintenance agreement with tank maintenance company was established for all five steel tanks.
- Earthquake-sensing valves ~~have been were~~ installed as part of our emergency preparedness program at all tank and reservoir facilities except for the Brown Reservoir.
- Continuous chlorine analyzers ~~have been were~~ installed at all production sources.
- Major upgrades to our SCADA system were completed to allow continuous monitoring and alarms on additional components of our production and distribution system.
- Permanent repairs and pipeline replacement were completed on the House Tunnel and the High/Low Pressure Tunnel production sources.
- The Vosburg booster pump was replaced with a new 25 HP submersible unit.

The total estimated costs for remaining projects as revised and updated in ~~this the~~ 2007 Revision using ~~our engineers' estimates and our~~ internal estimates ~~are were~~:

1. Pipeline Improvements	\$3,128,000
2. Pump Station Improvements	\$ 190,000
3. Tunnels	\$ 321,000
4. Other Improvements	\$ 189,000
5. Planned Maintenance	<u>\$ 542,000</u>
Total	<u>\$4,370,000</u>

The difference between the 2005 costs and 2007 costs is an increase of \$1,187,400. The net increase ~~is was~~ attributed to the following factors:

- Adjustment of previous costs to reflect inflationary and other factors in current project costs.
- A significant increase in pipeline construction costs based on bids for current projects.
- The estimated cost of remaining projects after removing completed projects and adding new projects identified since the master plan was adopted.

The following projects have been completed since the 2007 revision:

- All five steel tanks have been refurbished as necessary to maintain “as-new” condition.
- K-3 Well pump inspected and lowered 20 feet.
- New main installed connecting K-3 Well with the Wilcox Reservoir.
- Installed replacement mains in Kinneloa Mesa area.
- Replaced chlorine generators at two sites with Chlortec[®] units.
- Installed earthquake-sensing valve at the Brown Reservoir as part of our emergency preparedness program.
- Replaced pipeline in a portion of Villa Knolls Drive.
- Continuing upgrades to our SCADA system were completed to allow continuous monitoring and alarms on additional components of our production and distribution system.
- Solar power and SCADA installed at Brown Reservoir.
- Completed joint emergency interconnect project with Pasadena at two locations.
- Purchased additional emergency generators for three facilities.
- Installed utility electrical service at the East Tank to supplement existing solar power supply.
- Rebuilt Wilcox Reservoir 75 HP booster pump and motor.
- Rebuilt Pasadena Glen booster pump and motor.
- Installed replacement mains in Windover Road and portions of Sierra Madre Villa Avenue.
- Installed replacement connection and valves at the Vosburg Reservoir.
- Installed Variable Frequency Motor Control on K-3 Well pump.
- Replaced and added valves on main line on Villa Heights Road in East Tank pressure zone.
- Upgraded Chlorine analyzer at K-3 Well to include pH measurement.
- Replaced water depth measuring tube at Wilcox Well.
- Converted PCIC Interconnection facility to radio-based telemetry system.
- Rebuilt two of the Eucalyptus booster pumps.
- Installed transponders for radio reading of customer water meters.

The total estimated costs for remaining projects as revised and updated in this 2014 Revision using our engineers’ estimates and our internal estimates are:

<u>1. Pipeline Improvements</u>	<u>\$2,564,000</u>
<u>2. Pump Station Improvements</u>	<u>\$ 520,000</u>
<u>3. Tunnels</u>	<u>\$ 361,000</u>
<u>4. Other Improvements</u>	<u>\$ 105,000</u>
<u>5. Planned Maintenance</u>	<u>\$ 397,000</u>
<u>Total</u>	<u>\$3,947,000</u>

The difference between the 2007 costs and 2014 costs is a decrease of \$423,000. The net decrease is primarily attributed to the completion of many master plan projects during the past seven years offset by the higher costs of some of the remaining projects. The overall cost of completing the master plan as compared to the original 2000 master plan is subject to the following factors:

- Adjustment of the previous costs of uncompleted projects to reflect inflationary and other factors.
- Adjustment of the previous costs based on the bidding results of similar projects.
- The estimated cost of remaining projects after removing completed projects and adding new projects identified since the master plan was adopted.

In conclusion, many of the distribution and transmission facilities predate 1953, and are nearing the end of their useful service life. Originally, water facilities in the KID provided domestic supply, plus a fire flow of 750 gpm. As the population of the KID has grown over the years, the demand placed upon the entire system, including distribution and transmission mains, water sources, reservoirs, and pump stations have encroached upon the ability of the system to meet the required demands. The need for increased fire flow to meet the minimum Fire Department requirements for every fire hydrant will require the KID to construct improvements to the water system in the years ahead. Although many projects identified in the Water Master Plan adopted in 2000 and subsequent revisions have been completed, failure to continue to undertake the expenditures for the remaining projects leaves the KID vulnerable to serious and sustained service failure in the event of natural disaster or unanticipated breakage. Moreover, the cost to replace facilities and pipelines under non-optimal emergency conditions is likely to be much higher than if done under a planned program.

As a footnote to this 2007¹⁴ Revision, it should be noted once again that this Master Plan was primarily developed to address fire flow issues and general emergency preparedness issues that were raised after the 1993 firestorm. Although many operational improvements are gained through completion of recommended projects, this Master Plan does not address many worthwhile projects that would improve the operational efficiency and reliability of the production and distribution system. For example, ~~we are currently in a period of sustained drought with no expectation of normal rainfall in 2007-2008 season. Since~~ the Wilcox Well is no longer a major production facility due to declining pumping levels in the Raymond Basin and ~~since~~ production level from the tunnels has also been declining due to lower average rainfall, the drought, That has made the KID~~we are~~ increasingly dependent on a single production source – the K-3 Well. If the current conditions continue or worsen in the years ahead, the K-3 Well may not be able to meet our production demands for normal or emergency conditions. Therefore, the KID staff will continue to examine possible new production sources such as drilling a new well and/or constructing a connection with Foothill Municipal Water District in order to receive imported water from the Metropolitan Water District. However, the cost of developing new production sources is not currently reflected in this Master Plan. Therefore, unless additional funding sources are identified, voluntary or mandatory conservation programs may continue to be necessary in the future to avoid major additional capital expenditures not included in this revision of the Master Plan.

**KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN
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KINNELOA IRRIGATION DISTRICT

WATER MASTER PLAN

2.0 SYSTEM DESCRIPTION

2.1 *General*

The Kinneloa Irrigation District is divided into two distinct geographic areas. They are the east service area and the west service area, which are generally, divided by the Wilcox Canyon watercourse. Presently, the east and west service zones are connected by pipelines consisting of 6-inch and 8-inch pipe connecting the Holly Booster Pump Station, the East Tank, and the Vosburg Booster Station.

Almost all of the services in the KID are residential services for single family homes. The need for irrigating hillsides on relatively large lots creates much of the demand. Services and meters range from 3/4" to 2" in size.

Within each service area are several pressure zones which are serviced by a piping network, reservoirs, booster pump stations, wells, and horizontal water tunnels. See Exhibit II for a schematic drawing of the existing KID system.

2.2 *Water Sources*

2.2.1 Water Wells

The KID owns ~~five and operates two~~ water wells. ~~Two of these wells are operational and are, which are the~~ the primary source of water for the District. Those wells are the Wilcox Well which supplies the Wilcox Reservoir and the K-3 Well which supplies the Eucalyptus Reservoir. Both wells pump from the Raymond Basin. The District's adjudicated pumping allowance is 516 acre-feet per year plus an allowance for spreading. The current pumping allowance has been reduced by 30% to 361 acre-feet by informal agreement among water agencies to help maintain basin water levels. Current production is approximately 900 acre-feet per year. Both wells are equipped with deep-well, oil-lubricated, vertical turbine pumps and on-site generated sodium hypochlorite (0.8%) chlorinators with ~~LMI~~ metering pumps for disinfection. Well status signals are received via radio telemetry and start-stop commands are based on reservoir levels and time-of-use schedules to take advantage of off-peak electricity rates. See Table 2.~~2-1A~~ for a summary of well data.

TABLE 2.-2-1A
WELL DATA

Well Name	Year Drilled & Depth	Casing Size (inches)	Motor Horsepower	2006112-20007123 Production
Wilcox Well	1924 500'	14"	100	701058 acre-feet
K-3 Well	1965 700'	14" I.D.	125	860708584 acre-feet*

* Includes production of wholesale water sold to the City of Pasadena.

2.2.2 Tunnels

The KID owns and operates 15 water supply tunnels. The tunnels were originally constructed by hand in the 1800's and, in recent times, have supplied groundwater to the KID system and for spreading. Tunnel flow rate varies continuously according to the time of year. Tunnel water is delivered via gravity. Table 2.-2-2AB summarizes the tunnels, their status, and production.

TABLE 2.-2B-2A
TUNNEL SUPPLIES

Tunnel Name	Current Status	2006112-2007123 Production
High & Low Pressure Tunnels (4)	Currently in Service – feeds the Holly Tanks	1319454 acre-feet
House Tunnel	In service – feeds the Holly Tanks	27164 acre-feet
Eucalyptus Tunnel	In service – feeds the Eucalyptus Reservoir	451 acre-feet
Long Tunnel	In service for spreading	3784 acre-feet
Delores Tunnel	In service – feeds the Vosburg Reservoir or used for spreading	845817 acre-feet
Far Mesa Tunnels (2)	In service – feed the Glen Reservoir	134139 acre-feet
Tent Tunnel	In service for spreading	32 acre-feet
Falls Tunnel	In service for spreading	Not measured Measured for spreading credit only
Diversion Tunnel	In service for spreading	Not measured Measured for spreading credit only
Winifred Tunnels (2)	Not in service	Not measured

~~The KID also receives spreading credit from the Sierra Madre Villa Debris Basin and the Kinneloa Canyon Debris Basins. Total production from these sources for 200611-200712 was 202168 acre-feet.~~

Depending on the season of the year, the tunnels are each capable of supplying anywhere from a few gallons per minute up to a hundred gallons per minute or more.

The tunnels have traditionally been a low cost source of water for the KID. However, the firestorm of October 1993 damaged the High and Low-Pressure Tunnel delivery pipelines. The rainstorms of the winter of 1993-94 further damaged the High and Low Pressure Tunnel pipelines. The High and Low Pressure Tunnel pipelines were further damaged in the winter storms of 1994-95. As a result of the aforementioned natural disasters, temporary repairs were made to return these sources to service and permanent repairs were made in 2006. Old age, rockslide damage, and rain storm runoff washed out the Delores Tunnel delivery pipeline. This pipeline was replaced in 2001 after being out of service since 1979.

Because of the age of the tunnels and their vulnerability to damage from natural causes, the tunnel supply is not considered as a reliable source of supply for the purpose of calculating available water source supply. In this respect, the tunnel supply should be thought of as a reserve or "back-up" supply.

2.2.3 Spreading Credit and Leased Water Rights

The KID receives spreading credit for surface water diversion to the Sierra Madre Villa and the Kinneloa Canyon Debris Basins. Total credit from these sources for 2012-2013 was 161 acre-feet. Leased Water Rights are available in some years from other water agencies to supplement our adjudicated pumping rights. Water from these sources is produced by the K-3 and Wilcox Well pumps and is included in the totals for those production sources.

2.2.4 Imported Water

The Kinneloa Irrigation District is a member of the Foothill Municipal Water District (FMWD) which supplies imported water from the Metropolitan Water District of Southern California (MWD) to eight member agencies in the area. Although there is no physical pipeline connection from FMWD to the KID, arrangements could be made to deliver the water through the distribution systems of an adjacent water agency if supplemental water is ever needed.

2.2.3.5 Interconnections with the City of Pasadena

The KID ~~currently~~ has ~~onesix~~ six interconnections with the City of Pasadena to deliver excess KID ~~excess~~ water to the City of Pasadena and/or to receive ~~and~~ has water in the event of an ~~five~~ emergency ~~interconnections~~. These interconnections are shown in Table 2.-2-2BC. The capacity of interconnections 3 and 5 ~~were~~ is ~~increased~~ increased ~~are planned to be increased~~ in ~~2007 or~~ 2008 as a joint project with the City of Pasadena.

**TABLE 2.-2-2BC
INTERCONNECTIONS WITH CITY OF PASADENA**

ID	Location	Description	Size	Capacity	Purpose
1	1776 Kinneloa Canyon Road	KID-Eucalyptus (1125 HWL) to Pasadena-Sheldon (1050 HWL)	4"	800 gpm	Deliver excess KID excess water to City of Pasadena
2	1727 Kinneloa Canyon Road	Pasadena-Calaveras (1209 HWL) to KID-Eucalyptus (1125 HWL)	4"	650 gpm	Emergency interconnection to KID-Eucalyptus (K-3 Well System)
3	3560 Ranch Top Road	Pasadena-Don Benito (1432 HWL) to KID-Vosburg (1430 HWL)	4 8"	4 800 gpm	Emergency interconnection to KID-Vosburg & Brown/Glen System <u>and to deliver excess KID water to Pasadena</u>
4	2999 New York Drive	Pasadena-Sheldon (1050 HWL) to KID-Wilcox Reservoir (944 HWL)	6"	1200 gpm	Emergency interconnection to KID-Wilcox- Well/Wilcox Reservoir
5	3410 Fairpoint Street	KID-Vosburg (1430 HWL) to Pasadena-Murray System (1176 HWL)	2 8"	2 400 gpm	Emergency interconnection to Pasadena-Murray/Calaveras System <u>and to deliver excess KID water to Pasadena</u>
6	2650 New York Drive	Pasadena-Calaveras (1209 HWL) to KID-Eucalyptus (1125 HWL)	8"	1500 gpm	Emergency <u>interconnection to KID to provide additional</u> F ire P rotection for Dove Creek Town Homes

2.2.6 Portable Booster Pumps and Generators

The KID currently has two (2) trailer mounted portable boosters available for emergency operations and to supplement fire flows in some or all pressure zones. These pumps are capable of 1050 gallons per minute (gpm) at 360 feet Total Dynamic Head (TDH). The KID also has ~~four~~ one diesel-powered trailer mounted portable generator s to supply emergency power to any of the KID facilities.

2.3 Reservoirs

The KID operates and maintains tennine (910) water storage tanks and reservoirs. Overflow elevations range from 940 feet to 1,637 feet. Reservoir data is shown in Table 2.-3A.

**TABLE 2.-3A
STORAGE RESERVOIR DATA**

Reservoir Name	Number & Capacity	Zone Served	HWLH igh Water Line	Construction
Eucalyptus	1 - 0.180 MG	Eucalyptus	1,125'	Partially Buried Reinforced Concrete
Wilcox	1 - 1.125 MG	N/A	940'	Partially Buried Concrete
Holly Tanks	2 - 0.150 MG	Holly/Sage	1,460'	Circular, Welded Steel Aboveground
Vosburg	1 - 1.250 MG	Vosburg	1,430'	Partially Buried Reinforced Concrete
Glen	1 - 0.125 MG	Glen/Brown	1,265'	Buried Reinforced Concrete
Brown	1 - 0.125 MG	Glen/Brown	1265'	Buried Reinforced Concrete
East Tank	1 - 0.150 MG	East	1,637'	Circular Welded Steel, Aboveground
Sage Tank	1 - 0.225 MG	Holly/Sage	1,457'	Circular Welded Steel, Aboveground
West Tank	1 - 0.500 MG	West	1,634'	Circular Welded Steel, Aboveground
Total Storage	3.980 MG			

MG = Million Gallons

Existing storage capacity by zone is shown in Table 2.-3B.

**TABLE 2.-3B
STORAGE CAPACITY BY SERVICE ZONE**

Zone	Storage Capacity
Eucalyptus	0.180 MG
Holly/Sage	0.525 MG
Glen/Brown	0.250 MG
East Tank	0.150 MG
Vosburg	1.250 MG
West Tank	0.500 MG

2.4 *Booster Pumping Facilities*

The KID operates and maintains five (5) separate booster-pumping facilities. All booster pumps are operated via telemetry and based upon reservoir levels. Booster pump facility data is shown in Table 2.-4.

**TABLE 2.-4
BOOSTER PUMPING FACILITIES**

Facility Name	No. of Pumps	Horsepower	Head (feet)	Approx. Capacity (gpm)	Service
Eucalyptus	3	50 HP each	346'	400 each	Eucalyptus Reservoir to the Holly/Sage Tanks
Holly	2	20 HP each	205'	200 each	Holly Tanks to East Tank
Vosburg	1	25 HP	195'	280	Vosburg Reservoir to East Tank
Glen	1	25 HP	165'	345	Glen Reservoir to Vosburg Reservoir
Sage	2	25 HP each	205'	400 each	Sage Tank to West Tank
Wilcox Reservoir	1*	75 HP	325'	515	Wilcox Reservoir to <u>Brown/Glen Reservoirs</u>
		75 HP	490'	360	Wilcox Reservoir to Vosburg Reservoir
	2**	50 HP & 75 HP	325'	650	Wilcox Reservoir to <u>Brown/Glen Reservoirs</u>
		50 HP & 75 HP	490'	433	Wilcox Reservoir to Vosburg Reservoir

* Condition when pumping to either Brown/Glen Reservoirs or Vosburg Reservoir with just the 75 HP pump.

** Condition when pumping to either Brown/Glen Reservoirs or Vosburg Reservoir with both ~~the 75 HP and 50 HP~~ pumps.

2.5 *Piping*

2.5.1 Existing Piping

There are approximately 66,000 L-F-Linear Feet of transmission and distribution mains in the KID service area. The pipes range in size from 1" to 12-inch in diameter. Piping materials include galvanized steel, CML and CMC steel, asbestos cement (AC), ductile iron (DI) and AWWA C-900 PVC. There are approximately 90 fire hydrants in the system ranging in size from 2 ½" to 6" x 4" x 2 ½". All of the galvanized steel piping is old and obsolete. Some of the existing pipe is old and inadequate to provide current revised requirements for fire service.

2.5.2 Future Piping

Traditionally, piping in the KID was sized to provide for fire flows of 750 gpm. The firestorm of October 1993 exposed this pipeline delivery capacity weaknesses. As a result, the KID Fire Preparedness Policy now requires that all new facilities, including pipe, be sized to support a fire flow of 1,250 gpm with a

20 psi minimum residual. This represents a 500 gpm increase to the original system design capacity of 750 gpm fire flow at 20 psi minimum residual pressure. Some areas of the existing system meet the new requirements; however, portions of the distribution system will provide only the minimum original system design fire flows. Additionally, the County of Los Angeles has required 2000 gpm or more fire flow for some of the new larger homes currently being built where fire sprinklers are required. Future pipeline projects may need to be sized to support this flow.

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

3.0 EXISTING SERVICE DEMANDS

The KID services approximately 600 customers with a population of approximately ~~1,450~~1,500. Service sizes range from 3/4" to 2". All services within the District are residential with the following exceptions:

- High Point Academy
- Magic Growers
- Los Angeles County Fire Station No. 66
- Pasadena Church of Christ
- Equestrian Center

The KID produces water from two wells and several tunnels. The ~~2006~~2012-~~2007~~2013 production from those sources is shown in Table ~~3.10~~3.11.

TABLE ~~3.0-1~~3.11
TUNNEL AND WELL PRODUCTION
DELIVERED TO DISTRIBUTION SYSTEM ~~2006~~2012-~~2007~~2013

Source	2006 <u>2012</u> - 2007 <u>2013</u> Production
K-3 Well	860.1 <u>584.2</u> acre-feet*
Wilcox Well	7057.26 acre-feet
High and Low Pressure Tunnels	13153.05 acre-feet
Far Mesa Tunnel	1339.43 acre-feet
House Tunnel	2614.53 acre-feet
Eucalyptus Tunnel	44.640.7 acre-feet
Delores Tunnel	8317.46 acre-feet
TOTAL	1229.0807.0 acre-feet

* Includes production of wholesale water sold to the City of Pasadena.

Additional production from tunnels is delivered for spreading in the Raymond Basin. Water delivered for spreading can be recovered by the District by increased pumping allotments or can be sold to other water purveyors. In ~~2006~~2012-~~2007~~2013, water delivered for spreading by the KID amounted to ~~202161~~ acre-feet. The sources of this water in a particular year can include the High and Low Pressure Tunnels, the Long Tunnel, Delores Tunnel, Diversion Tunnel, Falls Tunnel, Winifred Tunnels, Tent Tunnel, and surface runoff from watershed owned by the District into the Glen Wash, Kinneloa Canyon ~~Debris Basins~~ and the Sierra Madre Villa Debris Basins.

KINNELOA IRRIGATION DISTRICT

WATER MASTER PLAN

4.0 FUTURE DEVELOPMENT

4.1 *General*

A report dated July 2, 1990, prepared for the KID by ASL Consulting Engineers identified a potential for 95 new dwelling units within the KID boundaries. The report identified 57 potential units which would be built by developers and another 38 units which would most probably be constructed as single units and not part of a development project. Since that time all major development work has been completed except for a potential development ~~of 8-12 homes~~ in the Doyne Road area as described below and the building or re-building of approximately 25 homes on individual vacant lots.

4.2 *Doyne Road Development*

Hydraulic studies were completed for a potential development (Tract no. 44323) that ~~is was~~ planned to be constructed in the south central area of the KID. The new tract ~~was to would~~ be served from the existing Holly/Sage Zone. The development requires ~~d~~ the grading of ~~8-12~~ undeveloped lots ranging in size from 0.60 acres to 3.0 acres. Total area ~~is was~~ approximately ~~13-18~~ acres ~~independ~~ing on the final development plan. Water system improvements for this tract ~~were to would~~ include new distribution and transmission mains and a new booster pump station at the Wilcox Reservoir. ~~However, after grading was completed for 8 lots, the property was purchased from the developer by an individual who subsequently abandoned plans for the tract and combined the lots into two separate parcels. As of January 2014, the~~ The status of for building homes on these parcelsthis project is not known. is uncertain at the present time. There is also an adjacent two acre parcel under separate ownership on which the home was not rebuilt after it was destroyed in the 1993 Kinneloa-Altadena firestorm.

4.3 *Potential Future Well Sites*

The KID has a few potential future water source well sites within the District boundaries. The Equestrian Center north of New York Drive was acquired by Los Angeles County and incorporated into the Eaton Canyon Natural Area. The park status will allow for a well site for the District. The area of Wilcox Canyon, north or south of the Wilcox Reservoir also offers potential for a future well site.

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

5.0 CAPACITY CHARGE IMPROVEMENT FEE

Improvements were made to the KID water system during the Dove Creek Development in 1987-1990. These improvements included improvements to the K-3 Well, Eucalyptus Reservoir, and piping in New York Drive. At the time of these improvements, the KID decided to build in reserve system capacity and redundancy beyond that required by the Dove Creek Development. Because the cost of the improvements was beyond what was required by the Dove Creek Development, the KID funded the marginal increase of the cost of the improvements beyond the Dove Creek Development requirements.

To recover the cost of the reserve capacity, the Board of Directors of the KID in 1990 instituted a Capacity Charge Improvement Fee on all future development in the District. The fee is \$3,000.00 per lot and is only charged for existing or newly created lots that do not have an existing water service. This fee is in addition to reimbursement for the cost of installing the new water service and required system improvements.

OR:

$$\frac{1,029 \text{ B.U.}}{237 \text{ Services}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{2.26 \text{ Gal/Min}}{\text{Service}}$$

The ratio of the maximum day demand over the average day demand is the maximum day factor. For the existing Holly and East Tank Zone, the maximum day factor is as follows:

$$\frac{2.83}{1.02} = 2.77$$

Existing service demands for the number of services in 2007 for each zone were based on the calculated average day and maximum day demand factors for the Holly and East Tank Zone and are shown in Table 6-1.

TABLE 6-1
SERVICE DEMANDS BY ZONE IN THE
KINNELOA IRRIGATION DISTRICT

Service Zone	No. of Services	Average Day Demand 0.81 gpm/service (gpm)	Maximum Day Demand 2.26 gpm/service (gpm)
Eucalyptus	62	51	141
Holly/Sage	190	154	430
East	61	4950	138
West*	25	3347	-90119
Brown/Glen	70	5657	159
Vosburg	192	156	432434

~~*Homes in this area are newly constructed and average day demand is based on 1.3 gpm per acre and maximum day demand of 3.6 gpm per acre.~~

* West Tank service demand based on 1.85 gpm/acre average day and 5.12 gpm/acre maximum day demands and a 23.3 acre service area.

6.2 Future Service Demands

Future service demands for various zones in the KID system were calculated based on the number of existing services, the planned additional services and the estimated future customer service demands. Planned additional services in the KID service area have a higher potential for water use than the existing customer services. Planned additional services are estimated to be comparable to the Shaw Ranch Estate type properties. Shaw Ranch record data indicates the September 1990 – September 1991 annual demand for 24 active services, serving 16.94 acres was a total of 21,984 billing units. Average day demand for planned future services is calculated as follows:

$$\frac{21,984 \text{ B.U.}}{16.94 \text{ Acre/Yr}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Year}}{365 \text{ Days}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{1.85 \text{ gpm}}{\text{Acre}}$$

OR:

$$\frac{21,984 \text{ B.U.}}{24 \text{ Services}} \times \frac{748 \text{ Gal.}}{\text{B.U.}} \times \frac{1 \text{ Year}}{365 \text{ Days}} \times \frac{1 \text{ Day}}{1,440 \text{ Min.}} = \frac{1.30 \text{ gpm}}{\text{Service}}$$

Maximum day demand for planned future services is the average day demand multiplied by the developed maximum day factor as follows:

$$1.85 \text{ gpm/acre} \times 2.77 = 5.12 \text{ gpm/acre}$$

OR:

$$1.30 \text{ gpm/service} \times 2.77 = 3.60 \text{ gpm/service}$$

For master planning and calculation of future system demands, 5.12 gpm/acre or 3.60 gpm/service will be used to calculate future service demands per zone. Table 6.2A shows the future service demand of the potential new services by zone.

TABLE 6.-2A
FUTURE SERVICE DEMANDS BY ZONE IN THE
KINNELOA IRRIGATION DISTRICT

Service Zone	No. of Future Services	Average Day Demand 1.3 gpm/service (gpm)	Maximum Day Demand 3.6 gpm/service (gpm)
Eucalyptus	1	1.3	3.6
Holly/Sage	16	21.0	58.0 57.6
East	1	1.3	3.6
West	0	0.0	0.0
Brown/Glen	8	11.0	29.0 28.8
Vosburg	5	7.0	18.0

Table 6.-~~2B3~~ shows the sum of the water demand for existing services in Table 6.1 and the potential new services in Table 6.2A.

TABLE 6.~~2B-3~~
TOTAL FUTURE SERVICE DEMANDS BY ZONE
IN THE KINNELOA IRRIGATION DISTRICT

Service Zone	Total Services	Average Day Demand (gpm)	Maximum Day Demand (gpm)
Eucalyptus	63	8352	227145
Holly/Sage	206	269175	742488
East	62	8151	224142
West*	25	4447	119
Brown/Glen	78	10168	281188
Vosburg	197	254163	702452

* West Tank service demand based on 1.85 gpm/acre average day and 5.12 gpm/acre maximum day demands and a 23.3 acre service area.

KINNELOA IRRIGATION DISTRICT

WATER MASTER PLAN

7.0 SYSTEM IMPROVEMENTS

7.1 *General*

The KID was formed in 1953. Many of the distribution and transmission pipelines predate 1953 and are nearing the end of their useful service life. For the purposes of this plan, the useful service life of the pipelines is set at 50 years. Development of excessive numbers of leaks and/or reduced pipeline capacity are two of the indications of pipelines at the end of their useful service life.

Originally, water mains in the KID provided domestic supply plus a fire flow of 750 gpm. The existing distribution system meets the original fire flow design criteria. The firestorms of October 1993 exposed the KID pipeline delivery capacity weakness. As a result, the KID adopted a Fire Preparedness Policy which requires new water mains to be sized to provide 20 gpm per service, plus a fire flow of 1,250 gpm each at two fire hydrants simultaneously.

As the population of the KID has grown over the years, the demands placed upon the entire system, including distribution and transmission mains, water sources, reservoirs, and pump stations have encroached upon the ability of the system to meet the required demands. Population growth, plus the need for increased fire flow to provide adequate fire protection will require the KID to construct improvements to the KID water system.

7.2 *Piping*

In April 1996, ASL Consulting Engineers conducted a study for the KID to identify water main improvements required to increase water system capabilities to deliver domestic demands plus 1,250 gpm fire flows. ~~The results of the study are shown in Table 7.2.~~

All pipes that develop chronic leaks should be replaced to decrease waste of water and to achieve overall lower operational costs.

In addition, pipes which have exceeded their useful life should be replaced. It can be shown that replacing older pipelines will result in lower long-term operational costs. Pipelines which have become inaccessible due to development or are traversing private property in easements should also be replaced if practical and/or possible. Pipelines should be upsized where required to meet the fire preparedness goals. Upsizing is to be determined by hydraulic modeling and verified by field-testing.

Many Projects have been completed since the original master plan. The remaining projects that are listed in Table 7-4.2 provide a remedy for the following conditions:

- Chronically leaking pipes.
- Pipe requiring upgrade to meet domestic demand and fire preparedness goals.
- Piping which has exceeded its useful service life of 50 years.
- Piping which has become inaccessible due to development or traverses private property in easements.

TABLE 7-4.2
REQUIRED WATER MAIN REPLACEMENTS
TO MEET 1,250 GPM FIRE FLOW AND
450 FEET VEHICULAR DISTANCE

Main Size	Description	
	From	To
8"	1900 Windover Road	Corner of 2090 & 2060 Villa Heights Road
8"	Intersection Larmona Drive & Kinneloa Mesa Rd.	1908 N. Kinneloa Cano Rd.
12"	New Connection to Vosburg Reservoir	
16"	2014 Windover Road	Sierra Madre Villa Avenue
10"	Sierra Madre Villa Avenue and Windover Road	Vosburg Street
8"	Sierra Madre Villa at Windover Intersection of Sierra Madre Villa & Villa Mesa Rd.	Corner of 2090 & 2060 Villa Heights Rd. In Front of 3336 Villa Mesa Rd.
8"	Intersection of Meyerloa & Kinneloa Mesa Rd.	In Front of 2985 Meyerloa Ln.
8"	Intersection of Kinneloa Mesa Rd. & Clarmeya Ln.	In Front of 2924 Clarmeya Ln.
8"	Intersection of Kinneloa Mesa Rd. & Lindaloe Ln.	In Front of 2925 Lindaloe Ln.
8"	Intersection of Kinneloa Mesa Rd. & Doyne Rd.	In Front of 3069 Doyne Rd.
8"	Country Lane	Southeast Corner of 1747 Country Lane
12"	Glen Reservoir	Intersection Villa Highlands & Sierra Madre Villa Includes Slope from Pasadena Glen to Barhite
8"	Kinclair Dr.	Behind 2150 Kinclair Dr.
8"	Kinclair Dr.	#4 Cricklewood Path
8"	Kinneloa Canyon Rd.	Behind 2044 Piccadilly Ln.

Main Size	Description	
	From	To
8"	Intersection of Vosburg St. & Lower Pasadena Glen Rd.	In Front front of 1658 Pasadena Glen Rd.

7.3 *Booster Pump Stations*

7.3.1 Existing Booster Pump Stations

The KID presently has sufficient booster pump capacity to provide for domestic demands. The 1,250-gpm fire flow requires supplementing booster station flow with gravity flow from reservoirs.

There are booster pump facilities located at the Eucalyptus Reservoir, Holly Tanks, Sage Tank, Wilcox Reservoir, Glen Reservoir and at the Vosburg Reservoir. The booster pumps at the Eucalyptus Reservoir were replaced with high efficiency vertical turbine units in 2002 as part of the system improvements needed for the Kinneloa Ridge Development.

The booster pump at the Holly Tank is a horizontal, split case pump. A preferred installation would be high efficiency vertical turbine units set in cans.

The booster pump at the Vosburg Reservoir is a submersible, centrifugal pump. A preferred installation would be a high efficiency vertical turbine unit, but a replacement 25 HP submersible pump that was installed in 2006 is providing increased flow and efficiency as compared to the previous 20 HP unit. A permanent three-booster pump station is currently in the design process and is expected to be constructed in 2015 or 2016 if the project is approved by the KID Board.

Table 7-2.3A compares the required booster pump station capabilities with existing booster pump station capabilities. Required booster pump station capabilities will supply maximum day demand with an off-peak 16-hour maximum pumping period.

Required Booster Pump Capacity Calculations— Each booster facility must provide capacity to serve all zones in the system above the booster station.

- Eucalyptus Booster Station must provide capacity to serve Holly/Sage Zone, West Zone, and ½ of the East Zone. Flow rates required are from Table 6-3.2B.

$$\text{Eucalyptus Booster Capacity} = \frac{24}{16} (738488 + 119 + \frac{220142}{2}) = 1,451,101.7 \text{ gpm}$$

- Holly Booster Station must provide ½ of the East Zone.

$$\text{Holly Booster Capacity} = \frac{24}{16} \cdot \frac{(\underline{220142})}{2} = \underline{165107} \text{ gpm}$$

- Vosburg Booster capacity is 285 gpm.
- Glen Booster must supply Vosburg Zone and ½ of East Zone.

$$\text{Glen Booster Capacity} = \frac{24}{16} (\underline{702452} + 119 + \underline{220142}) = \underline{1,397785} \text{ gpm}$$

- Sage Booster supplies the West Zone only.

$$\text{Sage Booster Capacity} = \frac{24}{16} (119) = 179 \text{ gpm}$$

- Wilcox Booster must supply Vosburg Zone, Brown/Glen Zone and ½ of East Tank Zone.

$$\text{Wilcox Booster Capacity} = \frac{24}{16} (\underline{702452} + \underline{277188} + \underline{220142}) = \underline{1,6341067} \text{ gpm}$$

TABLE 7-2.3A
COMPARISON OF REQUIRED BOOSTER PUMP CAPACITIES

Booster Station	Required Future Pump Capacities (gpm)	Existing Capacity (gpm)**	Additional Capacity Required (gpm)
Eucalyptus	1,451 <u>1,017</u>	1,600 <u>800</u>	0
Holly	465 <u>107</u>	400 <u>200</u>	0
Vosburg*	465 <u>107</u>	285	0
Glen	1,397 <u>785</u>	345	1,052 <u>440</u>
Sage	179 <u>179</u>	400	0
Wilcox Reservoir	1,634 <u>1,067</u>	650	984 <u>417</u>

* Additional capacity and redundancy will be provided with the proposed construction of a permanent booster station at the Vosburg Reservoir in conjunction with the proposed East-West Tank connector pipeline project.

** Existing capacity reflects normal operation. Some sites have additional capacity if all boosters are used simultaneously.

Table 7-2.3B shows the proposed concept for increasing booster pump improvements to increase station efficiencies and/or capacities and provide improved redundancy.

TABLE 7-2.3B
RPROPOSED EQUIRED BOOSTER IMPROVEMENTS

Booster Station	Description
Glen	Increase booster pump capacity.
<u>Holly*</u>	<u>Replace existing pumps with two vertical turbine pumps in cans.</u>
<u>Vosburg</u>	<u>Replace existing submersible pump with three vertical turbine pumps in cans.</u>
<u>Holly*</u>	<u>Replace existing pumps with vertical turbine pumps in cans.</u>
Wilcox Reservoir**	Increase booster pump capacity.

* Not needed if East-West Tank Connector Pipeline project is completed.

** Pipeline upgrades also required to reduce pumping head.

7.3.2 Proposed Booster Pump Stations

Although the plan for an eight-home tract on Doyne Road has been abandoned, the building of two or more homes on Doyne Road Development if constructed will may require additional booster pump capacity at the Wilcox Reservoir and other pipeline upgrades. —A portion of The cost of additional booster pump capacity may will be provided by the developer. The necessary improvements have already been made at the Eucalyptus Booster Pump Station in conjunction with the Kinneloa Ridge Development and the main on Doyne Road was replaced as part of the Kinneloa Mesa pipeline improvement project. However, two new 50 HP booster pumps at the Wilcox Reservoir will be needed to supply the Holly Tanks.

7.4 *Tunnels*

7.4.1 High Pressure Tunnel

The High Pressure Tunnel pipeline is currently in service and supplies water to the Holly Tanks or the West Tank. The High Pressure Tunnel pipeline was damaged during the firestorms of October 1993. Additional damage occurred from mudslides during the rainy season of subsequent years. In 1994, the High Pressure Tunnel pipeline was repaired with FEMA funding. In the winters of 1994-95 and 2004-05, the High Pressure Tunnel pipeline was again damaged by mudslides. The KID applied for FEMA funding as a result of the disaster declaration after the 2004-2005 storms and permanent repairs were completed in 2006 using a combination FEMA funds and KID funds.

7.4.2 Low Pressure Tunnels

Pipelines delivering water from the Low Pressure Tunnels to the Holly Tanks have been out of service at various times since 1993. Both low pressure tunnel pipelines were damaged during the fire storms of October 1993. Further damages occurred from mudslides during the rainy seasons of subsequent years. In 1994, the lower Low Pressure Tunnel pipeline was replaced using FEMA funding. In subsequent rainy seasons, the tunnel has since been buried by mudslides. The storms of 2004-2005 further damaged the lines. The KID applied for FEMA funding to repair the lines in order to take advantage of the low cost water supply. The upper low pressure tunnel pipeline was replaced and put back in service in 2006. The lower low pressure tunnel was excavated to the tunnel face, but further work has been suspended due to lack of funding and safety concerns.

7.4.3 House Tunnel

The House Tunnel pipeline was also damaged in the 2004-2005 storms. The damaged section was replaced with flexible hose suspended from a cable and the rest of the pipeline was inspected and repaired at two locations. Since the majority of the pipeline is galvanized steel and was installed decades ago, it is expected that the pipeline will need to be replaced within the next 20 years even if there is no further storm damage.

7.4.4 Delores Tunnel

The Delores Tunnel was out of service between 1979 and 2001 due to rockslide and rain storm damage to the delivery pipeline. Although this pipeline was replaced in 2001 with flexible hose suspended from a cable for much of its length, it is still vulnerable to damage in the future. Therefore, it is expected that portions will need to be repaired or replaced within the time frame of this master plan.

The required tunnel maintenance and improvements are listed in Table 7-3.4.

TABLE 7-3.4
REQUIRED TUNNEL MAINTENANCE AND IMPROVEMENTS

Tunnel	Description
High Pressure	Periodically inspect pipeline for potential damage from landslides. Inspect for leaks and repair or replace pipeline as needed.
Low Pressure	Periodically inspect pipeline for potential damage from landslides. Continue excavation of lower tunnel and complete new tunnel face and pipeline between the tunnel and the injector if tunnel flow is significant.
House	Periodically inspect pipeline for potential damage from landslides. Inspect for leaks and repair or replace pipeline as needed.
Delores	Periodically inspect pipeline for potential damage from landslides. Inspect for leaks and repair or replace pipeline as needed.

7.5 *Other Improvements*

7.5.1 General

Within Section 7 of this master plan, necessary improvements have been identified which would connect tunnel water supplies to the system and improve system hydraulics in order to meet a 1,250 gpm fire flow for two hours. Also, improvements to reservoirs have been identified which are necessary to meet a minimum 1,250 gpm fire flow for two hours plus domestic demands. ~~Finally, developer financed improvements have been identified which are necessary to provide fire flow and domestic supply to the proposed developments.~~ This section will examine other necessary system improvements.

7.-5.2 Additional Improvements

The KID has identified other capital improvements necessary to upgrade existing facilities to provide increased operational efficiency, greater margins of safety, address emergency preparedness issues and to decrease maintenance costs. Additional capital improvements are shown in Table 7-4.5.

TABLE 7-4.5
ADDITIONAL IMPROVEMENTS AS IDENTIFIED BY THE
KINNELOA IRRIGATION DISTRICT

Description
Upgrade SCADA hardware, software and communications radios to prevent obsolescence (OPS)
Provide power at the Brown Reservoir and install earthquake sensors and automatic shutoff valves and add telemetry equipment to the SCADA system to monitor conditions at this reservoir. {EP and OPS}
Replace obsolete Unieler with <u>Chortee on-site</u> chlorine generators. (OPS)
Purchase 50 kw trailer mounted generator to be used at Glen Reservoir and Sage Tank {EP}
Purchase 250 kw trailer-mounted generator to be used and Wilcox and K-3 (EP)
Purchase 50 kw generator for office {EP}
EP= Emergency Preparedness OPS= Operations Improvement

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

8.0 PLANNED MAINTENANCE PROGRAM

The KID has developed a Planned Maintenance Program for the KID’s water distribution system which extends the life of existing capital improvements. These items of work include pump overhauls, motor overhauls and replacements, reservoir recoating, reservoir roof repairs, upgrade interconnections with other agencies, purchase of small tools, upgrading various facilities, and office improvements. The items of work identified in this section are typically referred to as operations and maintenance items but due to relatively high cost they need to be budgeted in the same manner as capital improvements. Planned maintenance items identified by the staff are listed in Table 8-1.0 and are not in priority order.

TABLE 8-1.0
PLANNED MAINTENANCE PROGRAM ITEMS

Item	Description	Est. Cost
1	Install Eye Wash Stations at six locations per JPIA request	\$9,000
21	Glen Reservoir - Install Polypropylene Liner —Add protective sealer to roof to extend cap sheet	\$ 30,000
32	Upgrading of Fire Hydrant Heads- (\$ 500.00 to \$2,500 ea.)	\$34,000
43	Tunnel Maintenance (avg. \$ 7,000 per year) (amount is for a 10 year period)	\$70,000
54	Valve Maintenance (replacement cost averages \$2,500 per valve)	\$25,000
6	Vosburg Reservoir—Add protective sealer to roof	\$ 15,000
7	Upgrade of Interconnections with the City of Pasadena	\$75,000
85	Office Maintenance & Improvements: 1. Replace carpet and do interior painting; 2. Add storage shed to existing concrete pad	\$40,000
96	Brown Reservoir - Roof—add protective sealer to extend cap sheet— Install liner	\$30,000
107	Holly Tanks Erosion Control (All Phases)	\$140,000
118	Holly Boosters - Paint Booster Station	\$1,000
12	Glen Well—Remove & Replace protective wood cover with metal cap	\$ 6,000
139	Wilcox Reservoir - Pump stand/other repairs —permanent connections for portable pump	\$25,000
14	Vosburg Reservoir—Expand and repave asphalt driveway and east side of reservoir	\$40,000
1510	Service Area - Emergency prep. - install or replace “Blue Dot” Markers for Fire Hydrants	\$1,000
161	Wilcox Well - Modify dump line to dispose of water on site	\$1,000
	Total	\$542,397,000

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

9.0 PROJECT PRIORITIES

Project priorities are based upon cost-benefit considerations. Projects that will realize higher revenues per unit cost are given a higher priority than projects that will realize lower revenue, or no revenue, per unit dollar spent. Priorities are also based upon increased fire protection, increased operational efficiencies and lower maintenance costs. Projects are listed in Table 9-1.0 in order of decreasing priority in each project category.

TABLE 9-1.0
CAPITAL IMPROVEMENT PROJECTS LISTED BY PRIORITY

Priority	Project	Description
1	Pipeline	West Tank to East Tank (including portion of High/Low Pressure Tunnel line listed below). In Front of 3136 Mesaloe Lane to Intersection of Mesaloe Lane and Kinneloa Mesa Road
2	Pipeline	In Front of 2985 Meyerloa Lane to Intersection of Meyerloa Lane and Kinneloa Mesa Road
3	Pipeline	Intersection of Kinneloa Mesa Road and Clarmeya Lane to in Front of 2924 Clarmeya Lane
4	Pipeline	Intersection of Kinneloa Mesa Road and Lindaloe Lane to in Front of 2925 Lindaloe Lane
5	Pipeline	Intersection of Kinneloa Mesa Rd. & Doyne Road to 3069 Doyne Rd.
6	Pipeline	Sierra Madre Villa from Windover Road to Corner of 2090 and 2060 Villa Heights Road Replace service main in Edgecliff Lane from Villa Knolls Drive to cul-de-sac
3	Pipeline	Replace service main in eastern portion of Fairpoint Street-portion of Fairpoint Street from 3410 to last service at 3500 Fairpoint
4	Pipeline	Country Lane to Southeast Corner of 1747 Country Lane Replace service main in East Fairpoint Street from Sierra Madre Villa Avenue to the last service
8	Pipeline	Country Lane to Southeast Corner of 1747 Country Lane
9	Pipeline	Kinclair Drive to rear of 2150 Kinclair Drive
10	Pipeline	Kinclair Drive to #4 Cricklewood Path
11	Pipeline	Kinneloa Canyon Road to rear of 2044 Piccadilly Lane
12	Pipeline	Intersection of Vosburg St. and lower Pasadena Glen Rd. to front of 1658 Pasadena Glen Rd.
13	Pipeline	Replace service main in Edgecliff Lane from Villa Knolls Drive to cul-de-sac 1900 Windover Road to Corner of 2090 and 2060 Villa Heights Road
14	Pipeline	1908 N. Kinneloa Cyn. Rd. to intersection of Larmona Drive & Kinneloa Mesa Road (Doyne Road project)
15	Pipeline	New Connection to Vosburg Reservoir
16	Pipeline	Sierra Madre Villa Avenue to 2014 Windover Road
17	Pipeline	Windover Road in Sierra Madre Villa Avenue to Vosburg Street
18	Pipeline	Replace service main from Villa Knolls Drive to end of Hartwood Point Drive
19	Pipeline	Replace service main in Villa Mesa Dr. from Sierra Madre Villa Ave. to 3336 Villa Mesa Dr.
20	Pipeline	From Glen Reservoir to intersection of Villa Highlands and Sierra Madre Villa. Includes slope from Pasadena Glen to Barhite
21	Pipeline	West Tank to East Tank
22	Pipeline	Replace water main from Wilcox Well to Wilcox Reservoir
1	Tunnel	Construct permanent replacement pipeline section from High Pressure Tunnel to Holly and/or Sage Reservoir

Priority	Project	Description
2	Tunnel	Construct pipeline from lower Low Pressure Tunnel to junction with High Pressure Tunnel Pipeline north of Kinneloa Debris Basin
3	Tunnel	Replace other tunnel pipelines as required
1	Booster	Replace the existing 50 HP oil lubricated booster pump at Wilcox Reservoir with a water lubricated pump
2	Booster	Install additional booster pump and new electrical (at Wilcox Reservoir) (for Doyne Road project) if needed
3	Booster	Replace existing booster pump at Glen Reservoir with a higher capacity unit
4	Booster	Replace existing booster pumps at Holly Tank with vertical turbine pumps in a can (Not needed if West Tank to East Tank pipeline is constructed)
1	Other (Telemetry)	Provide additional telemetry to SCADA system for Brown Reservoir
2	Other (Reservoir)	Install earthquake sensor and automatic shutoff valve at Brown Reservoir
3	Other (Emergency Preparedness)	Purchase 50 kw trailer-mounted generator for Glen Reservoir
4	Other (Emergency Preparedness)	Purchase 250 kw trailer-mounted generator for Wilcox and K-3
2	Other (Preventative Maintenance)	Upgrade SCADA hardware, software and communications radios to prevent obsolescence
3	Other (Preventative Maintenance)	Replace Uniclor with Chlortec chlorine generators to prevent obsolescence
5	Other (Emergency Preparedness)	Purchase 50 kw generator for office

KINNELOA IRRIGATION DISTRICT
WATER MASTER PLAN

10.0 COST ESTIMATES FOR REQUIRED IMPROVEMENTS

10.1 *Pipelines*

Cost estimates for pipeline replacements as described in Section 7.1, are taken from a study prepared by ASL Consulting Engineers for the KID in April 1996. Cost estimates were up-dated in July 2002 and adjusted for inflation and current construction costs ~~in 2007~~ in 2014. Nearly all of the replacement pipelines are needed to meet 1,250 gpm fire flow and 450 feet vehicular distance requirements. Category definitions are as follows: EP-Emergency Preparedness; PM-Preventive Maintenance; OPS- Operational Improvement. The estimated costs are shown in Table 10-~~1.1~~ 1.1. ~~All costs are in 2007 dollars.~~ In order for the district to get the best prices for these projects, the smaller projects should be bundled in dollar amounts not less than \$150,000.

TABLE 10-1.1
PIPING IMPROVEMENTS COST ESTIMATES

Priority	Main Size	Description		Category	Cost
		From	To		
1	8"	Intersection of Meyerloa Ln. & Kinneloa Mesa Rd.	Front of 2985 Meyerloa Ln.	EP/PM 425 ft.	\$70,000
2	8"	Intersection of Kinneloa Mesa Rd. & Clarmeya Ln.	Front of 2924 Clarmeya Ln.	EP/PM 230 ft.	-\$50,000
3	8"	Intersection of Kinneloa Mesa Rd. & Lindaloe Ln.	Front of 2925 Lindaloe Ln.	EP/PM 425 ft.	\$70,000
4	8"	Intersection of Kinneloa Mesa Rd. & Doyne Rd.	Front of 3069 Doyne Rd. (Doyne Rd. Project)	EP/PM 380 ft.	\$50,000
<u>1</u>	<u>12"</u>	<u>West Tank</u>	<u>East Tank</u>	<u>EP/OPS 5000 ft.</u>	<u>\$1,150,000</u>
52	8"	Sierra Madre Villa at Windover Rd. Edgecliff Lane from Villa Knolls	Corner of 2090 and 2060 Villa Heights Road End of Cul-de-sac	EP 1840 ft. EP/PM 700 ft.	<u>\$188,000</u> \$80,000
3	<u>4"</u>	<u>Eastern portion of Fairpoint St.</u>	<u>Last service on Fairpoint St.</u>	<u>EP/PM 950 ft.</u>	<u>\$84,000</u>
63	4"	<u>Last service on Fairpoint</u>	<u>Sierra Madre Blvd.</u>	<u>PM 950 ft.</u>	<u>\$84,000</u>
74	8"	Country Lane	Southeast Corner of 1747 Country Lane	EP 270 ft.	\$28,000
85	8"	Kinclair Dr.	Rear of 2150 Kinclair Dr.	EP 250 ft.	\$38,000
96	8"	Kinclair Dr.	#4 Cricklewood Path	EP 400 ft.	\$50,000

Priority	Main Size	Description		Category	Cost
		From	To		
107	8"	Kinneloa Canyon Rd.	Rear of 2044 Piccadilly Ln.	EP 250 ft.	\$38,000
118	8"	Intersection of Vosburg St. & Lower Pasadena Glen Rd.	Front of 1658 Pasadena Glen Rd.	EP/PM 350 ft.	\$48,000
129	8"	Edgecliff Lane from Villa Knolls 1900 Windover Road	End of Cul-de-sac Corner of 2090 and 2060 Villa Heights Road	EP/PM 700 ft. EP 1840 ft.	\$80,000 \$188,000
1310	8"	Larmona Drive & Kinneloa Mesa Road	1908 N. Kinneloa Canyon Rd.(Doyne Rd. Project)	EP	\$204,000
14	12"	New Connection at Vosburg Reservoir		EP/PM	\$26,000
15	16	Sierra Madre Villa at Windover Road	Vosburg Reservoir	EP/PM 1000 ft.	\$184,000
16	10"	Windover Road & Sierra Madre Villa	Vosburg Street	EP/PM 1010 ft.	-\$134,000
171	8"	Villa Knolls Drive	End of Harwood Point	EP/PM 1960 ft.	\$204,000
182	8"	Sierra Madre Villa	3336 Villa Mesa	EP/PM 300 ft.	\$42,000
193	12"	Glen Reservoir	Intersection Villa Highlands & Sierra Madre Villa Includes Slope from Pasadena Glen to Barhite	EP/OPS 3100 ft.	\$442,000
20	10"	West Tank	East Tank	EP/OPS 5000 ft.	\$1,150,000
2114	10"	Wilcox Well	Wilcox Reservoir Line	EP/OPS/PM 500 ft.	\$60,000
SUBTOTAL					<u>\$2,778,000</u>
Engineering, Design, and Planning					\$200,000
Construction Management and Inspection					\$150,000
SUBTOTAL					<u>\$350,000</u>
TOTAL PIPELINE PROJECTS					<u>\$3,128,000</u>

10.2 *Booster Pump Station Improvements*

Cost estimates for installation of some of the booster pump improvements at the Wilcox Reservoir that were required for the Doyne Road Development (Tract 44323) were developed in a report prepared by ASL Consulting Engineers for the KID and dated June 3, 1996. Cost estimates were up-dated in February 2002 but are were not included in the KID capital project budget because it was expected that these improvements would be as they will be constructed at the developer's expense if the developer proceeds with the project. However, since the development as originally planned has been abandoned by a new owner of the property, the cost of an additional booster at the Wilcox Reservoir is not included.

Cost estimates for installation of other booster pump improvements were developed in a report prepared by ASL Consulting Engineers for the KID and dated November 3, 1995. Cost estimates were up-dated in February 2002. Although some of these projects are being deferred because of the purchase of portable pumps, they are listed for planning purposes in the event that the portable pumps are used for other purposes. Costs for improvements to the booster pumps at the Wilcox Reservoir, Glen Reservoir, Holly Tank and the Vosburg Reservoir are included in the KID capital project budget. Costs include engineering, inspection, management and contingency. All costs were updated in 2002 and have been adjusted for inflation to 2007~~14~~ dollars.

Booster Pump Station Improvements are shown in Table 10-~~2.2~~.

TABLE 10-~~2.2~~
BOOSTER PUMP STATION IMPROVEMENTS

Priority	Description	Estimated Costs
N/A	Construct new 50 HP booster pump at Wilcox Reservoir (Tract 44323)	By Developer
1	Replace the existing 50 HP oil lubricated booster pump at Wilcox Reservoir with a water-lubricated pump.	\$10,000.00
2	Construct improvements to the Booster Pump at Glen Reservoir	\$60,000.00*
3	Construct new improvements to the Booster Pump <u>Station</u> at Vosburg Reservoir	\$ 639 0,000.00*
4	Construct improvements to the Booster Pumps at Holly Tanks (Not needed if East-West Tank to <u>East Tank connector</u> pipeline is constructed)	\$60,000.00*

*~~Previously D~~deferred by purchase of portable pumps. Needed to maximize benefit if East-West Tank connector pipeline is constructed.

10.3 Tunnel Improvements

The pipeline from the upper Low Pressure Tunnel face to the new High/Low combiner was replaced in 2006. The existing High Pressure pipeline was not replaced but the line was suspended from a new cable to the combiner to protect it from landslides. The lower Low Pressure Tunnel pipeline was not replaced since there was no water exiting that tunnel at the time of the construction work in 2006. The combined High/Low Pressure pipeline from the combiner to the Kinneloa Canyon West Debris Basin may also need to be replaced in future years. The cost estimates for the remaining pipelines are shown in Table 10-~~3.3~~.

TABLE 10-~~3.3~~
TUNNEL IMPROVEMENTS

Priority	Description	Cost Estimate
1	Replace the combined High/Low Pressure Tunnel Pipeline from combiner to Kinneloa Canyon West Debris Basin	\$200,000.00
2	Replace the lower Low Pressure Tunnel Pipeline	\$ 61,000.00
3	Replace other tunnel pipelines as required	\$100,000.00

10.4 *Costs of Other Improvements*

Cost estimates for the construction or purchase of other improvements are based upon estimates by KID staff and are shown in Table 10-4.4.

TABLE 10-4.4
OTHER IMPROVEMENTS

Priority	Description	Estimated Cost
1	Purchase 250 kw portable generator for Wilcox and K-3	\$40,000
2	Upgrade SCADA hardware, software and communications radios to prevent obsolescence	\$50,000
2	Install solar power, SCADA, earthquake sensor and automatic shutoff valve at Brown Reservoir.	\$50,000
3	Replace Unielor with Chortec chlorine generators	\$13,000
4	Purchase 50 kw portable generator for Glen Reservoir	\$18,000
5	Purchase 250 kw portable generator for Wilcox and K-3	\$40,000
6	Purchase 50 kw generator for office	\$18,000

10.5 *Total Costs*

Table 10-5.5 shows total estimated costs for all necessary improvements as identified in this master plan. Cost estimates include design, inspection, construction management and contingency costs. Improvements identified to be installed and financed by developers are not included. Costs for the items identified as other work were developed for this master plan from cost estimates by the KID staff.

TABLE 10-5.5
TOTAL ESTIMATED COSTS

No.	Description	Cost Estimate
1	Pipeline Improvements	\$3,128,000 <u>2,564,000</u>
2	Pump Station Improvements	\$190,000 <u>520,000</u>
3	Tunnels	\$321,000 <u>361,000</u>
4	Other Improvements	\$189,000 <u>103,000</u>
5	Planned Maintenance (from Section 8)	\$542,000 <u>397,000</u>
	TOTAL	\$4,370,000 <u>3,945,000</u>

RESERVOIR IMPROVEMENTS

Cost estimates for District funded improvements to reservoirs are not included in the Water Master Plan. Since these costs were estimated in 1996, these projects will need to ~~Should funding become available consideration of these projects will~~ be re-evaluated if they are pursued in the future.

Existing Reservoirs

In April 1996, ASL Consulting Engineers conducted a study for the KID to identify reservoir improvements, which would have to be made to comply with the KID Fire Preparedness Policy. The results of that study indicate that additional capacity is required at the Holly Tanks, Glen Reservoir and East Tank.

Table I compares the required future reservoir storage capacity with the existing reservoir capacity for each service zone. Wilcox Reservoir is a forebay for the Wilcox Well and is not included. Required capacity is the sum of maximum day demand, operational capacity, and fire flow.

TABLE I
REQUIRED RESERVOIR CAPACITY

Reservoir	Maximum Day Demand (Gal.) *	Operational Capacity (Gal.) ***** -	Fire Flow (Gal.) **	Required Capacity (Gal.)	Existing Capacity (Gal.)	Additional Capacity Required (Gal.)
Eucalyptus Reservoir	308,160	77,000	300,000	685,160	180,000	505,160
Holly/Sage Tanks	702,720	176,000	300,000	1,178,720	525,000	653,720
East Tank	230,400	58,000	300,000	588,400	150,000	438,400
West Tank****	135,360	0***	300,000	435,360	500,000	0
Brown/Glen Reservoir	298,080	7275 ,000	300,000	670,080	250,000	420,080
Vosburg Reservoir	643,680	161,000	300,000	1,104,680	1,250,000	0

* Maximum Day Demand = 60 min. x 24 hours x max day demand (gpm/service).

** Fire Flow = 1,250 gpm for 4 hours.

*** Operational storage not required.

**** West Tank Maximum Day Demand based on (gpm/acre).

***** 25% of maximum day demand.

The proposed reservoir improvements are shown in Table II.

TABLE II
PROPOSED RESERVOIR IMPROVEMENTS

Tank	Description
Holly Tanks*	Remove both existing reservoir in two stages. Construct new concrete reservoir in two stages and miscellaneous site improvements. Increase existing Holly Tanks to provide total 1-MG storage.
East Tank*	Site has 1 existing 0.15 MG reservoir. Add two additional 0.15 MG steel reservoirs and miscellaneous site improvements. Site limitations prevent construction of total required storage. Maximum day operation will require careful management of operational levels with potential of encroaching on peak pumping Edison rate.
Glen Reservoir**	Demolish existing 0.15 MG reservoir. Construct new 0.5 MG concrete reservoir and miscellaneous site improvements.
Eucalyptus Reservoir	Emergency connections, portable pumps and tunnel supply are considered to make up storage deficit.

* ~~Considers moving Holly Tanks to East Tank site.~~ Low priority if East-West Tank connector pipeline is constructed.

** ~~Low~~ Third priority because Glen Reservoir has back up storage in Vosburg Reservoir.

Cost estimates for District funded improvements to reservoirs were developed in a study by ASL Consulting Engineers for the KID and dated April 1996. The Estimated cost for improvements to Holly Tanks, East Tanks, and Glen Reservoir are shown in Tables III, IV, and V respectively. All costs are in 1996 dollars.

TOTAL ESTIMATED COSTS

No.	Description	Cost Estimate
1	Holly Reservoir Improvements	\$612,000
2	East Tank Improvements	\$422,000
3	Glen Reservoir Improvements	\$624,000
	Total Reservoir Improvements	\$1,658,000



RESOLUTION 2014-5-20

**A RESOLUTION OF THE BOARD OF DIRECTORS OF THE KINNELOA IRRIGATION DISTRICT
URGING HEIGHTENED WATER CONSERVATION BY CUSTOMERS IN RESPONSE TO DROUGHT**

WHEREAS, California is experiencing one of the most severe droughts on record; and

WHEREAS, the 2014 water year has been one of the driest in decades and follows two consecutive dry years throughout the state; and

WHEREAS, even after recent rain and snowfall, the state's major reservoirs remain well below average levels for the date and the statewide snowpack is less than a third of normal, with little time remaining to recover in 2014; and

WHEREAS, many areas of the state will face water shortages this year; and

WHEREAS, Governor Brown declared a drought state of emergency on January 17, 2014, and called on all Californians to do their part to reduce their water use; and

WHEREAS, the Kinneloa Irrigation District's supply of local ground water is limited and has diminished over the past five years; and

WHEREAS, it is critical that all residents do what they can to use water wisely to maximize supplies and protect water reserves in case next year is dry, too; and

WHEREAS, Kinneloa Irrigation District has made significant investments in local programs to improve water supply reliability and other strategies to stretch supplies, and will continue to do so.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of the Kinneloa Irrigation District recognizes that California is in a statewide drought and there is a critical need for all Californians to use water wisely on an ongoing basis and heighten their conservation efforts now as the state continues to face drought conditions; and

BE IT FURTHER RESOLVED that the Board of Directors thanks its customers for their ongoing water efficiency efforts and asks that they re-double those efforts wherever possible at this time in response to the drought.

We certify that this is a true copy of Resolution 2014-5-20 as passed by the Board of Directors of the Kinneloa Irrigation District at its meeting on May 20, 2014.

Chair

Secretary



PERRY C THOMAS

Engineering Contractor
Underground Utilities
Lic. #672532

5-9-2014

240 W. Duarte Road
Monrovia, CA 91016

626-303-4483
626-303-0126
Fax 626-303-7959

Kinnaloo Irrigation District
1999 Kinclair Drive
Pasadena Ca. 91107

Attention: Chris Burt

RE: Brown well Landscaping

In accordance with the above referenced project we propose to furnish labor, material and equipment for the following:

1.) Install 320 square feet of 1-1/2-inch crushed rock, grade and place existing boulders along frontage, place (4) 17x30 Armocast pullboxes, 2x6 redwood headers, 3/4-inch irrigation lines.

Lump Sum \$ 7,452.00

Excludes: permits, Boulders

Rock that cannot be excavated with a John Deere 510B backhoe or equal will be removed at an extra charge, on an hourly time and equipment basis. Drilling and / or blasting if required will be done by others and paid separately by Customer. Retrenching and / or jackhammer work after rock removal, drilling and / or blasting will be at an extra charge billed on an hourly time and equipment basis.

Engineering, grading and setting of grade stakes and Customer, if required, shall do lot line markers. Customer is to have grade to within plus of minus three (3) inches on our right of way. Permits and inspection fees are to be secured, and paid for, by Customer.

The above work will be completed in a workman like manner according to the standard specification of JOB WALK. Alterations or deviations, if any, from the above specifications, or any delays of postponements of the work by the Customer or his agents which result in additional material of labor costs, will become an extra charge which will be billed as an addition to this proposal amount. Any extra move on or off the job site, due to circumstances beyond our control, will be billed as an extra in the amount of \$ 0 per move.

Progress billing, commensurate with the work complete, will be made monthly until ninety percent (90%) of the work is billed. Upon completion of all work, the remaining ten-percent (10%) retention will be billed. Extra charges will either be added to this proposal amount, or billed as above, or billed separately after the completion of work. Terms for the payment of all invoices are net thirty (30) days with a one and one-half (1 1/2%) monthly interest charge on all past due accounts.

In the event legal action is instituted to endorse any of the terms or conditions of this proposal, the prevailing party shall be entitled to recover reasonable attorney's fees and collection costs.

We are prepared to start work within ~ working days after receipt of your acceptance of this proposal and estimate that will be completed within — working days.

This proposal is good for 20 days from 5-9-, 2014.

Sincerely,

PERRY C. THOMAS CONSTRUCTION INC.


CHRIS MIKITY, Estimator

**** ACCEPTANCE****

Authorized Signature

Date

PRESENT PERFECT NURSERY

140 S. KINNELOA AVE.

PASADENA, CA 91107

(626) 449-6211

690565

CUSTOMER'S ORDER NO.		DEPARTMENT	DATE	
		626-797-6295	5/16/14	
NAME Kinneloa Irrigation District				
ADDRESS				
CITY, STATE, ZIP				
SOLD BY	CASH	C.O.D.	CHARGE	
			ON ACCT	
			MODE. RETD	
			PAID OUT	
QUANTITY	DESCRIPTION		PRICE	AMOUNT
1	Area B	70 1-gal plants	7-	490-
2		7 zen planting mix	7-	49-
3	Area C	18 15-gal Tylosma	60-	1080-
4		10 zen planting mix	7-	70-
5	Area E	40 1-gal plants	7-	280-
6		5 5-gal plants	20-	100-
7		6 zen planting mix	7-	42-
8	Area F	30 1-gal plants	7-	210-
9		4 5-gal plants	20-	80-
10		5 zen planting mix	7-	35-
11				2436-
12		Labor- All plantings + preparations		1100-
13		Sprinkler System- (Primary lines, valves and risers pre-installed by Water District) Labor and materials for water delivery to all plants (includes battery operated controller, 4 station)		
14				
15				1500-
16				
17				
18				
RECEIVED BY			Total	5036.00

adams RDC5805

KEEP THIS SLIP FOR REFERENCE

Page 1 of 2

07-11



PRESENT PERFECT NURSERY

140 S. KINNELOA AVE

PASADENA, CA 91107

(626) 449-6211

690566

CUSTOMER'S ORDER NO.	DEPARTMENT 626-797-6295	DATE 5/16/14				
NAME Kinneloa Irrigation District						
ADDRESS						
CITY, STATE, ZIP						
SOLD BY	CASH	C.O.D.	CHARGE	ON ACCT	MO'SL. RETD.	PAID OUT
QUANTITY	DESCRIPTION	PRICE	AMOUNT			
1	Note: Placement of boulders, building of stone wall and spreading of gravel area to be done by Contractor.					
2						
3						
4						
5						
6						
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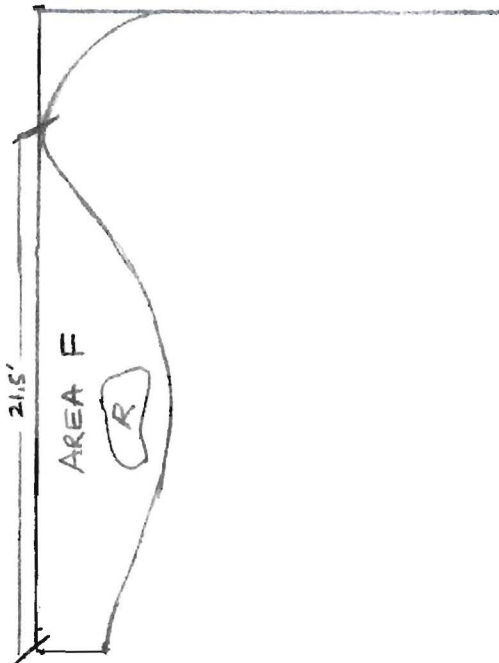
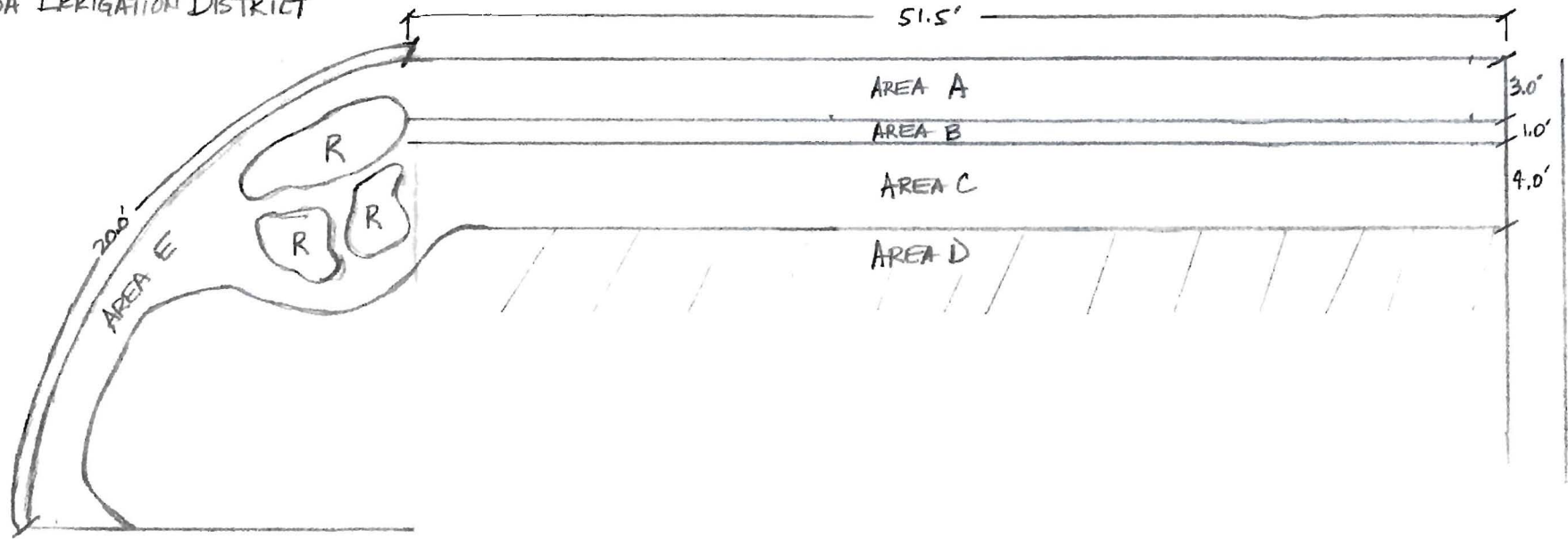
adams RDC5805

KEEP THIS SLIP FOR REFERENCE

Page 2 of 2



KINNELOA IRRIGATION DISTRICT



- R = ROCK (USING EXISTING ROCKS)
- AREA A GRAVELED AREA ADJACENT TO STREET CURVE
- AREA B PLANTED AREA - APPROX. 70 PLANTS SPACED APPROX. 9" APART, COMBINATION OF SENECIO, ECHEVERIAS AND DWART GREEN PENNISETUM GRASS.
- AREA C PLANTED AREA - 18 15-GAL XYLISMA CONGESTUM SPACED 3' APART.
- AREA D BUILT UP STONE WALL AT APPROX. 45° ANGLE.
- AREA E PLANTED AREA - APPROX. 40 PLANTS - TO BE DETERMINED.
- AREA F PLANTED AREA - APPROX. 30 PLANTS - TO BE DETERMINED

IRRIGATION - LINES WILL BE INSTALLED IN AREAS B, C, E, F.
 WILL USE BATTERY OPERATED CONTROLLER WITH DRIP OR LOW VOLUME HEADS.

General Manager's Report for the Board of Directors Meeting on May 20, 2014

I. Customer Account Information and Internet Usage

A. Delinquent Accounts –

27 accounts received past-due notice
 26 accounts received late charges in the total amount of \$469.48
 7 accounts received door hanger shut off notice
 0 accounts were shut off for non-payment
 1 account remains shut off for non-payment

B. Aged Receivables –

Month	Current	30 days	60 days	90 days or greater	Total
January 2014	\$21,534.89	\$1,251.61	\$16.32	\$0.00	\$22,802.82
February 2014	\$45,508.72	\$1,631.05	\$216.50	\$16.32	\$47,372.59
March 2014	\$34,460.40	\$3,123.69	\$773.48	\$232.82	\$38,590.39
April 2014	\$21,542.73	\$1,986.53	\$386.45	\$213.03	\$24,128.74
May 2014					
June 2014					
July 2014					
August 2014					
September 2014					
October 2014					
November 2014					
December 2014					

C. Internet Usage –

Month	Visitors	Page Views	Online Payments	Online Amount
January 2014	106	459	32	\$5,380.79
February 2014	117	403	29	\$4,356.27
March 2014	133	346	40	\$6,556.36
April 2014	143	446	26	\$3,963.75
May 2014				
June 2014				
July 2014				
August 2014				
September 2014				
October 2014				
November 2014				
December 2014				
Year to Date	499	1654	127	\$20,257.17

II. General Manager's Projects and Activities

- A. Master Plan** – A revision of the *Master Plan* is being presented at this meeting for discussion and approval by the Board. This revision includes an update to the list of completed projects, future projects and estimated costs as well as minor changes to the narrative and explanatory sections to reflect current information and to correct errors that have been found in the original report and subsequent revisions. The main purpose of this plan is to emphasize projects that will improve our emergency preparedness for natural disasters and unexpected operational problems.
- B. Year-End Review and Audit** – The 2013 audit has been published.
- C. Water Supply Issues and Plan of Action** – I prepared a report for discussion at this meeting.
- D. Activities/Meetings/Conferences**

Subject	Location	Start	End	Purpose
JPIA Property Inspection	KID Office and Field	Tue 4/1/2014 1:00 PM	Tue 4/1/2014 2:30 PM	Onsite inspection of our insured property with our JPIA risk management consultant
SA Associates	KID Office	Wed 4/2/2014 1:30 PM	Wed 4/2/2014 3:00 PM	Discussion of scope and methodology for developing plans and specs for East-West pipeline
Three City MOU	Pasadena Water Dept.	Thu 4/3/2014 2:00 PM	Thu 4/3/2014 4:00 PM	Develop MOU for NPDES/MS4 Permit
FMWD Special Board Meeting	FMWD Board Room (La Canada)	Wed 4/9/2014 4:00 PM	Wed 4/9/2014 4:30 PM	Discussion and action regarding generator replacement project change
RBMB Finance & Administration Committee	RBMB Conference Room-Azusa	Thu 4/10/2014 2:00 PM	Thu 4/10/2014 4:00 PM	Review 2014-2015 Budget and agency assessments
East-West Job Walk with SA Associates	KID Office	Fri 4/11/2014 1:30 PM	Fri 4/11/2014 5:00 PM	To determine and agree on the preferred alignment of the pipeline
ACWA Region 8	KID (Conference Call)	Mon 4/14/2014 10:00 AM	Mon 4/14/2014 11:00 AM	To discuss board agenda and the regional work plan for 2014
FMWD Engineering and Finance Committees	FMWD Board Room (La Canada)	Thu 4/17/2014 4:00 PM	Thu 4/17/2014 5:30 PM	Review of generator project and pipeline inspection project; Review and discussion of preliminary 2014-2015 budget, rates, charges and reserves
KID Board Meeting (Special Date and Time)	KID Office	Tue 4/22/2014 6:30 PM	Tue 4/22/2014 10:30 PM	Executive session for my performance evaluation followed by adjourned regular board meeting followed by work to troubleshoot Server03 problem
FMWD Board Meeting	FMWD Board Room (La Canada)	Mon 4/28/2014 3:00 PM	Mon 4/28/2014 5:00 PM	Adjourned regular monthly board meeting
Meet w/ Gerrie and Frank	KID Office	Mon 4/28/2014 5:00 PM	Mon 4/28/2014 6:30 PM	Discuss Vosburg Reservoir fence/landscaping issue raised by adjacent property owner

III. System and Facility Activities and Incidents

- A. **East-West Connector Pipeline** – Two meetings with SA Associates were held to discuss scope of the design project and to complete a job-walk to identify the suggested alignment of the pipeline.
- B. **Valve and Hydrant Maintenance** – Fourteen fire hydrants that were identified in the recent testing project were repaired by installing new valve stem bushings to facilitate operation to the fully-open position. Additionally, five street valves were located and/or exercised to facilitate normal operation. We will be receiving an extensive electronic database from the contractor in the near future as specified in the contract. This will facilitate the implementation of a regular testing and flushing program as required by the California Department of Public Health.
- C. **Vosburg Booster Replacement Project** – Civiltech Engineering provided 11 of the 17 preliminary design drawings for review.
- D. **Water Service Installation** – Perry Thomas construction along with our staff installed the new water service line and meter for the new home at 2230 Villa Heights Road.

**MINUTES OF THE ADJOURNED MEETING
OF THE BOARD OF DIRECTORS OF THE
KINNELOA IRRIGATION DISTRICT
APRIL 22, 2014**

MEMBERS PRESENT: Chair-President Gerrie Kilburn
Directors-Frank Griffith, Steven Sorell, Tim Eldridge, Gordon Johnson

STAFF PRESENT: Melvin Matthews, General Manager
Chris Burt, Facilities Supervisor
Shirley Burt, Administrative Assistant & Secretary to the Board

CALL TO ORDER:

The meeting was called to order by the Chair, Gerrie Kilburn, at 1845 hours. She declared that there was a quorum present. The Board then adjourned to Executive Session.

The Board reconvened at 2037 hours and the Chair reported that the General Manager's Performance had been reviewed and that no decisions had been made.

The **Chair** then asked for approval of the Agenda and it was unanimously agreed that Information Items #5,#6,and #8 would be deleted from this meeting due to the lateness of the hour and would be placed on the Agenda for the next Board Meeting.

Director Eldridge requested that the item "General Manager's Compensation" be added to the Agenda.

It was M/S-(Eldridge/Sorell)-"**That the General Manager's Compensation be added as item #4 to the Agenda.**"

Directors Kilburn, Eldridge, Griffith, Johnson and Sorell voted Aye. The motion carried.

PUBLIC COMMENT: No persons wished to comment at this time.

REVIEW AND ACCEPTANCE OF THE 2013 YEAR AUDIT:

Gail Egan, Auditor, reviewed the Draft Audit as presented in the Board Packet. She noted that the Financial Statements present fairly the financial position of the District and that there had been no disagreement with management.

It was M/S/-(Sorell/Griffith)-"**That the Draft Audit be accepted as the Approved Audit for the year 2013 with a few minor changes in wording.**"

Directors Kilburn, Eldridge, Griffith, Johnson, and Sorell voted Aye. The motion carried.

REPORT ON PASADENA GLEN FIRE SAFE COUNCIL ACTIVITIES:

Mala Arthur reviewed the activities of the Council up to this point in time and presented a review of the brush clearance that had been done in the Pasadena Glen and Far Mesa Tunnel areas showing pictures of the areas cleared before and after clearance.

The Board thanked her for an excellent report.

SELECTION OF LAFCO REPRESENTATIVE:

Jerry Gladbach and Melvin Matthews were presented as candidates on the ballot.

It was M/S/-(Griffith/Sorell)-"**That the Board vote for Melvin Matthews.**"

Directors Kilburn, Eldridge, Griffith, Johnson and Sorell voted Aye. The motion carried.

**MINUTES OF THE ADJOURNED MEETING
OF THE BOARD OF DIRECTORS OF THE
KINNELOA IRRIGATION DISTRICT
APRIL 22, 2014**

Page 2

GENERAL MANAGER'S COMPENSATION:

It was M/S-(Eldridge/Sorell)-“**That the General Manager not be given an increase in salary or bonus at this time.**”

Directors Kilburn, Eldridge, Griffith, Johnson and Sorell voted Aye. The motion carried.

GENERAL MANAGER'S REPORT:

The **General Manager** reviewed his report in the Board packet and the report was approved for filing as presented.

Director Griffith questioned whether the Lease Agreement had been signed by the property owners to the east of the Brown Well site and the General Manager stated it had not been signed but the final draft as reviewed by our attorney and approved by the board has been presented for signature and there are no outstanding issues with the agreement.

Director Sorell noted that on the copy he had in hand that the statement by the Notary Public does not have the current correct format and that it needed to be updated. The General Manager will provide a revised notary form to the property owners.

REVIEW OF MINUTES:

The minutes of March 18, 2014, were reviewed and approved for filing as presented.

REVIEW OF FINANCIAL REPORTS:

Director Sorell reviewed the Reports for March 31, 2014, and they were accepted for filing as presented.

POSSIBLE ITEMS FOR NEXT AGENDA:

Discussion of a possible cost of living increase

Review of Master Plan

Report Metropolitan Water District

Review Water Supply Alternates

ADJOURNMENT:

The meeting was adjourned at 2137 hours. The next meeting will be on May 20, 2014.

Respectfully submitted,

Shirley Burt
Secretary to the Board



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 TELEPHONE (626) 797-6295 • FAX (626) 794-5552
 WEBSITE: kinneloairrigationdistrict.info

Memo

Date: May 12, 2014
 To: Board of Directors
 From: Mel Matthews
 Subject: Financial Review for April 2014

Total Revenues for the month were \$131,273.03 as compared to the budgeted amount of \$101,166.66. Although there were no wholesale water sales in April, retail water sales were \$129,211.04 which is \$44,211.04 higher than the budgeted amount of \$85,000.00. The total revenues for the four months year to date were \$428,674.16 as compared to the budgeted amount of \$353,666.64 which is a favorable variance of \$75,007.52. **Total Expenses** for the month were \$87,000.28 as compared to the budgeted amount of \$84,459.14. Total expenses for the four months year to date were \$328,260.64 as compared to the budgeted amount of \$363,736.56 which is a favorable variance of \$35,475.92. The General Ledger amounts that were significantly different than the budgeted amounts for the month are as follows:

GL Acct.	Description	Actual	Budgeted	Difference	Comments
4000	Water Sales	129,211.04	85,000.00	44,211.04	Continuation of the drought and warmer weather
4015	Wholesale Water Sales	0.00	15,000.00	-15,000.00	Discretionary sales when water is not needed for retail customers
5030	Maintenance Contractors	24,347.10	10,416.67	13,930.43	Budgeted evenly over year - not a predicable expense - valve maint.

Net Income was \$44,272.75 as compared to a budgeted gain of \$16,707.52. There were \$1,918.19 in **Other Expenditures** for approved projects. The total budgeted amount for 2014 projects is \$129,300.00. The actual projects performed and the scheduling of the projects continues to be contingent on the actual net income and the desired increase in the net surplus for future major projects.

Total cash in our checking and reserve accounts excluding Pasadena Glen Fire Safe Council funds is \$1,234,964.97 as of April 30, 2014. The net increase in cash for the month was \$78,850.55 and year to date increase is \$102,548.99.

Kinneloa Irrigation District
Income Statement for the Four Months Ending April 30, 2014

	Current Month Actual	Current Month Budget	Year to Date Actual	Year to Date Budget
Revenues				
4000 Water Sales	129,211.04	85,000.00	421,856.71	304,000.00
4015 Wholesale Water Sales	0.00	15,000.00	0.00	45,000.00
4020 Service/Installation Charges	1,175.89	833.33	3,682.20	3,333.32
4025 Asset Sale/Miscellaneous	0.00	0.00	350.00	0.00
4035 Interest-Reserve Fund	587.53	333.33	1,849.05	1,333.32
4070 Misc. Income	298.57	0.00	936.20	0.00
Total Revenues	131,273.03	101,166.66	428,674.16	353,666.64
Expenses				
5005 Electricity	8,843.33	8,500.00	33,885.22	33,000.00
5010 Maintenance Supplies	2,294.73	2,000.00	7,278.21	9,000.00
5011 Material and Labor for Install	0.00	833.33	1,518.59	3,333.32
5012 Safety Equipment	0.00	133.33	74.67	533.32
5015 Operations & Maintenance Labor	12,719.75	12,916.67	48,768.37	51,666.68
5016 Operations & Maintenance OT	846.15	1,166.67	5,518.53	4,666.68
5020 Stand-by Compensation	510.00	625.00	2,370.00	2,500.00
5022 Training/Certification	0.00	133.33	0.00	533.32
5025 Water Treatment/Analysis	598.03	1,833.33	6,197.83	7,333.32
5030 Maintenance Contractors	24,347.10	10,416.67	56,662.76	41,666.68
5034 Equipment Maintenance	0.00	833.33	5,157.42	3,333.32
5035 Vehicle Maintenance	558.34	500.00	662.42	2,000.00
5036 Fuel - All Equipment	1,119.28	1,000.00	6,474.73	7,000.00
5045 Insurance-Workers Compensation	0.00	0.00	1,495.84	3,000.00
5046 Insurance-Liability	1,233.75	1,833.33	(615.89)	7,333.32
5048 Insurance-Property	180.83	208.33	345.08	833.32
5049 Insurance-Medical	6,049.54	5,951.25	24,198.16	23,805.00
6000 Engineering Services	600.00	3,750.00	7,678.45	15,000.00
6005 Watermaster Services	879.33	1,000.00	3,517.32	4,000.00
6015 Administrative Salary	10,316.64	10,833.33	41,266.56	43,333.32
6017 Administrative Travel	98.57	250.00	570.59	1,000.00
6020 BofD Compensation	300.00	400.00	1,200.00	2,000.00
6021 Administrative & Board Expense	0.00	104.17	0.00	416.68
6022 BofD-Election	0.00	0.00	11,790.38	12,500.00
6024 Customer/Public Info. Prog.	0.00	125.00	0.00	500.00
6025 PERS - KID	1,560.72	1,833.33	6,164.62	7,333.32
6030 Social Security - KID	2,396.15	2,583.33	9,565.52	10,333.32
6035 Office/Computer Supplies	241.54	583.33	822.84	2,333.32
6036 Postage/Delivery	252.55	416.67	1,461.97	1,666.68
6040 Professional Dues	748.48	625.00	2,993.92	2,500.00
6045 Legal Services	584.85	1,250.00	2,489.35	5,000.00
6050 Telephone	343.00	333.33	1,363.94	1,333.32
6051 Mobile Telephone	76.52	125.00	316.75	500.00
6052 Pagers	19.16	20.00	76.64	80.00
6053 Internet Service	55.00	83.33	220.00	333.32
6059 Computer/Software Maintenance	566.84	750.00	1,396.79	3,000.00
6061 Office Equipment Maintenance	0.00	83.33	276.49	333.32
6065 Accounting Services	0.00	0.00	0.00	7,000.00
6070 Office & Accounting Labor	6,629.71	6,946.25	25,916.11	27,785.00
6075 Outside Services	691.36	1,666.67	3,661.20	6,666.68
6080 Administrative Fees	600.84	604.17	2,381.96	2,416.68
6081 Permits/Fees	290.00	833.33	1,365.00	3,333.32
6120 Bank Service Charges	448.19	375.00	1,772.30	1,500.00
Total Expenses	87,000.28	84,459.14	328,260.64	363,736.56
Net Income	44,272.75	16,707.52	100,413.52	(10,069.92)

Kinneloa Irrigation District
Income Statement for the Four Months Ending April 30, 2014

	Current Month Actual	Current Month Budget	Year to Date Actual	Year to Date Budget
Other Expenditures				
1504 Water Mains	0.00	0.00	0.00	25,000.00
1509 Wilcox Well/Wilcox Booster	0.00	0.00	0.00	10,300.00
1511 Water Treatment Plant	0.00	0.00	0.00	6,000.00
1512 Water Meters	0.00	416.67	0.00	1,666.68
1513 Electrical/Electronic Equip.	0.00	2,083.33	1,525.91	8,333.32
1514 Computer/Office Equipment	1,138.19	416.67	1,138.19	1,666.68
1516 Water Company Facilities	0.00	1,000.00	5,672.00	4,000.00
1526 Vosburg Booster	780.00	0.00	8,920.00	25,000.00
1527 SCADA Equipment	0.00	1,083.33	7,687.07	4,333.32
1530 Tools	0.00	250.00	1,702.04	1,000.00
Total Other Expenditures	1,918.19	5,250.00	26,645.21	87,300.00
Total Increase or (Drawdown)	42,354.56	11,457.52	73,768.31	(97,369.92)

Kinneloa Irrigation District
Balance Sheet
April 30, 2014

ASSETS

Current Assets

1010	Checking-Wells Fargo Bank	\$ 150,734.25
1011	Checking-PGFSC	45,445.30
1012	Reserve Fund-LAIF	118,400.87
1014	Reserve Fund-CalTRUST	965,829.85
1015	Accr. Int./Price Adj.-CalTRUST	888.16
1016	Accrued Interest-LAIF	40.15
1100	Accts. Receivable-Water Sales	24,128.74
1101	Accts. Receiv.-Service Charges	45.47
1190	Allowance for Bad Debts	(771.48)
1200	Inventory	20,000.00
1340	Accrued Water Sales	129,236.40
1350	Prepaid Insurance	6,544.41
1360	Prepaid Expenses	17,406.98

	Total Current Assets	1,477,929.10
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Property and Equipment

1501	Water Rights	52,060.41
1503	Land Sites	96,700.08
1504	Water Mains	2,423,817.02
1505	Water Tunnels	705,985.75
1506	K-3 Well	82,848.37
1507	Improvement District #1	602,778.12
1508	Mountain Property	6,620.00
1509	Wilcox Well/Wilcox Booster	94,030.98
1510	Interconnections	14,203.27
1511	Water Treatment Plant	184,940.70
1512	Water Meters	78,368.69
1513	Electrical/Electronic Equip.	247,430.46
1514	Computer/Office Equipment	61,210.72
1515	Vehicles & Portable Equipment	222,084.16
1516	Water Company Facilities	65,751.20
1517	KID Office	54,202.92
1518	Shaw Ranch	280,789.92
1519	Dove Creek Project	487,383.87
1520	Glen Reservoir/Booster	24,190.86
1521	Kinneloa Ridge Project	690,492.58
1522	Eucalyptus Booster Station	532,342.43
1526	Vosburg Booster	38,314.00
1527	SCADA Equipment	234,271.98
1528	Tanks and Reservoirs	97,944.39
1529	Holly Tanks	181,113.76
1530	Tools	6,811.57
1600	Accum. Depreciation	(3,447,963.12)

	Total Property and Equipment	4,118,725.09
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	Total Assets	\$ 5,596,654.19
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Kinneloa Irrigation District
Balance Sheet
April 30, 2014

LIABILITIES AND CAPITAL

Current Liabilities

2000	Accounts Payable	\$	34,650.36	
2011	Accounts Payable PGFSC		309.06	
2272	Job Deposits		9,631.18	
2274	PGFSC Grant		44,998.24	
2290	Accrued Vacation		17,933.70	
	Total Current Liabilities			107,522.54

Long-Term Liabilities

	Total Long-Term Liabilities			0.00
	Total Liabilities			107,522.54

Capital

3040	Fund Balance		5,387,565.82	
3900	Prior Year Adjustments		5,765.00	
	Net Income		95,800.83	
	Total Capital			5,489,131.65
	Total Liabilities & Capital	\$		5,596,654.19

Kinneloa Irrigation District
Statement of Cash Flow
For the Four Months Ended April 30, 2014

	Current Month	Year to Date
Cash Flows from Operating Activities		
Net Income	\$ 44,272.75	\$ 100,413.52
<i>Adjustments to reconcile net income to net cash provided by operating activities</i>		
1100 Accts. Receivable-Water Sales	14,461.65	24,435.90
1101 Accts. Receiv.-Service Charges	(45.47)	223.30
1350 Prepaid Insurance	1,414.58	3,485.83
1360 Prepaid Expenses	(8,622.53)	(2,569.12)
2000 Accounts Payable	492.22	(51,008.77)
2011 Accounts Payable PGFSC	156.83	(111.94)
2260 Med./Dental-Withhold-Employee	0.00	78.57
2272 Job Deposits	(900.00)	9,631.18
2274 PGFSC Grant	29,538.71	44,615.73
	36,495.99	28,780.68
Net Cash Provided by Operations	80,768.74	129,194.20
 Cash Flows from Investing Activities		
<i>Used for</i>		
1513 Electrical/Electronic Equip.	0.00	(1,525.91)
1514 Computer/Office Equipment	(1,138.19)	(1,138.19)
1516 Water Company Facilities	0.00	(5,672.00)
1526 Vosburg Booster	(780.00)	(8,920.00)
1527 SCADA Equipment	0.00	(7,687.07)
1530 Tools	0.00	(1,702.04)
	(1,918.19)	(26,645.21)
Net Cash Used in Investing	(1,918.19)	(26,645.21)
 Cash Flows from Financing Activities		
<i>Proceeds from</i>		
<i>Used for</i>		
Net Cash Used in Financing	0.00	0.00
Net Increase (Decrease) in Cash	\$ 78,850.55	\$ 102,548.99
 Summary		
Cash Balance at End of Period	\$ 1,410,574.98	\$ 1,410,574.98
Cash Balance at Beg. of Period	(1,331,724.43)	(1,308,025.99)
Net Increase (Decrease) in Cash	\$ 78,850.55	\$ 102,548.99

Kinneloa Irrigation District
Check Register
For the Period from April 1, 2014 to April 30, 2014

Date	Check #	Payee	Amount	Description
4/1/14	7562	ACWA/JPIA	2,170.00	property insurance 4/1/2014-4/1/2015
4/1/14	7563	American Messaging Services	19.16	paggers
4/1/14	7564	Byrd Industrial Electronics	4,779.23	K-3 SCADA upgrade; master telemetry rep./maint.
4/1/14	7565	Calif. Utility Emergency Assoc.	500.00	CUEA annual membership dues 7/1/14-6/30/15
4/1/14	7566	Eurofins Eaton Analytical, Inc.	118.80	water sample analysis
4/1/14	7567	Fyre Guard Company	754.67	fire extinguisher, extinguisher inspections/tests
4/1/14	7568	McMaster Carr	833.14	maintenance and cl2 supplies, tools
4/1/14	7569	R.E. Miller Tree Service	1,650.00	trimming/hauling wood and brush at West Tank
4/1/14	7570	Specialty Services	275.00	janitorial service
4/1/14	7571	Western Water Works	1,754.69	stock parts, parts for 1-1/2" service at Mesaloe Ln.
4/15/14	EFT2072	Bernadette C. Allen	874.13	salary
4/15/14	EFT2073	Christopher A. Burt	2,344.24	salary
4/15/14	EFT2074	Shirley L. Burt	1,443.00	salary
4/15/14	EFT2075	Melvin L. Matthews	3,236.96	salary
4/15/14	65665173	Brian L. Fry	1,425.88	salary
4/15/14	65665174	Felix Galindo	418.39	salary
4/15/14	65665175	Chris J. Mellinger	429.72	salary
4/15/14	EFT2076	Christopher A. Burt	150.00	salary
4/15/14	EFT2077	Automatic Data Processing, Inc.	65.89	payroll processing
4/15/14	EFT2078	Automatic Data Processing, Inc.	4,870.52	withholding and taxes
4/22/14	EFT2079	Century Business Solutions	15.00	monthly banking service fee
4/22/14	EFT2080	Arco Gaspro Plus	1,119.28	truck gas
4/22/14	EFT2081	Athens Services	126.70	trash pick up
4/22/14	EFT2082	Bank of America Business Card	1,337.56	see attached schedule - February
4/22/14	EFT2083	Calif. Public Emp. Ret. Sys.	3,053.85	calPERS - March KID/employee
4/22/14	EFT2084	Century Business Solutions	147.95	banking service fee
4/22/14	EFT2085	Southern California Edison Co.	6,608.50	electricity
4/22/14	EFT2086	Verizon Wireless	86.39	mobile phone
4/22/14	7572	ACWA/JPIA	2,700.00	1st quarter 2014 workers' compensation
4/22/14	7573	A&B Electric	1,525.91	install timer on chlorinator at Vosburg and K-3
4/22/14	7574	ACWA/JPIA	7,136.32	May health insurance - KID/employee
4/22/14	7575	AmeriPride Services	56.80	shop towel service
4/22/14	7576	Berg Hardware	38.99	Brown Res. pipeline valve maint. supplies
4/22/14	7577	Consolidated Electrical Distr.	175.35	120v relay; s-40 conduit for brown well driveway
4/22/14	7578	Civiltec Engineering, Inc.	1,380.00	Vosburg pump station repl.; fire flow Villa Heights
4/22/14	7579	Clinical Laboratory, SB	24.00	water sample analysis
4/22/14	7580	Eurofins Eaton Analytical, Inc.	295.20	water sample analysis
4/22/14	7581	Foothill Municipal Water District	600.84	administrative fee
4/22/14	7582	Generator Services Co.	5,157.42	2014 annual generator maintenance at 4 sites
4/22/14	7583	Lagerlof, Senecal, Gosney & Kruse	584.85	public water agencies group 1/17th share tools; flo-loc, warehouse, cl2 and Vosburg booster
4/22/14	7584	McMaster Carr	1,705.53	maint. sup.; stock

Kinneloa Irrigation District
Check Register
For the Period from April 1, 2014 to April 30, 2014

Date	Check #	Payee	Amount	Description
4/22/14	7585	Monrovia Mailing Company	395.94	March statement mail handling and postage
4/22/14	7586	Pump Check	1,505.00	pump efficiency tests (5), water meter tests (2)
4/22/14	7587	Raymond Basin Mgmt.. Board	173.23	title 22 monitoring lab, sampling, admin. fees
4/22/14	7588	Utility Service Co., Inc.	3,859.70	tank maintenance agreement
4/22/14	7589	Perry Thomas Construction Co.	11,168.98	fire hydrant/valve maintenance, cl2 warehouse
4/30/14	EFT2087	Charter Communications	320.00	internet and telephone
4/30/14	EFT2088	Bernadette C. Allen	874.13	salary
4/30/14	EFT2089	Christopher A. Burt	2,239.70	salary
4/30/14	EFT2090	Shirley L. Burt	1,443.02	salary
4/30/14	EFT2091	Francis J. Griffith	92.35	salary
4/30/14	EFT2092	Gerrie G. Kilburn	92.35	salary
4/30/14	EFT2093	Melvin L. Matthews	3,236.96	salary
4/30/14	EFT2094	Steven G. Sorell	57.35	salary
4/30/14	65670228	Brian L. Fry	1,596.88	salary
4/30/14	65670229	Felix Galindo	411.95	salary
4/30/14	65670230	Chris J. Mellinger	552.50	salary
4/30/14	EFT2095	Christopher A. Burt	150.00	salary
4/30/14	EFT2096	Automatic Data Processing, Inc.	70.57	payroll processing
4/30/14	EFT2097	Automatic Data Processing, Inc.	<u>5,118.98</u>	withholding and taxes
Total			<u>95,349.45</u>	

Credit Card Detail
February 2014

(Expenses incurred in February, billed in March, due in March, paid in March, and payment processed in April.)

Acct. No.	Account Description	Additional Description	Shirley	Mel	Brian	Chris B	Chris M	TOTAL
5010	Maintenance Supplies	Ni 125; street valve lid maintenance supplies			\$27.73	\$97.34		\$125.07
5012	Safety Equipment							\$0.00
5022	Training/Certification							\$0.00
5025	Water Treatment/Analysis	40 lbs. solar salt/delivery; Cl			\$706.64	\$27.23		\$733.87
5035	Vehicle Maintenance							\$0.00
5036	Fuel							\$0.00
6017	Adm. Travel							\$0.00
6021	Adm. & Bd. Exp							\$0.00
6035	Office/Computer Supplies	office supplies				\$114.14		\$114.14
6036	Postage/Delivery							\$0.00
6040	Professional Dues							\$0.00
6050	Telephone	answering service January		\$78.00				\$78.00
6051	Mobile Phone							\$0.00
6053	Internet Service							\$0.00
6059	Computer/Software Maintenance	Microsoft monthly subscription		\$9.99				\$9.99
6061	Office Equipment Maintenance	Dell 22 touch monitor		\$276.49				\$276.49
6075	Outside Services							\$0.00
6081	Permits/Fees							\$0.00
TOTAL			\$0.00	\$364.48	\$734.37	\$238.71	\$0.00	\$1,337.56

Kinneloa Irrigation District - PGFSC Grant Account

Check Register

For the Period from April 1, 2013 to April 30, 2013

Date	Check #	Payee	Amount	Description
4/22/14	001024	United Site Services of CA, Inc.	304.46	portable toilet rental costs
4/22/14	001025	VOID		ck #001024 descriptions overprinted ck #001025
	Total		<u>304.46</u>	